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INDIVIDUAL FACTORS RELATED TO UTILITARIAN URBAN CYCLING: REPRESENTATIONS, MOTIVATIONS AND PERCEIVED AGGRESSION

FACTEURS INDIVIDUELS LIES A L'USAGE DU VELO UTILITAIRE EN VILLE : REPRESENTATIONS, MOTIVATIONS ET AGRESSION PERÇUE

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LONG ABSTRACT

Utilitarian urban cycling could be a solution to the current mobility problems of industrialized societies (e.g. pollution, congestion). Nevertheless, the bicycle as a mode of transport has a low modal share (3%, ENTD, 2008) in France. Efforts by transport planners, stakeholders, and public authorities to increase the cycling modal share has been focusing principally on external factors and cycling infrastructure. However, some studies showed that cycling infrastructure could improve cyclists' safety but it does not necessarily lead to more utilitarian urban cyclists. Finding other determinants, such as individual factors, that could help to increase this cycling modal share, is crucial; however literature on individual factors is still scarce. To contribute to this societal issue, the general goal of this thesis was to identify individual factors, in terms of representation (Jovchelovitch, 2007), motivation (Ryan & Deci, 2000b), and perception of others' behaviors (i.e. aggression, Baron & Richardson, 1994), that could help to better understand utilitarian urban cycling as a more integrative approach, and that could be used in the promotion of this mode of transport. In order to reach this general goal, three studies were carried out.

The aim of the first study was to identify the main positive and negative representational and motivational arguments related to utilitarian urban cycling and to examine whether there were similarities and differences in the arguments between cyclists and non-cyclists. This exploratory study consisted of face-to-face semi-structured in-depth interviews (around 1h) with cyclists and non-cyclists (N=20; 55% female) in Paris area. Through interview-content analyses, 48 positive arguments and 49 negative arguments associated with utilitarian cycling were identified and analyzed. Among the positive arguments, physical activity was the advantage cited most often by both cyclists and non-cyclists, while the feeling of freedom was the motivation cited the most by cyclists. Among the negative arguments, danger, rain, and distance were the most common disadvantages cited by cyclists and non-cyclists, with distance as the most frequently cited barrier to cycling. Cyclists cited more disadvantages than non-cyclists, while non-cyclists cited more intrinsic disadvantages and barriers to cycling (such as fear of cycling).

A second study was carried out with the first aim of determining the weight of the identified arguments, with a larger sample of cyclists and non-cyclists through an online survey (N=409; 51% female) in the eleven largest French cities. The second aim was to compare the results with the first study in terms of the main representations and motivations. The third aim was to differentiate representations (advantages and disadvantages) from motivations (levers and barriers). According to the cycling frequency and the distribution of the sample, three groups of users were distinguished with the hypothesis that they differed in terms of representations and motivations related to utilitarian urban cycling: frequent cyclists (n=163), occasional cyclists (n=98), and non-cyclists (n=148). For the three groups, the most important advantage associated with utilitarian cycling was physical activity, as in the first study. It was also the most important lever to cycling for frequent cyclists and occasional cyclists, which differs from the first study. The most important lever that could lead non-cyclists to use the bicycle was good weather. For the three groups, bad weather was the most important disadvantage and barrier, which differs from the first study. The subsequent negative arguments for cyclists were lack of attention of other road users, vulnerability in traffic, and aggression by other users. A principal component analysis revealed a distinction, for advantages, between utilitarian aspects, independence, and enjoyment; and for disadvantages, between perceived danger, weather issues, effort, sweating issues, and lack of parking places. For each group, and for all arguments (positive and negative), representational scores were higher than motivational scores. There was a high positive correlation between advantages and levers, and between disadvantages and barriers, suggesting that the distinction between representation and motivations was more quantitative than qualitative. Also, for positive arguments, the cyclists' means were higher than the non-cyclists' means, and the occasional cyclists' means were in an intermediate position between the two. For negative arguments, on the opposite, the non-cyclists' means were higher than the frequent cyclists' means, and again the occasional cyclists' means were in an intermediate position. Thus, the more a person uses a bicycle as a mode of transport, the more he or she will give importance to advantages and levers and the less to disadvantages and barriers.

The main aim of the third study was to better understand the interactions between cyclists and car drivers in urban situations, focusing on one of the negative arguments, the aggressive behavior from car drivers. Using specific interaction situations between cyclists and car drivers based on three pilot studies, we carried out an online survey (N=174; 70% female) where we compared cyclists' perceived aggression from car drivers, in two cities with different cycling modal share: Paris (3%) and Berlin (13%). We measured perceived aggression, emotional and behavioral reactions, cyclists' evaluation of car drivers' knowledge about adapted behaviors when interacting with cyclists, cyclists' evaluation of whether car drivers see them as legitimate on the road, social identity as a cyclist, and trait aggressiveness. There was no significant difference in terms of perceived aggression between Paris and Berlin students. Cyclist students from Paris had a higher cyclist identity and perceived that car drivers granted more legitimacy to cyclists than cyclist students from Berlin. Moreover, perceived aggression was predicted principally by perceived intention, and also by perceived danger, perceived drivers' knowledge about adapted behaviors when interacting with cyclists, perceived legitimacy given by car drivers to cyclists on the road, aggressiveness trait, and "cyclist" social identity.

In total, these three studies underline the importance of taking into account individual factors, positive and negative representations and motivations, and the perception of others' behaviors, in particular, perceived aggression. This helps to better understand de diverse types of users, cyclists as current users, and the occasional users and the non-cyclists as potential users; it also helps to identify the factors that could be used to design cycling promotion campaigns tailoring different user types in order to increase the cycling modal share in France, in general, and to reduce the conflict between cyclists and car drivers, in particular. The theoretical, methodological and applied implications of these results are discussed, as well as the limits of the studies and the perspectives for future research.

Keywords: utilitarian urban cycling, cyclists, non-cyclists, representation, motivation, perceived aggression, psychology, urban mobility.

INDIVIDUAL FACTORS RELATED TO UTILITARIAN URBAN CYCLING: REPRESENTATIONS, MOTIVATIONS AND PERCEIVED AGGRESSION

SHORT ABSTRACT

Utilitarian urban cycling, one of the possible solutions to mobility problems (e.g. pollution, congestion), has a low modal share of 3% in France, despite numerous efforts to increase it. The general goal of this Ph.D. thesis was to identify individual factors, such as representation, motivation, and perceived aggression from car drivers' behaviors, that could help to better understand utilitarian urban cycling and could be used in its promotion. To reach this goal, three studies were carried out. The first study served to identify the main representations and motivations related to utilitarian urban cycling and to examine whether there were similarities and differences between cyclists and non-cyclists, through 20 semi-structured interviews in Paris area. The second study aimed to identify the weight of the previously identified arguments and to differentiate representations from motivations among cyclists and non-cyclists through an online survey (N=409) in the main French cities. These two studies revealed that advantages, levers, disadvantages and barriers related to utilitarian urban cycling are comparable between cyclists and non-cyclists; quantitative differences were found between representations and motivations. The third study was designed to understand whether cyclists perceive aggression from car drivers on road conditions, through an online survey (N=174) in 2 cities with different cycling modal share: Paris (3%) and Berlin (13%). The predictors of perceived aggression were intention, danger, knowledge, legitimacy, cycling identity and trait aggressiveness. The theoretical, methodological and applied implications of the results are discussed.

Keywords: utilitarian urban cycling, cyclists, non-cyclists, representation, motivation, perceived aggression, psychology, urban mobility.

FACTEURS INDIVIDUELS LIES A L'USAGE DU VELO UTILITAIRE EN VILLE : REPRESENTATIONS, MOTIVATIONS ET AGRESSION PERÇUE

RESUME

Le vélo urbain utilitaire, une des solutions aux problèmes de mobilité (ex, pollution) a une part modale faible (3 %) en France malgré des efforts pour l'augmenter. L'objectif général de ce doctorat a été d'identifier des facteurs individuels — représentation, motivation et perception des comportements des automobilistes comme agressifs — afin d'aider à mieux comprendre le vélo urbain utilitaire et à favoriser sa promotion. Trois études ont été réalisées. La première, sur la base de 20 entretiens semi-structurés en Île-de-France, a identifié les principales représentations et motivations liées au vélo urbain utilitaire et a examiné les similitudes et différences entre cyclistes et non-cyclistes. La deuxième a vérifié si les arguments étaient similaires sur un échantillon plus grand (*N*=409) par une enquête en ligne dans les principales villes de France, et a mesuré le poids accordé à ces arguments. Ces deux études ont révélé que les avantages, leviers, inconvénients et barrières liés au vélo urbain utilitaire sont comparables entre cyclistes et non-cyclistes ; des différences quantitatives ont cependant été trouvées entre représentations et motivations. La troisième a cherché à comprendre si les cyclistes perçoivent les comportements des automobilistes comme agressifs, un des inconvénients perçus à l'usage du vélo, à travers une enquête en ligne (*N*=174) dans 2 villes avec des parts modales vélo contrastées : Paris (3 %) et Berlin (13 %). Les prédicteurs de la perception d'agression sont l'intention, le danger, la connaissance, la légitimité, l'identité cycliste et l'agressivité trait. Les implications théoriques, méthodologiques et appliquées des résultats sont discutées.

Mots-clés : vélo urbain utilitaire, cyclistes, non-cyclistes, représentation, motivation, agressivité perçue, psychologie, mobilité urbaine.

To my mother…

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INTRODUCTION

Because mobility is not a matter
of transportation
but a societal issue.

City on the Move Institute, IVM

Mobility is an important societal need, giving access to education, work, and health (Hickman, Hall, & Banister, 2013). This mobility, understood as people's travel from place A to place B, when it is used for a specific purpose (e.g. go to work, to study, to do grocery shopping); is known as "utilitarian purpose mobility", or the use of a mode of transport for a utilitarian purpose. As mentioned by the European Metropolitan Network Institute, urban mobility means "freedom and choice for the individual citizens and social and economic development for the cities as a whole" (2016, p. 1). Moreover, urban mobility could be a prerequisite of social inclusion for some people (Kaufmann, 2007; Preston & Rajé, 2007; Ureta, 2008), as leaving one's immediate surroundings provides access to a world of opportunities. Therefore, the value of urban mobility goes beyond the mere geographic travel of people since it provides people with a broader mindset, through the various interactions between spaces, contexts and people (Basole, 2004; Kakihara & Sorensen, 2001). However, the current context of urban mobility presents several drawbacks. In particular, the current use and distribution of the principal modes of transport (cars, public transport) entails a number of important problems in terms of pollution, traffic congestion, gas costs, and public transport saturation, affecting inhabitants' quality of life (Patricia Delhomme, Cristea, & Paran, 2013; Mohan & Tiwari, 1999). Among other things, this is due to the density and concentration of the population in urban areas. According to the United Nations Human Settlement Program (UN-HABITAT, 2011), while urban areas only cover 2% of the global land-living area, these urban areas are responsible for more than 70% of the global greenhouse-gas emissions. Likewise, more than 50% of the world's population now lives in urban areas and this percentage is expected to increase (Bellucci, Bogner, & Sturchio, 2012).

Among these urban mobility problems, the pollution caused by motorized transportation vehicles is a major concern and led the European Commission (2011) to target a 60%

reduction in transport-related CO2 emissions by 2050. France, for its part, has set the goal of reducing greenhouse gas (GHG) emissions to 25% of the 1990 levels by 2050 (Kyoto Protocol; United Nations, 1998; LAURE — *Loi sur l'air et l'utilisation rationnelle de l'énergie*, 1996). The individual car, which is the dominant mode of transport in the majority of western countries, is one of the main factors of air pollution (Chapman, 2007; Metz, 2012; Stradling, 2003). Besides the consequences of pollutant emissions to public health, other externalities of cars have a significant negative impact, in particular concerning social costs, such as road traffic accidents, traffic congestion, urban sprawl, public space over-occupation, noise, stress (European Metropolitan network Institute, 2011; Hickman & Banister, 2014; Rocha, Cunha, Varandas, & Dias, 2007), thus affecting general livability (Fishman, 2016).

From an economical point of view, the private car and its use are one of the most expensive alternatives of transport for citizens; household expenses for private cars include the cost of the vehicle, fuel, engine oil, wear and tear of the vehicle, maintenance, repairs, insurance, and owner taxes, not to mention the car depreciation. Likewise, it is costly for municipalities and governments, which must include in their budgets the construction, maintenance, and management of infrastructure and road networks for cars and other motorized vehicles (Gössling & Choi, 2015; Luk, Hepburn, & Thoresen, 1995). Apart from the economic costs, the use of the private car is detrimental to public and individual health, due not only to the effects of pollution but also to an increasingly sedentary way of life (Cutler, Glaeser, & Shapiro, 2003; Owen, Sparling, Healy, Dunstan, & Matthews, 2010). These negative consequences of the use of private vehicles seem more troubling if we take into account that, according to Stradling (2003), up to 80% of the journeys could be carried out using another mode of transport. However, due to, among other reasons, the position of car as a symbol of personal freedom and high social status (Boquet, 2009), people are, in general, dependent on car use (Stradling, 2003).

Regarding other modes of transports and their impact on urban mobility, public transports do not generate the problems caused by private car to the same extent. Nevertheless, according to Boquet (2009), public transports are not always available and saturation during peak hours is a common occurrence. Besides, public transports represent a constraint to passengers because of the fixed routes and schedules, which leads to an incomplete mobility experience for passengers. Passengers also perceive public transports negatively because they feel a loss of their personal space. In addition, public transports can be, in certain cases (such as buses without dedicated lanes), inefficient time-wise as they can be subject to traffic congestion, just like private vehicles. Moreover, the development of public transports implies important investments and/or infrastructure construction, making its implementation slow and expensive for municipalities and governments.

On the other hand, walking is the greenest mode of transport, has no negative externalities, is healthy, provides complete journey autonomy and isn't expensive. However, walking is limited in terms of distance and speed (Metz, 2012). Therefore, walking requires more time to travel than other modes of transport, becoming a problem in time-oriented western societies. In terms of urban mobility, it is suitable only for covering very short distances.

Thus, the use of private car appears as a non-optimal alternative for the issue of urban mobility. As for public transport and walking, albeit being better solutions than the private car in terms of costs and pollution, they cannot fulfill the current demand for urban mobility. Given this context, a possible solution to the urban mobility problems, in particular the problem of air pollution, is to promote more environment-friendly modes of transportation such as cycling, and to explore the potential of a modal shift from individual cars to bicycles. According to the report of the International Transport Forum (ITF), when it is used for a utilitarian purpose (that is to say not for sport or recreational purposes), cycling is an important contribution to solving the mobility problems because it is one of the most sustainable forms of transport, as it requires no fossil energy, does not pollute, improves cyclists' health by promoting physical activity, causes less noise disturbance, and has less impact on traffic congestion since it takes up less public space that any motorized mode of transport (ITF, 2013). Cycling is in general achievable by almost everyone (except people with health conditions or disabilities). Additionally, it is a relatively fast mode of transport over short distances (Gatersleben & Appleton, 2007), and, due to its low costs, cycling could also help to reduce household expenses. Furthermore, cycling provides independence from public transports schedules and routes.

To sum up, utilitarian urban cycling contributes to enhance the quality of urban life (Van Acker, van Wee, & Witlox, 2010), and it even increases the happiness feeling (St-Louis, Manaugh, van Lierop, & El-Geneidy, 2014). Walking and cycling are associated with nature, fitness, and mental health (G. O. Thomas, Walker, & Musselwhite, 2014) but, compared to walking, cycling allows to go farther and faster (Metz, 2012).

On account of this positive outcome of cycling as a mode of transport, in the last 15 years, most European countries have tried to improve cycling rates (Héran, 2014; Pucher & Dijkstra, 2003), leading to renewed interest from users and reflections from public authorities and stakeholders about the status of bicycles in urban settings. Several actions have been implemented to promote urban cycling, such as cycling infrastructure, signalization, and legislation. These actions have been characterized mainly as "externalist" measures, designed by engineers or urban planners from a technical perspective, such as the construction of cycle paths. However, cycling rates did not evolve proportionally to these efforts (Gatersleben & Murtagh, 2012), and cycling is still not a major transport mode in most European countries (Metz, 2012; Pucher & Buehler, 2008).

Similarly, in France, the actions undertaken by public authorities and stakeholders to promote utilitarian urban cycling have been mainly focused on infrastructure and cycling facilities (e.g. cycling paths, bicycle-sharing system). These efforts could be expected to have produced notable positive impacts in France as this country has numerous characteristics that allow efficient utilitarian urban cycling (e.g. in France 50% of car trips are less than 3 km, which can be covered in about 15 minutes by bicycle; ADEME, 2004). However, these actions have not significantly improved the modal share of cycling, which only reaches a rate of 3% in France (Papon & De Solère, 2010).

Taking into account the numerous positive arguments that support cycling as a mode of transport, as well as the high number of people who meet the conditions to cycle (e.g. in terms of traveling distances), and the significant efforts made by public authorities and stakeholders in the last years to promote cycling, the persistence of the low rates of cycling modal share in most European countries, particularly in France, becomes a relevant issue for the whole of society. It could be argued that this mode of transport is proving difficult to boost because the actions used to promote it are insufficient and do not target the main determinants of cycling. Even though the infrastructure issues have been addressed, it is evident that there are other factors that play a substantial role in the increase of cycling rates and that need to be identified.

RESEARCH ABOUT EXTERNAL FACTORS INVOLVED IN CYCLING

Among the factors that influence urban cycling, some of the most frequently cited in the literature relate to the utility dimension: commuting time and commuting distance (Park, Lee, Shin, & Sohn, 2010; Wuerzer & Mason, 2015), environmental dimension such as slopes or hills (Vandenbulcke et al., 2011), weather issues such as rain, snow, temperature and seasonality (Ahmed, Rose, & Jakob, 2013; Bergström & Magnusson, 2003; Flynn, Dana, Sears, & Aultman-Hall, 2012), and road traffic conditions such as traffic density and speed of other vehicles (Souza, Sanches, & Ferreira, 2014). These external factors are also commonly addressed by public authorities and stakeholders through cycling infrastructure (e.g. cycle paths) or cycling facilities (e.g. signalization) (Pucher & Buehler, 2008; Pucher, Dill, & Handy, 2010; Reynolds, Harris, Teschke, Cripton, & Winters, 2009; Tilahun, Levinson, & Krizek, 2007). These solutions are known as "hard measures" and defined as "externalists". However, some studies suggest that while improved cycling infrastructure and facilities can make cycling safer (Krizek & Roland, 2005; McClintock & Cleary, 1996) they are not completely effective as they have not led to an increase in cycling rates (Wardman, Hatfield, & Page, 1997; Welleman, 1997), particularly commuting cycling -to go to work or to study- (Heesch & Sahlqvist, 2013) or among individuals who do not usually use the bicycle (Bergström & Magnusson, 2003; Goodman, Sahlqvist, & Ogilvie, 2013), that is new users.

The relative ineffectiveness of these measures, as illustrated by the low cycling rates, stresses the importance of looking at other types of determinants in road users. Indeed, notwithstanding the influence on cycling of these external factors, the decision to use or not use a bicycle as a mode of transport can also be impacted by subjective/internal determinants that are seldom, or not correctly, taken into account, such as psychological (e.g. fear of cycling, confidence in one's cycling ability and skill, motivations), personal (e.g. poor or good physical condition, environmental principles), and social (e.g. negative stereotypes, positive social approval) factors. This diversity of subjective and internal determinants that could impact the modal choice suggests that it is very important to take into account the individual's point of view when studying utilitarian urban cycling, in particular, the individual factors related to the social and environmental context involved in the use and non-use of bicycles as a mode of transport. Therefore, identifying these psychological factors is imperative for the development of utilitarian urban cycling.

RESEARCH ABOUT CYCLING INDIVIDUAL FACTORS

As we just mentioned, most of the research on cycling is centered on technical or environmental aspects—external factors—and addressed by infrastructure and facilities. However, recently a number of studies have started investigating psychological aspects, such as socio-demographic factors, attitudes related to cycling, the social image of cycling, the typology of cyclists, and various other factors influencing cycling behavior. In order to identify the characteristics most frequently associated with cycling, Gatersleben and Appleton (2007) showed, in the UK, that commuting cyclists value the relative flexibility of a bicycle more than health and environmental benefits. They also found a positive relationship between attitudes toward cycling and the first five stages of change (*precontemplation*, *contemplation*, *prepared for action*, *action*, and *maintenance*) described in the Transtheoretical Model of Change (Prochaska & DiClemente, 1983). As users progress from the *precontemplation* stage to the *action* stage, users' attitudes toward cycling become more positive and their perceptions of personal and external barriers change. Likewise, in Sweden, Forward (2014) showed through a study wherein participants rated 15 behavioral beliefs about cycling, that the characteristics related to "well-being and environmental concerns" are the ones most associated with cycling in the last stage of change (*maintenance*), while those concerning "speed and efficiency", and "discomfort" came in second and third place respectively. However, when participants were in the first stage (*precontemplation*), the results were slightly different: "well-being and environmental concerns" remained as the main aspects related to cycling, but "discomfort" took the second place, leaving "speed and efficiency" in the third place. In line with Gatersleben and Appleton (2007), Forward (2014) also found that the perceived effects of cycling were more positive as the person advanced through Prochaska and DiClemente's stages of change, from non-cyclists to frequent cyclists.

Davies, Halliday, Mayes, and Pocock (1997) noted, through seven depth-interviews and thirteen focus groups (8-12 participants by group), that the image of cycling was mainly negative in the UK, and comprised elements such as "harassed", "rain-soaked", "exhausted individuals", "negotiating hills", and "threatened by the lorries", and for some drivers, cyclists were also seen as "careless or irresponsible" for behaviors such as cycling without lights after dark. More recently, Daley and Rissel (2011), in Australia, found that although cycling was generally viewed positively, as an environmentally friendly activity, the behaviors of some cyclists were perceived negatively, which influenced negatively views about cycling, particularly among non-cyclists. They also found that the public image of cycling could act as a barrier or a facilitator of cycling. In France, the image of cycling has gone through several phases, following closely the rate of bicycle use (see Cycling Background chapter). This image was mainly positive in the early stages of cycling (19th century) when cycling became popular, then the image was deteriorated with the decline of cycling (20th century), and finally, started to improve again with the relaunch of cycling (21st century). Today, cycling is perceived in heavily contrasted ways, with a part of the population supporting it and another opposing it (Héran, 2014).

Regarding the type of cycling users, several studies have tried to go further in the categorization of urban cyclists by defining a typology of users. In a questionnaire-based survey in England, Gatersleben and Haddad (2010) identified four types of cyclist stereotypes in urban cycling: responsible, lifestyle, commuter, and hippy-go-lucky. This typology was obtained by responses from cyclists and non-cyclists. These authors also showed that the frequency of bicycle use seemed to change the perception of the stereotype: users that cycled recently associated the typical cyclist more with responsible, commuter and hippy-go-lucky types and with a bicycle use for normal day-to-day activities (e.g. shopping and commuting), whereas users that did not use a bicycle recently associated the typical cyclists more with lifestyle type and with someone who truly enjoys and spends a lot of time and money on cycling. In another phone survey conducted in Portland (USA), Dill and McNeil (2013) also identified four types of cyclists with different characteristics: the strong and fearless, the enthused and confident, the interested but concerned, and no way, no how. In general, in these studies, cyclists were perceived positively and the typology of urban cyclists allowed differentiating their interests.

Miller and Handy (2012) investigated the factors that influence commuting by bicycle. They showed that for University employees living in Davis, California (USA), individual preferences such as liking cycling—in contrast to liking driving—and cycling comfort were key determinants of bicycle use, whereas socio-demographic factors traditionally associated with cycling use, such as gender, age, or income, did not have direct effects. Passafaro et al. (2014) showed in Italy that anticipated positive emotions and past behavior were the two main predictors of people’s desire to cycle in urban settings. In a qualitative study, Heesch and Sahlqvist (2013) found that the most frequently reported motivations influencing utility cycling by a sample of utility and non-utility cyclists were related to the built environment (e.g. well-designed, segregated bicycle routes) followed by social-cultural factors (e.g. greater acceptance, awareness, and consideration of safety by other road users).

Nowadays, the issue of population’s well-being has become fundamental. Several recent studies have underlined that cycling, more than other modes of transport, is strongly associated with well-being and happiness (Morris & Guerra, 2015; St-Louis et al., 2014; Taniguchi, Grääs, & Friman, 2014; Willis, Manaugh, & El-Geneidy, 2013), and also with sickness absence (Mytton, Panter, & Ogilvie, 2016). Likewise, another study showed that active transport modes (cycling and walking) were associated with more well-being, compared to car travel, and that the switching from car travel to more active travel modes was associated with an improvement in well-being (Martin, Goryakin, & Suhrcke, 2014).

Wellbeing is one of the positive aspects of cycling recently studied and could be considered as a psychological motivation capable of persuading or internally moving someone to start and/or continue cycling. In the studies previously described, there are other significant results about psychological factors involved in cycling, which are still scarcely being taken into account. As well as well-being, other motivations could be part of the internal factors determining cycling. These motivations could be integrated into an approach of utilitarian urban cycling that includes the external factors that influence cycling practice as well as the internal factors, more precisely, the psychological motivations. Both external and internal factors seem to be essential components in the development of an integrated approach of cycling that could be used for the promotion of cycling. This kind of approach has not really been explored before. The need for such an integrated approach is what led us to run this Ph.D. thesis.

A fundamental element in the development of this model is a proper analysis of the negative aspects of cycling, in other words, what prevents someone to use a bicycle for utilitarian purposes? Just like the positive aspects of cycling, its negative aspects must also be explored, from both an external and internal approach, especially the concern about road safety.

Thus, when having to decide whether to cycle or not for a utilitarian purpose, a potential user has to face a decisional process and to assess a whole set of different types of positive and negative arguments related to cycling. The factors that facilitate cycling could include the general positive advantages of cycling (representational factors), and the particular reason or personal incentives for cycling (motivational factors), which we will refer to as "levers" in this Ph.D. thesis. On the other hand, the factors that discourage cycling could include the general disadvantages of cycling (representational factors) and the personal reservations or reluctance toward cycling (motivational factors), such as fear of traffic, which we will refer to as "barriers".

Representational and motivational factors could be seen as two different parts in the assessment of an object or an action. The concept of representation that we used integrates three theoretical concepts: the mental representation as "an encoding of information in memory" (Smith & Queller, 2001, p. 111); the social representations that are "systems of values, ideas, and practices which enable communication to take place among the members of a community" (Moscovici, 1973, p. xiii); and attitude as "a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor" (Eagly & Chaiken, 1993, p. 1). In other words, the concept of representation in our study refers to the information, knowledge, cognitive evaluations, and beliefs about cycling and its associated characteristics. While motivation could be defined as "a hypothetical intra-individual protean strength, which can have internal and/or multiple external determinants, and that explains the direction, the beginning, the persistence and the intensity of a behavior or action" (Fenouillet, 2012, p. 9, our translation). Thus, the representational factor acts as an initial step of the decisional process of whether or not to cycle, whereas the motivational factor acts as a second and more decisive step of the same process.

In addition, the perception and the evaluation of each argument for or against cycling are also influenced by a diversity of the individual's characteristics (in terms of knowledge, experiences, habits, values, and personality), by his-her social and cultural background, and also by his-her personal needs, wishes, and expectations of the moment. Thus the result of the perception of an argument, an object or an action can be interpreted through different references that vary from one individual to another (inter-individual variability) and one individual can also change an argument assessment over the lifetime (intra-individual variability); therefore the outcome could closely reflect reality, but it could also be somehow distorted and not necessarily factual (Duncan, 1976).

As a result of the subjective factors, a determined distance (e.g. seven kilometers) for a specific cycling trip could be evaluated differently by two individuals: one individual might consider it to be a suitable cycling distance while another might see it as too long to cycle. This concerns the variability between individuals. More specifically, when someone feels unable to surmount a given barrier, it can be because such an obstacle cannot objectively be controlled or overcome, or because of a personal and subjective assessment that exaggerates its difficulty rendering impossible what could otherwise be a manageable obstacle in other circumstances or by another individual. In this sense, a subjective assessment of all the factors considered could be used by the individual to weigh the disadvantages and/or barriers in front of the advantages and/or motivations, in order to decide accordingly whether to cycle or not.

Consequently, the individual factors, in terms of representation and motivation, positive and negative, their features, and their perception (personal interpretation) need to be integrated into the spectrum of reasons that could influence positively or negatively utilitarian urban cycling. Presently, the weight of these advantages, disadvantages, levers and barriers in the decision to cycle are little known.

OBJECTIVE AND SUBJECTIVE CYCLING RISKS

One of the most important concerns about cycling is related to road safety (Passafaro et al., 2014). The term safety refers to the state of being safe; in other words, to be safe is to be free or protected from the occurrence or the risk of injury or danger (Cambridge Dictionary, 2016). Slovic, Fischhoff, and Lichtenstein (1985) defined objective risk as "quantitative measures of hazard consequences expressed as conditional probabilities of experiencing harm" (p. 92). Notwithstanding the vulnerability of cyclists in regards to car or other vehicles that are protected by coachwork, objectively urban cycling is not the most hazardous mode of transport in France. Regarding the case of Paris, among the total number of deaths in traffic during 2014, 20 were pedestrian (51%), 14 were motorcyclists (36%), 2 were car users (5%) and only 3 were cyclists (8%) (Observatoire des Déplacements à Paris, 2016). Using only this data as a basis, pedestrians seem to be the road users most at risk in the Paris traffic (not including Public Transport), followed by motorcyclists. Car passengers and cyclists are almost at the same level. However, the modal share of these modes of transport is not the same. According to the Observatoire des Déplacement à Paris (2016), walking is the most used mode of transport (49%), followed by public transport (34%), cars (11%), cycling (3%), motorcycle (2%), and other (1%) in Paris. So, taking into account the modal share and deaths in road traffic, the rates indicate that the most dangerous mode of transport in Paris is the motorcycle (11.6), followed by cycling (1.7), walking (0.7) and cars (0.3)[1]. However, the majority of pedestrians and cyclists fatalities take place when a motor vehicle strikes a pedestrian or a cyclist, either on the road or on the sidewalk (Semler et al., 2016). As reported by the French Road Safety Observatory (ONISR, 2015), out of 159 cyclists killed in 2014 in France, about 79% were killed in a collision with a four-wheel motor vehicle.

According to Amoros, Chiron, Thélot, and Laumon (2011) in a study based on 13,684 cyclist casualties between 1996 and 2008 in the Rhône County, the majority of adult and teenager cyclists injured in town (n=7,981) were involved in bicycle-only crashes (67.1%)

[1] The rate is calculated by dividing the vehicle road traffic fatality rate by the vehicle commute mode share.

compared to crashes involving a motor vehicle (30.9%). In the same study, the injury severity was categorized according to six types of severity. The major proportion of injuries for adult and teenager cyclists in town were slight (64.7%), followed by moderate (28.1%), serious (5.6%), severe (0.9%), critical (0.2%), and fatal (0.6%).

These data regarding accidents, fatalities, injury severity classification, the modes of transport involved in an accident, and the rates of transport mode showed that some modes of transports are more vulnerable (e.g. motorcycle, cyclists, and pedestrians) than others (e.g. four-wheel motor vehicle). Even though the majority of cyclist accidents were bicycle-only crashes, most of the time these were not severe. The most traumatic cycling accidents take place when a motor vehicle is involved. Thus, danger is not an inherent condition of cycling, the risk arises from the interaction with motor vehicles.

In addition, for cyclists, the risk of injury can come from different sources. It can come, as shown before, from an external source, such as the interaction with other road and path users; but also from supplementary external sources such as weather (e.g. rain) and road infrastructure (e.g. cracks in the soil surface). On the other hand, the risk of injury can also come from an internal source, like tiredness or lapse of concentration. In addition, a cyclist could fall at any time, either because of an internal or external source, as the balance required for riding a bicycle can easily be lost. Hence because of these multiple sources of danger, cyclists and could feel or perceive that they are indeed more vulnerable than other road users; this perception originates from a personal assessment and is thus related to the subjective risk of cycling (and therefore not necessarily accurate).

Objective risk and subjective risk are both very important factors involved in cycling, however, essential differences exist between them. Objective risk is principally based on quantitative information about accomplished facts, whereas subjective risk is personal and "refers to the assessment of probability of an accident or negative event and the judgment of severity of consequences if an accident should take place" (Lund, Nordfjærn, & Rundmo, 2012, p. 1171). Besides, measuring them is not simple. Concerning objective risk, when cycling is important it is possible to use records and data about accidents, injuries, and fatalities in order to try to quantify the objective risk of urban cycling; nonetheless, the notorious dearth of data due to under-reporting (Blaizot, Papon, Haddak, & Amoros, 2013) of cycling accidents hinders the investigation on this subject and opens more questions than it provides answers. As for the assessment of subjective risk, the psychological processes involved in the risk judgments are still not completely estimated (Price, 2001). Although, according to Lund and Rundmo (2009), factors such as "familiarity with the risk source and perceived control over the situation are thought to have an effect on risk perception" (p. 548). However, the problem with subjective risk is that "individuals are often inaccurate judges of risks" (p. 548).

Cyclists are considered as "vulnerable" road users by road authorities (Shinar, 2012), which can be understood as motor vehicles, especially cars and heavy vehicles (e.g. lorries), are greater than cyclists in terms of size, mass, and speed. Thus, in interactions with them, cyclists are indeed less protected. In urban mobility, bicycles and buses are at the opposite ends of the spectrum in terms of size, mass, and maneuverability; while bicycles are small, light and agile, buses are large, heavy and rigid (Austroads, 2005). Therefore, safety conflicts may ascend when buses, or other motor vehicles, and bicycles are on the road sharing the same space (Baumann, Brennan, & Zeibots, 2012). Moreover, even if no collision occurs close passing motor vehicles can lead cyclists to feel unsafe and deter them from cycling (Guthrie, Davies D. G., & Gardner, 2001; Parkin, Wardman, & Page, 2007; Walker, Garrard, & Jowitt, 2014). In a study of interactions between cyclists and car drivers, Chaurand and Delhomme (2013) showed that cyclists perceived more risk when the other vehicle was a car rather than another bicycle. The problematic interactions between cyclists and road users are frequently not intentional, but due to the ignorance and/or incompetence of road users who do not notice cyclists (Christmas, Helman, Buttress, Newman, & Hutchins, 2010). This is different from when cyclists are noticed or seen but not respected, i.e. when cars do not yield at intersections or roundabouts (Fyhri, Bjørnskau, Laureshyn, & Beate Sundfør, Hanne Ingebrigtsen, 2016). There is a notable difference between cyclists who think that they have not been seen and cyclists who think that they have been seen, but are regardless ignored or not respected. Cyclists could feel that they are not being respected, or even worse, that they are intentionally attacked or are aggressed since the car driver's behavior does not correspond to the correct and expected road behavior according to road rules. This difference becomes crucial in conflictual interactions in terms of perceived aggression between cyclists and car drivers.

On the other hand, cyclists can also weave in and out between cars, a behavior that can be a nuisance for car drivers. There are other transgressions committed by cyclists that can irritate car drivers, such as running red lights (Johnson, Newstead, Charlton, & Oxley, 2011). Additionally, car drivers may feel invaded by cyclists who are occupying the roads that they have for a long time considered being exclusively theirs. As explained by Walker (2012), cyclists “are engaging in an activity that is deemed slightly inappropriate in a culture that views driving as normative and desirable and, arguably, views cycling as anticonventional and possibly even infantile” (p. 680). Because of their low speed, cyclists get in the way of car drivers, making the latter feel frustrated and inconvenienced (e.g. wasted time, occupying their space). These kinds of feelings can lead to car drivers adopting negative behaviors that could be considered as “aggressive”. An aggressive behavior is defined as “any form of behavior directed toward the goal of harming or injuring another living being who is motivated to avoid such treatment” (Baron & Richardson, 1994, p. 7). Aggressive car drivers’ behaviors include behaviors such as driving too close, shouting abuse, or making obscene gestures (Heesch, Sahlqvist, & Garrard, 2011; Villieux & Delhomme, 2010). These behaviors, in turn, can make the cyclist feel uncomfortable, vulnerable, harassed, afraid and/or angry.

Several surveys do record cyclists’ experience by measuring perceived aggression, and not objective aggression. This distinction is important, as it is perceived aggression that will impact cyclists’ emotions, attitudes, motivations, and behaviors. In a telephone survey of a random sample of 1880 Australian adults in 2004, more women (46%) than men (38%) agreed or strongly agreed that “aggressive drivers put me off cycling or walking” (unpublished data, Australian Associated Motor Insurers, 2004; as cited in Garrard, Rose, & Lo, 2008). Moreover, in another Australian survey, 66% of 2,403 cyclists in Victoria reported experiencing intentional harassment from motor vehicle occupants in the previous 12 months (Garrard, Crawford, & Hakman, 2006). However, the perception of aggression may not exactly reflect actual aggression, as perception can be influenced by cyclists’ previous experience, emotions, personality and appraisal of the situation and environment. Indeed, non-aggressive behaviors from car drivers (e.g. inattention or errors) can be perceived as aggressive and intentional, and have the same consequences on cyclists’ behaviors and emotions as objectively aggressive behaviors.

In consequence, perceived safety, perceived risk, feelings of fear (e.g. fear of traffic), and more largely cyclists' subjective road experience are likely to influence their attitudes, representations, motivations and intentions of cycling, particularly when cyclists perceive a dangerous behavior from car drivers as intentional. Thus, the impact of these factors must be studied and be taken into account in order to reduce concerns about cycling road safety and increase the efficiency of cycling promotion actions.

To sum up, the general aim of this Ph.D. thesis is to contribute with a more integrative approach to a better understanding of utilitarian cycling in urban settings from the individual's viewpoint. More precisely, we will focus on individual factors, and their diverse sources of influence from both the social and the environmental context, and on their interactions, which in complement of the external factors could impact cycling practice. In particular, our focus will be on positive and negative representations, motivations toward cycling, and barriers to cycling, as well as on cyclists' perception of aggression related to car drivers' behaviors. Identifying the main individual factors influencing cycling and how they work is the first part in a more general objective to devise ways to impact the behavior of users and, in the end, increase cycling rates. Moreover, understanding the perceived aggression in on-road interactions and the mechanisms that influence it could help to a large extent to improve traffic safety.

OVERVIEW OF THE PH.D. THESIS

In addition to the introduction and the general discussion, this thesis is composed of two main parts: the theoretical aspects and the empirical research. The theoretical aspects comprise three chapters. The first chapter, called "Cycling Background", is an overview of utilitarian urban cycling that, without being exhaustive, describes the history of cycling, including the principal historical periods of cycling, the current state of urban cycling, its rules and infrastructure, and the strategies to promote it in France.

The second chapter outlines the theoretical framework of this research and contains the development of the main concepts used in this Ph.D. thesis. This chapter includes two sections. The first section focuses on the reasons for utilitarian urban cycling, and presents the concepts of representation and of motivation. The second section focuses on perceived aggression. These two sections present the definitions of the concepts from a theoretical perspective, and explain how the three concepts, representation, motivations, and perceived aggression, are applied to the study of cycling.

The third chapter concerns the overview of the research program, including the research questions and the main hypotheses. This chapter will make the connection between the theories presented in the previous chapter and the next main part containing the empirical studies.

The empirical research is composed of three chapters presenting each one of the three studies carried out in this Ph.D. thesis. The first two studies focus on the representation and motivation about cycling from the cyclist and the non-cyclist point of view. The first study was conducted through interviews, whereas the second was conducted among a large sample through an online questionnaire. Then, the third study focuses on the perception by cyclists of aggression from car drivers when interacting with cyclists; this study was also conducted through an online questionnaire.

Finally, in the general discussion and conclusion, the results of these three studies concerning utilitarian urban cycling, the theoretical and societal implications in terms of representation and motivation, on the one hand, and the perceived aggression on the other, are discussed, as well as the limits of our studies and the perspectives for future research.

FIRST PART: THEORETICAL ASPECTS

1. CYCLING BACKGROUND: BICYCLE AS A MODE OF TRANSPORT

1.1 WHAT IS A BICYCLE?

Precursors of the bicycle, such as the draisine (Figure 1) from Germany (1817) and the velocipede (Figure 2) from France (1861), had structures quite different from the actual bicycle (Herlihy, 2004). These precursors evolved until about 1890 to reach the current modern form of the bicycle.

Figure 1
Draisine or Laufmaschine ("running machine") was invented by the German inventor Karl Drais in 1817 (Héran, 2014).

The actual bicycle, often called bike or cycle, is a vehicle with two wheels one behind the other in a linear alignment, attached to a frame that allows the cyclist to move ahead principally with his own human effort by pushing on two pedals (e.g. except for electric bicycles).

Figure 2
Velocipede ("fast pedestrian"), Pierre Michaux has adapted cranks and pedals on the front wheel of a draisine in 1861(Héran, 2014).

1.1.1 Types of bicycle

There are several types of bicycles, used for different purposes and that can be categorized in many different ways. The principal categorization of bicycles, relevant to the aims of this thesis is by function: transport, sport and recreation. For transport it is common to use a type of bicycle called *city bicycle* (Roadster or Dutch bicycles), designed to be comfortable and to facilitate everyday riding in normal clothes. City bicycles are also built for frequent short, moderately paced rides through relatively flat urban areas and in a variety of weather conditions. There are several types of bicycles designed for sport as well as exercise and competition (e.g. road racing, track cycling, mountain biking, cyclocross, BMX). For recreation and for leisure, many types of bikes can be used. However, for touring cycling[2], a comfortable and reliable bicycle capable of carrying baggage and heavy loads is recommended (Ballantine, 2000).

The different bicycle types can also be categorized by frame types (e.g. upright, folding, pedersen bicycle); by gearing (e.g. hub gear, derailleur gears with diverse speeds, single speed also called "fixie"); by the number of riders (e.g. single, tandem, triplet, with child seats or trailers, conference bike with seven riders, busycle with fifteen riders, party bikes up to 17 riders, the largest multi-bike can have 40 riders); by means of propulsion (e.g. human-powered, motor-assisted such as "electric bicycle"); by rider position (e.g. upright, recumbent, prone position); and also by property (e.g. personal, rent, bikesharing). Unicycles, tricycles and quadracycles are often familiarly referred as "bikes" but are not strictly bicycles, as they have respectively one, three and four wheels (Ballantine, 2000).

1.1.2 Utilitarian Urban Cycling and Cycling Rates

The use of the bicycle for transport, also called "utilitarian cycling", refers to the use of a bicycle as a mode of transport to move from point A to point B with a specific purpose; it is different from the use of a bicycle for recreation or for sports. Utilitarian cycling concerns two types of utilitarian journeys: regular and occasional. Utilitarian regular journeys include commuting cycling, i.e. the journeys to work or to study done by bicycle. Utilitarian occasional journeys, on the other hand, include the journey to go shopping, to visit friends or relatives, go to leisure places, etc.; activities that are not necessary done on a regular or standard basis and could be considered more as a spontaneous motive of transport.

The term "modal share" or "modal split" refers to "the proportion of total person trips that uses each of various specified modes of transportation" (Bureau of Transportation Statistics, 2008). In other words, modal share is calculated based on the total trips of all modes of transport used; this measure does not report the percentage of people that used a particular mode but the part of the trips done by each mode of transport. The unit of measurement for modal share is indicated in terms of percentage. This percentage is usually obtained by robust travel surveys, often piloted by local governments, using different methodologies. This indicator is particularly used in transport studies and reports because it

[2] "Bicycle touring" is the action of riding a bicycle for days, weeks, months or even for years traveling often long distances. Cycle touring is considered a recreational activity for pleasure, adventure and autonomy rather than sport, commuting or exercise. Bicycle touring pro (n.d) Retrieved from http://www.bicycletouringpro.com/blog/.

allows comparing data for different modes of transport. The extent of geographical areas, population and the year of the survey are important differences to take into account for comparability. In general, the data for modal share differs based on the year it was obtained. Thus, in European cities where the bicycle has a relatively important role, it has been found that in recent years the proportion of bicycle trips has increased (Mason, Fulton, & McDonald, 2015; Pucher et al., 2010). In other words, the trend is that for these cities the more recent the survey data, the higher the modal share. In France the travel surveys, *enquête nationale transports et déplacements* (ENTD), *enquêtes ménages déplacements (*EMD) and *enquêtes déplacements grands territoires* (EDGT) aimed at obtaining the modal share (Certu, 2013b) are only conducted around every 10 years by the national government for the first, local government for the second and the third, that is for suburban and rural territories (Armoogum, Madre, & Gascon, 2010). Due to this, the more recent official data on France correspond to 2008. In this thesis, we will use modal share indicators as a reference to illustrate the use of cycling and to present comparisons between cities and between countries, in particular in France and Germany, and more precisely Paris and Berlin (see TEMS- The EPOMM Modal Split tool, in Table A1 in annexes, which presents a list of modal share of European cities with more than 500,000 inhabitants).

Apart from the Netherlands, where in Amsterdam the cycling modal share was 22% in 2008, and Denmark, where in Copenhagen the cycling modal share was 30% in 2014, cycling is not currently a widespread more of transportation in the majority of large Western cities (Institute for Transportation and Development Policy & University of California, 2015). According to Pucher and Buehler (2008),"bicycling in much of the industrialized world is a marginal mode of transport, occasionally used for recreational purposes but rarely used for practical, everyday travel needs" (p. 495). The Eurobarometer 2014 survey, with 27,868 respondents from 28 Member States of the European Union, showed that cars were by far the most used mode, representing 54% of daily transport, while cycling was far away, with only 8% (European Commission & Directorate-General for Mobility and Transport, 2014). In some countries, like Cyprus and in Portugal, cycling represented only 1% of the mode of transport most often used on a typical day, and in Malta it represented 0%. Moreover, the Eurobarometer showed that there are significant differences for cycling daily use between European countries, ranging from 0% in Malta to 36% in the Netherlands.

1.2 UTILITARIAN URBAN CYCLING HISTORY

1.2.1 Principal Periods

Since its invention to the present day, urban cycling practice has gone through several periods. Regarding the principal periods, there are three lines: the rise, the decadence and the relaunch. The rise corresponds to the introduction of the bicycle in the 19th century, which encountered barriers in the beginning with cities such as New York, Berlin or Moscow passing laws to restrict cycling (Walker, 2011b). However, the urban bicycle use was relatively rapidly adopted, especially when, because of mass production, the price of bicycles were dramatically reduced (Walker, 2011), and bicycle became a symbol of freedom and very popular in the first half of the 20th century (Héran, 2014). Then, the use of bicycles was involved in a second tendency where it decreased during most of the second half of the 20th century in Europe, due to the rise of car supremacy and the development of powered-two-wheelers, to the point urban cycling use almost disappeared. In the United States this decline started around 1920, before Europe (Héran, 2014). The prime position that cars have held since the end of the Second World War (Fishman, 2016) could also explain the collapsing of cycling. In Europe, this drop of bicycle use concerned all countries, even the most cycling ones, such as the Netherlands and Denmark. Finally, since 1970, and more so since the turn of the 21st century, urban bicycle use has started to increase slightly again (Héran, 2014), entering its third period. The three cycling periods are related to an economical context, parallel between Europe and the USA. Other countries in Asia, or Russia, with different historical and economic developments, experienced different cycling development, but will not be presented in this thesis.

1.2.2 Relaunch of Utilitarian Urban Cycling

The third period, the relaunch of cycling around 1970 did not happen principally, as is commonly thought, because of the creation of cycling infrastructure, as the Dutch example illustrates. Indeed, in the Netherlands, the relaunch of cycling was born from a popular request. The creation of infrastructure accompanied the change that had already been launched.

After the worldwide decline of cycling, the main increase of cycling rates in the Netherlands since mid-1970's was preceded by some historic events. Among the most important events, the social mass movement and the bicycle activism started in 1965 with

"Provo" and its "white bicycle plan" (Héran, 2014) and continued with "Stop de kindermoord" (stop the child murders) protest in 1970. Another important event was the political objective to be less dependent on energy and fuel that appeared after the first oil crisis in 1973, and that triggered an awareness of the consequences of car mobility. The Dutch government answered by turning away from car-centric policies and making way for alternative transport, like cycling (Bolhack, Bouchard, Duckworth, Goddard, & Sams, 2013; Pucher & Buehler, 2006, 2008; Stoffers, 2012), by creating cycling infrastructure. Likewise activism movements were also carried on in other European cities, such as in Paris "Bagnoles, ras-le-bol" (we are fed up with cars) in 1972 (Héran, 2014). However, these movements did not have the same success or political commitment as the movements in the Netherlands.

An idea commonly spread is the Dutch idea that "build it (cycle paths) and they (cyclists) will come", the idea that the mere fact of building cycling infrastructure automatically brings new cyclists users. This strategy worked in the Netherlands (1970–1980), but this success was in a large part due to the context and history around it, in particular that it was not an isolated action but a part of a larger concern. Nowadays, in low cycling modal share countries without an important social movement such like the one in the 1965–1970 in Netherlands and a marked economic crisis like the one in 1973, cycling infrastructure alone will not stir up the cycling modal share. They may influence actual users and perhaps some new users, but not necessarily a mass of new ones. Indeed, Héran (2014) showed that the development of cycling in Strasbourg, the city with the highest cycling modal share in France (8%, National Travel Survey; ENTD, 2008), could not be principally attributed to the cycling infrastructure but rather to the moderation of speed in town and the reintroduction of the tramway.

1.2.3 Current State of Urban Cycling in France and Germany

The previous retrospective is necessary to be able to understand the current state of utilitarian urban cycling. As mentioned before, utilitarian urban cycling did not develop under the same circumstances and the cycling modal share is now very different between countries. In this thesis, we will focus on the state of utilitarian urban cycling in two comparable countries (in terms of size, population, and GDP) with a different cycling modal share: France and Germany.

As well as other European countries, France and in Germany did experience a strong decline in cycling rates from World War II until the 70s, and then a revival of cycling, but not to the same extent. France, compared to Germany, experienced an earlier and more pronounced decline of bikes, as well as a later and weaker revival. Since around 1976, the German have started to take up cycling as a transportation mode again, and this renewed interest was supported principally by policies such as traffic moderation and speed reduction in cities (Héran, 2014). According to the last consensus data, in 2008 in Germany, cycling represented a modal share of 10%, with 58% for cars, 24% for walking and 9% for public transport (Pucher & Buehler, 2008). In France, also in 2008, cycling represented one of the lowest modal shares among all transportation modes: 2.7%, with 64.9% for cars, 22.3% for walking, 8.4% for public transport and 1.7% for motorized two-wheelers (ENTD, 2008; Papon & De Solère, 2010).

Moreover, cycling accidents are more common in France than in Germany. Indeed, in France, the number of cyclist fatalities is 27 per billion kilometers per year (for an average cycling distance of 88 km per person per year) while in Germany, the number of cyclist fatalities is 15 per billion kilometers per year (for an average cycling distance of 368 km per person per year) (ITF, 2013). These disparities could have an impact on individual factors. More precisely, the representations and the motivations about utilitarian urban cycling, as well as the perception of the road users could be different in France and in Germany. Thus, these differences should be taken into account on the strategies to promote cycling efficiently in each country.

1.3 URBAN CYCLING RULES, INFRASTRUCTURES AND FACILITIES

To understand the current cycling context it is important to have an overview of cycling rules, infrastructure and facilities. In general, cycling rules and infrastructure share almost the same principles around the world, although specific laws and infrastructure vary somewhat across countries. We will describe only cycling recommendations and the principal urban cycling infrastructure and facilities in France.

1.3.1 Overview of Cycling Rules and Recommendations in France

In France, bicycles are considered as a vehicle by road rules and as such, cyclists have to respect road rules; each offense to road rules is punishable by a fine (*Code de la route* [French road code]). In general cyclists can use the same network of roads and streets used by motor vehicles, except some road banned to cyclists (e.g. freeways). Some special infrastructure dedicated to bicycles that are not allowed to motorized vehicles.

Regarding the equipment, according to the French road code, the bicycle must necessarily be equipped with a ring bell (R313-33), front and rear brakes (R315-3) and retro-reflectors: white on the front, red on the back, orange on the sides and on the pedals (R313-18, 19, 20). A yellow or white front light and a red rear light (R313-4, 54) are mandatory at night or when there is poor visibility. Wearing a certified retro-reflective vest for any cyclist (and passenger) is also mandatory in these conditions, as well as when riding out of towns (R431-1-1). The cyclist must check the condition of his bicycle before using it. And finally, the use of helmets is not mandatory for adults cycling in France (R431-1). Australia and New Zealand are the only two countries where currently the use of helmets by all cyclists is mandatory and a fine is applied (Walter, Olivier, Churches, & Grzebieta, 2013; it is still the case in 2016). The use of helmet while cycling is a topic largely studied, as helmet is a preventive equipment but wearing it can lead to risk compensation in some cases (Constant, Felonneau, Lagarde, & Messiah, 2011; Gamble & Walker, 2016; Messiah, Constant, Contrand, Felonneau, & Lagarde, 2012; Shinar et al., 2015), and mandatory helmet wearing can deter cycling (Rissel & Wen, 2011). In France there is no definitive position about getting helmets mandatory, or not, for all cyclists.

Besides the equipment required for cycling by road rules, cyclists can wear and/or use other protective accessories, such as safety wings, reflective straps and reflective stickers. To ease the ride, the bike can also be equipped with a basket, saddlebags, luggage rack or a child seat.

Concerning the positioning on the road lane, cyclists should ride on the right of the road, keeping a distance of at least one meter from other vehicles, and even one meter from the right edge, in order to avoid obstacles and accidents when a car door opens. Cyclists must also ride on the right of the lane when there is a bus lane opened to cyclists. Additionally, it is recommended that cyclists ride in the middle of the road on narrow streets to avoid dangerous overtaking by cars. Cyclists cannot zigzag between cars. Cyclists must indicate with their arm that they will turn as, according to the road rules, "any driver (cyclists included) who is going to change the direction of the vehicle or slow the pace must notify its intention to other users" (*Code de la route*, 2016, Article R412-10).

Cyclists are not allowed to ride on the sidewalk, except for children under eight years. However, walking pushing one's bicycle in hand is tolerated on the sidewalk (Art. R412-34). If a cycle path, evidenced by two white stripes and the bicycle symbol, was built on a portion of the sidewalk, it becomes a portion of pavement dedicated to cyclists. Moreover, a one-way street is a wrong way even for cyclists except when contraflow cycling is permitted, or when there is a specific area allowing it.

1.3.2 Principal Cycling Infrastructures

1.3.2.1 Cycleways

Cyclists have dedicated special facilities. While some cycling infrastructure, indicated by round cycling panels, are mandatory for cyclists, others, indicated by square cycling panels, are optional. There are principally four types of cycleways. The first one is a way completed separated from motor vehicles by physical constraints (e.g. barriers, parking or bollards), such as cycle paths ("piste cyclable", cycle trail or cycle track). Cycle paths can be unidirectional on either side of the way, with a recommended width of 2.00m, or bidirectional on one side, with a recommended width of 3.00m (Certu, 2013a); sometimes they are also distinctly colored. In this type of separated cycling infrastructure can be placed the "Réseau cyclable à haut niveau de service" (*Bicycle superhighway*). The bicycle superhighway is a performance cycling network over distances of up to 10–20 km, which consists of radial and circular routes, continuous and homogeneous, in order to provide a maximum level of security by removing or substantially removing cyclist conflicts with other users (drivers and pedestrians), and to maintain an average of 20 km/h cycling speed by limiting the number of cyclists stops and restarts at every intersection (Cerema, 2016b).

The second type is on-road and partially separated from motor vehicles only by painted markings, such as "bande cyclable" (*cycle lane*) and "double sens cyclable" (*two-way cycling in one-way street or contraflow cycle lane*). A cycle lane is defined by the French road code as a "way exclusively for two or three-wheel cycles on a roadway with several lanes" (Art. R.110-2). The recommended cycle lane width in urban settings is 1.50 m and is marked by broken white lines (Cerema, 2015b). A contraflow cycle lane "is just a two-way street with one direction of travel reserved for cycles" (Cerema, 2015a; Certu, 2013). It is generally a painted cycle lane that allows cyclists to ride in the opposite direction of all other traffic. The third type is a lane where cyclists share the road with motor vehicles, such as bus lanes opened to cyclists. The four and last type of cycling infrastructure is areas where cyclists share the path with pedestrians, such as the shared area or the greenway, the latter principally in the countryside.

1.3.2.2 Special Street Areas

As mentioned before, there are three street areas that allow cyclists to ride on contraflow. The first area is "zone 30" (*30 km zone*), a section of a street or several sections of adjacent streets constituting an area where all road users can go. The special feature of this area is that the speed is limited to 30 kilometers per hour. All roads in this area are two-way for cyclists, unless the appointing authority police took different provisions. Another special area is the "zone de rencontre" (*shared area*). This is also a section of the street or several sections of adjacent streets constituting an area where all road users can go. In this case vehicle speed is limited to 20 kph and pedestrians are allowed to walk on the road and have priority over vehicles. The last area is the "aire piétonne" (*pedestrian area*), a section of the street or several sections of adjacent streets constituting a temporary or permanent pedestrian-only area. Only motor vehicles necessary for the internal service of the area are allowed to come in, their speed is limited to a walking pace, about 6 kph and they do not have priority over anybody (French Ministry of Ecology, Sustainable Development, and Energy; MEDDE, 2014)[3]. Cyclists are allowed to ride in a pedestrian area by keeping the walking pace and not causing

[3] Called currently Ministry of Environmental, Energy and the Sea (Ministère de l'Environnement, de l'Énergie et de la Mer-MEEM).

inconvenience to pedestrians (Article R431-9). For the three areas, a special sign announces the entrances and exits. These three areas are considered as traffic calming measures.

1.3.2.3 Bike Box

Apart from the cycleways and the special street areas, there is other cycling infrastructure conceived for cyclists. At intersections it is recommended that cyclists go in front of vehicles in order to be seen. Sometimes there is a "SAS vélo" (bike box), facilitating this positioning. The bike box, also called stop box or advanced stop line, is a road marking at road junctions with traffic lights between the stop line of motorized vehicles and the pedestrian crossing line. The bike boxes allow cyclists a head start when traffic signals change from red to green (Certu, 2012b; Dill, Monsere, & McNeil, 2012).

1.3.2.4 Intersection for Cyclists

Concerning the traffic lights, all road users, including cyclists, must respect red lights. There are sometimes special traffic lights for cyclists showing a bicycle sign. "Cédez-le-passage cycliste au feu" (*the 'give way' signs*) "allow cyclists (and cyclists only) to turn right, left, keep running straight, or for several directions at the traffic light, even when the light is red, if they do not interfere with upcoming traffic" (see Figure 3; Cerema, 2016a; Certu, 2012a). This system aims to increase safety since it dissociates cyclists' departure from those of the motorized vehicles.

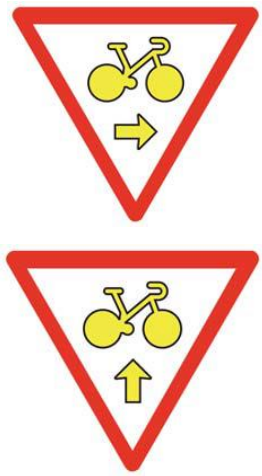

Figure 3
Give way signs (Certu, 2012a)

1.4 PROMOTION OF URBAN CYCLING

1.4.1 Reasons to promote cycling

After urban cycling's decline and given the multiple mobility problems the society is facing (e.g. pollution, traffic congestion), awareness of the importance of increasing cycling use has grown strongly. There are also several arguments for the promotion of cycling from a socio-economical perspective, for example, "each km travelled by car or bike incurs a cost to society, though the cost of car driving is more than six times higher (€ 0.50/km) than cycling (€ 0.08/km). Moreover, while the cost of car driving is likely to increase in the future, the cost of cycling appears to be declining" (Gössling & Choi, 2015, p. 106). Furthermore, the United Nations Economic Commission for Europe (UNECE) and the World Health Organization Regional Office for Europe (WHO) say that "over 76,600 people would be employed in green and healthy transport every year and 10,000 lives would be saved if major European cities reached the cycling modal share of Copenhagen" (THE PEP, 2014). Likewise, a study from the Cyclists' Public Affairs Group (Edwards, 1998) has demonstrated that modest increases in cycling modal share could readily lead to a 6% reduction of transport sector emissions in Great Britain, while increases up to Dutch cycling levels would yield a 20% reduction. It is for these reasons that European countries, including France, are striving to increase cycling as part of a sustainable Urban Mobility Plan (European Commission, 2012), especially in order to decrease pollution.

1.4.2 Strategies used in France to facilitate cycling

According to the Ministry of Environmental, Energy and the Sea (MEDDE, 2014), to facilitate utilitarian cycling French stakeholders are enlarging the cycling network. 14,000 km of urban streets in France are cyclist-friendly, which represents a 6,000 km progression over the last four years. Likewise, the length of one-way streets where cyclists can travel in both directions has increased by 400% between 2007 and 2010.

In French metropolitan areas over 100,000 inhabitants, "Plan de Déplacements Urbains (PDU)" (Urban Mobility Plans) are mandatory. These plans imply to have a road map for cycling promotion and improved travel safety. All local authorities that manage a road network can set up a cycling master plan. The development of the cycling routes layout must fulfill Urban Mobility Plan requirements, if there are any. In the same line of the Urban Mobility Plan, "Plan de Déplacements Entreprise —PDE" (business travel plan) are a set of measures negotiated within a company that aims to optimize travels related to professional activities and to promote the use of alternative modes for commuting. Public authorities encourage the implementation of business travel plans, as they have many advantages for companies, employees and the community. Among the actions mentioned in the PDE, cycling can be promoted through the establishment of secure parking, a bike room with tools and services, hanging rooms and showers, or giving out a bike kit comprising the cycle map of the city and/or different cycling routes, urban cycling guide, prepared by the Federation of bicycle users (FUB). A law passed in 2008 requires employers to refund 50% of the costs of subscription to bike-share systems used for commuting by employees, as for other public transit (MEDDE, 2014).

According to the ADEME (2016), bikesharing systems, the shared use of a bicycle fleet (*vélo en libre service,* VLS), are currently present in 38 French large cities with 48,000 shared bicycles. Vélib (see Figure 4), the Parisian system, is the largest bikesharing system in France and also in Europe (Fishman, Washington, & Haworth, 2014) with more than 23,000 shared bicycles in its 1450 stations inside Paris and in its 300 stations in the municipalities next to Paris. In France, most of the growth of the bikesharing systems took place between 2005 and 2009.

Figure 4
Vélib station (Office du Tourisme et des Congrès de Paris, 2015)

Bikesharing systems are considered as an encouragement for urban cycling, because, as explained by Shaheen, Guzman, and Zhang (2010), the principle is simple, individuals use bicycles on an as-needed basis without the responsibilities and costs of bike ownership. Bikesharing also provides flexible short-term use for daily mobility, allowing users to approach public bicycles at unmanned bike stations and to pick up and return the bicycle to different stations. As stations are often located close to public transport stations or in strategic places, bikesharing systems also provide a solution to the “last mile” problem. According to Fishman, 2016, the launch of Vélib’ in 2007 in Paris and the preceding enhancement to the bicycle infrastructure network appeared as a "catalyst for many of the 850 cities that have established a bike share program" (p. 1).

Another kind of system used to facilitate cycling in France is the bicycle long-term renting or lending system. The municipality of Lille with a float of 8,000 bicycles and 4 bicycles house in its V'Lille system, currently offers to rent a bicycle (classic, folding or electric) for 1, 9 or 12 months for a low cost (MEDDE, 2014). Likewise, since 2001, the long-term lending system of Bordeaux Municipality (VVB, *vélo ville de Bordeaux*) has lended bicycles free of charge to citizens of Bordeaux, in priority to students and jobless people, who can have a bike from one week to 6 months and can renew for more than 6 months (Mairie de Bordeaux, 2016). In other words, these long-term systems offer inhabitants a period to "test", to experiment the urban bicycle before completely adopting it. These two types of system, bikesharing and long-term renting or lending can be complementary. Thus, Bordeaux has both systems, bikesharing with V3 (formerly called VCub) in the Bordeaux metropole (15 municipalities) and bicycle long-term free lending with VVB in Bordeaux city.

At the government level, in 2006 France decided to appoint a coordinator of all policies conducted to develop cycling by the various ministries. The inter-ministerial coordinator is in relation with the ministries in charge of housing and planning, sustainable development, health, education, interior, sports and tourism, and their regional services. The coordinator is also in relation with the associations of elected officials, users, professionals and technicians. The coordinator has the mission to help and coordinate the local authorities to implement the national scheme of greenways and cycling network. In 2014, France decided to strengthen its support to active mobility by launching an action plan (PAMA) organized by this coordinator with 25 concrete measures to confirm cycling as an efficient means of transportation (MEDDE, 2014).

One of the actions of the PAMA was the launch of a pilot test of the "IKV- *indemnité kilométrique vélo*" (cycling kilometer allowance) carried out by the French Agency of Environment ADEME. During six months (June to November 2014), ADEME experimented the favorable tax treatment for cycling (IKV) among 18 voluntary companies (10,000 employees). After positive results, such as the multiplication by more than two of the number of bicycle users during the experiment (Gioria & Lucas, 2014), French Government approved an optional implementation of the IKV by companies in the private sector. The IKV allow employers to pay to their employees who commute by bicycle or electric bike, 0.25€ per kilometer. For the employer, this cycling allowance is exempt from social security contributions, within the limit of €200 per year per employee, and on the basis of kilometers travelled by employees to get to work (Article L3261-3-1 of labor laws). The IKV constitutes a new strategy to promote cycling (Haubold, 2014).

Concerning other facilities, more than 1,000 “give way” signs have been put on traffic lights. All across France, associations, local authorities (PDU) and businesses (PDE) propose cycling courses to help a variety of publics (school students, adults, people with disabilities, etc.) to learn how to ride a bicycle in the city, by learning balance, riding in city traffic, small repairs, etc. Since 2011, a national day of cycling schools is organized during the European Mobility Week (MEDDE, 2014).

A legal obligation in France since 1996 (article L 228.2 of the environment code-LAURE) states that during the creation or renovation of urban roads (e.g. tram network development), cycling routes must be developed. The question that arises from this law is whether the increase of the cycling network in France results from a conscientious effort from stakeholders with a real commitment to promote and develop utilitarian cycling or, from a mere requirement that stakeholders followed without ensuring that conditions are adapted for utilitarian cyclists,. In addition, there are only around 70 utilitarian urban cycling schools in France (ADEME, 2016) and most of them operate as volunteer groups in an association; it is rare that a municipality has its own utilitarian urban school.

Despite the mentioned strategies to promote utilitarian cycling, the cycling modal share in France remains low, only 3% (ENTD, 2008). The important efforts were principally based on cycling infrastructure, and even if there are other kinds of actions (e.g. Urban Mobility Plans) to promote utilitarian urban cycling, in general, the users, and more importantly the potential users, have not necessarily been placed at the center of actions. In this Ph.D. thesis, we propose to consider individual factors for a broader understanding of cycling, in order to be able to develop other kinds of promotion actions that could be a complement to the already used strategies. This would participate to build an integrative approach to the utilitarian urban cycling, combining individual and external factors.

2. THEORETICAL FRAMEWORK

For me, a theory exists only insofar
as it fosters a practice of discovery,
of facing social problems,
and gives some meaning to our lives.

Moscovici, 1997

The general aim of this Ph.D. thesis is to contribute through a more integrative approach to a better understanding of utilitarian cycling in urban settings, from the individual's viewpoint. More precisely, we will focus on individual factors that in complement of the external factors could impact cycling practice, and will describe here the theoretical framework relevant to these individual factors. The theoretical framework thus comprises two main sections. In the first section we will present two theoretical psychological concepts, representation and motivation, which could help to explain the reasons to use or not to use cycling as a mode of transport. In the second section, we will focus on one of the negative arguments for not using the bicycle as a mode of transport, aggression perceived by cyclists from car drivers' behaviors. We will present the theoretical concept of aggression, as well as the factors related to the perception by cyclists of aggression from car drivers' behaviors.

2.1 REASONS FOR UTILITARIAN URBAN CYCLING

In this section we focus on the factors that lead to use or not to use the bicycle as a mode of transportation, and try to provide elements that can help to answer the question: what makes someone adopt cycling for utilitarian purposes? We review the literature on cycling, as well as the psychological approaches in order to identify the most interesting factors that could be determinants of cycling or not cycling.

In the literature about cycling, the question is addressed through two approaches: the engineering and the individual factors. The first one, the classical approach in transport, is a technical approach principally adopted by engineers or urban planners who state that it is the cycling infrastructure that makes someone cycle. But as we mentioned in the introduction, several studies show that this is not necessarily accurate nor sufficient (see Introduction and Cycling Background chapter).

As we have seen in the introduction, the individual factors approach has been gaining acknowledgement in the research on utilitarian urban cycling. In this approach, cycling can be related to socio-demographic factors (e.g. gender, age), at a basic level, as well as to more complex theoretically based psychology concepts. Indeed, several of these concepts have been recently applied to the study of cycling, for example attitudes, motivations, image of cycling, decisional process (modal choice), or behavioral change theories such as the theory of planned behavior (TPB; Ajzen, 1985), transtheoretical model of change (Prochaska & DiClemente, 1983), etc. However, in these studies, some concepts were not sufficiently taken into account or not clearly theoretically differentiated (e.g. using the term motivations when measuring beliefs). Thus, this approach has not yet found the answers to successfully explain why people decide to use or not the bicycle as a mode of transport.

As of now, there is still a lack of understanding of the main psychological determinants of cycling. Therefore, we came back to the main question, the reasons for utilitarian urban cycling, with the aim of employing differently the theoretical psychological concepts that could provide clearer explanations. Two concepts in particular appear as the theoretical approach best suited to address the question: representation and motivation. In the next subsections, these two concepts will be presented and their relevance to the issue will be explained.

2.1.1 The Representation of Cycling: Advantages and Disadvantages

In order to delimit the concept of representation, we present different definitions of representation, as well as more elaborated concepts such as mental representation, representation social, and attitudes. These three concepts and the theoretical development around them play an important role in the construction of the concept of representation that we chose to use in this Ph.D. thesis.

2.1.1.1 The Concept of Representation: from Mental to Cognitive Representation

First, as Morgan (2014) mentioned: "representations represent something" (p. 218). In other words, a representation corresponds to the information, the knowledge that someone has about an object, a behavior, a person, an activity, etc. Jovchelovitch (2007) proposed to understand representation "as a dialogical form generated by the interrelations between self, others and object-world" (p. 2). According to Smith and Queller (2001), a representation is defined by psychologists "as an encoding of information in memory. An individual can create, retain, and access representations" (p. 112). Thus, for these authors, many of the principal concepts of social psychology are mental representations, including the self-concept, attitudes, stereotypes, and impressions of other people and objects. According to the American Psychological Association (2007), representation is defined as:

> 1. a mental structure of encoded information that corresponds to some object or concept. 2. in psychoanalytic theory, the use of symbols to stand for a threatening object or a represented impulse. 3. more generally, the use of any object, figure, or image to stand for or signify something (p. 789).

From the perspective of cognitive science, the notion of mental representations is defined as information-bearing structures that are the occurrence, transformation and storage (in the mind/brain) of cognitive states or processes (Pitt, 2013). Besides, other authors in this same approach specify this notion as a cognitive representation, defining it as a "correspondence (mapping) from objects in the represented world to objects in the representing world such that at least some relations in the represented world are structurally preserved in the representing world" (Palmer, 1978, p. 266). In this sense, the represented world refers to the "reality" that someone observed, whereas the representing world refers to the cognitive representations. In cognitive social psychology, mental representations are categorized in different kinds, for instance: associative networks, schemas, exemplars, and distributed representations (Smith & Queller, 2001). This type of classification allow to established assumptions about the formation, the structure and the functioning in memory of mental representations.

The idea of representing the reality or the word (the "outside word") was also addressed by Moscovici (2000), who explained representations as that "which either direct us toward that which is visible and to which we have to respond; or which relate appearance and reality; or again which define this reality (…) Where reality is concerned, these representations are all we have that to which our perceptual, as well as, our cognitive systems are adjusted" (p. 20). In this explanation, Moscovici referred to the explanation of the cognitive system and how the individuals apprehend the "reality" in order to construct knowledge. Indeed, knowledge, the information about something, is materialized somehow, as one expert of the theories of knowledge reminds asking: "how the elaboration that leads to knowledge takes place, which prisms the reality went through before becoming an object for a subject who knows" (Besnier, 2005, p. 12). The theorist of knowledge "finally has to convince himself that he is essentially dealing with his representations, that there is no knowledge without the intervention of signs to interpret reality and therefore, the mechanism of production of these representations and these signs can only provide the keys to the understanding of the power of man to assimilate what is not him" (Besnier, 2005, p. 12). The knowledge obtains a personal dimension when it is materialized into representations. In this sense, "it is through representation that we can understand both the diversity and the expressiveness of all knowledge system" (Jovchelovitch, 2007, p. 2). Besides this construction of knowledge, this representation of the world is a personal process submerged in a social dimension, since "the human child cannot produce herself as a feeling and thinking self without the participation of other human beings" (Jovchelovitch, 2007, p. 3).

The study of the psychology of knowledge led Moscovici to conceptualize representation by including its social dimension. Therefore his work on representation went farther than the question of knowledge and allowed to develop the social representation theory, in which "social representation should be seen as a specific way of understanding, and communicating, what we know already" (Moscovici, 2000, p. 31). According to Jodelet (2011), the theory of social representation emerged from the original intention of Moscovici to contribute to a theory of knowledge, by combining the contributions of several disciplines such as social psychology, sociology, and anthropology to address a concept and phenomena of cognitive and social nature, which was developed in his book on psychoanalysis (edited in 1961).

2.1.1.2 From the Concept of Cognitive Representation to Social Representations Theory

Social representation has several definitions, principally due to the "actual phenomena" that has a large history already and also because its development has generated diverse approaches. The classic definition of social representations, given by Moscovici (1973) is that social representations are:

> systems of values, ideas, and practices which enable communication to take place among the members of a community by providing them with a code for social

> exchange and a code for naming and classifying unambiguously the various aspects of their world and their individual and group history (p.xiii).

According to Herzlich (1973), social representations constitute a body of information and beliefs about an object. A social representation operates like a group of cognitive elements (Flament, 1994) whose nature and complexity vary from simple images and opinions, to intricate stereotypes or categories (Moliner & Tafani, 1997). The initial Moscovici's concept of representation finished to be integrated in the theory of social representation[4]. What differs between the notion of representation and the notion of social representation is that the latter put the most importance on the characteristic of "share" by society or by a community and solved the individual differences about "common sense".

Retracing the development of the theory of social representation, Wagner et al. (1999) showed that the concept of social representation corresponded to the initial meaning of "social attitude" developed by Thomas and Znaniecki (1919). The concept of social representation was presented by Moscovici for the first time to the English-speaking community in an Annual Review paper on attitudes and opinions (Wagner et al., 1999). According to Moliner and Tafani (1997), "Moscovici's theory called upon attitudes to account for the structure of social representations" (p. 690). This is one of the principles underlying the concept of attitude, individuals possess a representation of the attitudinal object. Thus, even if one of the gaps that separate attitudes from social representations is that attitudes are individual and representations are collective, Moliner and Tafani (1997) proposed a framework incorporating both attitudes and social representation in the same paradigm. However, the currently used concept of attitude is more related to representational processes than to social representation theory.

In this sense, the concept of representation is closely related to the concept of attitudes. For these reasons it is necessary to explore the concept of attitude, as well as its relationship with the concept of representation, to understand representation and be able to study its role as a possible determinant of utilitarian urban cycling.

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[4] Moscovici (1997) said that "shared representations are there to set up and build a common "reality", a common sense which becomes "normal", taken for granted at the end of a conflict between competing representations, common practices" (p. 4). He also mentioned that the aim of the social representation theory "was to offer a plausible model of how knowledge and meaning are shared, and why transformation, generation of knowledge, cannot but be a social process, not an individual one (…) I do not mean that the individual aspects are negligible, or that the individual counts for nothing. But the social is logically unavoidable as a basic "ingredient" because a way of representing is also a way of communicating" (p. 3).

2.1.1.3 The Concept of Attitude, other Conceptualizations of Representation

The concept of attitude has long been considered a central concept of social psychology, in particular because attitudes are supposed to influence behavior. The concept of attitude has changed over the years to the point that the definition is not a fixed consensus among psychologists, some definitions are unidimensional and others are multicomponent. The initial definitions of attitudes were wide, for example, Allport (1935) defined attitude as "a mental and neural state of readiness, organized through experience, exerting a directive and dynamic influence upon the individual's response to all objects and situations with which it is related" (p. 810). As we can see here, this definition of attitude is close to the definition of representation proposed by Jovchelovitch (2007) mentioned before. However, as explained by Schwarz and Bohner (2007), in the following decades, the concept of attitude lost much of its width, especially because of two known discussions, the Attitude-Behavior problem (LaPiere, 1934; Wicker, 1969) and the Attitude-Object problem (Asch, 1948). Due to that, currently, the concept of attitude has been largely reduced to its evaluation character as the most important or even sole component. Thus, Eagly and Chaiken (1993) defined attitude as a "psychological tendency, expressed by evaluating a particular entity with some degree of favor or disfavor" (p. 1). In other words, attitudes express approval or disapproval, favorability or unfavorability, likes or dislikes. In this sense, attitudes could be positive or negative; e.g. I like or I do not like utilitarian urban cycling. This definition of attitude corresponds to the first definition offered by APA Dictionary of Psychology (2007), in which attitude is defined as "1. in social psychology, a relatively enduring and general evaluation of an object, person, group, issue, or concept on a scale ranging from negative to positive" (p. 83).

However, other definitions of attitude bring the concept of attitude closer to the concept of representation. Hogg and Vaughn (2005) proposed the definition of an attitude as "a relatively enduring organization of beliefs, feelings, and behavioral tendencies toward socially significant objects, groups, events or symbols" (p. 150). This definition is closer to the definition of representation proposed by Jovchelovitch (2007), and to the second definition proposed by the APA Dictionary of Psychology (2007): "2. any subjective belief or evaluation associated with an object" (p. 83). Likewise, Cunningham, Zelazo, Packer, and Van Bavel (2007) mentioned that the iterative reprocessing (IR) model represents a combined view in that "current evaluations are constructed from relatively stable attitude representations" (p. 736). In the IR Model, the evaluative processes are part of an iterative cycle: "with every iteration, the current evaluation of a stimulus can be adjusted in light of additional contextual and motivational information in order to create an updated evaluation in line with finer stimulus detail, the context, and/or current goals (…). This 'reseeding' of information allows for the foregrounding of relevant (and backgrounding of irrelevant) attitude representations and contextual information in order to develop a more nuanced evaluation congruent with current goals" (p. 739).

The relationship between attitude and representation is also a source of discussion in the perspective of cognitive social psychology, opposing distributed connectionist models versus localist and symbolic models. In order to address the questions about the multiplicity of attitudes and their stability (or instability) over time, Conrey and Smith (2007) reviewed the model of attribute representation in a distributed, connectionist memory system placing the attitudes as time-dependent states of the system (attitudes as occurrent patterns of activation) rather than as static elements that are "stored" in memory.

Other definitions of attitudes correspond to the ancient psychological paradigm of stimuli-response, as such for Rosenberg and Hovland (1960) attitudes are "predispositions to respond to some class of stimuli with certain classes of response" (p. 3). Thus, these authors distinguished three dimensions in the attitudes: affective, cognitive and conative/behavioral (Rosenberg & Hovland, 1960; Zanna & Rempel, 1988). In this three-component model of attitudes, the affective component concerns positive or negative emotions that the individual has toward the attitudinal object, a predisposition to evaluate this object as good or bad, interesting or uninteresting, etc. In other words, and attitudinal object could arouse positive and negative emotions, feelings and mood states. The cognitive component refers to knowledge and beliefs, present and past, which the individual has about the attitudinal object and the credibility that the individual gives to this information. The behavioral component (conative) is an energy component in that it relates to the past and present behavior of the individual toward the attitudinal object and its future behavioral intentions.

Following this three-component model of attitudes, Fishbein and Ajzen (1975) made a distinction between the attitude concept, beliefs, and behavioral intentions. According to them, beliefs refer to information, knowledge or opinions about the attitudinal object; this corresponds to the cognitive component in the three-component model. Behavioral intentions refer to the predispositions to behave in a special way toward the attitudinal object; this corresponds to the conative/behavioral component in the three-component model. Thus, the concept of attitudes corresponds to the emotions, positive or negative, liked to the attitudinal object; corresponding to the affective component in the three-component model.

The work of Fishbein and Ajzen evolved to the conceptualization of the theory of reasoned action, TRA (Ajzen & Fishbein, 1980) in which they modeled a relationship between attitudes and behavior, incorporating a social norm component. In their theory, they proposed that the intention to perform or not to perform a behavior is the main determinant of this behavior, and that intention is predicted by two factors: attitudes and subjective norm. Attitudes toward the behavior are based on personal beliefs of the outcomes of the behavior. The subjective norm corresponds to normative beliefs about others' expectations and the personal motivation to comply with these expectations (perceived social pressure).

This reasoned action theory was later extended to form the theory of planned behavior, TPB (Ajzen, 1985) including the perceived behavioral control component as a further determinant of both behavioral intention and behavior itself. Perceived behavioral control is people's personal perceptions of their ability to achieve a given behavior (self-efficacy theory, Bandura, 1977). Perceived behavioral control is formed by the control beliefs, which are the beliefs about the presence of factors or events that could facilitate or impede the behavior's performance and about the perceived power of these factors or events.

Thus there is a strong relationship between the theoretical developments of the concept of representation (mental representation and social representation) and the concept of attitudes. Even when the developments of both these concepts contribute to the concept of representation that we use, our concept is voluntarily bordered in order to frame it in the context of our study.

2.1.1.4 Representation in this Ph.D. Thesis

In the context of our studies, the concept of representation corresponds to information, knowledge, cognitive evaluations and beliefs about cycling and its associated characteristics, in terms of positive and negative components, based on the description made by Jovchelovitch (2007) where representation "is at the basis of all knowledge system and understanding its genesis, development and realization in social life provides the key to understanding the relationship that ties knowledge to person, communities and lifeworlds" (Jovchelovitch, 2007, p. 2). We lean on this viewpoint of representation because it is integrative and includes the knowledge and information, from the concept of mental representation, as well as the social dimension of the construction of knowledge, from the concept of social representation. Additionally, we associated to this perspective the positive and negative features and the peculiarity of a precursor of the behavior, both components offered by the concept of attitude. Thus, we chose to use the concept of representation as a construction of these three theoretical concepts: mental representation, social representation, and attitudes; in order to apply it to the study of utilitarian urban cycling.

Even if these three concepts, mental representation, social representation and attitudes, help us to define and delimit our concept of representation, we do not go in depth to the development that the theories and models around these three concepts have done. This is principally because these developments do not fit with the aims of our study[5]. Concerning the concept of representation we are more interested in the components of the representation of cycling, positive (advantages) and negative (disadvantages), for the participants in our studies. We take into account that the representation, as the information that someone has of an object or an action, comes from diverse sources, which includes society and its social construction. Thus, when we talk in our studies about the concept of representation, we do not deny its social character, but we are not interested at this stage of research in defining which is the social representation of cycling shared by the society or by all our participants.

In our research, we refer principally to the concept of mental, internal or subjective representation to define the positive and negative arguments related to cycling. Additionally, our aim is to distinguish the representation of our "object", cycling as a mode of transport in urban settings, from the motivation too cycle or to not cycle, and to study the difference in these two concepts between cyclists and non-cyclists. Thus, we consider both representation and motivation as two components that could explain the choice of cycling as a mode of transport, and thus why someone uses or not the bicycle as a mode of transport in urban

[5] The development around the concept of mental representation has focused principally on how the information is recalled or activated in memory. Besides, the theory of social representation as developed by Moscovici has delved into how the social representations socially define an object. In particular, using the structural or central nucleus ("central core" or "noyau central" in French) approach developed by Abric (1976), the theory of Social Representation is used principally to define both elements of the structure of a specific social representation. In addition, in this study, our aim is not to define the social representation of urban cycling. Accordingly, the theoretical development of the attitude concept has focused on determining the structure of the attitudes (Rosenberg & Hovland, 1960; Zanna & Rempel, 1988) or the evaluative aspect of the attitudes (Eagly & Chaiken, 1993). Likewise, the theory of reasoned action (TRA, Ajzen and Fishbein, 1980) and its improved version, the theory of planned behavior (TPB, Ajzen, 1985) could be used for other purposes that are not in line with our aims.

settings. In the next section, the concept of motivation and the principal theories and model are presented.

2.1.2 Motivations: Levers toward the Cycling Use and Barriers Preventing Cycling Use

The second concept in psychology that could help us to understand the question about the use and the non-use of utilitarian urban cycling is the concept of motivations. As for the concept of representation, the concept of motivation entailed a considerable literature, as well as an important number of theories that could be grouped in few perspectives. The diverse theories of motivation bring a large quantity of research on motivational phenomena from different angles (e.g. behaviorism, social cognition, social psychology, clinical psychology), and applied to different objects in different fields (e.g. education, work, sport). Besides, motivation is commonly associated with other psychological mechanisms (e.g. attention, perception, judgment). As such, there are many definitions of the concept of motivation and as with the concept of representation, we need to explore some of the definitions in order to delimit the concept of motivation most appropriate for our studies. However, is it important to remark as mentioned by (Forgas, Williams, & Laham, 2009) referring to motivation, that "understanding how and why people adopt a purposive action is one of the most interesting yet complex tasks in social psychology" (p. 15).

In this subsection, we start with the historic perspectives of the concept of motivation, in order to understand the current definition of motivation. Then, we will present the main theory of motivation used in the conceptualization of motivation in this Ph.D. thesis, as well as a model explaining the role of motivation on behavior.

2.1.2.1 What is Motivation? Three Perspectives on the Concept of Motivation

To understand the actual definition of motivation, we will present the three main historic perspectives of the concept of motivation. One of the first precursors was the concept of *will,* used by philosophers, whereas the term motivation only appeared in psychology in the 1880's (Forgas et al., 2009). Other initial concepts that contributed to the development of the actual concept of motivation were *instinct*, *drive cathexis* or *libido* (Freud, 1957), *directed volition* (James, 1890), *drive* (Hull, 1943), and *goal intention* (Lewin, 1951).

According to Higgins (2012), there are three main perspectives about motivation. The first one is the perspective that considered motivation as *all-purpose energy to be directed.* In this perspective, motivation is conceptualized as an energy that pumps the actor to do something. Additionally, if the task is perceived difficult but feasible when the actor is highly motivated, more effort is allocated in order to perform the task. This viewpoint was criticized, among other things, because it failed to distinguish qualitatively different types of motivation sources. For instance, whether energy was created by a positive or negative incentive ("carrot/stick"), was not given importance as long as the resulting energy could be directed toward the desired destination.

Another important historic perspective considered motivation *as approaching something or avoiding something* in order to maximize pleasure and minimize pain Higgins (2012). In this sense, the term motivation is defined as what moves or initiate motion; motivation is viewed as movement. Several models supported this second perspective such as *learning/biological models* (Gray, 1982), *control models* (Carver & Scheier, 1990) and *dynamic model* (McClelland, Atkinson, Clark, & Lowell, 1953). These models, in various ways, considered motivation as a will to move toward desired end-states, and furthermore to move away from undesired end-states, following the hedonic principle. According to Higgins (2012), one problem with this perspective of motivation as toward and backward movement is that it does not take into account that sometimes motivation does not need to produce any movement (e.g. when someone freezes in a fear state). Besides, another problem with this perspective is that "the amount of energy that is invested in doing something does not directly reflect the strength of motivation to succeed at it" (p. 45).

According to Higgins (2012) much attention has been given to motivation as essentially based on the principles of surviving, satisfaction of needs, and also with the Greek hedonic principle of pleasure seeking. It has been considered for granted that these two principles are going in the same line. It is true that the satisfaction of needs could be felt as a reward or a pleasure when they are fulfilled, however "the motivation for pleasure, such as sweetness, is so important that it can even trump the motivation to satisfy basic biological needs" (Higgins, 2012, p. 30). For instance, feeding on junk food, which is against the survival principle of being healthy, is often experienced as pleasant. Also for these reasons, these two perspectives of motivation, as *all-purpose energy to be directed* and as *approaching something or avoiding something,* became insufficient in the light of multiple and complex human motivations.

In order to complement the two previous perspectives of motivation and go further than the survival principle and the hedonic principle, a perspective that integrates the scope considering motivation "*as preferences directing choices in order to be effective in life pursuits*" (Higgins, 2012) was proposed. This third perspective is supported by several concepts such as *optimal stimulation* (Hebb, 1955), *competence* (White, 1959) and *self-efficacy* (Bandura, 1977). Motivation here involved the idea of making a choice, or several choices, because of the particular goal of being effective. It is not only referred as the widespread view of economists that considered that individuals chose the highest utility alternative in terms of best benefits-to-cost or gain-to-loss ratio of outcomes. Indeed, the perspective also considered that individuals have preferences and strategies at multiple levels. According to Higgins (2012), these strategic preferences "can have a major impact on how goals are pursued, which in turn can influence what choices are made independent of the outcomes that are associated with the choice alternatives" (p. 25).

The term "effective" is considered in this third perspective as "effectance", the motivational aspect of competences (White, 1959) and "efficacy". Being effective here means making choices in order to be successful, and thus it generally involves preferences directing choices (Higgins, 2012). These preferences and the idea of success is determined by individuals, who can have a personal definition of success different from the one of society or those around definition of successful. In this sense, "the motivation to be effective—wanting to succeed at something—can trump hedonic and survival concerns" (p. 41). The choices or the motivations of individuals "are not based only on the hedonic outcome they anticipate. There are other kinds of outcomes, such as knowing the truth about something (even when the truth hurts)" (p. 42). For instance, the engagement in life-threatening activities such as extreme sport or the engagements in a sportive carrier as done by high-performance athletes generally imply important difficulties and even intense suffering. But here, the underlying motivation is to develop physical or mental competences and to be able to overcome important obstacles; in other words, the motivation is the challenge. In this perspective pleasure and pain, instead of being seen as the initiators of motivation, are seen as the feedback signals about whether the goal pursuit has been effective or not; the motivation is to be effective (Higgins, 2012).

Another difference between this perspective and the two previous perspectives is that here more importance is given to the experience of the actor. Besides, the outcome or the result of a behavior is not the only source of preference or motivation, "people also prefer do something in a particular way" (Higgins, 2012, p. 42). For instance, according to the Regulatory Focus Theory (Cesario, Higgins, & Scholer, 2008; Higgins, 1997, 1998) an eager way will be preferred by promotion-focused individuals and a vigilant way by prevention-focused individuals. Thus, more that needs, pleasure or rationality, people have their own motivations and a particular way to do what they want to do. In this sense, their goals, the environment, the context, the others, the experience could influence what people want.

2.1.2.2 The Current Motivation Concept

After regarding these three historical perspectives of motivation, as an all-purpose energy to be directed, as approaching something or avoiding something, and as preferences directing choices in order to be effective in life-goal pursuits, which allow us to present the evolution and the complexity of the concept of motivation, it is important to take into account the main current definitions to complete the overview of motivation. According to the APA Dictionary of Psychology (2007), motivation is defined under four entries; the first one is:

> The impetus that gives purpose or direction to human or animal behavior and operates at conscious or unconscious level. Motives are frequently divided into (a) physiological, primary, or organic motives, such as hunger, thirst, need for sleep and (b) personal, social or secondary motives, such as affiliation, competition and individual interest or goals. An important distinction must also be drawn between internal motivating forces and external factors, such as rewards or punishment, that can encourage or discourage certain behaviors (p. 594) [6].

The first part of this entry could be considered as associated with the first perspective previously described, motivation as an *all-purpose energy to be directed*. In this entry are also distinguished two types of motives. The first type of motive is related to the principle of surviving, also previously mentioned. The second type of motive accounts for the third perspective of motivation, *as preferences directing choices*. However the classification of motives in only two categories is particularly narrow. There are many classifications of human motives or needs, but among the wider and most distinguished is the hierarchy proposed by

[6] The other three entries for motivation definition according to the APA Dictionary of Psychology are: 2. in conditioning, the variables, collectively, that alter the effectiveness of reinforces. 3. a person's willingness to exert physical or mental effort in pursuit of goal or outcome. 4. the act or process of encouraging others to exert themselves in pursuit of a group or organizational goal (p. 594).

Maslow (1943), in which the human needs are conceived in a pyramid shape. In the bottom level are placed the most fundamental needs, such as physiological need to survive; then are placed the safety needs; the needs for love, affection and belonging; the needs for esteem; and at the top, the need for self-actualization. According to Maslow's theory of human motivation, when a level of needs is satisfied, the needs or motives in the next level emerge. At the end of the APA definition, are mentioned two types of sources of motivation, internal and external. These two sources will be explained at the end of the chapter with the theory of self-determination (Ryan & Deci, 2000b).

Another important definition of motivation was proposed by (Atkinson, 1958), one of the most important contributors to the scientific study of motivation, as "the arousal of a tendency to act to produce one or more effects. The term motivation points to the final strength of the action tendency which is experienced by the person as an 'I want to'…" (p. 602). Besides, as a further feature of motivation this author considered that "the particular aim of the momentary state of motivation is situationally defined" (p. 602). Here it is important to make a difference between "arousal", the term used in this definition, and "disposition", another term used in the understanding of motivation. For example, the individual's disposition is the name of the generalized state of hunger, anxiety or fear, and the specific behavior toward a particular goal is the result of its arousal (Roeckelein, 2006). The theories of motivation that center on arousal are generally those that include the role of brain structures and neural mechanisms on motivated behavior. These theories could be considered as a fourth perspective of the concept of motivation.

Fenouillet (2012) in his book on "the theories of motivations" presented an integrative and general definition of motivation, "a hypothetical intra-individual protean strength, which can have internal and/or multiple external determinants, and which allows to explain the direction, the beginning, the persistence and the intensity of the behavior or the action" (p. 9). Additionally, the characteristic related to the "hypothetic construct" is explained by Nevid (2012) when he mentions that "we don't actually observe a motive; rather, we infer that one exists based on the behavior we observe" (p. 288).

Finally, for Ryan and Deci (2000), motivation concerns "energy, direction, persistence and equifinality--all aspects of activation and intention" (p. 69). Motivations are the personal reasons that trigger one's decision to do something, with varying degrees of strength and involving a volition process. These authors also proposed a model of motivation that contributes to understanding even more the concept of motivation.

2.1.2.3 Theory of Self-Determination (Ryan & Deci, 2000)

One of the most widespread theories that have attempted to conceptualize the motivation process is the self-determination theory, SDT (Ryan & Deci, 2000b), which distinguishes different types of motivation. According to Deci and Ryan (2000), the beginning of their theory is "the postulate that humans are active, growth-oriented organisms who are naturally inclined toward integration of their psychic elements into a unified sense of self and integration of themselves into larger social structures" (p. 229). In other words, for them SDT suggests that it is natural for the individual "to engage interesting activities, to exercise capacities, to pursue connectedness in social groups" (p. 229). These natural developmental tendencies do not function automatically, they necessitate ongoing social nutriments and supports. Thus, the social context can support or thwart this tendency, or, in contrast, can catalyze lack of integration, defense, and fulfillment of need-substitutes. After the essential biological needs, this theory suggested that for optimal development and functioning, there are at least three universal psychological needs: needs for competence, autonomy, and relatedness. This theory is in line with the third perspective explained in the begging of this subsection, the motivation as *preferences directing choices in order to be effective in life pursuits.*

a) Two Types of Motivation: Intrinsic and Extrinsic Motivation

In the self-determination theory (Ryan & Deci, 2000b), the most fundamental distinction is between intrinsic and extrinsic motivations, based on the different reasons or goals that give rise to an action. Intrinsic motivation is defined by Ryan and Deci (2000a) as "the doing of an activity for its inherent satisfactions rather than for some separable consequence. When intrinsically motivated a person is moved to act for the fun or challenge entailed rather than because of external prods, pressures, or rewards" (p. 56). In general, intrinsic motivation implies an active engagement in the activity that people find interesting, novel, or challenging, and thus, promotes growth. To be intrinsically motivated to cycling implies that the individual finds cycling inherently interesting or enjoyable.

Extrinsic motivation is defined as "a construct that pertains whenever an activity is done in order to attain some separable outcome" (Ryan & Deci, 2000a, p. 60). Being extrinsically motivated to do something means that a person is interested in an instrumental value. The authors proposed that "extrinsic motivation can vary greatly in the degree to which it is autonomous" (p. 60). For example, individuals can decide to cycle because they want to save money or because they personally believe it is good for the environment and congruent with their self (and values). In both cases, they are extrinsically motivated because they are cycling for its instrumental value rather than because they find cycling interesting in itself. Both examples involve instrumentalities, but the latter example requires personal endorsement, a feeling of choice, a form of an internal reward. The former example involves more outward profit. Thus, both types of motivation characterize "intentional behaviors, but the two types of extrinsic motivation vary in their relative autonomy" (p. 60).

b) The Self-Determination Continuum

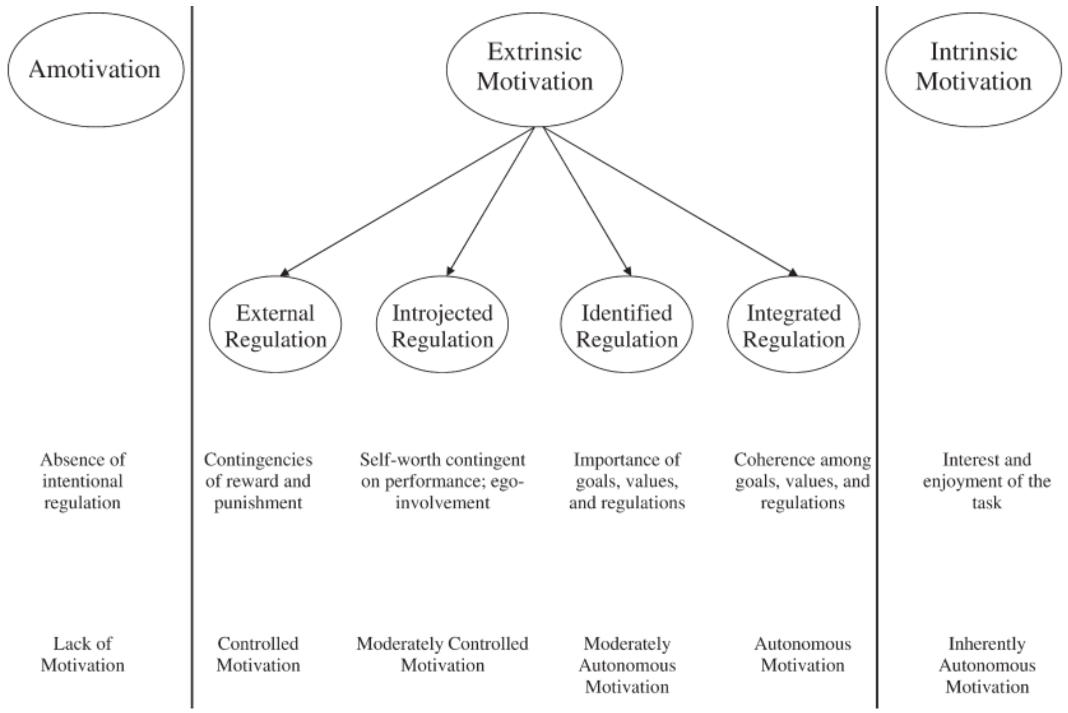

Figure 5
The self-determination continuum (Gagné & Deci, 2005) showing the three types of motivation, the subtypes of extrinsic motivation in a continuum of internalization and the nature of the regulation for each type of motivation and its placement along the continuum indexing the degree to which each represents autonomous motivation.

The four subtypes of extrinsic motivation are positioned along a continuum of *internalization* (see Figure 5). First, the lowest-autonomy subtype is *externally regulated*, where individuals are externally controlled, such as when acting for tangible rewards or fear of punishment. The next subtype is labeled *introjected regulation,* which involves taking in a regulation but not fully accepting it as one's own. This is the case when individuals follow social norms in order to avoid guilt and anxiety or feel pride and worth. Afterwards, there is *regulation through identification*, in which individuals consciously acknowledge the underlying value of the goal or activity. Lastly, the highest-autonomy subtype is *integrated regulation*. Integration happens when "identified regulations are fully assimilated to the self, which means they have been evaluated and brought into congruence with one's other values and needs" (Ryan & Deci, 2000a, p. 73).

Deci and Ryan (1985), in this organismic integration theory (OIT) placed these four subtypes of extrinsic motivation in the middle of the self-determination continuum. Besides, at the far left of the continuum they placed the *amotivation*, which is "the state of lacking the intention to act. When amotivated, people either do not act at all or act without intent--they just go through the motions" (Ryan & Deci, 2000b, p. 72). At the far right of the continuum they placed the *intrinsic motivation*, the inherent satisfaction for doing an activity, that is "highly autonomous and represents the prototypic instance of self-determination" (p. 72). Because motivations are not the only factors related to the accomplishment of a particular behavior, we looked for a model that let us have a general vision of the role of motivation and other factors in a specific behavior.

2.1.2.4. Model of Goal-Directed Behaviour (MGB; Perugini & Bagozzi, 2001)

After the theory of self-determination, we present a complementary model of motivation, which is relevant to see the articulation of motivation and other factors, and their role in the decision to perform a behavior from a more general perspective. This model of motivation is the Goal-Directed Behaviour Model (see Figure 6) proposed by Perugini and Bagozzi (2001).

It is based on the theory of planned behavior (TPB; Ajzen, 1985), but the authors proposed a new model of purposive behavior where "desires are the proximal causes of intentions, and the traditional antecedents in the TPB work through desires" (Perugini & Bagozzi, 2001, p. 79). According to these authors, desires "represent the motivational state of mind wherein appraisals and reasons to act are transformed into a motivation to do so"

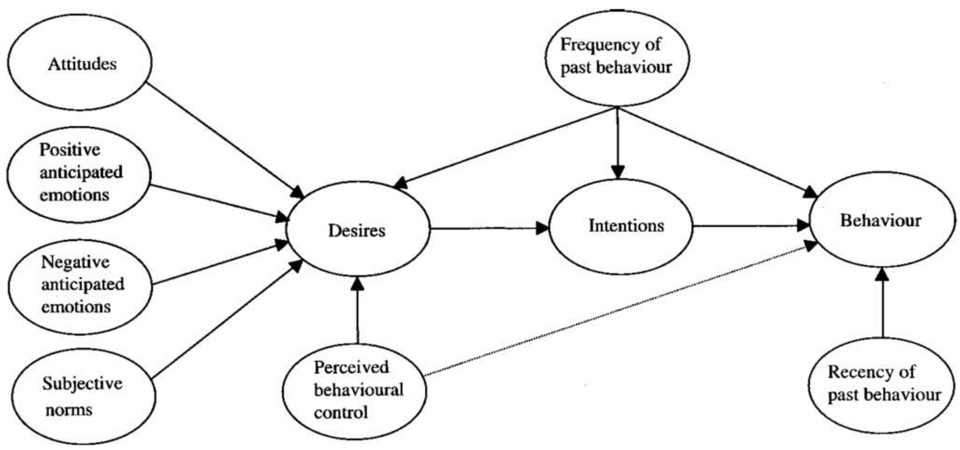

Figure 6
The Model of Goal-Directed Behaviour (MGB; Perugini & Bagozzi, 2001)

(p. 84). In addition, they called "anticipated emotions" the perceived consequences of goal achievement and goal failure. The anticipated emotions are determinants of desires, as well as the "attitudes" and the "subjective norms"; these latter already existed in the TPB model.

Another important difference with the TPB is that the MGB also distinguishes two dimensions in the "past behavior": frequency and recency. According to Perugini and Bagozzi (2001), frequency refers to "a long history of performing a given behavior" (p. 84) that could be stopped for a particular reason (without having performed the behavior recently) or could be pursued. On the other hand, recency refers to "the recent initiation of an activity with no prior experience with this activity" (p.84). Concerning their role in the model, according to the authors "frequency of past behavior is further assumed to be a predictor of desires, intentions, and behavior, whereas recency of past behavior predicts behavior only" (p. 80).

Taking into account this model of motivation, the most interesting aspect is the difference between desires and intention. Desires are defined as "a state of mind whereby an agent has a personal motivation to perform an action or to achieve a goal" (Perugini & Bagozzi, 2004, p. 71), whereas intentions are considered as a general measure of commitment. These authors distinguished desires and intention using three criteria: perceived performability, the perception that the subject can perform the action; action-connectedness, the perceived connection of the action with a goal that the individual wants to attain; and temporal frame, the definite versus indefinite time within which the action is framed.

Regarding utilitarian urban cycling the difference between desire (motivation) and intention can be illustrated with an example: "a person can have the desire to use a bike in the city even when lacking the perception that he/she will be able to do so in his/her city, and in the absence of a specific commitment to act. Moreover, this person may desire to use a bike, but has not necessarily defined where and when to cycle" (Passafaro et al., 2014, p. 78). Thus, an individual who has the intention to use a bicycle as a mode of transport will project the idea of when, where, and how the action will take place.

The MGB articulates the representation (attitudes in the model) and the motivations (desires in the model) as precursors of the behavior, utilitarian urban cycling. We focus our first two empirical studies on the study of representation and motivations as determinants of utilitarian urban cycling, as this MGB illustrate.

2.1.2.5 Motivation in this Ph.D. Thesis

As we showed in this subsection, the concept of motivation is a complex concept that experienced a progression of historic perspectives to arrive at the actual definition. We principally took into consideration the conceptualization of Ryan and Deci (2000) and the model of Perugini and Bagozzi (2001) to frame the concept of motivation. Thus, in our study motivations constitute the motives that move someone directly to an action or behavior; in this case utilitarian urban cycling. According to Corsini and Auerbach (1998), motivation "deals with the 'why' of behavior" (p. 549). This supports our intention of applying this concept to answer the question of the reasons to use a bicycle as a mode of transport. Additionally, we also distinguished two types of motivation. The positive motivations are the movement toward cycling (encouraging) and are called in our study "levers". In contrast, the negative motivations are the movement backward cycling (preventing) and are called "barriers". Besides, we also integrated the intrinsic and extrinsic motivation to categorize the motivations to cycling; intrinsic motivation to cycling is related to the interested in cycling without external rewards, whereas extrinsic motivations to cycling are related to the external outcomes provided by cycling.

2.1.3 Representation and Motivations in this Ph.D. Thesis

These two theoretical concepts, representation and motivation, can be considered as two dimensions of the arguments related to utilitarian urban cycling. Representation is a more basic and general kind of argument, in a cognitive aspect, concerning the processes of information encoding that an individual uses to represent an object or action. This information, its social meaning and the positive and negative attitudes can be created because of personal experiences, but also because of the influence of the social context. In this sense, the representations are not stable, but dynamic, and could be essential in the moment to decide to perform an action or not. Motivations are more specific and more complex type of argument, concerning what specifically moves, drives, pushes someone to undertake an action or prevents someone to do a particular action. Representations can influence what motivates someone to cycle or not to cycle. However, depending on the individual, representations may or may not correspond to motivations. Indeed, even if someone has positive representations about cycling, it may not be enough for them to start cycling. Motivations, which are by definition reasons that trigger the action, and which take into account one's personal characteristics, are likely to be more important than representations in predicting cycling behavior. Thus, representations and motivations could influence distinctly the perception of utilitarian urban cycling.

Representation and motivation are two concepts in psychology that let us understand subjective perspectives of cycling in terms of positive and negative arguments, with positive representation as advantages, negative representation as disadvantages, positive motivation as levers, and negative motivations as barriers. Besides, the arguments related to cycling can also be studied in terms of several dimensions, more than the positive and negative valence. Apart from the intrinsic/extrinsic orientation (Ryan & Deci, 2000a), controllability, the feeling that we can or cannot control the levers or barriers of cycling, could play a role (Weiner, 1986). On one side, an argument with internal control is an argument that we can alter if we wish to do so. On the other side, an argument with external control is an argument that we cannot easily alter. As such, arguments related to cycling can be under external control (e.g. traffic jams, bicycle parking, pollution) or internal control (e.g. going anywhere, taking shortcuts, going faster). The arguments related to cycling can also be categorized as stable or episodic (Weiner, 1986). For example, the existence of cycle paths is a stable argument whereas rain is an episodic argument. These dimensions, controllability and stability, allow us to further explore the types of arguments related to cycling. Thus, cycling-related factors (advantages, disadvantages, levers and barriers) can also include the intrinsic/extrinsic dimension, controllability and stability. Additionally, when people are motivated to cycle but encounter disadvantages or barriers that make cycling complicated, they may or not implement strategies to avoid these disadvantages or barriers. The strategies could be through a particular behavior (e.g. putting several locks or a "U-lock" to avoid bicycle theft) or a reappraisal (e.g. cognitive reevaluation of the disadvantages) to overcome the impediments. Thus, the strategies that one person can use could depend on its own representations and motivations related to cycling.

As part of the main aims of this Ph.D. thesis, we are also interested in differentiating the concept of motivation from the concept of representation. Motivations are in our study the reasons to act, and representations are the information about the object (bicycle) and the action (cycling). Both representation and motivation constitute the precursors of behavior, to use or not to use the bicycle as a mode of transportation in urban settings. This combination of representation and motivation is interesting because it covers the cognitive aspect and the volitional aspect in front of a particular object. In this sense:

> …to understand people one needs to understand what leads them to act as they do, and to understand what leads them to act as they do one needs to know their goals, and to understand their goals one must understand their overall interpretive system, part of which constitutes and interrelates these goals, and to understand their interpretive system—their schemas—one must understand something about the hierarchical relations among these schemas (D'Andrade & Strauss, 1992, p. 31).

Other authors considered these concepts, as suggested by Forgas et al. (2009), "in their various ways, Heider, Lewin, and Festinger all placed significant emphasis on the importance of motivational forces, and both conscious and unconscious mental representation about the social word, as the key to human behavior" (p. 3). Hence, representations and motivations are complementary factors highlighting the advantages and disadvantages, on one side, and the levers and barriers on the other. To our knowledge there are no other studies that compare representations and motivations in a theoretical approach, neither in the study of utilitarian urban cycling.

2.2 CAR DRIVERS' BEHAVIORS PERCEIVED AS AGGRESSIVE BY CYCLISTS

The second section of the theoretical framework concerns in a specific feature of cycling as a mode of transport, the interaction between car drivers and cyclists in urban settings. Such interactions are sometimes conflictual, providing the idea and the feeling that urban cycling is not safe. It can be thus perceived as not safe by cyclists, as actors, but also by the spectators, including potential users, and those who interact with cyclists. This may be independent from the number of accidents or whether there is adequate cycling infrastructure to reduce accidents, which are questions more related to objective risk. As psychologists we are especially concerned about users' perception and interpretation. Thus, we will focus on one of the negative arguments, in terms of representation and barriers, of the use of the bicycle as a mode of transport: the perception by cyclists that the car drivers adopt aggressive behavior when interacting with them in urban settings.

Following this, this section begins with the conceptualization of aggression, including a definition and a general model of aggression, in order to understand the perceived aggressive behavior in the interaction between cyclists and car drivers. Then, in order to comprehend this particular interaction and the possible perception of aggression that derives from it, we review important concepts such as perception and the notion of subjective risk. Finally, we present the concepts of intergroup relations, social categorization and social identity to understand the possible reasons for perceived aggression in the interaction between cyclists and car drivers.

2.2.1 Aggressive Behavior

In order to understand perceived aggression it is important to review the perspectives and the definition of the concept of aggression.

2.2.1.1 Different Perspectives on Aggression

Aggression, from a social psychological perspective, is considered as "a social problem in interaction between individuals and between groups, resulting from the joint influence of the personal characteristics of the actors and the situational and societal conditions in which their behavior takes place" (Krahé, 2013, p. 2). In this sense, the manifestation of aggression occurs in individuals or groups relationships, and other kinds of aggression, like a personal aggression (self-destructive) is not included in this perspective, which is in line with our subject of research as we focus precisely on the relationship between cyclists and car drivers. Accordingly, in the social perspective of aggression, the occurrence of aggression is explained by the differences in individuals that appear in the course of their development, these individual differences interact with factors in the social environment and with situational states that are prompted by particular characteristics of social situations. Thus, the understanding of aggression can be possible through the analysis of these social situations and the factors that facilitate or reduce the expression of aggression. This does not mean that non-social factors do not have some effect on the aggressive behavior; on the contrary, the main idea is that aggression occurs in the context of social interaction integrating other factors. In particular, in the case of cycling, the interaction between car drivers and cyclists on the road could include aggressive behaviors or behaviors that are perceived as aggressive without necessarily being aggressive, that maybe will not be presented in other contexts.

In this social psychology perspective can be included the social-learning theory, which considered aggression "to be form of learned and reinforced behavior gained by imitating or observing some other person who engages in aggressive acts" (Roeckelein, 2006, p. 13). According to Roeckelein (2006), apart from biological processes (e.g. hormonal explanation), there have been three principal psychological perspectives of aggression. First is the perspective that considered aggression as instinctual (instinct theory of aggression) in which aggression is an innate tendency to fight. Second is the drive theory of aggression in which aggression stems from a major state of arousal or drive that is reduced through its expression. Additionally, this perspective is considered a widespread frustration-aggression hypothesis, in which frustration produces instigations to respond in an aggressive way. This second perspective gave way to the third perspective, social learning theory, which was considered for a long time the dominant approach of aggression. In this sense, social psychological perspective integrates different theories, especially social learning theory given also importance to situational factors.

2.2.1.2 A Definition of Aggression, from Layperson to Aggression Theorists

It is very important to differentiate the use of the term "aggression" by laypersons and the definition used by psychologists. In general, the culture, the shared values, and the normative beliefs in a society determine the languages and the terms used as a social construction, and can vary between societies and over time (Krahé, 2013), and this applies to the use of the term "aggression". As for motivation, the term aggression is commonly used by individuals in everyday discourse. In the case of aggression, the term is used to refer to a large variety of actions, in particular to qualify someone who is often unfriendly, or when someone "is very forceful and tries to get his own way in his dealing with others, or maybe that he assertively stands up for his beliefs, or perhaps that he usually attempts to solve the problem facing him" (Berkowitz, 1981, p. 4). Sometimes laypersons refer to a "healthy" or "good" aggression differently from a "bad" aggression (Krahé, 2013). However, these uses of the term aggression are not often coherent with the definition of aggression used by experts studying in depth this phenomenon.

Additionally, there is not a consensus between different definitions of aggression by psychologists. One of the most widely accepted definitions was proposed by Baron and Richardson (1994). For them, an aggressive behavior is defined as "any form of behavior directed toward the goal of harming or injuring another living being who is motivated to avoid such treatment" (p. 7). Because this definition is clear, and more specifically because it gives several key concepts and key points to understand aggression, it is the definition adopted in this thesis. Besides, the definition of Baron and Richardson (1994) is more concrete than the definition of the APA dictionary of psychology (2007), in which aggression is a "behavior, motivated by competitiveness, anger or hostility, that result in harm to or destruction or defeat of others or, in some cases, oneself" (p. 30).

Krahé (2013) explained the key concept of *harm* as "any form of treatment that is not wanted by the target persons, such as causing them physical injury, hurting their feelings, damaging their social relationships by spreading rumours about them, or taking away or destroying their cherished possessions" (p. 10). Thus, harm in the definition of aggression comprises physical harm, as well as psychological harm. Another important point of the aggression definition is that the aggressive behavior is principally characterized by its intention to harm or injure someone else, independently of the consequences. In other words, a behavior should only be considered as an "aggression behavior" when someone wants to harm someone else with a particular behavior or action even when no harm was done or achieved in the end. In order to identify a behavior as aggressive, it is the intention and the expectancy that matters. In this sense, behavior is not considered as aggressive "if one person's actions lead to harm or injury of another, but the actor could not have anticipated that the behavior could lead to those adverse effects (…) They could be due to carelessness or incompetence" (Krahé, 2013, p. 9). Another important consideration of this definition is that the "aggressive" behavior is directed to an individual who wants to avoid it. Thus, if the target (the individual) consents, or agrees with, a specific behavior, this behavior is not qualifying as "aggressive" (e.g. cases of masochism or cases of assisted suicide are not considered aggressive behavior).

Table 1
The many faces of aggressive behavior (source Krahé, 2013)

Aspect	Examples
Response modality	
Verbal	• Swearing at someone
Physical	• Hitting someone
Postural	• Making threatening gestures
Relational	• Giving someone "the silent treatment"
Immediacy	
Direct	• Punching someone in the face
Indirect	• Spreading rumors about someone behind their back
Response quality	
Action	• Making another person engage in unwanted sexual acts
Failure to act	• Withholding key information from a colleague at work
Visibility	
Overt	• Humiliating someone in from of others
Covert	• Sending threatening text messages to a classmate
Instigation	
Proactive/Unprovoked	• Grabbing a toy from another child
Reactive/Retaliative	• Yelling at someone after having been physically attacked
Goal direction	
Hostile	• Hitting someone out of anger
Instrumental	• Taking a hostage to secure a ransom
Type of harm	
Physical	• Broken bones
Psychological	• Fear and nightmares
Duration of effects	
Transient	• Minor bruises
Lasting	• Long-term inability to form relationships
Social unit involved	
Individuals	• Intimate partner violence
Groups	• Riots and wars

According to the definition of aggression by Baron and Richardson (1994), many manifestations or behaviors can be qualified as aggressions. To illustrate the diversity, differences faces of aggression are presented in Table 1, including aspects of aggression (categories) and their examples (Krahe, 2013). The categories of aspects in this classification are not exclusive, these categories may be considered in conjunction. Additionally, the examples could belong to several categories of aspects. This table shows the scope of aggressive behaviors, showing in particular that aggressive behaviors are precisely intentioned behavior, as well as the consequences of the aggressive behavior that harm physically or psychologically an individual or a group of individuals. Besides, the table does not present examples of on-road situations where the behaviors are considered aggressive. Identifying these kinds of situations could be more complicated, stressing the importance of the question of perceived aggression.

2.2.1.3 The General Aggression Model, GAM (DeWall & Anderson, 2011)

An integrative framework of aggression that include situational, personological, and biological variables, also containing domain-specific aggression theories, is the General Aggression Model proposed by DeWall and Anderson (2011).

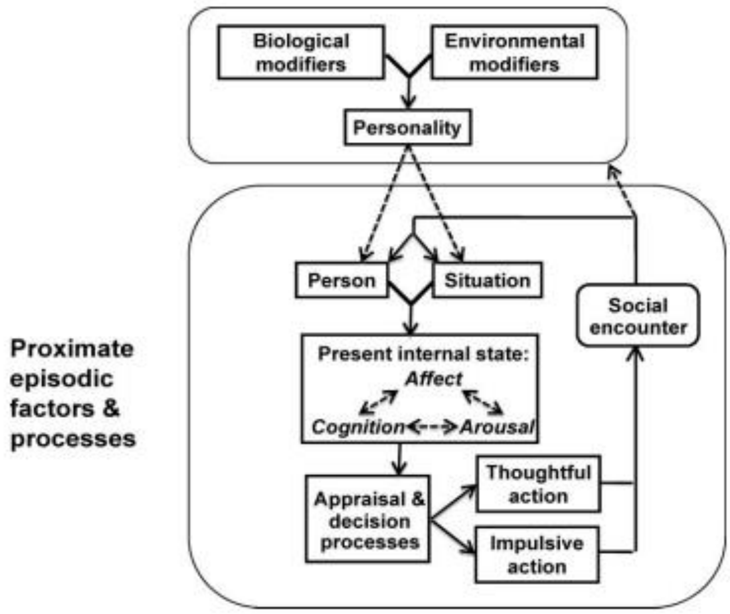

Figure 7
The General Aggression Model (DeWall & Anderson, 2011; source DeWall, Anderson, & Bushman, 2011).

This model is illustrated in Figure 7. In the model, *personal input* (including traits, beliefs, gender, attitudes, motivations, values, among others and other chronic knowledge structures) and *situation input* (including provocation, frustration, exposure to weapons, violent media, drugs, a hot environment, unpleasant odors, loud noises, and physical pain) can influence and increase the feelings a person has (affects), the number of hostile thoughts (cognition), and the physiological activation (arousal). The resulting internal states can then affect the outcomes of the complex appraisal and decision processes. The appraisal and decision processes contain automatic processes (or immediate appraisal) and more controlled processes (or reappraisal). Based on the outcomes of immediate appraisal or reappraisal processes, a person is impelled to act impulsively, often in an aggressive manner, or act more thoughtfully following consideration of whether or not the situation deserves an aggressive response. The person's choice of aggressive or nonaggressive behavior then affects how others respond to them (social encounter), which then can act as another situational provocation and can also increase the person's dispositional aggressiveness. To complete Figure 7, according to DeWall and Anderson (2011), the personal input factors "bring the past to the present, in the form of knowledge structures and well-rehearsed cognitive and affective processes that have been influenced by biological factors (e.g., genes, hormones) and past history" (p. 11). According to the authors aggression depends on:

> how an individual perceives and interprets his or her environment and the people therein, expectations regarding the likelihood of various outcomes, knowledge and beliefs about how people typically respond in certain situations, and how much people believe they have the abilities to respond to a variety of events (p. 6).

This explanation of the expression of aggression could also be applied to the understanding of any situation between different actors in which an actor perceives and interprets the behavior of another actor (e.g. cyclists perceiving and interpreting car drivers' behaviors).

This overview of aggression, including the social psychological perspective, its definition (Baron & Richardson, 1994), the different manifestations of aggression (Krahé, 2013), and the general model of aggression (GAM, DeWall & Anderson, 2011) let us understand this important concept, in particular as a goal-directed behavior (cf. intentions and expectancy). This conceptualization of aggression is especially important to understand perceived aggression, more precisely because it is necessary to take into account the characteristic of the aggression and the process behind an aggressive behavior in order to understand why an individual could interpret a behavior as aggressive, and interrogate whether a particular behavior is considered as aggressive because it indeed is, or whether this consideration could be inaccurate. Understanding the perception of aggression in particular on the road, where the behavior is not as directed as in the other relationships between individuals (e.g. partner, family, school, work), and specifically in the interactions between cyclists and car drivers, is one of the objectives of this thesis.

2.2.2 The Perception of Aggression in the Interaction between Cyclists and Car Drivers

When we talk about aggression, and especially aggressive behaviors, we talk about a phenomenon that occurs between at least two individuals (the victim and the perpetrator). Though, when we talk about "perceived aggression", instead of aggression, we are talking about one actor's (victim) *perception* about the other actor's (perpetrator) behavior, and more specifically its intention to harm. The perception of a behavior as aggressive depends not only on the occurrence of an aggressive behavior, but also on other factors. As such, in certain conditions a behavior could be perceived as aggressive even when it is objectively not aggressive. In the interaction between cyclists and car drivers on the road, the two actors are not in the same conditions and this could affect the perception of the interaction. As mentioned by Chaurand and Delhomme (2013) cyclists and car drivers "differ significantly from each other in terms of speed, size, weight, and vulnerability, so that interacting with one or the other implies adapting our perceptions and our behavior to these differences" (p. 1176). This vulnerability of cyclists compared to car drivers who are better protected could also influence the perception of aggression.

Additionally, in the context of road traffic in real situations (not in a laboratory experiment context), it is complicated to determine the real intention of a particular actor and expectancy to harm someone else with their behavior. In a road context, at least if we could manage to stop an actor in the street, we could ask about their intention concerning their previous behavior. But even if we could do that, we would not be sure whether the actor is honest about their intentions when doing a specific behavior toward another actor.

Another way to see the issue of perceived aggression is that in a conflict between two actors, without knowing the real intentions of the supposed perpetrator, we can also consider one actor's perceptions (the supposed victim) about the other actor's (the supposed perpetrator) behavior. In the case of aggression, it means asking about whether the other actor's behavior was considered as "aggressive". As we previously mentioned, the problem with the use of the term "aggression" is that this term is used by laypersons to refer to behaviors or attitudes different than the definition of aggression used by psychologists. Thus to determine if a behavior is aggressive, asking people directly about "aggressive behaviors" may not necessarily provide accurate evaluations, instead it would be more accurate to refer to the definition of aggression. According to this definition, a behavior is perceived as aggressive when it is perceived as being adopted with the intention to harm, either physically or psychologically. Intention is precisely defined conforming to two entries, first “a conscious decision to perform a behavior”, and second, “a resolve to act in a certain way, or an impulse for purposeful action” (APA dictionary of psychology, 2007 p. 489). Furthermore, as we are interested in cyclists and their conflicts with car drivers, we focus on the perceived aggressions that cyclists mentioned about car drivers' behavior.

Thus, to understand this complex phenomenon we have to review the definition of perception. According to the APA dictionary of psychology (2007), perception is “the process or result of becoming aware of objects, relationships, and events by means of the senses, which includes such activities as recognizing, observing, and discriminating. These activities enable organisms to organize and interpret the stimuli received into meaningful knowledge” (p. 683). As we can see in this definition, perception concerns principally the reception of information, and interpretation concerns, as a complement, the translation of this information into meaning. This is in line with the DeWall and Anderson's (2011) definition concerning aggression.

As mentioned by DeWall and Anderson (2011), the personal input and situational input influence the perception and the interpretation (affect, cognition, and arousal) of an episodic interaction. Then these internal states influence the appraisal and decision processes, and finally these steps will influence the response of an individual in front of a particular situation. In the case of the interaction between cyclists and car drivers, we will only consider the perception of the situation for the objectives of the third study of this thesis. Concerning the situational input, in interactions between cyclists and car drivers, cyclists, in comparison to car drivers, are not very protected. For this reason, the interpretation of the situation as risky is an important concern. Thus, additional important concepts to understand this interaction are risk and perceived risk. Slovic, Fischhoff, and Lichtenstein (1985) defined risk as “quantitative measures of hazard consequences expressed as conditional probabilities of experiencing harm” (p. 92). The problem here is managing to measure quantitatively the hazard that a cyclist is confronted to in on-road situations. For this reason, “objective risk for cyclists is most commonly evaluated through cyclists crash data” (Chaurand & Delhomme, 2013, p. 1177). Again, the problem is that this data is a posteriori, and that cycling crash data suffer from an important under-reporting (Blaizot et al., 2013).

For the second concept, APA dictionary of psychology (2007) defined perceived risk as "the extent to which individuals feel they are subject to a health threat. Risk is a joint function of the probability of occurrence of a negative event and the magnitude of its consequences" (p. 683). Thus, the two important components of perceived risk are the assessment of probability or likelihood that a negative event occurs, and the judgment of the severity or gravity of consequences if this event occurs (Lund et al., 2012; Lund & Rundmo, 2009). Individuals estimate both components, and this estimation is obviously subjective, even if it is based on objective considerations. Furthermore, subjective risk, and its discrepancy with objective risk, is not yet documented for cycling (Chaurand & Martinez Tabares, 2016). Most of the research on perceived risk on-road situation has focused on car drivers (Chaurand & Delhomme, 2013; e.g. Richer & Bergeron, 2012). Additionally, the previous components of perceived risk can vary depending on personal and situational input, as proposed by GAM (DeWall & Anderson, 2011) when the authors referred to the assessment of the other behaviors. In this sense, personal input (e.g. trait of personality) and situational input (e.g. traffic jam) could influence perceptions of risk and of aggression. To our knowledge, no research has been carried out yet on the issue of perception of aggression in the interaction between cyclists and car drivers from the point of view of cyclists, which could identify the specific factors that influence the perception of aggression.

2.2.2.1 Theory of intergroup conflict (Tajfel & Turner, 1979)

According to DeWall, Anderson and Bushman (2011), most of the theories of aggression attempt to explain aggression between individuals. The GAM is principally based on these theories. However these authors suggested that the GAM is also useful for understanding aggression between groups. They proposed that aggression between groups "begins as a result of characteristics that each group brings to a situation and of environmental features that increase aggression. Groups, like individuals, tend to have enduring motivations, attitudes, values, and believes that develop out of their prior history" (DeWall et al., 2011, p. 248). In our case, it is true that when a cyclist interacts with a car driver on the road, they are two individuals with their personal and situational input. Therefore, they can also be perceived as members of the group of cyclists and the group of car drivers. Thus, in this interaction between a cyclist and a car driver, factors such as belonging to a group and intergroup relations may play a role.

In this sense, Tajfel and Turner (1979) proposed an integrative theory of intergroup conflict. Three concepts underlined this theory: intergroup relations, social categorization and social identity. These three concepts need to be linked to understand the global idea of intergroup conflict. For the first concept, as opposite to interpersonal relations, *intergroup relations* "consist of interaction between two or more individuals (or group of individuals) which are *fully* determined by their respective memberships in various social groups or categories" (p. 34). For illustration, an extreme example of this definition is the behavior of soldiers from opposing armies during a combat, in which soldiers will interact as members of their group and not as individuals on the basis of their personal characteristics. In the less extreme case of a road situation, different road users can be influenced by group memberships, such as car drivers, motorcyclists or cyclists.

Likewise, according to Tajfel and Turner (1979), "the mere perception of belonging to two distinct groups—that is, social categorization per se—is sufficient to trigger intergroup discrimination favoring the in-group" (p. 38). Hence, even without a previous conflict or existing hostility between the groups, the mere social categorization influences individuals toward their group. This idea is clarified with the definition of categorization as "the process of understanding what something is by knowing what other things it is equivalent to and what other things it is different from" (McGarty, 1999, p. 1). This tendency to group things together is a normal and automatic human cognitive process. Therefore, *social categorization* is also a cognitive and useful tool, and is based on similar characteristics individuals put people together into a social group. This kind of classification helps individuals to easily make attributions about others and themselves, and thus separates the world into different groups, for instance, on one hand, "them", "you are Italians", the out-group; and in the other hand, "us", "we are French", the in-group. At the same time, an individual can belong to several different categories or groups (in-groups), for example, men, students, Paris Saint German (supporters), French, and European. Furthermore, as part of the social categorization, the group to which someone belongs (the in-group) is perceived as considerably different from the others (the out-group), and members of the same group are perceived as being more similar than they really are, a phenomenon called out-group homogeneity. But depending on circumstances, this similarity could be attributed to the in-group, a phenomenon called in-group homogeneity. For example, cyclists could consider that all car drivers (the out-group) are similar e.g. that all car drivers are aggressive toward cyclists (out-group homogeneity), or, cyclists could consider that the other cyclists (in-group) behave like themselves, e.g. all cyclists ride in the correct way according to road rules (in-group homogeneity).

Regarding the third concept, *social identity* consists "of those aspects of an individual's self-image that derive from the social categories to which he perceives himself as belonging" (Tajfel & Turner, 1979, p. 40). In other words, social identity is a person's sense of who they are based on their group membership(s) and also in comparison with those outside their group. For example, a "cyclist" social identity is the feeling of someone who uses the bicycle that they are a member of a group of persons who also use the bicycle, a group that represents a social category: cyclists. In order to increase their self-image or self-esteem, individuals could express favoritism bias or in-group favoritism, by enhancing the status and benefits of the group to which they belong (in-group), or by diminishing the status and over-emphasizing the negative aspect of the group they do not belong to (out-group). This can reach the point of negative prejudice, stereotypes and discrimination against the out-group, and in its extreme forms, hostile behaviors (e.g. racism).

These three concepts, intergroup relations, social categorization and social identity, can be used to illustrate the possible conflictive interaction between cyclists and car drivers. Due to social categorization, cyclists and car drivers belong to two different social groups. In this sense, in-group/out-group conflict can appear between them. Additionally, this conflict could increase due to the social identity that the members of these groups can have, in our study, the cyclist social identity. Moreover, as we saw with the GAM, the interaction between these groups can be compromised by both situational and personal inputs: situational inputs in terms of on road context as more stressful and hazardous; and personal input, in terms of representation, motivations, experience, skills and personality traits. However, because of the influence of the context, personal input can also include the feeling of vulnerability that a cyclist could have and the feeling of dominance by car drivers; e.g. the number of car users (in France) and the equipment that protects them (car body).

Interactions between cyclists and car drivers could also be impacted by societal conditions, such as the acceptability and legitimacy of all road users sharing the road, as well as the knowledge and the respect of the traffic rules. In this sense, in a society where cycling practice is developed, cyclists may expect that other users, such as car drivers, have a great knowledge about how to behave in road interaction. Besides, if a car driver behaves in an ill-adapted way, cyclists could consider this behavior as intentional, thus aggressive. On the other hand, in a society where cycling practice is developed, cyclists and the legitimacy of cyclists on the road are highly recognized, and if a car driver behaves in an ill-adapted way, cyclists could consider this behavior to be a mistake, thus non-aggressive. This is in line with the correspondent inference theory (Jones & Davis, 1966). Thus, because of multiple of factors previously mentioned a conflict situation between a cyclist and a car driver on the road could be perceived and interpreted by a cyclist as an aggressive behavior (intentional) coming from a car driver, even when it is non-intentional.

To sum up the chapter on perceived aggression, we focus on the perception of aggression, accurate or not, that could emerge from the conflictive interaction between cyclists and car drivers. Studying it is relevant principally because it constitutes a disadvantage and/or a barrier to utilitarian urban cycling reported by cyclists and potential users. This disadvantage or barrier is particularly problematic when the perception is inaccurate. In this section, we considered the definition of aggression (Baron & Richardson, 1994), highlighting the importance of intention, and the GAM (DeWall & Anderson, 2011) to understand more largely the perception of aggression in the interaction between cyclists and car drivers by cyclists, as well as the factors that could intervene in this perception such as the personal input and the situational input (GAM, DeWall & Anderson, 2011). We also presented factors more related to utilitarian urban cycling such as the objective risk (Slovic, Fischhoff & Lichtenstein, 1985), the perceived risk (Lund et al., 2012), or the cyclist's vulnerability in traffic, and factors concerning the intergroup relations between cyclists and car drivers factors such as the social categorization, the in-group/out-group conflict, and the social identity (Tajfel & Turner, 1979). Finally, we discussed the influence, on cyclists' perception of a car driver's behavior as aggressive, of the level of knowledge of car drivers about the adapted behaviors when interacting with cyclists in road conditions, and of the level of legitimacy of cyclists on the road granted by car drivers. As we mentioned before, perceived aggression in road situations between cyclists and car drivers from the point of view of cyclists, and the factors that influence this perception have not been studied before.

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The three main concepts used in this Ph.D. thesis, representation, motivation, and aggression, have a theoretically defined meaning from psychology, as well as several theoretical approaches within the psychological discipline as we presented in this theoretical framework. However, these three concepts are also employed in everyday language on the basis of their generally accepted meanings. The theoretical and the common use of these three concepts could be considerably different, in particular for aggression and the related concepts, risk and danger. According to Drottz-Sjöberg (1991), "in the practical empirical work of research in psychology intelligible communication required both the use of commonly understood language and the preservation of the intended scientific content meaning of the used or studied concepts" (p. 36). In this chapter, we referred to the theoretical definition and the principal approaches of the concepts used in our study. Besides, it is important to mention that in the empirical studies we used measures of these concepts that we constructed based on the theoretical definition, taking into account that the common use of these concepts could interfere with the participants' interpretation of these measures.

3. OVERVIEW OF THE RESEARCH PROGRAM AND HYPOTHESES

Because of its green and sustainable features, utilitarian urban cycling appears as one of the answers to improve the current mobility problems such as congestion, or pollution (ITF, 2013). However, cycling as a mode of transport represents only a little part of all modes of transport in the majority of Western countries while the dominant mode of transport is still the car (Chapman, 2007; Metz, 2012; Stradling, 2003). Recognizing the gaps between modes of transport and the multiple benefits of cycling as a sustainable mode of transport, recent efforts, focused on cycling infrastructure, have been launched by European countries to promote it (European Commission, 2012). As a mode of transport, engineers have principally based the promotion of cycling on technical answers. Several studies have shown that while the availability of cycling paths alone could improve cyclists' safety, it will not necessarily determinate the use of cycling as a mode of transport and cycling practice does not increase as expected (Bergström & Magnusson, 2003; Heesch & Sahlqvist, 2013; Wardman et al., 1997; Welleman, 1997). The relative ineffectiveness of this centered technical approach to get the new users and to promote utilitarian cycling stresses the importance of integrating other types of approaches, more centered on the individual point of view and interests, such as the psychosocial perspective (i.e. internal factors). Thus, social psychology could contribute as an additional consideration to a fuller understanding of the promotion of cycling (Schmuck and Vlek, 2003). Hence, integrating this perspective implies to explore the subjective position of potential cycling users, with their personal evaluations, their representations, their psychological motivations, and their psychological barriers. The psychosocial approach has not been really fully considered before in the promotion of cycling (Gehlert, Dziekan, & Gärling, 2013).

In this Ph.D. thesis, the focus is on utilitarian cycling in urban settings and as a part of a complex transport system that interacts with other road and path users, such as car drivers, motorcyclists, public transport drivers and users, other cyclists, and pedestrians. Utilitarian urban cycling is rooted in a specific context: the road. This context includes specific conditions around cycling, including physical environmental conditions (e.g. cities with good or bad cycling conditions), contextual situations (e.g. being in a hurry, being in a traffic jam) and social dimensions (e.g. stereotypes about cycling of the people around, society levels of cycling acceptance). But cycling is also influenced by personal characteristics (e.g. having young children) as well as psychological factors (e.g. representations, motivations, perceptions). The general aim of this work is to contribute with a more integrative approach to a better understanding of utilitarian urban cycling from the perspective of individuals, by identifying the individual factors involved in its use. Thus, it was hypothesized that, in addition to external factors, such as cycling infrastructure and facilities, there are also individual factors, such as representations, motivations toward cycling and personal perceptions of other road users (e.g. cars' drivers) that could influence positively or negatively the use of utilitarian urban cycling, encouraging this use for some people but also preventing it for others.

If someone examines the possibility to use a particular mode of transport, the social norm (what people around do) could increase the chances to influence their decision. This means that some modes of transports will be more likely to be chosen for commuting than others (Eriksson, 2008) according to the context. In France, for instance, the car as a dominant mode of transport has a benefit in relation to bicycle. Thus, as a non-dominant mode of transport, the bicycle is not a social norm (Cialdini, Reno, & Kallgren, 1990) in France. This does not imply that nobody will choose the bicycle as a mode of transport, it means that road users could find more difficulties to take a decision different from the social norm (i.e. using the bicycle as a mode of transport) than a decision that correspond to the social norm (i.e. use the dominant mode of transport, the car). Indeed, one of the processes associated with a future behavior, in this case, cycling, is related to the social image and the representations of cycling. A potential cyclist could feel that cycling means going against the current, which is negative (e.g. difficulties and unnecessary effort, Unwin,1995). However, they could also feel that it means going through a challenge, and this feeling could be experienced as positive (e.g. pursuit of a goal).

Another process is related to the modal choice (Heinen, Maat, & van Wee, 2011). This decisional process is related to a subjective evaluation of cycling as an alternative, including its advantages and disadvantages, in particular, the personal motivations, levers and barriers toward cycling. This subjective evaluation will differ between the potential users and depends on personal context. There is a subtle but important difference between the advantages of cycling and which of these advantages are the reasons or motivations to do something. In this thesis, "advantages" are the positive representation. The representational arguments refer to the information about an object or an action with a positive or negative connotation but without causing acting out (Eagly & Chaiken, 1993; Jovchelovitch, 2007; Moscovici, 1973), whereas motivations refer to an intra-individual strength or the reasons that drive someone (positive) or that prevents someone (negative) to initiate, to continue and/or to intensify a behavior or action (Atkinson, 1958; Fenouillet, 2012; Higgins, 2012; Perugini & Bagozzi, 2001; Ryan & Deci, 2000). In other words, positive motivations, called "levers", are what encourages the action, and have weight in the decision to start an action or to continue an action. On the other hand, disadvantages are the negative representation of a particular object or of doing something, without necessarily interfering with the accomplishment of an action, whereas the negative motivations, called "barriers", are stronger than disadvantages because they could even prevent someone to do a particular action, in this case, cycling.

Moreover, the representations and motivations should be different according to someone's cycling experience, whether they are currently a cyclist or a non-cyclist, whether they have already tried it or are thinking of trying it. For instance, concerning a cyclist, a lever could be a maintenance motivation to continue cycling, whereas concerning a non-cyclist a lever could be a trigger to start cycling. Likewise, a barrier could radically prevent a non-cyclist from cycling, whereas a barrier may stop a cyclist one given day, but not the day after. The representations and motivations are also influenced by society: when the social context is unfavorable to cycling, the positive representation and motivation must be stronger for someone to keep cycling.

In particular, the social context could play an important role on a specific type of negative arguments, the ones related to the interactions with other road users, in particular, the most common and the most problematic in terms of safety, interaction with car drivers in urban situations. A negative social context could generate more conflictive situations than a positive social context. In this sense, when a social context is negative or unfavorable for cycling, the social image of cycling could be negative, the knowledge that other users have about cyclists could be scarce, and other users could perceive that cycling is not legitimate on the road. On the other hand, cyclists could expect ill-adapted behaviors from car users.

Thus, the social context could influence the subjective evaluation of a given situation, particularly interpretation of the perceived information (DeWall & Anderson, 2011). Indeed, in negative or conflictive interaction, cyclists and car drivers could feel that the other is acting against them (Basford, Reid, Lester, Thomson, & Tolmie, 2002), and even interpret the other's behavior as aggressive, turning the situation into an in-group/out-group conflict (Tajfel & Turner, 1979; Walker, 2011).

Moreover, for cyclists, this in-group/out-group conflict could increase the higher the cyclist social identity (Tajfel & Turner, 1979). The cyclist's social identity could particularly depend on the cycling practice. Additionally to the social context, the perception of aggression by cyclists could also be influenced by other variables such as trait aggressiveness, the difference of vulnerability between cyclists and car drivers, and perceived danger. This perception of car drivers' behaviors as aggressive could also happen even when these behaviors are not necessarily intended to cause any harm (Baron & Richardson, 1994). Thus, cyclists could react aggressively in response (DeWall & Anderson, 2011), use adapted or dangerous strategies to avoid the conflict, or could stop cycling. Thus intergroup conflicts can be reinforced because of the perception of aggression leading to even more hostile interaction and more danger. This could influence negatively the image of cycling in a society, making cycling appear as dangerous and thus non-appealing.

Therefore, the presence of conflictual interactions between these two users affects the general image and perceptions of cycling, and it can also influence cyclists' behaviors and car drivers' behaviors in an ill-adapted way. In consequence, the presence of conflicts is particularly dangerous for cyclists because of the ratio of forces in comparison with car drivers. For these reasons, it is important to go in depth into the study of car drivers and cyclists' interactions, in particular the interactions that are conflictive or in which the car driver's behavior is perceived as aggressive by cyclists.

To summarize, the remaining issues concerning utilitarian urban cycling are the comparison of the arguments of cycling between cyclists and non-cyclists, as well as the study of perceived aggression according to the cycling modal share, and of the factors that intervene. Studying the influence on cycling of these psychological factors, such as the representations of cycling, in terms of advantages and disadvantage, the motivations, in terms of levers toward cycling and barriers from cycling, and the perception of the interaction between car drivers and cyclists, in terms of perceived aggression is essential to better understand urban cycling. In addition, this knowledge is especially important to help to design actions aimed at promoting cycling as a mode of transport, in general, and at improving the quality of the interactions between users (i.e. cyclists and car drivers) and in consequence road safety, in particular. Thus, we decided to address these issues in this Ph.D. thesis by conceiving three studies.

In the first study, the aim was to identify the representational and motivational arguments related to cycling as a mode of transport through an exploratory study based on semi-structured in-depth interviews and to examine whether there were similarities and differences in arguments between cyclists and non-cyclists. This first study was conducted with a specific French sample, the Paris area, where psychological factors have not been investigated as much as in other countries. Indeed, although there are numerous epistemological and statistical studies, transportation reports and travel surveys on cycling using French samples (e.g. French National Transport and Travel Survey; ENTD, 2008), most of the scientific social-psychology research about cycling has been carried out outside France (the UK, Australia, USA, etc.). A French study will allow for a comparison with international studies and will expand the existing transportation reports focused on external aspects by including psychological factors. The Paris area was chosen because the city has a representative number of cyclists. According to the European Platform on Mobility Management-EPOMM (2016), the cycling modal share in Paris (3%) corresponds to the mean modal share of the 10 principal cities of France and also corresponds to the cycling modal share in France. The Paris area had also carried out several investments in favor of cycling that allow cyclists to have a minimum of conditions to cycle, showing a political will for the promotion of urban cycling. Moreover, the Paris area also experiences serious mobility related issues like traffic congestion and pollution.

To reach the aims of this first study, we interviewed cyclists and non-cyclists about their experiences commuting in Paris area. For current cyclists, we wanted to know the positive representation of cycling (advantages) and the factors that incite them to use a bicycle for their trips (positive motivations; levers), as well as the negative elements of cycling (disadvantages), and the negative factors that could prevent them from using their bicycle one day or could ever make them stop using it (barriers). For non-cyclists, we wanted to know their representation on cycling as a mode of transport, the positive (advantages) and negative (disadvantages and barriers) aspects, and their intention to use it in the future. For that, we needed the non-cyclists to project themselves in this hypothetical circumstance of cycling and allow them to explain in their words from their own knowledge and beliefs the potential levers and barriers to cycling. We categorized their arguments, based on several dimensions such as intrinsic/extrinsic (Ryan & Deci, 2000a), stability and controllability (Weiner, 1986). This study was a first step in the understanding of urban cycling in terms of advantages, disadvantages, levers, and barriers for cyclists and non-cyclists.

The second study was carried out by questionnaire and was built based on the conclusions of the first study. This second study had three aims. As it was not possible in the previous study to identify the weight that a participant gives to a specific argument of cycling, the first aim of this study was thus to estimate more precisely the importance given to each argument in terms of advantages, levers, disadvantages, and barriers, by cyclists and non-cyclists. Its second aim was to know whether the representations and motivations found in the first study were also found in a larger sample. The third aim of this second study was to know whether the representation differs from the motivations, as well as between cyclists and non-cyclists.

More specifically, for the first aim we developed a measure in which participants could indicate for a same positive argument its importance as an advantage and as a lever, and for negative arguments as a disadvantage and as a barrier, in order to obtain a hierarchy for each type of argument, among cyclists and among non-cyclists.

For the second aim, we expected to corroborate the differences and similarities of these representational (advantages, disadvantages) and motivational (levers and barriers) factors of urban cycling found in the first study. For this, two hypotheses were conceived concerning the principal advantages, levers, disadvantages, and barriers.

For the third aim, it was hypothesized that a) because of their different impact the activity, representational and motivational arguments would be qualitatively and quantitatively different. Thus, for positive arguments, advantages and levers of cycling would differ, and for negative arguments, disadvantages and barriers to cycling would also differ. b) Because of the difference between user groups, the representational and motivational aspects of urban cycling considered as the most important would also differ between cyclists and non-cyclists.

In addition to the questions related to representations and motivations, we studied cycling practice questions to know whether the cyclists and the non-cyclists groups were comparable, in terms of frequency, experience, distance traveled and types of journeys; the future intention of cycling; the cycling facilities for their specific journeys. Besides, both cyclists and non-cyclists were asked about the use of other modes of transport and socio-demographic information.

In a third study, we focused on one of the barriers related to cycling identified in the previous studies. The conflictive interaction between cyclists and car drivers was identified as a special concern. We focused our study on the cyclists' perception of car drivers' behavior, in particular the behaviors that cyclists perceived as aggressive. We also wanted to investigate the relationship between this perceived aggressive behavior and cycling modal share, through the comparison of participants from two cities with different cycling modal shares but with comparable size, population, and GDP. For the lower cycling modal share the city of Paris (France) with a cycling modal share of 3% (ENTD, 2008) was chosen, and for a higher cycling modal share the city of Berlin (Germany) with a cycling modal share of 13% (National survey, 2008; European Platform on Mobility Management- EPOMM, 2016) was chosen.

In order to identify the cyclists' perceived aggression from car drivers' behavior in road interactions, we used five scenarios where cyclists and car drivers interact on road configurations. Danger and intention are two components of perceived aggression that vary according to the scenarios. It was hypothesized that perceived aggression would be different in these two cities, and that the difference between the cities would vary according to the level of knowledge of car drivers about the adapted behaviors when interacting with cyclists in road conditions, as well as to the level of legitimacy of cyclists on the road granted by car drivers. This relationship was thus conceived in two opposite and competing ways.

The first hypothesis was based on knowledge and postulated that the higher the knowledge cyclists think car drivers have, the more the cyclists perceive aggression. Indeed, in a country with lower rates of cycling, other users are likely to lack knowledge about how to safely interact with cyclists. Cyclists may then expect this lack of knowledge, and consider unsafe behaviors by car drivers as errors, and not as intentional aggressions. In a country with higher rates of cycling, other users should be more used to interacting with cyclists. Thus, cyclists could not attribute unsafe behaviors by car drivers to a lack of knowledge and should consider such behaviors as intentional aggressions.

The second hypothesis was based on perceived legitimacy and postulated the opposite relationship: the higher the perceived legitimacy granted by car drivers to cyclists on the road, the less the cyclists perceive aggression. Indeed, in a country with higher rates of cycling, other users will perceive cyclists as more legitimate on the road. Thus, other road users should adopt less aggressive behaviors toward cyclists. In a country with lower rates of cycling, cyclists may feel more vulnerable and threatened by other road users who see them as illegitimate, as a minority group or non-dominant group. They should, therefore, be more prone to consider dangerous behaviors by car drivers as intentional, and thus aggressive.

We also wanted to know whether legitimacy, knowledge, danger, or intention are predictors of perceived aggression. The questionnaire built with the five scenarios was administrated online to cyclist students in Paris and in Berlin, and participants answered the questions related to the scenarios as a cyclist. Additionally, to the questions related to the scenarios, other questions were related to cycling practice to know whether the characteristics between the two groups were comparable, such as cycling knowledge, cycling skill, cycling identity, trait aggressiveness, the use of other modes of transport, and socio-demographic information.

SECOND PART:
EMPIRICAL RESEARCH

4. FIRST STUDY: INTERVIEWS ABOUT REPRESENTATIONS AND MOTIVATIONS

Article 1: Martinez Tabares, C., Chaurand, N., and Delhomme, P. (2016b). Representations and Motivations of Utilitarian Cycling in Paris Area: Comparison between Cyclists and Non-Cyclists (Manuscript submitted for publication).

4.1 INTRODUCTION

The first study was an exploratory study about the reasons to use and not to use the bicycle as a mode of transport in urban settings. The aim of the present study was to identify the advantages (positive representations) that the cyclists and the non-cyclists find in the use of utilitarian urban cycling and the levers (positive motivations) that move them to use it. Likewise, we wanted to know the disadvantages (negative representations) they find in the use of bicycles as a mode of transport and the barriers that can stop them to ride a bicycle, (negative motivations). Consequently, we were interested in knowing why non-cyclists do not use the bicycle, what are the disadvantages and barriers they find and whether they perceive advantages in using a bicycle as a mode of transport. In this sense, we contacted cyclists and non-cyclists in Paris area and we conducted with them semi-structured in-depth interviews.

More specifically, our first hypothesis was that cyclists would cite more advantages and levers than non-cyclists (H1), in terms of the number of different positive arguments cited (H1a), the mean number of positive citations (H1b), and the proportion of positive arguments in the discourse (H1c). Our second hypothesis was that non-cyclists would cite more disadvantages and barriers than will cyclists (H2), in terms of the number of different negative arguments cited (H2a), the mean number of negative citations (H2b), and the proportion of negative arguments in the discourse (H2c). Concerning the intrinsic/extrinsic dimension, our third hypothesis was that given cyclists actually perform the behavior (i.e. utilitarian urban cycling), they would cite more intrinsic positive arguments than extrinsic positive arguments, and more intrinsic positive arguments than non-cyclists (H3). Finally, our fourth hypothesis was that given non-cyclists do not perform the behavior, they would cite more intrinsic negative arguments than extrinsic negative arguments, and more intrinsic negative arguments than cyclists (H4).

4.2 METHOD

4.2.1 Participants

The study involved 20 participants (11 females) between 22 and 56 years of age (M=38.5 years, SD=11.6) from the Parisian area. Thirteen participants were employees, five were students, and two were job seekers. Twelve had at least a master degree. Eleven participants were single, eight were married or lived with a partner, and one was widowed. Five had young children. Potential participants were contacted through snowball recruitment from colleagues and participants. We avoided individuals with expertise in transport and bicycling.

Among the participants, 10 were cyclists and 10 were non-cyclists. The cycling category was defined according to the participants' frequency of utilitarian cycling in urban settings. A *cyclist* was an individual who used the bicycle for a utilitarian goal (for transport, not leisure or sport) at least once a week. A *non-cyclist* was an individual who used a bicycle for a utilitarian goal less than once a week. Recreational or sport cycling was not considered to define a participant as a cyclist or as a non-cyclist. Cyclists and non-cyclist categories were defined according to the degree of utilitarian cycling. At the time of the study, all cyclists used the bicycle as their principal mode of transport, and non-cyclists did not use a bicycle as a regular mode of transport (one non-cyclist very rarely used a bicycle from a bike-sharing system to go to work, the other non-cyclists never used a bicycle).

Among the non-cyclists, three used to commute by bicycle for a long period (at least two years) but stopped cycling one year or more before the time of the interview and no longer commuted by bicycle. They had stopped cycling because they changed workplaces or moved, and their new commuting distance made commuting by bicycle impossible. They were separated from the non-cyclists group to form the *former cyclists'* group. The seven remaining non-cyclists had never used a bicycle for a utilitarian goal at least once a week.

In our sample, all cyclists also used public transport (combined with the bicycle, during the same trip or for different trips). All non-cyclists mainly used public transport (primarily the subway). One cyclist, one non-cyclist, and two former cyclists used a car. Nine cyclists, four non-cyclists, and two former cyclists had a driver's license. Seven cyclists cycled for all types of trips, two only for commuting, and two for trips different than the trips to go to work. A bicycle-sharing system (Vélib) was used by three cyclists and by one non-cyclist, all of them had an annual subscription. Only three participants declared using at the moment of the study the bicycle for leisure or sport (one former cyclist, one non-cyclist and one cyclist). Thus there were no differences between groups in terms of recreational cycling. Moreover, the small number of participants who use a bicycle for recreational purpose means that our results do not reflect arguments related to recreational cycling, and thus mainly reflect results specific to utilitarian cycling. The median commuting distance was 6.3 km (3.5 km for cyclists, 10 km for non-cyclists, and 10 km for former cyclists) and the median commuting time was 22.5 minutes (12.5 min for cyclists, 30 min for non-cyclists, and 40 min for former cyclists).

4.2.2 Procedure and Materials

4.2.2.1 Semi-Structured In-Depth Interview

We chose semi-structured in-depth interview in order to obtain the largest and most spontaneous list of arguments about utilitarian cycling seeking to approach topics that have not been covered in depth before and to explore the meaning in order to gain a better understanding of these arguments. This qualitative data collection method implicates conducting intensive individual interviews with a small number of respondents to explore rich, descriptive data about people's attitudes, perceptions, and behaviors (Boyce & Palena, 2006; DiCicco-Bloom & Crabtree, 2006). With semi-structured in-depth interviews, one can identify more elements than with a pre-constructed questionnaire, because the interviewees can freely express their impressions without having to fit them into a pre-determined list of possibilities. With questionnaires, "like any quantitative survey, the panel is restricted in the information that it can collect and will not obtain detailed information to explain why behavioral change has occurred" (Chatterjee, Sherwin, Jain, Christensen, & Marsh, 2012, p. 82).

The 20 semi-structured in-depth interviews were conducted face-to-face between January and March 2014. Most took place at the participant's workplace and some were held in the participant's home. The average length of the interviews was 62.8 minutes (range: 27–111 minutes), that is consistent with semi-structured in-depth interview methodology (DiCicco-Bloom & Crabtree, 2006). All interviews were recorded and transcribed (M=15 pages by interview). The number of interviews is in line with previous related work, including Hine (1996, 21 interviews); Mann, Varey and Button (2000, 14 interviews); Lennon and Watson (2011, 30 interviews); Strömberg and Karlsson (2016, 15 interviews); and Louis, López-Sáez and Rondinella (2016, 21 interviews).

A topic guide was drawn up to provide a framework for the interview. The topic guide covered ten main topics of interest, based on the literature and our theoretical framework, as follow: (a) representations of transport modes (car, public transport, cycling, walking): advantages and disadvantages; (b) transport habits; (c) motivations; (d) social influence and transport habits at different stages of life; (e) required skills and cycling strategies; (f) social identification to the "cyclists" group; (g) cycling experiences; (h) plan for a possible future change in cycling frequency; (i) environmental values; and (j) contextual characteristics. This topic guide was tested in advance and refined with eight participants (non-cyclists). The interviewer followed the topic guide but also remained flexible and open to new issues. The extent to which each topic was explored depended on its significance for the participant.

Participation was voluntary and the content of the interviews was kept confidential and anonymous. At the beginning of the session, the experimenter explained the procedure and the general objective of the interview, "to better understand the uses and users of certain modes of transport in urban settings", and asked for the participant's authorization to record the interview. Participants were encouraged to talk spontaneously.

The interviews started with an open question, "I would like you to talk about how you go around in urban settings, the mode of transport that you use, to commute or to go to other places, and the modes that you do not use". Participants were asked about several transport modes, regardless of whether they used (personal experience) or did not use (representation) them. Follow-up questions were used for clarification and to facilitate discussion of the salient issues, such as "could you tell me a little more to the latter (...); if I understood well, you said that (…)". When participants mentioned potentially interesting aspects without developing them, requests for further details were made.

At the end of the interview, participants provided socio-demographic information. Special attention was given to avoiding in-group/out-group bias. For example, the initial questions concerned transport in general, not just cycling; only later during the interview were the questions narrowed down to the topic of utilitarian cycling.

4.2.2.2 Coding Grid

The interviews were coded using a thematic content analysis (Weber, 1990), in order to reduce the information to more relevant, manageable pieces of data. In the coding process, sentences, ideas, expressions, and words in the transcribed interviews were classified into content categories on the coding grid. Each category defined consisted of units comprising one, several, or many words with similar meanings (Weber, 1990). Hence, when several participants used different words to refer to the same characteristic of cycling, we chose the most representative as the category name and put the other words in that category (e.g. *saves money* included: "economical", "less expensive", "cheaper than a car", "cheaper repairs", "allows you to save money", "no need to buy gas"). The categories were organized into themes and subthemes to allow for the inclusion and categorization of all information (e.g. frequency of bicycle use: for utilitarian purposes or for recreational purposes; distance traveled: for commuting or for shopping).

The coding grid was constructed and refined based on the information collected during the interviews. It covered all areas of the topic guide and had three main parts. The first part concerned the *objective* behavior. This included the participants' current and past transport behaviors and habits (e.g. multimodal or intermodal transport, the use of safety equipment for bicycles, and/or the use of travel passes for public transport and for the bike-sharing system). The second part concerned the *subjective* factor, which listed the positive and negative arguments associated with four different transport modes: car driving, public transport, walking, and cycling. For car driving, public transport, and walking, the arguments were categorized into two factors: advantages (positive representations) and disadvantages (negative representations).

For cycling, the arguments were also categorized as having a positive valence or negative valence. For the positive valence, the advantages were differentiated according to whether or not they represented a motivation. An advantage is a positive representation of the object or activity (Eagly & Chaiken, 1993; Jovchelovitch, 2007; Moscovici, 1973), in this case, cycling; whereas, a motivation is an advantage that can prompt an individual to perform the action (Atkinson, 1958; Fenouillet, 2012; Higgins, 2012; Perugini & Bagozzi, 2001; Ryan & Deci, 2000b), here the positive motivations to cycle. As Ryan and Deci (2000a) suggest, "to be motivated means to be moved to do something" (p. 54). Accordingly, if the advantage was presented as an advantage that did not trigger a behavior, it was coded as "advantage-no motivation". If it was presented as an advantage that was a reason for cycling, it was coded as "advantage-motivation" and was called lever (in order to avoid a misunderstanding with the negative motivations). Thus according to the definition of motivation and representation, levers are thus the positive motivations and were a subgroup of the advantages, and advantages were the positive representations.

For the negative valence, the disadvantages were also differentiated according to whether or not they represented a barrier (negative motivation), and whether they were a barrier or disadvantage that had been overcome. A disadvantage was a negative representation of the action (Eagly & Chaiken, 1993; Jovchelovitch, 2007; Moscovici, 1973), in this case, cycling. A barrier was a disadvantage that could prevent cycling and/or lower the will to cycle (and perhaps even deter a cyclist from cycling); a negative motivation (Atkinson, 1958; Fenouillet, 2012; Higgins, 2012; Perugini & Bagozzi, 2001; Ryan & Deci, 2000). An overcome disadvantage used to be a disadvantage or a barrier, but was no longer an obstacle to cycling because the individual used a strategy to resolve it or reevaluated it. If an argument was presented as a negative characteristic of cycling, but not one that prevented cycling, it was coded as "disadvantage-no barrier". If an argument was presented as a negative characteristic of cycling that was a reason for not cycling, it was coded as "disadvantage-barrier". Finally, if an argument was presented as a negative characteristic of cycling that used to be but was no longer a barrier to cycling, it was coded as "overcome disadvantage (no disadvantage, no barrier)".

Finally, the last part concerned s*ocio-demographic information*: gender, age, family situation, education, occupation, workplace, house location, commuting distance and time, etc. To make valid inferences from the text, the coding grid, and the content analysis were both submitted to a test of inter-coder agreement (Weber, 1990) in which two researchers used the same coding grid to code the same text. Improvements to the grid were made until the inter-coder agreement was 100%.

4.3 RESULTS

We will first present the number of arguments per category and group and then describe the arguments (advantages, levers, disadvantages, barriers, and overcome disadvantages) and the type of arguments (intrinsic/extrinsic, controllability, and stability). Finally, we will evaluate the general social image of cycling.

Preliminary analyses revealed that both the number of arguments and the type of arguments cited by former cyclists were closer to the number and type cited by cyclists than to the number and type cited by non-cyclists. Given that former cyclists cannot be considered “pure non-cyclists”, and that they represented only three participants, and considering that our purpose was to compare cyclists and non-cyclists in terms of their views, experience, representations, and motivations, former cyclists were not included in the analyses to avoid biasing the results.

4.3.1 Number of Arguments Given

Here we separated the number of *different arguments* reported (no matter how many participants cited each one) from the *total number of arguments* cited, taking into account the number of participants who cited each one.

In the coding grid, cycling arguments were coded according to their valence in cycling: positive (advantages and levers) and negative (disadvantages and barriers) (

Table 2). Cyclists and non-cyclists (*n*=17) reported a total of 97 different arguments, 48 positive arguments, and 49 negative arguments. Among these arguments, 28 of the advantages were considered by at least one participant as levers, and 32 of the disadvantages were considered by at least one participant as barriers.

For positive-valence arguments, cyclists reported 43 advantages of cycling, non-cyclists reported 18 advantages of cycling. For negative-valence arguments, cyclists reported 40 disadvantages of cycling, non-cyclists reported 27 disadvantages of cycling. Cyclists thus cited, on average, more positive arguments (13.6) than did non-cyclists (5.6). The proportion of the discourse of the different types of arguments, advantages, levers, disadvantages and barriers, was measured by computing the ratio of a particular type of argument reported on the total of arguments cited by participants. For example, the proportion of advantages for non-cyclists’ discourse was 40%, that means that about all of the arguments reported for non-cyclists (45 arguments), 40% of them were advantages (18 advantages) and 60% were disadvantages (27 disadvantages). Positive arguments represented a larger part of the cyclists’ discourse (54%) than of the non-cyclists’ discourse (40%). Cyclists also cited, on average, more negative arguments (11.8) than did non-cyclists (8.4). However, negative arguments represented a larger part of the non-cyclists’ discourse (60%) than of the cyclists’ discourse

(46%). Thus, the major part of the cyclist discourse was positive, whereas the major part of the non-cyclist discourse was negative.

Concerning cycling positive motivations (a subset of advantages), cyclists reported 25 levers, non-cyclists reported 5 levers. Cyclists thus cited on average more levers (5.6) than did non-cyclists (0.7). Levers represented a larger part of the advantages cited by cyclists (41%) than by non-cyclists (13%). Concerning cycling negative motivations (a subset of disadvantages), cyclists reported 23 barriers, non-cyclists reported 17 barriers. Cyclists thus cited, on average, slightly fewer barriers (4.1) than did non-cyclists (4.3). Barriers represented a larger part of the disadvantages cited by non-cyclists (51%) than by cyclists (35%).

A chi-square test of independence was performed to compare the proportion of advantages and disadvantages cited by cyclists and non-cyclists. It showed that the proportion of advantages was significantly higher for cyclists than for non-cyclists, $\chi^2(1, N = 17) = 7.75$ $p < .01$. The proportion of levers was also significantly higher for cyclists than for non-cyclists, $\chi^2(1, N = 17) = 23.05$ $p < .001$.

Table 2
Number of different arguments reported, total number of arguments cited, mean number of arguments per user cited, and proportion of the discourse for positive and negative arguments by cyclists and non-cyclists.

Valence of arguments	Arguments	Total	Cyclists	Non-cyclists
		n=17	*n*=10	*n*=7
All advantages	No. of different arguments	48	43	18
	Total no. of citations	175	136	39
	Mean no. of citations per user	10.3	13.6	5.6
	Proportion of the discourse	50%	54%	40%
Levers s as a type of advantage	No. of different arguments	28	25	5
	Total no. of citations	61	56	5
	Mean no. of citations per user	3.6	5.6	0.7
	Proportion of the advantages	35%	41%	13%
All disadvantages	No. of different arguments	49	40	27
	Total no. of citations	177	118	59
	Mean no. of citations per user	10.4	11.8	8.4
	Proportion of the discourse	50%	46%	60%
Barriers as a type of disadvantage	No. of different arguments	32	23	17
	Total no. of citations	71	41	30
	Mean no. of citations per user	4.2	4.1	4.3
	Proportion of the disadvantages	40%	35%	51%
	Total number of arguments	97	83	45
	Total number of citations	352	254	98

4.3.2 Description of Arguments

For each argument, the frequency of citation by cyclists and by non-cyclists was computed. It was calculated by dividing the number of times a particular argument was cited, by the total number of participant in the group. This frequency is expressed in term of proportion (where 1 means that was cited by all participants in the group).

4.3.2.1 Advantages

The advantages cited the most by cyclists and by non-cyclists (frequency ≥ 30%) are shown in Table 2. *Physical activity* was the most frequent advantage, for both cyclists (1) and non-cyclists (0.9). Several arguments related to personal emotions were cited frequently by cyclists but not by non-cyclists. These included *enjoyment of riding* (0.9), *feeling of freedom* (0.7), and *independence* (0.6), which were often cited by cyclists but never by non-cyclists. In the same way, *facility of carrying things on a bicycle,* which cyclists cited frequently (0.9) was not cited at all by non-cyclists. *Saving by using a bicycle* was cited at the same frequency by cyclists and non-cyclists (0.7), but for non-cyclists, it was the argument most often cited (after physical activity) while for cyclists, it was just one among several others. The same holds true for *ecological aspects* (0.4).

4.3.2.2 Levers

The results for the levers are also presented in Table 3. Very few levers were cited by non-cyclists (only five levers, each cited once). *Feeling of freedom (0.6)* was the lever cited the most often by cyclists, followed by *saves time, convenient, enjoyment, and fast / short travel time (each at* 0.5).

Table 3
Frequency of cycling advantages and levers cited by cyclists and non-cyclists.

Advantages	Frequency in Cyclists		Frequency in Non-cyclists
Physical activity	1	Physical activity	0.9
Enjoyment	0.9	Saves money	0.7
Possibility of carrying objects	0.9	Saves time	0.6
Saves time	0.8	Convenient	0.4
Saves money	0.7	Ecological	0.4
Feeling of freedom	0.7	Flexibility	0.4
Fast / short travel time	0.7	Available 24/7 (BSS)	0.4
Independence*	0.6	Inexpensive (BSS)	0.3
Easy to park	0.6		
Convenient	0.5		
Ecological	0.4		
Enjoying the good weather	0.4		
Receiving social support*	0.4		
Enjoying the view	0.4		
Clearing one's head/ relaxing	0.4		
Autonomy*	0.3		
Direct routes	0.3		
Nearby stations (BSS)	0.3		
Sociability of urban cyclists	0.3		
Levers	**Frequency in Cyclists**		**Frequency in Non-cyclists**
Feeling of freedom	0.6	Physical activity	0.1
Saves time	0.5	Saves money	0.1
Convenient	0.5	Enjoying the good weather	0.1
Enjoyment	0.5	Energy expenditure	0.1
Fast / short travel time	0.5	Transport during holiday trips	0.1
Physical activity	0.3		
Independence*	0.3		

Note. BSS = Bicycle-sharing system; *Independence: in deciding one's travel times; Receiving social support: from other cyclists/cycling associations; Autonomy: possibility of going anywhere.

4.3.2.3 Disadvantages

The disadvantages cited the most by cyclists and by non-cyclists (frequency ≥ 0.3) are shown in Table 4. The three most frequent disadvantages cited were almost the same for cyclists and non-cyclists. The argument *danger* was the most frequent disadvantage cited by both cyclists (0.8) and non-cyclists (0.9), followed by *rain* (0.8), *long distances,* and *bicycle theft* (0.7) as disadvantages. Non-cyclists cited *long distances* (0.9) and *fear of riding a bicycle* (0.6).

4.3.2.4 Barriers

The results for the barriers are presented in Table 4. The argument *long distances* was the barrier cited the most by cyclists (0.5) and non-cyclists (0.6). Next, the non-cyclists cited *fear of cycling* (0.6), *danger* (0.4), *rain, fear of traffic*, *sweating,* and *too much trouble* (0.3), and the cyclists cited *rain* (0.4), *bicycle theft*, *no place to put the bicycle at home,* and *no shared bikes at the station* (0.3).

Table 4
Frequency of cycling disadvantages and barriers cited by cyclists and non-cyclists.

Disadvantages			
	Frequency in Cyclists		Frequency in Non-cyclists
Danger	0.8	Danger	0.9
Rain	0.8	Long distances	0.9
Long distances	0.7	Fear of cycling	0.6
Bicycle theft	0.7	Rain	0.4
Difficulty carrying large objects	0.6	Bicycle theft	0.4
Lack of attention from others	0.6	Difficulty to carrying large objects	0.4
No place to put the bicycle at home	0.5	Lack of cycling facilities	0.4
Lack of cycling facilities	0.5	Fear of traffic	0.4
Snow	0.5	Sweating	0.4
Fear of traffic	0.4	Lack of Inattention from others	0.3
Finding a parking spot at work/on the street	0.4	No place to put the bicycle at home	0.3
Cyclists are not visible	0.4	Tiredness	0.3
No SBs at the station (BSS)	0.4	Too much trouble	0.3
Sharing road with pedestrians	0.4	Cold	0.3
Sweating	0.3	Heavy and large SBs	0.3
Tiredness	0.3		
Bad weather	0.3		
Heavy rain	0.3		
Not finding open spots (BSS)	0.3		
Vulnerability*	0.3		
Barriers			
	Frequency in Cyclists		Frequency in Non-cyclists
Long distances	0.5	Long distances	0.6
Rain	0.4	Fear of cycling	0.6
Bicycle theft	0.3	Danger	0.4
No place to put the bicycle at home	0.3	Rain	0.3
No SBs at the station (BSS)	0.3	Fear of traffic	0.3
Sweating	0.2	Sweating	0.3
Difficulty carrying large objects	0.2	Too much trouble	0.3
Tiredness	0.2		
Snow	0.2		

Note. Not finding open spots to deposit shared-bikes; Vulnerability: the gravity of consequences of an accident; BSS = Bicycle-sharing system; SBs = shared bikes.

4.3.2.5 Overcome Disadvantages

Although *rain* was considered by cyclists and non-cyclists as a disadvantage and as a barrier, *rain*, and *heavy rain* were overcome through strategies such as *carrying rainwear (rain pants in the bag)*. The results of overcome disadvantage are provided in Table 5.

Table 5
Frequency of overcome disadvantages of cycling cited by cyclists.

Overcome disadvantages	Frequency in Cyclists
Rain	0.3
Snow	0.3
Fear of traffic	0.3
Heavy rain	0.3
Bicycle theft	0.2
Finding a parking spot at work/ on the street	0.2
Cyclists are not visible	0.2

4.3.3 Types of Arguments by Dimension

Each argument was characterized considering the three type of argument: Extrinsic/Intrinsic, controllability, and stability. These three dimensions were coded according to the theoretical definition by three judges who coded individually, and then confronted their codes in order to find an agreement (Table 6). Each dimension, intrinsic/extrinsic, controllability, and stability, was examined as an ensemble, and the results of this grouping are presented in Table 7.

Table 6
Positive and negatives arguments characterized by extrinsic/intrinsic, controllability, and stability.

Positive arguments	E/I	Control	Stability	Negative arguments	E/I	Control	Stability
Autonomy*	ExtI	I	S	Bad weather	ExtE	E	T
Available 24/7 (BSS)	ExtE	E	T	Bicycle theft	ExtE	E	T
Clearing one's head/ relaxing	IntI	0	S	Cold	ExtE	E	T
Convenient	ExtE	I	S	Cyclists are not visible	ExtE	E	S
Direct routes	ExtE	E	S	Danger	IntI	E	T
Easy to park	ExtE	E	S	Difficulty carrying large objects	ExtE	E	T
Ecological	ExtI	I	S	Fear of cycling	IntI	I	S
Energy expenditure	IntI	0	S	Fear of traffic	IntI	I	S
Enjoying the good weather	IntI	E	T	Finding a parking spot at work/ on the street	ExtE	E	S
Enjoying the view	IntI	E	T	Heavy and large SBs	ExtE	E	S
Enjoyment	IntI	0	S	Heavy rain	ExtE	E	T
Fast / short travel time	ExtE	I	S	Lack of attention from others	ExtE	E	T
Feeling of freedom	IntI	0	S	Lack of cycling facilities	ExtE	E	S
Flexibility	ExtI	I	T	Lack of Inattention from others	ExtE	E	T
Independence*	ExtI	I	S	Long distances	ExtE	E	T
Inexpensive (BSS)	ExtE	E	S	No place to put the bicycle at home	ExtE	E	S
Nearby stations (BSS)	ExtE	E	S	No SBs at the station (BSS)	ExtE	E	T
Physical activity	ExtI	I	S	Not finding open spots (BSS)*	ExtE	E	T
Possibility of carrying objects	ExtE	I	T	Rain	ExtE	E	T
Receiving social support*	ExtE	I	T	Sharing road with pedestrians	ExtE	E	T
Saves money	ExtE	E	S	Snow	ExtE	E	T
Saves time	ExtE	I	S	Sweating	ExtI	E	T
Sociability of urban cyclists	ExtI	I	T	Tiredness	IntI	I	T
Transport during holiday trips	IntI	0	T	Too much trouble	IntI	I	T
				Vulnerability*	IntI	E	S

Note. SBs = shared bikes; BSS = Bicycle-sharing system; *Independence: in deciding one's travel times; Receiving social support: from other cyclists/cycling associations; Autonomy: the possibility of going anywhere; Not finding open spots to deposit shared-bikes; Vulnerability: the gravity of consequences of an accident; E/I = Extrinsic/Intrinsic; IntI = Intrinsic; ExtI = extrinsic-internal; ExtE = extrinsic-external; I = internal control; E = External control; 0 = No control; S = Stable; T = Transient

4.3.3.1 Intrinsic/Extrinsic

Intrinsic arguments, extrinsic-internal arguments, and extrinsic-external arguments were compared for cyclists and non-cyclists, first for positive and then for negative valence. As defined in the theoretical framework, intrinsic arguments are related to the satisfaction without rewarding (e.g. pleasure when cycling; fear of cycling). Extrinsic arguments are related to gains. For extrinsic-internal arguments, this gain is an internal gain related to personal values (e.g. be motivated to cycling in order to reduce pollution; not be able to listen to music when cycling). For extrinsic-external arguments, this gain is an external or utilitarian gain (e.g. saving money; bicycle theft).

More than half of the arguments were extrinsic-external for cyclists and for non-cyclists, both for the positive and the negative valence, except for barriers cited by non-cyclists. Extrinsic-external arguments represented a particularly large proportion of the negative-valence arguments cited by cyclists. Negative extrinsic-internal arguments were less frequent than positive ones, for both cyclists and non-cyclists. Intrinsic arguments were the most frequent kind of negative-valence argument for non-cyclists (especially barriers) and to a lesser extent the most frequent kind of positive-valence argument for cyclists.

4.3.3.2 Controllability

The number of internal-control arguments was greater for the positive valence than for the negative valence, for both cyclists and non-cyclists. Arguments with a negative valence were mostly ones where the control was external.

4.3.3.3 Stability

Positive-valence arguments were quite stable for both cyclists and non-cyclists. Negative valence arguments, on the contrary, were quite transient for both cyclists and non-cyclists.

Table 7
Percentage of arguments for the extrinsic/intrinsic, controllability, and stability dimensions, given by cyclists and non-cyclists.

	Cyclists				Non-cyclists		
Type of argument	Advantages	Levers	Disadvantages	Barriers	Advantages	Disadvantages	Barriers
Extrinsic/Intrinsic							
Extrinsic- External	55	57	79	81	51	61	47
Extrinsic- Internal	21	16	4	7	31	7	6
Intrinsic	24	27	17	12	18	32	47
Control							
External	30	23	89	88	33	76	63
Internal	52	54	11	12	54	24	37
No control	18	23	0	0	13	0	0
Stability							
Stable	76	91	28	22	77	37	40
Transient	24	9	72	78	23	63	60

4.3.4 Social Image of Cycling

The social image of utilitarian cycling was positive for most participants (80% of cyclists and 71% of non-cyclists). However, a large majority of participants (80% of the cyclists and 84% of the non-cyclists) indicated that there is a problem with respect of road rules by cyclists. Among them, some said that all cyclists break the rules of the road (40% of the cyclists and 28% of the non-cyclists), while some said that only some cyclists break the rules (40% of the cyclists and 56% of the non-cyclists).

4.4 DISCUSSION

The present study was aimed at identifying the self-reported levers and barriers for and against cycling as a mode of transport. To do this, we conducted semi-structured in-depth interviews to compare people who say they do not cycle for utilitarian purposes (non-cyclists)—no matter their use of the bicycle for sport or leisure—to people who say they cycle for utilitarian purposes at least once a week (cyclists). We explored the advantages, levers, disadvantages, and barriers related to cycling. We begin by commenting on the number of arguments reported by the 17 interviewees, and then go on to discuss our hypotheses, focusing first on the representational dimension of the arguments (advantages, disadvantages), second, on the motivational dimension (lever, barriers), and lastly, on the type of argument (intrinsic/extrinsic). We also discuss the results related to controllability and stability (internal/external; stable/transient), and the social image of cycling.

The number of different arguments reported (nearly 100) indicates the participants' rich knowledge and great interest in the topic, from both the cyclist and the non-cyclist point of view. For positive arguments, the ten cyclists reported more advantages than did the seven non-cyclists. Cyclists also reported, on average, more advantages than did non-cyclists, as expected in hypotheses H1a and H1b. The fact that some arguments were reported more than other arguments by all participants, or by one of the groups of participants, allows us to construct a preliminary classification and to make comparisons between arguments and between groups. The existence of a consensus on a given advantage in one of the groups implies that this argument is more readily available to that group.

The most frequently reported advantages could constitute an interesting tool for designing ways to promote cycling. Using an argument that is not generally considered an advantage of utilitarian cycling would require promotional actions to associate that argument with cycling and stress its importance. Using a positive argument already associated with cycling by both cyclists and non-cyclists would demand a less cognitive effort of people in general and would thus make promotional interventions easier. The advantage most frequently cited by cyclists and non-cyclists was *physical activity,* a finding that replicates studies showing that individuals, regardless of their cycling practices, strongly associate cycling with good health (e.g. Gatersleben & Appleton, 2007; Forward, 2014). This suggests that when planning campaigns or actions to promote cycling, it would be more effective to use the widely-accepted *physical activity* argument than less well-acknowledged arguments. It may, therefore, be possible to devise strategies combining cycling and health, such "medical recommendation to cycle" (as done by some physicians in Strasbourg), or campaigns stressing the fact that cycling for commuting is as efficient and cheaper than going to the gym, etc.

Moreover, both cyclists and non-cyclists also frequently cited *saves time* and *saves money*, and to a lesser degree, *convenient* and *ecological transport*. Other advantages of cycling were cited frequently but only by one of the participant groups. Indeed, some arguments were cited often only by cyclists: *enjoyment* during cycling, *the feeling of freedom*, and *the possibility of carrying objects/bags* on the bicycle, while other arguments were frequently cited often by non-cyclists only: *convenience, flexibility,* and *available 24/7*.

Another possibility for promoting cycling would be to make use of less-frequently-cited advantages while strengthening their association with cycling. Although a little more demanding in terms of cognitive resources than using a widely-accepted advantage, this would allow more flexibility in the choice of arguments to promote cycling among users with different interests. For example, bicycle as an *ecological* mode of transport ("green", non-polluting) is not necessarily the advantage most frequently cited by cyclists and non-cyclists. However, environment and sustainability are important concerns in most Western societies, and developing stronger associations between cycling and solutions to these concerns could help promote cycling.

Among the negative arguments, cyclists cited, on average, more disadvantages than non-cyclists did, thereby invalidating our hypotheses H2a (number of different arguments) and H2b (mean number of citations). The greater number of disadvantages cited by cyclists could be due to the fact that cyclists identified more elements due to their actual use of the bicycle and are more interested in the topic. On the other hand, non-cyclists may have less knowledge of the disadvantages of cycling and they may feel less concerned about the subject. Indeed, most non-cyclists cited that they were not willing to and/or could not use a bicycle as a mode of transport. Other non-cyclists said that they could try but under certain conditions (e.g. *"I would stick to spring or summer. I'm not sure I'm hardly enough to bike in winter when it's cold")*. However, the proportion of disadvantages (compared to the proportion of advantages) was greater in the non-cyclists' discourse than in that of the cyclists, which confirms Hypothesis H2c.

The most frequent disadvantage cited by cyclists and non-cyclists alike was *danger*, replicating a result found in previous studies that danger was one of the principal obstacles to cycling (Chataway, Kaplan, Nielsen, & Prato, 2014; Graser, Aleksa, Straub, Saleh, & Wittmann, 2014; Lawson, Pakrashi, Ghosh, & Szeto, 2013). Danger is in fact both an objective argument and a psychological argument. It is objective because cyclists are vulnerable when traffic accidents occur, mainly because they are not as well protected against collision as car users are; it is psychological because perceiving danger when cycling implies a negative emotion. As such, eliminating danger as a barrier implies both reducing the objective danger associated with cycling and decreasing the perception of danger (psychological). The issue of objective danger is being addressed by stakeholders and public authorities in Paris (and in France), but it is far from being resolved. Generally, a decrease in objective danger can decrease the perception of danger, but as a social representation, the perception of danger can be also biased (distorted or inaccurate), which required specific interventions.

For cyclists, the other most frequently cited disadvantage of cycling—equal in frequency to danger—was *rain*. Cyclists also frequently cited *long distances* and *bicycle theft*. For non-cyclists, the other most frequently cited disadvantage of cycling—equal in frequency to danger—was *long distances*. They also often cited *the fear of cycling*.

In fact, for an advantage to be frequently cited by non-cyclists implies that this argument is accepted as an advantage, but it may not be enough to convince them to cycle. Thus, although using such "recognized advantages" would be cognitively less costly, carefully designed intervention strategies would be needed to turn it into an efficient incentive. It is highly possible that merely accepting the advantages of cycling is not enough to make someone decide to cycle, so it is necessary to focus on levers, relying for example on the specific advantages cyclists say motivated their own decision to cycle.

Cyclists cited far more cycling levers than non-cyclists did, supporting hypothesis H1. Non-cyclists included very few levers in their discourse, either because they do not actually have any or are not interested in cycling, and/or because cycling is less familiar to them. Another possibility is that non-cyclists who were interested in cycling cited very few levers in order to avoid cognitive dissonance (Festinger, 1954). For cyclists, cycling levers, like cycling advantages, are readily available.

While the advantage cited the most by cyclists and non-cyclists was *physical activity*, the most frequent lever for cyclists was *feeling of freedom*. This implies that for cyclists, representational (cognitive) arguments are not necessarily the same as motivational arguments. It could be that the *feeling of freedom* (intrinsic motivation) associated with cycling is a lever that the cyclists may have discovered through using the bicycle in a utilitarian way, but non-cyclists may not perceive cycling as such an important advantage because they have rarely, if ever, experienced it. The *feeling of freedom,* then, may not have been the lever that prompted the cyclists to use a bicycle in the first place, but it could be a "maintenance motivation", one that keeps them cycling. It is thus possible that the practice of cycling changed the cyclists' lever to use a bicycle by adding new levers or by switching from extrinsic to intrinsic ones, for example. This result suggests that interventions to promote cycling should take into account the advantages and levers that are geared to the type of user and the type of argument. For a new or potential user, for instance, *physical activity*, as an argument, could be stressed in a first place to help this user consider or even make the decision to cycle. Another way would be to stress the *feeling of freedom*, as a lever, associated with cycling in communication campaigns, especially for non-cyclists who do not spontaneously perceive this advantage, given that it is the most frequent lever for cyclists, and could foster someone that has already consider the idea to use a bicycle but lacks positive motivations. Moreover, *freedom* may be a very valuable argument, considering that it is highly valued in our individualistic-oriented society (Triandis, 1993). This opens up a new area to explore: the differences between "first positive motivations" and "maintenance positive motivations" for cycling.

In addition to the feeling *of freedom*, cyclists often cited as a lever *enjoyment*, which is another intrinsic argument. This is consistent with recent studies showing that satisfaction and well-being are greater for people commuting by bicycle than for people using other modes of transport (St-Louis et al., 2014; Willis et al., 2013). In this way, "advantages" can be used as a first step to making someone consider using a bicycle, and "levers" can be used to support this first consideration and move to action.

In contrast to positive-valence arguments, negative-valence arguments given by both cyclists and non-cyclists included barriers. Cyclists cited more barriers than non-cyclists did, further invalidating hypotheses H2a and H2b. However, non-cyclists cited a greater proportion of barriers in their discourse than did cyclists, confirming our hypothesis H2c. We expected cyclists to cite fewer barriers and disadvantages than non-cyclists because, as they do in fact cycle, they should encounter fewer barriers and may want to defend their behavior. However, the fact that cyclists cited more disadvantages and almost the same number of barriers as non-cyclists could be due to the fact that their cycling experience provided them with more elements to describe. At the same time, it is worth noting that despite being aware of these disadvantages and barriers, cyclists keep on cycling.

As for the positive-valence arguments, the negative-valence representational arguments (disadvantages) differed from the motivational ones (barriers). Indeed, for both cyclists and non-cyclists, the most frequently cited disadvantage was the argument *danger*, but the most common barrier was the argument *long distance*. This shows the dichotomy between disadvantages and barriers, and in this case, shared it by both cyclists and non-cyclists. The result that *distance* was considered as a barrier and *danger* as a disadvantage by cyclists could be surprising. However, as cycling is considered in our research as a mode of transport, the question of trip distance becomes central as a part of the travel modal choice (Heinen, van Wee, & Maat, 2010; Scheiner, 2010; Wuerzer & Mason, 2015). In using a bicycle, cyclists may find that *long distances* constitute a greater barrier than *danger* because, due to learning, practice, and skill development, cyclists may reconsider or underestimate the weight of *danger* as a barrier. This idea is in line with Gatersleben and Appleton (2007), who found that the more cycling experience their participants acquired, the less they cited traffic-related problems in their cycling diaries. However, as of now, it is not known whether cycling practice influences the perception of danger as a barrier or whether, on the contrary, the perception of danger as not very serious or severe will lead people to become cyclists.

Another disadvantage and barrier frequently cited by cyclists was *rain*; that is also considered by them as an overcome disadvantage. Non-cyclists also frequently cited *fear of cycling* and then *danger* as barriers to cycling, again confirming previous results identifying the fear of cycling as an important barrier for people who do not use a bicycle (Horton, 2007; Jacobsen & Rutter, 2012). The disadvantages and barriers to cycling could be considered as two levels of obstacles to raise when promoting cycling. A disadvantage could complicate the idea of using a bicycle but does not prevent it completely, while a barrier could block completely the idea to use it. So, interventions to promote cycling could be addressed differently if the target group has only disadvantages or only barriers; or both, and their number. Additionally, it depends also on their type.

Concerning representations and motivations cited by cyclists and non-cyclists, we found several similarities, even though these two concepts are theoretically defined as quite different, and also several differences. It is, in fact, possible that participants had difficulties to distinguish between what is merely a positive aspect of cycling and what motives them directly to cycle. In order to further explore this possibility and to thoroughly understand the specific roles of representations and motivations in the decision to cycle, it will be necessary to use other kinds of methodology, such as a questionnaire in the next study.

In relation to the type of argument (intrinsic/extrinsic), the arguments cited by cyclists and non-cyclists were mainly extrinsic (Ryan & Deci, 2000a), showing the utilitarian dimension of cycling, even for cyclists who were supposed intrinsically motivated for cycling or more intrinsically motivated than non-cyclists. Although some intrinsic arguments were frequent such as the *feeling of freedom* in the cyclists' levers, or *fear of cycling* in the non-cyclists' barriers, this is more consistent with the theory of self-determination (Ryan & Deci, 2000b). In general, then, cycling was given an important utilitarian value (e.g. *saves time* or *saves money*) that is also understandable as cycling is a mode of transport.

We also found that for negative arguments, non-cyclists cited more *intrinsic* (in particular for barrier and disadvantages) and *extrinsic-internal* (in particular for disadvantages) than did cyclists. Indeed, *fear* (of cycling and traffic) or perceived *danger* appears to be disadvantages and barriers specific to non-cyclists. Such *intrinsic* or *extrinsic-internal* negative arguments are psychological barriers that can be targeted through psychological interventions (e.g. people-centered help to overcome fears and the anxiety they entail) in addition to infrastructure intervention (e.g. cycle paths). Zander, Passmore, Mason and Rissel (2013) showed that in a cycling program for older people, the biggest barrier was fear of cars and traffic, which was overcome by improving participants' confidence via a course in cycling skills.

Our study of the arguments in terms of controllability and stability showed that for the positive valence, cyclists and non-cyclists mainly cited *stable* and *internal* (controllable) arguments. Among the negative-valence arguments, non-cyclists, and to a lesser extent cyclists, mainly cited *external* (the control comes from outside) and *transient* disadvantages and barriers. This may suggest a self-serving bias (D. T. Miller & Ross, 1975; Weiner, 2000), where in order to maintain and enhance self-esteem, participants may attribute reaching a positively valued outcome (cycling) to internal causes/motivations (auto valuation) and failing to reach this positively valued outcome to external causes/motivations (defense mechanism).

Moreover, citing disadvantages and barriers that are out of their control may be a way for people to feel less responsible or reduce dissonance (Festinger, 1954), but it can also generate a feeling of uncertainty. Uncertain events can be experienced as uncomfortable and this can be problematic for cycling. This large number of disadvantages and barriers with a *transient* aspect can interrupt the continuity of cycling, but can also provide some leeway insofar as they are not an absolute disadvantage or barrier.

Finally, even though cyclists and non-cyclists report that cyclists do not always obey the traffic laws, the social image of cycling was globally positive for both cyclists and non-cyclists. This replicates the results by Gatersleben and Haddad's (2010), who showed that in the UK, most people perceived cyclists positively (as responsible road users) and also found little difference between cyclists and non-cyclists. In terms of social identity theory (Tajfel & Turner, 1979), which states that individuals view members of their own group (the ingroup) more positively than members of other groups (the outgroup), we did not find a negative image of cycling due to an outgroup bias among the non-cyclists in our small sample.

Our findings allow us to describe the negative and positive representations and motivations of utilitarian cycling for two kinds of users, and the differences between them. These findings need to be confirmed with a larger sample of cyclists and non-cyclists, recruited in different areas, via a closed-question survey, in order to identify the main levers and the most important barriers to cycling. Such a survey would also help identify other factors that influence the decision to cycle as a transport mode, and thus to determine ways to use those factors to promote cycling. For this, we would need to distinguish between factors independent from the personal perception of cycling and factors related to the personal perception of cycling.

Factors independent of the personal perception of cycling are independent of the cycling experience, such as social and personal characteristics, physical environment, and various triggers. The individual's social and personal characteristics and the physical environment are present before the process that leads to the decision to cycle, but they can also influence that process. Each factor can act for or against cycling. For example, for personal characteristics being in good physical condition can work in favor of cycling but laziness can work against it, considering that cycling, even with a utilitarian goal (transport), requires at least some physical effort.

Concerning the characteristics of the social environment in which someone lives, they may or may not be favorable to cycling. The social image of cycling, what others and relatives think of cycling, would have an influence on the decision (Daley & Rissel, 2011). The physical characteristics of the environment, be they transient (e.g. weather) or stable (distance and topography, such as hills or flat areas), can also have a positive or negative impact on cycling. Triggers are external events or situations with a significant impact on the decision to cycle, because they could suddenly and strongly change the importance of certain barriers or levers. For example, a trigger of cycling could be moving closer to one's workplace and a trigger to stop cycling could be having a bicycle accident. In this study, we saw the significance of triggers when analyzing the three former cyclists and why they stopped cycling.

Factors related to the personal perception of cycling correspond to the representations and motivations associated with cycling. These factors are directly related to one's thoughts and feelings about using or not a bicycle and could have a stronger impact than independent factors in the decision to commute by bicycle (Heinen et al., 2010). As we showed in this study, representations and motivations can have positive or negative valence. Different people interested in cycling could evaluate the same cycling conditions differently.

If all of the factors independent from cycling personal perception (independent) are favorable to cycling (e.g. cycle path, dry weather, good physical condition, positive social image of cycling) but the personal factors related to cycling (related) are unfavorable to cycling (e.g. few advantages and a lot of disadvantages perceived of cycling, levers, and strategies to avoid cycling), it is likely that the person will not take the decision to use a bicycle. However if the independent factors are unfavorable (e.g. not facilities to cycle, wet weather, bad physical condition, negative social image of cycling) but personal factors related to cycling (related) are favorable to cycling (e.g. important advantages and few disadvantages perceived of cycling, strong levers to cycling and strategies to avoid barriers to cycling), the decision to cycle is probably viable. In this way, the knowledge acquired in this study let us identify and categorize an important number of arguments corresponding to personal factors related to cycling, by both cyclists and non-cyclists: advantages and disadvantages at the representational level, and levers and barriers at a motivational level.

Factors related to cycling personal perception of cycling are indeed subjective and need to be further studied and integrated into a model of the decision to cycle; likewise, objective factors should be included. Finally, with a survey conducted on a large sample, one could run a factor analysis to identify a typology of cycling arguments.

Our study was exploratory and was conducted with a small sample in a particular context, Paris area. Most participants in our sample used public transport, maybe with participants who use more the private car the results would be different. The fact that our sample used public transport is probably due to the fact that this study was conducted in the Paris area. The public transport in Paris area is much frequented because it has a very important, widespread and compact network. In urban and central areas in Paris area, it is not necessary to have a private car to move around because it is possible to go around using only public transport. In Paris, in 2008, the use of private car represented 12% of modal share, public transport 33% and cycling 3% (ENTD, 2008; Quételard, 2010). This context prevents us from generalizing the results, especially for countries where there is not an important system of public transport, but the cycling modal share of Paris represents the mean modal share of several cities that are willing to boost urban cycling. However, as our study was exploratory, it sought to obtain a better understanding of cyclists and non-cyclists' arguments related to cycling and explore commonalities and variations in these. Our aim was not to obtain statistical generalizations, but to obtain insights that could apply to other contexts and could also open the reflection for further research. Nevertheless, the sample and the framework of the results were carefully described in this study, hence the relevance of these results elsewhere can be interpreted.

Furthermore, taking into account our methodology we could not study whether the most important arguments in differentiating cyclists from non-cyclists were advantages or disadvantages. In the same way, we could not measure the importance or the strength attributed to the different arguments, since the participants did not evaluate every cited argument. In the next study, we will thus be aimed at understanding which arguments are perceived stronger or more important than other or if there are arguments perceived as the most important related to cyclists or to non-cyclists.

In conclusion, we found a difference between the representational and motivational factors involved in utilitarian cycling and between the cyclists and non-cyclists groups. The principal cycling advantage was shared by cyclists and by non-cyclists, as well as the principal cycling disadvantage and barrier. However, non-cyclists did not report a principal cycling lever, thus for lever only cyclists levers were taken into account. Some arguments were shared while some were specific to a given user group. The similarities and differences noted in this study provide insight for designing cycling promotional campaigns geared to the type of user, the available resources, and the type of aims targeted. A campaign to promote cycling could be based on different advantages or levers, depending on whether the goal is to encourage more people to cycle as a transport mode (new users) or to boost the practice among current cyclists. Moreover, actions could differ according to whether the goal is to reduce a specific barrier or to avoid a particular disadvantage. Finally, this study provides a large database for future research that will help to develop a global perspective of cycling and to build a cycling decision model.

5. SECOND STUDY: SURVEY ON REPRESENTATIONS AND MOTIVATIONS ABOUT UTILITARIAN URBAN CYCLING

Article 2: Martinez Tabares, Chaurand and Delhomme (2016a). Cyclists and Non-Cyclists Representations and Motivations of Utilitarian Cycling in France: a survey study (manuscript in preparation).

5.1 INTRODUCTION

This second study based on the previous one is aimed at getting a deeper knowledge and understanding of representations of and motivations to utilitarian urban cycling among cyclists and non-cyclists using an online questionnaire. This study had three aims.

The first aim was to determine the weight of each type of argument: advantages, levers, disadvantage, and barriers, by cyclists and non-cyclists. The second aim was to know whether the ranking of arguments found in the first study would be replicated in a large sample. According to the self-determination theory (Ryan & Deci, 2000b), we expected to find that the most important motivations for cycling would be intrinsic positive arguments evaluated by cyclists, and that the main barriers to cycling would be intrinsic negative arguments evaluated by non-cyclists. The third aim was to distinguish the two theoretical concepts that can influence cycling: the representations (advantages and disadvantages) and the motivations (levers and barriers).

More precisely, we formulated four hypotheses.

We expected to find rankings of positive and negative arguments (H1) similar to the ones we found in our previous study. We expected these similarities for both the cyclists' group (positive arguments H1a and negatives H1b) and the non-cyclists' group (positive arguments H1c and negatives H1d).

Concerning the differentiation of representation and motivation, for a qualitative distinction of the concepts, we expected to find that the ranking of advantages differed from the ranking of levers (H2a), and that the ranking of disadvantages differed from the ranking of barriers (H2b).

For a quantitative distinction, we expected a significant difference in the mean scores between representation and motivation (H3). More precisely, for positive arguments we expected that the score for levers would be higher than the score for advantages (H3a); and for negative arguments, we expect that the score for barriers would be higher than the score for disadvantages (H3b).

Between cyclists and non-cyclists, we expected that the score of positive arguments would be higher for cyclists than for non-cyclists (H4a). Likewise, we expected that the score of negative arguments would be higher for non-cyclists than for cyclists (H4b).

5.2 METHOD

5.2.1 Overview

The questionnaire was administrated through an online survey platform (Limesurvey). As we wanted to know the cyclists' and non-cyclists' point of view, we differentiated them using with the following question: "on average over the last 6 months (excluding holidays), how often did you use the bicycle as a mode of transport (to get to a given location)?". Nine answer options were displayed: never, once, between 2 and 5 times, once per month, 2 or 3 times per month, once per week, between 2 and 4 times a week, 5 times per week, and every day. Thus, participants who said they used the bicycle as a mode of transport at least once per week over the last 6 months were considered as cyclists, and the other participants were considered as non-cyclists.

5.2.2 Sample

Our sample consisted of 409 French participants (51% female) from the 11 largest French cities, separated in three age groups: 141 aged between 18 and 34 years old, 132 aged between 35 and 49 years old, and 136 aged 50 years old and more. 58% of the participants were married or lived with a partner. Most participants had a university education (70%) and had a job (69%). The mean regular commute distance reported by the participants was 8.67 km. Concerning the use of modes of transport different from bicycle, the most frequent mode used by participants was walking (M=4.14, SD=.84), followed by public transport

(M=3.74, SD=1.12), car driving (M=2.86, SD=1.39), being a car passenger (M=2.53, SD=.98), motorcycle driving (M=1.41, SD=.94) and being a motorcycle passenger (M=1.33, SD=.79).

5.2.3 Procedure

The questionnaire was administered between October 22nd, 2014 and November 4th, 2014, by a mail database service provider that sent invitations to a panel of potential participants living in Paris, Marseille, Lyon, Toulouse, Nice, Nantes, Strasbourg, Montpellier, Bordeaux, Lille, and Rennes. Participants who completed the questionnaire received point credits from the service provider.

The questionnaire started with screening questions in order to ensure that the participants lived in an urban area with a city-size of more than 100,000 inhabitants, as well as to ensure an equivalent repartition of participants according to age, gender, and user type (cyclists and non-cyclists). The mean time taken to complete the questionnaire was 13.64 minutes (SD= 8.92).

5.2.3.1 Pre-test

A pre-test of the questionnaire was run before the data collection in order to correct possible misinterpretation and to improve the quality of the questionnaire. The order of the questions was planned to avoid desirability bias. The survey started with the central aim of this study, in order to prevent any association with other questions such as habits of transport or in-group/out-group conflicts. Moreover, because it was the longest question that could demand more effort to the participants, and putting this scenario in the beginning of the questionnaire could prevent participants from quitting.

5.2.4 Measures

The questionnaire included two versions, one for cyclists with 41 items, and one for non-cyclists with 46 items, each version containing user type-related questions. The questionnaire was divided into six sections (see Figure 8). The first section was mainly the same version for cyclists and non-cyclists, for the second and third sections there was a version for cyclists and a version for non-cyclists, the last three sections were common for cyclists and non-cyclists. The first section of the questionnaire was about positive and negative arguments of cycling, the second was about utilitarian cycling practice, the third was about cycling intentions, the fourth was about the physical environment of travel, the fifth was about recreational cycling and sports cycling, and the sixth was about socio-demographic information.

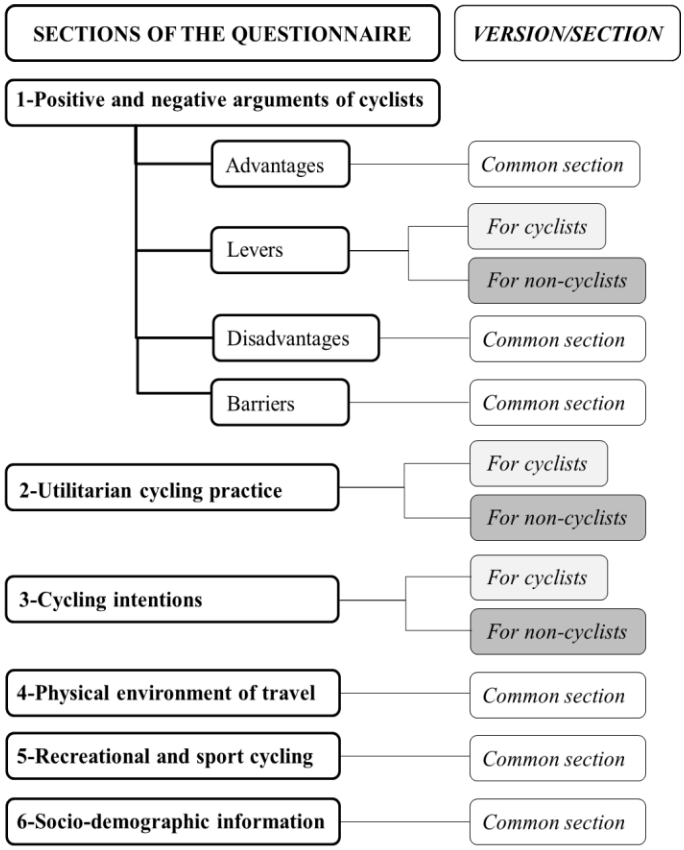

Figure 8
Structure of the questionnaire according to the sections and the corresponding version (or common section). Version for cyclists; version for non-cyclists; and common section= for both cyclists and non-cyclists the same questions.

5.2.4.1 Positive and Negative Arguments of Cycling

This section consisted of two lists of arguments related to cycling, 14 positive (see Table 9) and 21 negative arguments (see Table 10). These arguments were identified in the previous study. Both positive and negative arguments were evaluated as representational and as motivational factors for cycling, constituting four subsections.

The first subsection was focused on advantages of cycling, the representational feature of positive arguments. For each positive argument, participants were asked to indicate how important an advantage of cycling as an urban mode of transport it was for them (on a 5 point Likert scale from 1 - not at all important advantage to 5 - very important advantage). This question was a common section for all participants.

The second subsection was focused on levers for cycling, the motivational feature of positive arguments. This subsection was different according to the type of user. Participants who reported using the bicycle at least once per week were asked, for each positive argument, to what extent it was for them a motivation to use the bicycle as an urban mode of transport, i.e. it was a part of the reasons that made them use cycling. Participants who reported using a bicycle less than once per week were asked, for each positive argument, to what extent it *could be* for them a motivation to use the bicycle as an urban mode of transport, i.e. it could be a reason that could make them take up on cycling (on a 5 point Likert scale from 1 - not at all important motivation to 5 - very important motivation).

The third subsection was focused on disadvantages of cycling, the representational feature of negative arguments. For each negative argument, participants were asked to indicate how important a disadvantage of cycling as an urban mode of transport it was for them (on a 5 point Likert scale from 1- not at all important disadvantage to 5- very important). As for advantages, this question was a common section for all participants.

The fourth subsection was focused on barriers to cycling, the motivational feature of negative arguments. Participants were asked to indicate, for each negative argument, to what extent it was for them a barrier to use the bicycle as an urban mode of transport (on a 5 point Likert scale from 1- is not a barrier to 5- is a strong barrier). As for advantages and disadvantages, this question was a common section for all participants.

5.2.4.2 Utilitarian Cycling Practice

The second section of the questionnaire was related to the cycling practice. There were two versions. In the version for cyclists, the characteristics of the participant's actual cycling practice were measured. Participants were asked the length of time they had used the bicycle as a mode of transport, the distance and duration per week they went cycling for utilitarian trips. They also indicated their frequency of cycling for a regular utilitarian use, for an occasional utilitarian use, for a leisure use and for a sports use on a 5-point Likert scale ranging from 1-never to 5-almost always. Utilitarian cycling was separated into two types of utilitarian journeys. The first one was regular journeys that included commuting for work or for study. The second one was occasional journeys that included going shopping, to visit friends or relatives, go to leisure, etc. Participants finally indicated the seasonal variation in cycling, and the type of bicycle they used.

In the version for non-cyclists, the characteristics of the participant's previous cycling experience were measured. Participants were asked whether they knew how to ride a bicycle. In order to identify former utilitarian cyclists, they were asked whether they had used the bicycle as a mode of transport at least once per week at some point in their adult life. If they said that they had, they indicated their maximum frequency of cycling by choosing between three options: once a week, several times a week, and every day or almost. They were also asked the time they had used it; since when they had stopped (or decreased) using it; and the reason why they stopped (or decreased) using it by choosing between eight options: cycling is too restrictive (uncomfortable, slow, tiring, etc.), after a bicycle accident, after a bicycle theft, after health or physical problems, after a home move, after a change of work, after a family change (arrival of a child, etc.) and other (open answer).

Additionally, participants in the common section answered the affirmation "I have the skills to use the bicycle as a mode of transport in the city" with a 5-point Likert scale ranging from 1- not agree at all to 5- totally agree. They also estimated the maximum distance (in kilometers) that they would accept to cycle for a utilitarian journey (not as a hobby or as a sports) on flat ground.

5.2.4.3 Cycling Intentions

The third section of the questionnaire was related to intentions to cycle and had two versions. The version for cyclists included questions about the intention to use more the bicycle as a mode of transport, the plans to use more a bicycle in the next 3 years for regular trips (e.g. going to one's place of work/study) and for occasional trips (e.g. buying bread, visiting relatives, going to the cinema, etc.). These three questions used a 5-point Likert scale ranging from 1- Do not agree at all to 5- Totally agree.

The version for non-cyclists included questions about the intention to use the bicycle as a mode of transport, the plans to use the bicycle in the next 3 years for regular trips (e.g. going to one's place of work/study) and for occasional trips (e.g. buying bread, visiting relatives, going to cinema, etc.). These three questions used a 5-point Likert scale ranging from 1- Do not agree at all to 5- Totally agree. If they had plans to use a bicycle in the next three years, they indicated how soon by choosing between six options: in the coming month, between 1 and 3 months, between 4 and 6 months, between 7 and 12 months, in more than one year, and last, I do not know yet.

Participants also indicated whether there were circumstances at the moment of the study that made it impossible for them to use the bicycle as a mode of transport. Six options were proposed: physical or health problems, distances too great for commuting, a lot of slopes on the way, I do not know how to ride a bicycle; I don't have a bicycle, and other (open answer). Finally, for a list of eleven situations (identified in the first study), they indicated to what extent each situation could lead them to use a bicycle as a mode of transport, on a 5-point Likert scale ranging from 1- not agree at all to 5- totally agree. The situations were as follows: make a discovery tour of cycling routes and facilities, having nearby a cycling repair shop, having friends who ride with you, wanting to lose weight, wanting to do sports (or physical activity), receive a bicycle as a gift, have a kilometer allowance going to work by bicycle, having showers on the workplace, knowing that you will move closer to your workplace, change of work, and have more cycle paths on your journey.

5.2.4.4 Physical Environment of Travel

The fourth section of the questionnaire was mainly related to the participant's physical environment around their home and workplace. The participants were asked whether the area where they lived and the one where they worked or studied were too hilly (i.e. lots of slopes), on a 5-point Likert scale ranging from 1- not agree at all to 5- totally agree. Participants then indicated whether there were around their home or on their usual routes three types of cycling infrastructure: contraflow cycle lanes (one-way streets for motorized vehicles, but allow cyclists travel in the opposite direction of all other traffic), cycle lanes (on-road lanes marked with paint dedicated to cyclists), and cycle paths (paths dedicated to cyclists, physically separated from road traffic). Answers included a 5-point Likert scale ranging from 1- none to 5- many and an option "Do not know". They also mentioned the number of usable bicycles at home, whether they had a suitable place to store a bicycle at home as well as near their workplace/study place (yes or no), the length of time they have lived at their current address and whether they planned to move in the next six months (yes or no).

5.2.4.5 Recreational and Sports Cycling

The fifth section of the questionnaire was principally related to recreational (hobby) and sports cycling, other types of bicycle use different than the utilitarian use. Participants were asked whether they were members of a cyclist association, choosing between no association, sports association, urban association to promote cycling, and other associations related to cycling (open answer). They indicated their frequency of recreational cycling (for a ride, as a hobby); on a 9-point scale: once per year, between 2 and 6 times a year, between 7 and 11 times a year, once per month, several times a month, once per week, several times a week, and every day or almost. They also indicated the kilometer(s) and time average per year of recreation cycling. The same three questions were asked for sports cycling.

5.2.4.6 Socio-demographic Information

Lastly, socio-demographic questions were asked: civil status, number of children less than 18 years old, level of education, occupation, use of other modes of transport (car -as a driver or as a passenger-, Scooter/Motorcycle -as a motorcyclist or as a passenger-, public transport, and walking -more than 5 minutes-), and last, commute distance.

5.3 RESULTS

We will first present the characteristics of three groups of cyclists, then the descriptive analysis, the results concerning the hierarchy of arguments, the principal component analysis, and the correlations between representation and motivations. Finally, we will explore the result of the MANCOVA test run on representations and motivations according to the type of users.

5.3.1 Characteristics of the Three Groups of Cyclists

We initially wanted to compare two groups of users, cyclists and non-cyclists. The distribution in the question related to the frequency of utilitarian urban cycling in the last 6 months showed that 163 participants used the bicycle more than once per week (frequent cyclists) and 246 participants used the bicycle less than once per week. However, when we ran the preliminary analysis, we realized that there were differences in patterns among non-cyclists, between the non-cyclists who never used the bicycle (n=148) and the non-cyclists who used it between once and three times per month (n=98). Moreover, someone that had never used a bicycle as a mode of transport could have a representation based on imagination rather than real experience, whereas someone who had already used a bicycle as a mode of transport, even not frequently, should have a representation based on their own experience. Given that the size of the two subgroups was large enough to ensure statistical power if we separated the non-cyclists into two groups, we chose to compare three groups: frequent cyclists (40%), occasional cyclists (24%), and non-cyclists (36%).

Concerning gender, the distribution between men and women did not differ significantly between the three groups, χ^2 (2, N = 409) = 3.76, p =.15 (see Table 8). Regarding age, while the proportion of frequent cyclists decreased with age, the proportion of non-cyclists increased with age, χ^2 (4, N = 409) = 25.26, p<.001 (see Table 8).

Table 8
Distribution of gender and age group according to the group of cyclists

	Frequent Cyclists N=163	Occasional Cyclists N=98	Non-cyclists N=148
Female (%)	51.5	43	55
18-34 years old (%)	48	28	24
35-49 years old (%)	43	24	33
50 years old and more (%)	28	20	52

On behalf of other socio-demographic variables, there was no difference between the groups for educational levels; 72% of frequent cyclists, 71% of occasional cyclists and 65% of non-cyclists had a university education. Concerning occupation, frequent cyclists were more employed (79%) than both occasional cyclists (71%) and non-cyclists (57%).

Regarding the self-reported regular commute distance, for frequent cyclists, it ranged between 0 and 35 km, for occasional cyclists between 0 and 75 km, and for non-cyclists between 0 and 65 km. The mean regular commute distance did not differ between the groups, for frequent cyclists was 8.1 km, for occasional cyclists was 10 km, and for non-cyclists was 8.5 km (F(2, 241)= 0.72, p=.490). Likewise, use of other modes of transport did not differ between the groups (see annex B1).

5.3.2 Descriptive Analysis

We present a descriptive analysis in which we compare the three groups of cyclists. However, for utilitarian cycling practice and for cycling intentions, we present the results according to the sections of the questionnaire (see Figure 8).

5.3.2.1 Utilitarian Cycling Practice

a) Frequent Cyclists

Looking more specifically into how frequent cyclists in our sample used the bicycle, the mean cycling experience was 9 years (*SD*=8.89). The mean number of kilometers per week was 43 km per week (*SD*=48.80), the mean cycling time was 3.5 hours per week (*SD*=3.89) and the mean speed was 16.5 km/h (*SD*=14.90) (more details are given in annexes, Table B1). Kilometers per week and time per week allowed us to calculate the speed per week, however these two measures are in general difficult to estimate for participants. Some of the participants in our sample gave outlier estimations for kilometers or/and time (e.g. too high or too low compared to normal standards), for these reasons the most deviant data were not taken into account (less than 10% of the data was discarded). These measures are given only for information but are not reliable enough for analyses.

Frequent cyclists were asked about the frequency of journey types. For regular journeys (*M*=3.45, *SD*=1.33), they reported using the bicycle almost always 28%, frequently 23%, occasionally 26%, seldom 10% and never 12%. For occasional journeys (*M*=3.75, *SD*=.96) they reported using the bicycle almost always 23%, frequently 42%, occasionally 25%, seldom 10% and never 1%.

Regarding the type of bicycle used, most frequent cyclists in the sample said that they use a normal/classic personal bicycle (74%), followed by 16% who use a public bicycle (bike-sharing system like Vélib' in Paris), 7% who use a personal folding bicycle, and 2% who use a personal electric bicycle (e-bike).

The frequent cyclists were asked about the cycling practice related with seasons. In general, cycling practice decreases with winter. Most frequent cyclists said that they use the bicycle less in winter than in summer: little less (36.8%) and far less (34.4%). Whereas 24% said that they use the bicycle as much in winter as in summer, 2.5% of cyclists use the bicycle a little more in winter than in summer, and 1.8% said that they use the bicycle much more in winter than in summer.

b) Comparison between Occasional Cyclists and Non-Cyclists

Only 3 non-cyclists reported they did not know how to ride a bicycle. Concerning the use of a bicycle as a mode of transport, 75% of occasional cyclists and 40% of non-cyclists had already used a bicycle at least once per week in the past. Among the occasional cyclists who had already used the bicycle in the past, 44% said that they used to cycle once per week, 36%

several times per week, and 20% every day or almost. Among the occasional cyclists who had already used the bicycle in the past, 35% said that they used to cycle once per week, 35% several times per week and 30% every day or almost.

The mean time that occasional cyclists had used a bicycle as a mode of transport was five years (*SD*=6.40), while it was four years (*SD*=5.40) for non-cyclists. The mean time since occasional cyclists had stopped using a bicycle as a mode of transport was 7 years (*SD*=8.26), and for non-cyclists was 12.6 years (*SD*=10.71). The reason to have stopped using the bicycle chosen most often by occasional cyclists was "change of job" (18%) and by non-cyclists was "move to another house" (15%).

c) Comparison between Frequent Cyclists, Occasional Cyclists and Non-Cyclists

Concerning the cycling skills, cyclists (*M*=4.32, *SD*=.74) in average estimated that they had the skills to use the bicycle as a mode of transport in urban settings more than occasional cyclists (*M*=3.99, *SD*=.82) and non-cyclists (*M*=3.51, *SD*=1.21).

5.3.2.2 Cycling Intentions

a) Frequent Cyclists

Frequent cyclists reported they agreed with the statement that they wanted to use more the bicycle as a mode of transport (*M*=3.77; *SD*=0.83). Increasing regular journeys in the next 3 years was contemplated by 60% (*M*=3.68, *SD*=.96) and occasional journeys by 68% (*M*=3.85, *SD*=.93) of frequent cyclists.

b) Comparison between Occasional Cyclists and Non-Cyclists

Three options of intention concerning the use of bicycle as a mode of transport were explored:

- **Intention to use a bicycle in general:** More intentions to use a bicycle were reported by occasional cyclists (*M*=3.60, *SD*=.81) than by non-cyclists (*M*=2.80, *SD*=1.18); $F(1, 245)= 34.84$, $p<.001$, $\eta^2= .125$.
- **Intention to use a bicycle for regular journeys:** Occasional cyclists (*M*=3.20, *SD*=1.00) considered more using a bicycle for regular journeys in the next 3 years than non-cyclists (*M*=2.20, *SD*=1.16); $F(1, 245)=48.76$, $p<.001$, $\eta^2= .167$. Among those who answer agree or totally agree with this question (*N*=58), 46% of occasional cyclists and only 26% of non-cyclists mentioned that they considered

doing it in the next 6 months, but the difference was not significant (F(1, 57)=2.91, p=.094).

- **Intention to use a bicycle for occasional journeys:** Differences between occasional cyclists (M=3.74, SD=.83) and non-cyclists (M=2.54, SD=1.23) were also found related to planning to use a bicycle for occasional journeys in the next 3 years (F(1, 245)=72.11, p<.001, η^2= .228). Among those who answered agree or totally agree with this question (N=94), 59% of occasional cyclists and 21% of non-cyclists mentioned that consider doing it in the next 6 months, this difference was significant (F(1, 95)=15.18, p<.001, η^2= .139).

Regarding the impossibility to use the bicycle as a mode of transport, the means for occasional cyclists (M=3.30, SD=1.06) and for non-cyclists (M=3.49, SD=1.29) were not significantly different F(1, 245)= 1.49, p=.224. There was no correlation between the intention to use a bicycle in general and the impossibility to use it (r(246)= .07, p =.272). Among those who mentioned that it was not possible to use a bicycle, the most chosen reason was "the distances to do are too long" for occasional cyclists (M=0.21, SD=.41) and "not having a bicycle" (M=0.26, SD=.44) for non-cyclists.

For both the occasional cyclists group and the non-cyclists group there was a positive correlation between intention to use a bicycle as a mode of transport (in general) and the consideration to use it as a mode of transport for regular journeys (r(98) = .37, p <.001; r(148) = .63, p <.001 respectively) as well as for occasional journeys (r(98) = .60, p <.001; r(148) = .65, p <.001 respectively).

For both groups there was likewise a positive correlation between the consideration to use a bicycle as a mode of transport for regular journeys and for occasional journeys (r(98) = .21, p =.036; r(148) = .65, p <.001). There was no correlation between these variables and the impossibility to use the bicycle.

Among the 11 different situations that could lead the participants to use a bicycle as a mode of transport, occasional cyclists (M=3.91, SD= .91) and non-cyclists (M=3.47, SD=1.25) principally chose the situation: "make a discovery ride of the cycling itineraries or cycling facilities".

5.3.2.3 Environment

The physical environment for utilitarian cycling was evaluated through two variables: hilly areas and cycling infrastructure. Hilly areas grouped two questions, one related to hilly areas around home and the other to hilly areas around workplace or study place (all $\alpha > .7$; see Table B2 in annexes); likewise cycling infrastructure grouped three questions: contraflow cycle lanes, cycle lanes, and cycle paths; (all $\alpha > .7$; see Table B3 in annexes).

In general the environment for riding was evaluated more positively by frequent cyclists than by occasional cyclists and non-cyclists: they indicated there were in terms of more cycling infrastructures (M_{fc}=3.35, *SD*= 1.09; M_{oc}=2.99, *SD*=1.16; and M_{nc}=2.70, *SD*=1.14; $F(2, 380) = 12.27$, $p < .001$, $\eta^2 = .061$)[7]; and less hilly areas during the route for commuting (M_{fc}=2.21, *SD*=1.07; M_{oc}=2.40, *SD*=.95; and M_{nc}=2.52, *SD*=1.12; $F(2, 406) = 3.42$, $p = .034$, $\eta^2 = .017$) (see Table B4 in annexes).

The mean of the maximum distance participants would accept to cover on bike for an utilitarian journey on flat ground was 20 km (*SD*=20.5) for frequent cyclists, 13 km (*SD*=13) for occasional cyclists, and 7 km (*SD*=7.6) for non-cyclists; the difference between the groups was significant ($F(2, 402) = 30.184$, $p < .001$, $\eta^2 = .131$). On average, frequent cyclists had 1.6 usable bicycles at home, occasional cyclists had 1.1 and non-cyclists had 0.3. The majority of frequent cyclists mentioned having a suitable place to store a bicycle at home and at the workplace/study place (77%; 79% respectively), as well the majority of occasional cyclists (69%; 55% respectively), and in a less proportion non-cyclists (45%; 46% respectively). Non-cyclists (*M*=12.3, *SD*=11.46) had been living at their current place for longer than occasional non-cyclists (*M*=9.8, *SD*=8.70) and cyclists (*M*=9.4, *SD*=7.92). In general, participants (84%) did not plan to move from their place.

5.3.2.4 Recreational and Sports Cycling

In our sample, 12% of frequent cyclists, 5% of occasional cyclists and 1.4% of non-cyclists reported belonging to a cycling association. More specifically, 16 frequent cyclists, 4 occasional cyclists, and 1 non-cyclist were members of a cycling sportive association (club); 3 frequent cyclists and 1 non-cyclist were members of an urban association to promote cycling; and 1 cyclist was part of a bicycle-repairing association.

[7] η^2= Effect size

Concerning leisure cycling, the mean frequency was 6.54 (*SD*=1.56) for frequent cyclists, 4.66 (*SD*=1.57) for occasional cyclists and 3.06 (*SD*=1.12) for non-cyclists. On average frequent cyclists said they rode 411 km a year for leisure cycling (*SD*=763.66), occasional cyclists said 209 km (*SD*=462.39) and non-cyclists said 34 km (*SD*=50.14). A bicycle trip for leisure lasted on average 2 hours (*SD*=2.09) for frequent cyclists, 3 hours (*SD*=11.61) for occasional cyclists and 1.58 hours (*SD*=.85) for non-cyclists.

For sports cycling, the mean frequency was 6.06 (*SD*=1.73) for frequent cyclists, 4.73 (*SD*=1.70) for occasional cyclists and 3.06 (*SD*=1.34) for non-cyclists. On average, frequent cyclists said they rode 445 km a year for sports cycling (*SD*=881.98), occasional cyclists said 171 km (*SD*=281.79) and non-cyclists said 47 km (*SD*=59.11). A bicycle trip for sports purpose lasted on average 3.3 hours (*SD*=8.54) for frequent cyclists, 2.5 hours (*SD*=8.70) for occasional cyclists and 1.2 hours (*SD*= .33) for non-cyclists.

5.3.3 Hierarchy of Arguments

5.3.3.1 Positive Arguments

In general, the most important advantage associated with using a bicycle for a utilitarian purpose was *physical activity* (see Table 9). It was, the most important advantage associated with using a bicycle for a utilitarian purpose for all groups. It was also the most important motivation to cycling for frequent cyclists and for occasional cyclists. The most important motivation that could lead non-cyclists to cycle was *good weather*. P*hysical activity* was followed by the *ease to park* as an advantage as well as a motivation for the three groups.

Table 9
Average evaluation scores for 14 positive arguments by groups

	Advantages						Levers					
	Frequent Cyclists *N*=163		Occasional Cyclists *N*=98		Non-cyclists *N*=148		Frequent Cyclists *N*=163		Occasional Cyclists *N*=98		Non-cyclists *N*=148	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Carrying objects	2.69	(1.21)	2.47	(1.13)	2.39	(1.24)	2.55	(1.22)	2.44	(1.12)	2.07	(1.09)
Clearing one's head	3.62	(1.12)	3.41	(1.02)	3.24	(1.24)	3.35	(1.16)	3.13	(1.05)	2.97	(1.24)
Ease to park	4.02	(1.00)	3.89	(.93)	3.65	(1.27)	3.67	(1.02)	3.41	(1.07)	3.00	(1.38)
Ecological aspect	3.66	(1.16)	3.55	(1.09)	3.34	(1.29)	3.49	(1.23)	3.27	(1.14)	2.95	(1.30)
Feeling of freedom	3.61	(1.11)	3.38	(1.12)	3.17	(1.19)	3.58	(1.04)	3.03	(1.08)	2.72	(1.18)
Good weather	3.75	(.98)	3.62	(1.02)	3.51	(1.08)	3.50	(1.07)	3.39	(.96)	3.03	(1.16)
Money saved	3.77	(1.14)	3.37	(1.20)	3.29	(1.32)	3.60	(1.15)	3.20	(1.17)	2.88	(1.31)
Physical activity	4.06	(.86)	3.83	(.94)	3.66	(1.02)	3.73	(.92)	3.50	(.96)	2.84	(1.17)
Pleasure of riding a bicycle	3.76	(.87)	3.53	(.89)	2.96	(1.22)	3.42	(1.00)	3.21	(.96)	2.55	(1.15)
Sociability	2.65	(1.32)	2.68	(1.11)	2.17	(1.15)	2.50	(1.25)	2.60	(1.12)	1.95	(1.06)
The view or the landscape	3.43	(1.18)	3.45	(1.03)	3.20	(1.16)	3.06	(1.17)	3.12	(1.01)	2.86	(1.13)
Time saved	3.82	(1.01)	3.48	(1.05)	3.28	(1.14)	3.66	(1.00)	3.29	(1.08)	2.85	(1.15)
To go wherever you want	3.85	(.95)	3.57	(1.06)	3.49	(1.12)	3.64	(.94)	3.30	(.99)	3.00	(1.23)
To leave a place when you want	3.88	(.90)	3.56	(1.04)	3.39	(1.18)	3.65	(.92)	3.29	(1.07)	2.92	(1.18)

Note. Clearing one's head= relaxing; Sociability=the exchange with other people

5.3.3.2 Negative Arguments

In general, the most important disadvantages and barriers associated with using a bicycle for a utilitarian purpose were weather issues (*ice, snow, heavy rain and cold*) for the three groups (see Table 10). More specifically, the most important disadvantage and the most important barrier was the argument *ice*. After the weather issues, the following disadvantage and barrier for frequent cyclists was the *lack of attention from other road users*, for occasional cyclists it was the *long distance*, and for non-cyclists it was the *vulnerability in traffic*.

Table 10
Average evaluation scores for 21 negative arguments by groups

	Disadvantages						Barriers					
	Frequent Cyclists *N*=163		Occasional Cyclists *N*=98		Non-cyclists *N*=148		Frequent Cyclists *N*=163		Occasional Cyclists *N*=98		Non-cyclists *N*=148	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Aggression from other users	3.16	(1.28)	3.19	(1.05)	3.30	(1.21)	2.76	(1.29)	2.70	(1.10)	3.24	(1.28)
Cold	3.35	(1.09)	3.79	(1.09)	4.11	(.97)	2.96	(1.18)	3.51	(1.16)	4.03	(1.03)
Danger – risk of accident	3.04	(1.22)	3.44	(1.18)	4.01	(1.00)	2.84	(1.20)	3.14	(1.26)	3.90	(1.09)
Difficulty to carrying objects	2.84	(1.02)	3.18	(1.04)	3.33	(1.04)	2.63	(1.09)	2.98	(1.13)	3.20	(1.13)
Difficulty to find a parking spot at work/on the street	2.69	(1.30)	3.01	(1.18)	2.80	(1.33)	2.45	(1.26)	2.80	(1.18)	2.63	(1.26)
Fear of cycling	1.98	(1.23)	2.27	(1.30)	2.55	(1.46)	2.03	(1.26)	2.22	(1.24)	2.53	(1.43)
Fear of traffic	2.60	(1.27)	2.83	(1.27)	3.64	(1.21)	2.36	(1.19)	2.74	(1.26)	3.59	(1.30)
Heavy rain	4.19	(.91)	4.36	(.89)	4.53	(.86)	4.00	(1.11)	4.10	(1.09)	4.43	(.98)
Hills	2.99	(1.09)	3.31	(1.05)	3.79	(1.01)	2.75	(1.10)	3.04	(1.02)	3.73	(1.06)
Ice	4.27	(1.02)	4.46	(.95)	4.70	(.68)	4.15	(1.10)	4.24	(1.03)	4.62	(.75)
Lack of attention of other road users	3.39	(1.22)	3.49	(1.05)	3.97	(.99)	3.03	(1.23)	3.10	(1.21)	3.89	(1.05)
Longs distances	3.15	(1.11)	3.59	(1.01)	3.82	(1.05)	2.96	(1.15)	3.39	(1.06)	3.70	(1.05)
Moderate rain	3.23	(.96)	3.58	(.97)	3.85	(1.03)	3.14	(1.10)	3.47	(.99)	3.78	(1.02)
No place to put the bicycle at home	2.66	(1.29)	3.20	(1.23)	3.51	(1.28)	2.47	(1.32)	2.72	(1.26)	3.29	(1.37)
Physical effort/Tiredness	2.28	(1.14)	2.58	(1.15)	2.68	(1.22)	2.18	(1.17)	2.53	(1.06)	2.66	(1.18)
Snow	4.05	(1.14)	4.37	(.92)	4.59	(.76)	3.78	(1.29)	4.18	(1.01)	4.49	(.88)
Spare clothes	2.61	(1.20)	2.90	(1.14)	3.10	(1.19)	2.37	(1.19)	2.64	(1.12)	3.03	(1.22)
Sweating	2.61	(1.12)	2.85	(1.12)	2.91	(1.22)	2.56	(1.14)	2.69	(1.14)	2.95	(1.26)
Take a shower	2.71	(1.32)	3.01	(1.25)	3.11	(1.34)	2.46	(1.26)	2.71	(1.18)	3.06	(1.31)
Vulnerability in traffic	3.31	(1.20)	3.53	(1.17)	4.18	(1.01)	3.02	(1.19)	3.27	(1.22)	3.99	(1.12)
Wind	3.12	(1.14)	3.40	(1.03)	3.69	(1.09)	2.80	(1.13)	3.32	(1.01)	3.57	(1.10)

5.3.4 Principal Component Analysis (PCA)

5.3.4.1 PCA on Advantages

Data from the 14 advantages of cycling among the whole sample of participants (*n*= 409) were entered in a Principal Component Analysis (PCA) using Varimax rotation (see Table 11). The PCA revealed three components with eigenvalues larger than 1, which together explained 55% of the total variance (KMO = 0.878; BTS < .001)[8]. An EFA was also run but did not provide clear factors.

The first component, "Independence", explained 38.25% of the total variance and included six items: the *possibility to go wherever you want*, the *possibility to leave a place when you want*,

[8] Measures of sampling adequacy (MSAs): KMO = Kaiser-Meyer-Olkin ; BTS = Bartlett's test of sphericity

the *enjoyment of good weather*, the *feeling of freedom*, the *ecological aspect* and the *ease to park*. The second component, "Pleasure", explained 10.02% of the total variance and included: the *pleasure of riding a bicycle*, the *possibility of clearing one's head/relaxing*, the *enjoyment of the view or the landscape*, the *sociability/the exchange with other people* (e.g. relatives, colleagues cyclists at the workplace and association) and the *physical activity*. The last component, "Utilitarian Function", explained 7.16% of the total variance, and included three items: the *possibility of carrying objects*, the *time saved* and the *money saved.*

Some items had loaded on two components. *Feeling of freedom* item loaded .57 on the first component and .43 on the second component. *Possibility of clearing one's head/relaxing* loaded .63 on the second component and .54 on the first component.

Table 11
Principal Component Analysis on Advantages

	Component		
	1 Independence	2 Pleasure	3 Utilitarian Function
The possibility to go wherever you want	**.78**	.20	.17
The possibility to leave a place when you want	**.74**	.20	.18
The enjoyment of good weather	**.61**	.46	.11
The feeling of freedom*	**.57**	.43	.11
The ecological aspect	**.54**	.17	.27
The ease to park	**.53**	.01	.44
The pleasure of riding a bicycle	.14	**.74**	.07
The possibility of clearing one's head/relaxing*	.54	**.63**	-.03
The enjoyment of the view or the landscape	.44	**.63**	.12
The sociability/the exchange with other people	-.03	**.61**	.47
The physical activity	.18	**.54**	.07
The possibility of carrying objects	.02	.15	**.75**
The time saved	.33	-.01	**.71**
The money saved	.32	.15	**.59**

Note. *=loading on two components

As the PCA on levers did not indicate clear patterns, it is not presented here.

5.3.4.2 PCA on Disadvantages

For disadvantages, a Principal Component Analysis (PCA) using Varimax rotation (see Table 12) was also conducted on data from the 21 disadvantages of cycling among the whole sample of participants (n= 409). The PCA revealed five components with eigenvalues larger than 1, which together explained 62.80% of the total variance (KMO = 0.861; BTS < .001).

The first component, “Perceived Danger”, explained 30.99% of the total and included five items: the *vulnerability in traffic*, the *lack of attention of other road users*, the *danger – risk of accident*, the *aggression from other users* and the *fear of traffic*. The second component, “Weather Issues”, explained 11.62% of the total variance and included five items: the *heavy rain*, the *ice*, the *snow*, the *moderate rain* and the *cold*. The third component, “Effort”, explained 8.45% of the total variance and included five items: the *wind*, the *long distances*, the *hills*, the *physical effort/tiredness* and the *fear of cycling*. The fourth component, “Sweating Issues”, explained 6.45% of the total variance and included three items: the *spare clothes*, *take a shower*, and *sweating*. The fifth component, “Lack of Parking Places”, explained 5.29% of the total variance and included three items: *no place to put the bicycle at home*, the *difficulty to find a parking spot at work/on the street* and the *difficulty to carrying objects*.

Table 12
Principal Component Analysis on Disadvantages

	Component				
	1 Danger Perceived	2 Weather Issues	3 Effort	4 Sweating Issues	5 Lack of Parking-Places
Vulnerability in traffic	**.80**	.23	.19	.06	.12
Lack of attention of other road users	**.77**	.22	.05	.15	.09
Danger – risk of accident	**.75**	.21	.26	.08	.11
Aggression from other users	**.69**	-.02	.04	.23	.15
Fear of traffic	**.63**	.03	.45	.00	.19
Heavy rain	.07	**.81**	.11	.07	-.01
Ice	.26	**.80**	-.03	-.01	.01
Snow	.21	**.77**	.09	-.01	.08
Moderate rain	-.04	**.60**	.43	.17	.12
Cold	.07	**.57**	.45	.12	.06
Wind	.12	.26	**.69**	.08	-.04
Long distances	.13	.26	**.62**	.11	.11
Hills	.22	.23	**.62**	.21	.09
Physical effort/Tiredness	.14	-.13	**.60**	.29	.22
Fear of cycling*	.29	-.20	**.55**	.02	.39
Spare clothes	.19	.05	.16	**.85**	.19
Take a shower	.16	.09	.08	**.82**	.16
Sweating	.06	.04	.25	**.78**	.05
No place to put the bicycle at home	.11	.17	.12	.07	**.81**
Difficulty to find parking spot at work/on the street	.22	-.13	.13	.14	**.71**
Difficulty to carrying objects	.12	.21	.10	.31	**.56**

Note: *=loading on two components

The PCA on barriers was almost identical (for all the groups) to the PCA on disadvantages.

5.3.5 Comparison of Representations and Motivations

5.3.5.1 Advantages and Levers

Among the whole sample, the average score of advantages (*M*= 3.41, *SD*=.41) was higher than the average score of levers (*M*=3.10, *SD*=.34), $F(1, 400)= 227.15$, $p<.001$, $\eta^2=.362$. This difference was found in the three groups. For frequent cyclists, the score of advantages (*M*= 3.61, *SD*=0.41) was significantly higher than the score of levers (*M*= 3.39, *SD*=0.40), $F(1, 160)= 83.66$, $p<.001$, $\eta^2=.362$. For occasional cyclists the score of advantages (*M*= 3.41, *SD*=.39) was also significantly higher than the score of levers (*M*= 3.16, *SD*=.30), $F(1, 95)= 53.42$, $p<.001$, $\eta^2=.360$. And for non-cyclists the score of advantages (*M*= 3.20, *SD*=0.43) was again significantly higher than the score of levers (*M*= 2.76, *SD*=.34), $F(1, 145)= 105.65$, $p<.001$, $\eta^2=.421$. This effect was found for almost each positive item individually (see Table B5 in annexes).

5.3.5.2 Disadvantages and Barriers

For negative arguments, in all sample, the average score of disadvantages (*M*=3.33, *SD*=.58) was higher than the average score of barriers (*M*=3.16, *SD*=.56), $F(1, 400)= 81.56$, $p<.001$, $\eta^2=.169$. This difference was found in the three groups. For frequent cyclists, the score of disadvantages (*M*= 3.06, *SD*=.59) was significantly higher than the score of barriers (*M*= 2.84, *SD*=.56), $F(1, 160)= 45.18$, $p<.001$, $\eta^2=.220$. For occasional cyclists, the score of disadvantages (*M*= 3.35, *SD*=.57) was also significantly higher than the score of barriers (*M*= 3.12, *SD*=.55), $F(1, 95)= 43.64$, $p<.001$, $\eta^2=.315$. And for non-cyclists, the score of disadvantages (*M*= 3.63, *SD*=.63) was again significantly higher than the score of barriers (*M*= 3.54, *SD*=.61), $F(1, 145)= 7.73$, $p=.006$, $\eta^2=.051$. This effect was found on almost all negative items individually (see Table B6 in annexes).

5.3.6 Correlations between Representation and Motivations

5.3.6.1 Advantages and Levers

For every positive argument studied among the whole sample, the correlation between the score of advantages and the score of motivations was significant, positive, and strong. The 14 correlations for all participants varied between .58 and .79. For example, the correlation between *physical activity*-advantage and *physical activity*-lever was significant and positive (r = .58, p <.001). This positive correlation for every positive argument was also observed for each group: frequent cyclists, occasional cyclists and non-cyclists.

5.3.6.2 Disadvantages and Barriers

In the same way, the correlation between disadvantages and barriers for every negative argument studied was significant, positive, and strong, in the entire sample and for each group of users. The 21 correlations for all participants varied between .56 and .85. For example, *cold* as a disadvantage was significantly and positively correlated with *cold* as a barrier (r=.75, p<.001).

5.3.7 MANCOVA on Representations and Motivations according to the type of users

A MANCOVA test (controlling for age) was performed to study the effect of the group on the importance given to different arguments. Planned comparisons were then performed to test whether the arguments (advantages, levers, disadvantages and barriers) between frequent cyclists, occasional cyclists, and non-cyclists were different.

5.3.7.1 Advantage and Levers

For positive arguments, the frequent cyclists' means are significantly higher than the non-cyclists' means and the occasional cyclists' means are in an intermediate position. Indeed, the more a person uses the bicycle as a mode of transport, the more they will give importance to advantages and levers. For example, for the argument pleasure of riding a bicycle as an advantage the frequent cyclists' mean (3.42, SD=1.00) was higher than non-cyclists' mean (2.55, SD=1.15) and occasional cyclists mean (3.21, SD=.96) was an intermediate position (F(1, 405)= 46.81, p<.001, η^2=.104). The same was observed for 12 advantages (except for the arguments *carrying objects* and *view*) and for 13 motivations (only exception *view*).

5.3.7.2 Disadvantages and Barriers

For negative arguments, the non-cyclists' means are significantly higher than the frequent cyclists' means and the occasional cyclists' means are in an intermediate position. Indeed, the more a person uses the bicycle as a mode of transport, the less they will give importance to disadvantages and barriers. For example, for the argument fear of traffic as a barrier, the non-cyclists' mean (3.59, *SD*=1.30) was significantly higher than the frequent cyclists' mean (2.36, *SD*=1.19) and the occasional cyclists' mean (2.74, *SD*=1.26) was an intermediate position ($F(1, 405)= 59.43$, $p<.001$, $\eta^2=.128$). This difference was found for 19 disadvantages (except for *aggression from other users* and for *difficulty to find a parking spot at work/on the street*) and for 20 barriers (the only exception was the *difficulty to find a parking spot at work/on the street*). In sum, the test showed that the more frequent the practice of cycling the higher the score of positive arguments and the lower the score of negative arguments.

5.4 DISCUSSION

Three aims were assigned to this study. The first aim was to identify the weight that cyclists (current users) as well as non-cyclists (possible potential users) give to a specific argument of utilitarian urban cycling from the eleven main French cities. The second aim was to compare with the previous study the principal representation, in terms of advantages and disadvantages, and the principal motivations, in terms of levers and barriers with a larger sample. The last aim was to distinguish the representations and the motivations, based on the definition according to qualitative and quantitative differences, and, according to the user.

Instead of two groups of users as it was initially expected, data analysis showed that there were three groups of users: frequent cyclists, occasional cyclists, and non-cyclists. This separation was essential given the difference in the answer patterns, because several dimensions (e.g. past cycling practice, accepted cycling distance, importance given to the arguments) showed that occasional cyclists group differed considerably from non-cyclists group; and that the occasional cyclists group was in an intermediate position between frequent cyclists group and non-cyclists group.

In order to be able to have an equilibrated point of view of users and potential users, the questionnaire administrated online was addressed 50-50 to cyclists and to non-cyclists thought equivalent distribution (portion) in the recruitment. Finding the cyclists required more efforts (in terms of time of participant's recruitment) than finding the non-cyclists. It also required more effort to find women cyclists, as we also wanted to have the viewpoint of women non-cyclists and women cyclists in the sample. At the end of the recruitment, our sample contained enough cyclists (both women and men) and non-cyclists (both women and men) to be able to statistically compare the groups and to generalize our results for specific groups studied. Our sample is thus noteworthy because it contains participants from different cities in France, and also because the recruitment was aimed at answering the variability of elements: type of user, gender, and age.

Moreover, it is rare to find studies on cycling with this equilibrated number of men and women because, apart from the cases of Netherlands and Denmark, urban utilitarian cycling is an activity practiced mostly by men. In this sense, the results found in our study could be principally attributed to the frequency of urban cycling and no to gender differences.

Besides, we obtain a sample of participants with a low number of cyclists who belong to an urban association to promote cycling which is different than other studies in the field. Indeed cyclists belonging to a cycling association are likely to be inclined to promote and defend cycling that thus their representations and motivations may not be representative of the ones of the general cyclist population.

However, there was a difference concerning age, the distribution of the ages showed that the majority of 18-34 years old and 35-49 years old were in the group of frequent cyclists while the majority of 50 years old and more were in the group of non-cyclists. For this reason, in all the statistical tests done in the study, age was controlled.

Additionally, the information found throughout this study, related to the description of cyclists groups, let us understand better the characteristics related to frequent cyclists as current users; occasional cyclists as potential users who have already tried utilitarian cycling, and non-cyclists as potential users, as well as the difference between them. Concerning utilitarian cycling, the frequent cyclists in our sample use the bicycle for both types of journeys: regular and occasional. In average, frequent cyclists used a little bit more the bicycle for occasional journeys than for regular journeys. The personal bicycle was the favorite type of bicycle for frequent cyclists in our study. As it has been shown in other studies (Sears, Flynn, Aultman-Hall, & Dana, 2012), the use of cycling by frequent cyclists decreases during the winter season.

In our sample the commute distance as reported by participants did not significantly differ between the groups, showing that at least for distance, frequent cyclists (8.1 km), occasional cyclists (10 km) and non-cyclists (8.5 km) have the same conditions. In other words, the commute distance could not be a determinant for the group of frequent cyclists to use the bicycle as a mode of transport. The three means of commuting distances found in our study slightly overtake an adapted theoretical distance for the bicycle as a mode of transport, estimated around 7 km in France (ADEME, 2004); this distance is estimative and concerns the distance adapted for each mode of transport. Besides, the mean commute distance is not an unattainable distance to doing by bicycle (perhaps required training for people without a good physical condition) and it seems that it is not a problem for the frequent cyclists in our study. Additionally, compared with the distance reported as accepted for commuting by bicycle for frequent cyclists and for occasional cyclists, the mean commute distance reported was shorter; for non-cyclists, the mean commute distance reported was a bit longer. The accepted distance for commuting by cycling was higher for frequent cyclists (20 km) than for occasional cyclists (13 km) and for non-cyclists (7 km); again occasional cyclists were in an intermediate position. Frequent cyclists accepted an important distance to ride a bicycle, but occasional cyclists, and in a less extent non-cyclists, also reported an interesting distance, taking into account that according to ADEME (2004) in France 50% of car trips are less than 3 km. This accepted distance could be favorable to the modal shift (from the car to the bicycle), as well as to the increase of the cycling modal share. The fact that for non-cyclists, the accepted distance is higher than the majority of the car trips in France thus implies that distance may not be objectively a barrier.

Regarding the other purposes of cycling, in general, frequent cyclists used more the bicycle for recreation and for sports purposes than occasional cyclists and non-cyclists. We do not know whether the practice of other purposes of cycling, as sports and recreation, bring the practice of utilitarian cycling or, on the opposite, cyclists start using the bicycle for utilitarian purpose and then also use the bicycle for sports and/or recreation, or the different purpose coexist at the same time.

In general, non-cyclists experienced conditions less in favor of utilitarian urban cycling (such as the number of bicycles at home, few places to stock the bicycle at home or parking places at work) that the other two groups. This was also reflected in the evaluation of the physical environment (less cycling infrastructure, more hills on the itinerary for commuting). Thus the question is whether non-cyclists really have the adapted conditions for cycling in a lesser proportion than frequent cyclists and occasional cyclists, or whether they do not acknowledge their possibilities for cycling, or whether it is a mere process of rationalization in order to reduce discrepancy, cognitive dissonance (Festinger, 1954).

Similar to the first study, the main reasons to have stopped using the bicycle for utilitarian purpose chosen by occasional cyclists and by non-cyclists was “change of job” and “move to another house”. These reasons constitute an impediment for some, as in the case of occasional cyclists and non-cyclists, but can also become opportunities to start using the bicycle for others, as moments of rupture (Rocci, 2007). A high proportion of occasional cyclists had already used in the past a bicycle as a mode of transport at least once per week; possibly former cyclists, as it was found in the first study.

With reference to the test of our hypothesis, we begin with the comparison of results with the previous study. Concerning the positive factors associated with utilitarian cycling, in this study, the most important advantage (positive representation) of cycling for the three groups was *physical activity*. This was in line with the first study where cyclists and non-cyclists mentioned more frequently *physical activity* as an advantage of cycling. Thus, hypotheses H1a and H1c were validated, meaning that *physical activity* is one of the main positive representations for cyclists and non-cyclists.

Concerning the main levers (positive motivations) to cycling, in this study was found that for frequent cyclists and occasional cyclists the most important lever was also *physical activity*. This result differs from what was found in the first study, in which the first lever for cyclists was *feeling of freedom*. Thus, hypothesis (H1a) was not completely validated for levers. We also expected, according to the first study, to find internal levers (intrinsic in the self-determination continuum; Ryan & Deci, 2000) for frequent cyclists such as *pleasure*, but these arguments appeared as mid-level aspects in the survey. According to Deci and Ryan (2000), people are more motivated or better motivated when their motivations are rather intrinsic than extrinsic, meaning that the reward is principally internal than external. For this reason, cyclists in comparison with non-cyclists who are supposed to be more motivated were expected to give more importance to intrinsic arguments such as *pleasure*, *feeling of freedom*, as was found in the first study.

Even if the *feeling of freedom* was not one of the most important levers in this study; it was a more important lever for frequent cyclists than for occasional cyclists and non-cyclists. Additionally, the *feeling of freedom* was an argument where the difference between frequent cyclists and the two other users was more important on levers, than on advantages (where it was similar to the trend of the other arguments). Generally, when an argument has a lower mean score compared to the rest of the arguments, the trend shows that the scores of the three users decrease. This was the case of the argument *feeling of freedom* as an advantage, but it was not as a lever since the score for frequent cyclists on the lever *feeling of freedom* remains high, while the score for occasional cyclists and non-cyclists on the lever *feeling of freedom* decrease. This result could imply that *feeling of freedom* is a particular lever for cyclists, showing a qualitative difference with the *feeling of freedom* as an advantage, in line with our hypothesis.

In conclusion concerning the levers of utilitarian urban cycling, it seems that *physical activity* is a very important lever for frequent cyclists and is still a more intrinsic motivation compared to the arguments *save time* or *save money* (more extrinsic and instrumental motivations). Besides, the *feeling of freedom* is a lever for cyclists and a path to explore in the future research.

On the other hand, the most important lever that could lead non-cyclists to use the bicycle was *good weather*. In the previous study, we did not measure the levers for non-cyclists, thus it is not possible to make the comparison. This lever for non-cyclists seems logic in the sense that if they are not really motivated or they are not considering using the bicycle as a mode of transport (Perugini & Bagozzi, 2001), they could think or feel that they are most ready to use the bicycle as a mode of transport if the physical environment (in this case, weather) is in the best conditions. In this sense, *good weather* implies less effort or more (external) benefits of using the bicycle. Following the hierarchy of arguments according to the scores, the next advantages and levers for the three groups was the *ease of parking*. Compared with the previous study, this result is also interesting because *ease of parking* was mentioned by cyclists but not strongly in the previous study. In the second study there seems to be a sort of consensus between frequent cyclists, occasional cyclists, and non-cyclists about this instrumental argument of utilitarian urban cycling.

Concerning negative arguments, in this study we found that the most important disadvantages, and also the most important barriers for the three groups were related to weather issues (*ice*, *snow*, *heavy rain* and *cold*). This result slightly differs from what was found in the previous study where the most frequently mentioned disadvantages were *danger* and *rain* for cyclists (H1b), and *danger* and *long distances* for non-cyclists (H1d). The most frequently mentioned barriers were *long distances* for cyclists (H1b) and *long distances* and *fear of cycling* for non-cyclists (H1d). Still, as in the first study *rain* was one of the most mentioned disadvantages and barriers, hypothesis H1b concerning the *rain* as a main disadvantage of cycling for cyclists was partially validated.

Data seem to show a ceiling effect on the argument *ice* as a disadvantage and barrier of cycling with the highest score. This result hinders the comparison between frequent cyclists, occasional cyclists and non-cyclists, and the comparison with the other arguments. This ceiling effect on *ice* is maybe because it is evident the impact of *ice* on causing accidents, however, it is particularly problematic because it is rare to find *ice* in urban settings in France in the winter.

In order to identify the other important disadvantages and barriers to cycling, we also highlighted the subsequent arguments. Thus, after weather issues, the following disadvantage and barrier was the *argument lack of attention of other road users* for frequent cyclists, *long distance* for occasional cyclists, and *vulnerability in traffic* for non-cyclists. These results showed interesting differences between the three groups when using the Model of Goal-Directed Behavior (MGB; Perugini & Bagozzi, 2001). These differences may mean that the problems found out in the past by the groups were different according to their experience (past behaviors) and their level of cycling frequency. Thus, the argument *lack of attention from other users* for frequent cyclists could mean that this argument could arise from a large experience and the frequency of the past behavior (i.e. long history of performing a given behavior), whereas *long distance* for occasional cyclists could arise from less experience and the recency of the past behavior (i.e. have recently taken up an activity with no necessary long history of performing it), and *vulnerability in traffic* for non-cyclists could arise from something that they have not necessarily experienced by themselves (actual experience), but rather from their representations (imaginary) or the social influence. In this sense, the difference in past behavior of the three groups could explain the difference in the negative arguments.

Additionally, after the argument *lack of attention of other road users*, the arguments *vulnerability in traffic* and *aggression from other users* were considered as disadvantages and barriers by frequent cyclists. The arguments *lack of attention of other road users* and arguments *vulnerability in traffic* were important for the three groups, but *aggression from other users* was in a quite lower position on the hierarchy of arguments by occasional cyclists and non-cyclists. In order to explore further why aggression was more concerning for frequent cyclists than for the other groups, in our third study we will explore the cyclists' perceived aggression from car drivers' behaviors on road interactions.

Long distance as a disadvantage and barrier for occasional cyclists could be related to effort associated with a more realistic projection (intention) and perceived behavioral control about the cycling practice, but also because this group presented the highest mean regular commute distance (and more variability in distances) of the three groups. Besides, this result it is in line with the result found in the first study, in which the *long distance* was mentioned as frequently as a disadvantage for non-cyclists and as a barrier for cyclists and non-cyclists. In consequence, this result goes in the same direction as the hypothesis H1b conceived for cyclists and the hypothesis H1d conceived for non-cyclists. Occasional cyclists were not expected as a group when the hypotheses were conceived, but as they used the bicycle as a mode of transport, even not frequently, we can associate them as cyclists concerning the hypotheses, in this sense, the hypothesis H1b is validated.

Finally, the *vulnerability in traffic* for non-cyclists could be related to an internal negative argument of cycling (intrinsic in the self-determination continuum; Ryan & Deci, 2000) or to negative anticipated emotions (Perugini & Bagozzi, 2001) closer to *danger* and *fear of cycling*. In line with the first study and Ryan and Deci (2000), we expected to find internal (intrinsic) barriers for non-cyclists such as *danger* and *fear of cycling*. These arguments appeared much lower in this survey but *vulnerability in traffic*, still related to these arguments, was a more important argument.

Regarding the result of the Principal Component Analyses run over the advantages, participants make a distinction between three components that could be taken as different facets of the general positive representation of utilitarian urban cycling by all participants. These facets could be important in the development of actions to promote cycling. The first component grouped aspects of "Independence", the second factor was related to "Pleasure", and the last factor was related to the "Utility Function". The first component, "Independence", comprised arguments quite instrumental but more internal (q.v. continuum of internalization; Ryan & Deci, 2000) than the third factor, in which the arguments are much instrumental and more related to the "Utilitarian Function" of transport by bicycle. These elements of "Independence" could also enhance an added value to cycling on the promotional actions additional than the already known "Utility Function". The second component comprises the most intrinsic or internal arguments of cycling. According to the self-determination theory (Ryan & Deci, 2000b), we expected that the *feeling of freedom* would belong to the "Pleasure" component, instead, it belongs to "Independence". This could be because the idea of *freedom* is associated principally with the independence of movement provided by the bicycle as a mode of transport, rather than with the *feeling of freedom* that could also be associated with an enjoyable feeling of the activity.

On the other hand, the PCA run over the disadvantages indicates a distinction between five components; as for advantages, these components could be taken as different facets of the general negative representation of utilitarian urban cycling, and could be used to develop action to improve the conditions of cycling. The first component, combining aspects related to "Perceived Danger", could represent the internal disadvantages related to cycling according to intrinsic motivation in the self-determination theory (Ryan & Deci, 2000b). This factor also represents the first concern about urban cycling as a mode of transport, according to the literature on cycling, road safety (Passafaro et al., 2014). In a social psychology approach, perceived danger needs more than the availability of cycling infrastructure to be overcome and need to be approached with soft measures focused on individuals, such as education, information, and training. This training could also be addressed to other users fostering more acknowledgement of road sharing by different kinds of users. Likewise, to surpass these disadvantages and/or barriers related to "Perceived Danger", it is important, for potential users and beginners, to develop actions such as training and guiding to develop skills on utilitarian urban cycling. This result also shows that in general, participants associated principally the disadvantage of cycling to *danger*; in order to increase cycling rates, this association should be addressed focusing on changing this negative image of cycling.

The second factor regrouped most of the arguments related to "Weather Issues". As mentioned before, it is important to consider these disadvantages and barriers in promotion campaigns, but they could also be overcome in several cases with the adapted equipment. The next elements contributed to the component related to "Effort". Interestingly, *wind* was not associated to "Weather Issue" but as adding to the "Effort" component. In this third component were grouped different aspects related to "Effort" that, at the same time, give to utilitarian cycling an association with *physical activity* and thus, health. Therefore, it could also be an advantage for some users who want to do a physical activity at the same time that they commute. For those who consider this component as negative, it can be surpassed with e-bikes.

Another interesting result is that the argument *fear of cycling* appeared in "Effort", but could theoretically belong to the "Perceived Danger" component. According to the self-determination theory (Ryan & Deci, 2000b), the argument *fear of cycling* is an intrinsic negative argument that we expected to be associated with other intrinsic negative arguments (e.g. fear of traffic) in "Perceived Danger". The component "Effort" assembles different types of efforts, and maybe *fear of cycling* represents a fear to face, which is also an important effort for those who do not know how to ride a bicycle.

"Sweating Issues", the fourth component, is a particular aspect of cycling that could be managed individually but that in general could be facilitated with specific external facilities such as having a locker and a shower at the workplace; this could be a measure principally addressed on business travel plans (PDE), and could help to the well-being of employees and their mobility. The last component was related to aspects of utility, in particular the "Lack of Parking Places" in public spaces in cities, as well as in private spaces, at home and at the workplace. This could be addressed principally by infrastructure (dedicated and safe cycling parking spots).

These different components of the PCA show different facets, positive and negative, from a general representation of utilitarian urban cycling, complementing the other analyses focused principally on the comparison of users. A PCA conducted on levers and barriers did not indicate clear patterns; at least not different from advantages and disadvantages. This may be because there was a high positive correlation between advantages and levers, and between disadvantages and barriers.

Concerning the theoretical hypothesis related to the difference between representation, and motivation, we expected a difference between the means of the scores between the concepts but also between the groups of users. Likewise, we expected to find a qualitative difference in terms of a higher score for some arguments on representation (e.g. *physical activity*) and a higher score for other arguments on motivations (e.g. *feeling of freedom*). We found that there was a difference between these two concepts considering that for each group, and for all arguments the means of representations were significantly higher than the means of motivations, but we expected a difference in the opposite direction (H3). In both cases, advantages scores were higher than levers scores, and disadvantages scores were higher than barriers scores, invalidating our hypotheses H3a and H3b. Additionally, we found that there was a strong correlation between advantages and levers and between disadvantages and barriers for each one of the arguments studied, for the entire sample and also by groups, this result does not support our hypotheses H2a and H2b. In consequence, there was not a strong difference between the arguments with higher scores on representation and arguments with higher scores on motivation. Indeed, in the opposite direction as expected, the correlations found between representation and motivations showed that the two variables are strongly linked. These results suggest that the distinction in our study, between these two concepts, representation and motivation, was more quantitative (different mean scores between representation and motivations) than qualitative (strong correlations between representation and motivations).

Concerning the difference between groups, for positive arguments, the frequent cyclists' means were significantly higher than the non-cyclists' means, and the occasional cyclists' means were in the intermediate position between the two. This result validated our hypothesis H4a. For negative arguments, on the contrary, the non-cyclists' means were significantly higher than the frequent cyclists' means, and here again, the occasional cyclists' means were between non-cyclists and frequent cyclists. Again, this result validated our hypothesis H4b. Indeed, this linear tendency between these three groups suggested that the more a person uses a bicycle as a mode of transport, the more they will give importance to advantages and motivations and the less to disadvantages and barriers. This is in line with the model of Goal-Directed Behavior (Perugini & Bagozzi, 2001) but also with the transtheoretical model (Prochaska & DiClemente, 1983) and other studies on cycling (Forward, 2014; Gatersleben & Appleton, 2007).

On the basis of different definitions, theories (mental representation, social representation, attitudes, self-determination) and models, as in the first study, in this study representation and motivation were considered as two separate concepts. Consequently, we tried to measure them separately. However, these two measures showed a similar pattern. This could be interpreted in two different ways. A first interpretation is that the absence of a concrete difference in our results reflects a problem of operationalization. This may be due to three reasons. Firstly, the difference we proposed based on the literature may not be the correct difference or must be still adapted. Secondly, participants could not differentiate the two concepts in the survey, because this difference is difficult to explain. Thirdly, it may be an issue of methodology in the construction or presentation of the questions.

The second main interpretation is that there is no difference between these two concepts. In this case, representations (ideas, beliefs, knowledge, and information) and motivation (reasons, desires, and volition) are similar. Therefore, in both cases, more studies are needed to determine which interpretation is the correct. Thus, in the future the study structure should be improved to minimize the possible methodological bias and be sure to determine a conclusion of this issue.

Another interesting point in our study is that we focused motivations in cycling as a specific behavior. Given that cycling does not match the standards domains of motivational studies that are traditionally focused on education, work, and sports fields, the research on utilitarian urban cycling and the motivations associated with constitute an opening also for a theoretical approach.

The results of this study could help to a better understanding of the individual factors related to cycling, in particular the positive and negative representation and motivations. These results could be useful in the development of strategies to increase the cycling modal share, which is to bring new users and to increase the use of the current users. The strategies could be based on the strengthening and visibility of positive arguments, and on the improvement and reduction of negative arguments. Concerning the positive arguments, *physical activity* as an important advantage and lever for the majority of participants with different cycling practice is an important path to explore in this promotion of cycling. Likewise, it seems that *ease of parking* is an important argument for all the participants that could also to take into account for promotes cycling. According to non-cyclists, the *good weather* is for them a lever concerning utilitarian urban cycling. Therefore, when planning a campaign to promote the use of utilitarian urban cycling for non-cyclists, the weather conditions and the season must be taken into account. Concerning the negative arguments, weather issues are not a controllable condition, however, when weather issues are presented, it could be applied to other strategies to facilitate using the bicycle, for example, removing *ice* on cycling infrastructure or showing the adapted cycling accessories to overcome *rain*.

As we mentioned in the beginning of the discussion, the sample of this study is noteworthy, not only because of the number, but also because of the number of balanced variables. However, the results concerning the description of the sample showed that our participants are high educated, which could be a limit of our study. In future studies, the sample should also include more less-educated populations or at least consider this point in order to identify a possible influence.

To conclude, as a fundamental approach, the results of this study provide an interesting discussion of the comparison of representations and motivations, allowing us to examine them for utilitarian urban cycling, from three different user perspectives: frequent cyclists, occasional cyclists, and non-cyclists. Finally, as an applied approach, the results of this study, as well as the results of the first study could be used by stakeholders, public authorities and companies to design campaigns promoting utilitarian urban cycling adapted to different user types.

6. THIRD STUDY: SURVEY ABOUT PERCEIVED AGGRESSION

6.1 INTRODUCTION

The main aim of this research is to understand the interactions between cyclists and car drivers on the road by measuring cyclists' perceptions of car drivers' aggressive behaviors based on specific situations. We conducted this study in collaboration with Pr. Barbara Krahé and her staff at Department of Psychology in Potsdam University, Germany. In this study we compare the two cities, Berlin (Germany) and Paris (France), in order to study the impact of different cycling modal shares of these two cities (13% and 3% respectively in 2008), as well as contextual social factors and individual factors on perceived aggression.

More precisely, this research has three aims. The first aim is to identify, in Berlin and in Paris, which behaviors are considered aggressive, from the cyclists' perspective, in the interaction between cyclists and car drivers in urban settings. Then, based on these aggressive behaviors we will select specific situations in order to study, as the second aim, the degree of aggression of these specific situations and the consequences of perceived aggression on cyclists, at the emotional level and at the behavioral level. At the emotional level, we will focus on negative reactions such as fear, stress, and anxiety. And at the behavioral level, we will study the tendency to adopt an aggressive behavior toward car drivers as a reaction to the perceived car driver's aggression. As a third aim, we will evaluate the cyclists' point of view about car drivers' representations toward cyclists: knowledge about the adapted behaviors when interacting with cyclists and legitimacy of cyclists on the road, as well as their social identity as cyclists, trait aggressiveness, and the perceived frequency of the situations, in order to study the relationship between these variables and the perception of aggression in the interaction between cyclists and car drivers. This study is based on participants' evaluations and perceptions about aggression. To our knowledge, no study about the perception of cyclists of the aggression behaviors from car drivers or comparing it in those countries has been carried out.

More precisely, concerning knowledge and legitimacy (the two measures of cyclists' evaluation of car drivers' representations toward cyclists), our hypothesis was that the higher the score of knowledge about the adapted behaviors when interacting with cyclists, the higher the perceived aggression (H1a). Moreover, we made the hypothesis that Berlin participants would have a higher score in knowledge (in Berlin car drivers have interacted more with cyclists due to a higher cycling modal share) than Paris participants (H1b). Hence, we also made the hypothesis that Berlin participants would have a higher global score in perceived aggression than Paris participants, and that this relationship would be mediated by knowledge (H1c).

Secondly, regarding legitimacy, our hypothesis was that the lower the score of the legitimacy of cyclists on the road, the higher the perceived aggression (H2a). Moreover, we make the hypothesis that Berlin participants would have a higher score in legitimacy than Paris participants (H2b). Hence, we propose a second hypothesis, in the opposite direction from H1C, that Berlin participants would have a lower global score in perceived aggression than Paris participants and that this relationship will be mediated by legitimacy (H2c).

We also propose the following hypothesis:

- Perceived intention increases perceived aggression (H3)
- Perceived danger increases perceived aggression (H4)
- The higher the score on the aggression scale, the higher the score on perceived aggression (H5)
- The higher the cyclist social identity the higher the perceived aggression (H6)

Considering that there are no specific tools to assess aggression from car drivers' behaviors as perceived by cyclists, three pilot studies were carried out to explore the situations considered as aggressive by cyclists in the interaction with car drivers, as well as to explore the degree of danger and intention of these aggressive situations. The use of pilot studies generally increases the validity of the tool (P. Delhomme & Meyer, 2002).

6.2. PILOT STUDIES

The aim of these three pilot studies was to provide the situations to be tested in the final study.

6.2.1 Situations Identified as Aggressive by Cyclists

6.2.1.1 Aim

The aim of the first pilot study was to identify what behaviors were considered as aggressive by cyclists in the interaction with car drivers.

6.2.1.2 Participants

The sample comprised 72 cyclists: 38 French and 34 German participants.

6.2.1.3 Material and Procedure

Cyclists on internet cyclists' forums and cyclists students were asked to answer an open question: "Could you describe the behaviors and/or the situations that you consider as aggressive between car drivers and cyclists in urban settings?

6.2.1.4 Results

On the French side, the 38 participants reported a total of 151 aggressive behaviors, on average four aggressive behaviors per participant. On the German side, the 34 participants reported a total of 129 aggressive behaviors on average 3.79 aggressive behaviors per participant. The behaviors were categorized into 30 different types of aggressive behaviors; 9 types were reported only once and were discarded. As a result, 21 aggressive behavior types (Table 13) reported at least twice were classified into three categories: behavioral aggression, verbal or gestural aggression, and ambiguous. This last category contains behaviors considered as aggressive where there is not a direct interaction.

Table 13
List of perceived aggression types by categories according to French and German cyclists (n=72)

Type of aggression	Name	
Behavioral	To overtake a cyclist in a narrow street	*
Behavioral	To bump a cyclist	*
Behavioral	To pressure	*
Behavioral	To flash headlights at another cyclist to make faster progress	*
Behavioral	To honk strongly next/behind a cyclist	
Behavioral	To overtake a cyclist rapidly/accelerate	
Behavioral	Non-respect of right of way (priority) of a cyclist	
Behavioral	To cut a cyclist up/to cut in front of a cyclist	
Behavioral	To get close to a cyclist	
Behavioral	To drive closely behind a cyclist	
Behavioral	To make the engine roar/motor strongly	
Behavioral	To overtake a cyclist closely	
Verbal/Gestural	To reproach/Blame	*
Verbal/Gestural	To give hostile looks	
Verbal/Gestural	To make obscene gestures to a cyclist	
Verbal/Gestural	To threaten a cyclist	
Verbal/Gestural	To insult a cyclist	
Ambiguous	To park or to stay on a bike box/advanced stop box	*
Ambiguous	To park or to stay on a cycle path/band	
Ambiguous	To open one's car door while parked-carelessly-	
Ambiguous	Not use of the indicator/turn signal	

The list obtained contained several behaviors that are dangerous but not necessarily aggressive or intentional according to the definition of aggression (Baron & Richardson, 1994), which could imply that cyclists associated the term "aggressive behavior" with danger. However, "danger" is not necessarily a component of the concept of aggression as defined in the literature. It may imply here that the definition of aggression held by laypeople (here cyclists) differs from the one in the literature.

6.2.2 Level of Danger and Intention of the Situations

6.2.2.1 Aim

The aim of the second pilot study was to determinate the degree of danger and the degree of intention of each situation.

6.2.2.2 Participants

The sample comprised 29 participants: 10 French and 19 German participants.

6.2.2.3 Material and Procedure

In this second pilot study, 15 situations were selected from the 21 identified in the previous pre-test. The 6 situations removed (an asterisk in Table 13) were the ones that were very similar to another more common situation, and the situations that could have a threshold or ceiling effect, such as "to bump a cyclist". Indeed, this situation was likely to get very high score and hinder the comparability with the other situations.

Participants were asked to imagine that a car driver in the presence of a cyclist in urban settings adopted a specific behavior. Each of the 15 situations was then described (Table 13). Two questions were asked for each of the situation. Concerning danger, the question was "To what extent do you think that each car driver's behavior in the list is dangerous for a cyclist?". Answers were rated on a 5-point Likert scale ranging from 1-Not at all dangerous to 5-Very dangerous. For intention, the question was "For each behavior, to what extent do you think that the car driver tries to damage (physically or psychologically) the cyclist?". Answers were rated on a 5-point Likert scale ranging from 1- Not at all to 5-Completely.

6.2.2.4 Results

For each situation, a score for danger and a score for intention were computed by averaging the two samples (Berlin and Paris). The scores were used to categorize the 15 situations into four categories according to the variables danger and intention, which are each divided into two levels, high and low, with a cut-off point of around 3. The four categories were: Danger+/Intention+, Danger+/Intention-, Danger-/Intention+, and Danger-/Intention- (Table 14). In each category, a situation was selected based on the score and similarity between the Berlin and Paris samples. This selection was made in order to build the scenarios that will integrate the final questionnaire.

Table 14
Danger and intention score and classification of aggressive behaviors according to Berlin and Paris participants (n=29)

Aggressive Behaviors	DB	DP	IB	IP	MD B-P	MI B-P	Classification	Type
To cut a cyclist up/to cut in front of a cyclist	4.9	4.3	3.0	3.5	4.6	3.3	Danger+/Intention+	A
To get close to a cyclist	4.3	4.4	2.9	3.7	4.4	3.3	Danger+/Intention+	A
To drive closely behind a cyclist	4.2	3.4	3.4	3.7	3.8	3.6	Danger+/Intention+	A
To overtake a cyclist closely	4.5	4	3.0	2.5	4.3	2.8	Danger+/Intention-	B
To overtake a cyclist rapidly/accelerate	3.6	3.8	2.5	2.8	3.7	2.6	Danger+/Intention-	B
Non-respect of right of way (priority) of a cyclist	4.7	4.3	2.7	3	4.5	2.8	Danger+/Intention-	B
To open one's car door while parked-carelessly-	4.6	4.4	2.1	2.8	4.5	2.5	Danger+/Intention-	B
Not use of the indicator/turn signal	4.8	4.3	2.3	3.2	4.6	2.8	Danger+/Intention-	B
To honk strongly next/behind a cyclist	3.3	3.1	2.8	3.9	3.2	3.4	Danger-/Intention+	C
To insult a cyclist	1.8	1.8	3.5	3.7	1.8	3.6	Danger-/Intention+	C
To make the engine roar/motor strongly	2.2	2.1	2.3	4	2.2	3.1	Danger-/Intention+	C
To make obscene gestures to a cyclist	1.4	2	3.4	4	1.7	3.7	Danger-/Intention+	C
To give hostile looks	1.6	1.8	2.6	3.6	1.7	3.1	Danger-/Intention+	C
To threaten a cyclist	2.4	2.2	3.9	4.2	2.3	4.1	Danger-/Intention+	C
To park or to stay on a cycle path/band	2.9	2.9	2.1	2.5	2.9	2.3	Danger-/Intention-	D

Note. DB: Danger Berlin, DP: Danger Paris, IB: Intention Berlin, IP: Intention Paris, MD B-P: Means of Danger Berlin-Paris, MI B-P: Means of Intention Berlin-Paris.

6.2.3 Validation of the Scenarios

6.2.3.1 Aim

The aim of the third pilot study was to develop a hypothetical scenario for each danger/intention category describing realistic and non-ambiguous interactions between cyclists and car drivers, to be used in the main study.

6.2.3.2 Participants

The sample comprised eight participants: four French and four German participants.

6.2.3.3 Procedure

In order to select the situations used for developing the scenarios, we adapted the procedure by Vallières, Bergeron and Vallerand (2005) for their intentionality scenarios used to investigate aggressive driving behaviors. In their study, they used three dimensions: "intentional scenarios", "unintentional scenarios", and "ambiguous scenarios". Given our aims and the results of the previous pilot studies, in this study it was more relevant to use the dimensions related to danger and intention. Consequently, the three principal criteria used to select the situations were that the situation must be a common situation (that had been encountered, so it is accessible in memory), a problematic situation (those most cited in the pilot test), and finally the most important criterion, a situation that was as frequently cited in France and in Germany.

The number of scenarios to be used in the questionnaire was an important concern. First, in order to achieve the aims of our main study, each scenario proposed in the questionnaire required multiple questions, which made impossible to include all of the 15 situations identified, as this would have made the questionnaire too long. Likewise, we would have preferred to use at least two situations by category in order to have a better representation of the danger/intention categories and thus be able to determine more accurately the factors that determine perceived aggression. However, eight scenarios would also make the questionnaire too long for the participants.

Initially, we wanted to use one scenario per category, thus four scenarios. But taking into account that the criteria for selecting the situations was that each situation should be equivalent in both samples, the category Danger+/Intention+ posed a problem because according to the pilot study of danger/intention, the Danger+/Intention+ situations were not perceived in the same way by the French and the German sample. Therefore, for this category (Danger+/Intention+), instead of one representative situation, we decided to choose two different scenarios, one for France and one for Germany, as it was more important that the scenarios differ on the critical dimensions in the respective country than using exactly the same scenarios in both countries. Consequently, we decided to build five scenarios instead of four, two for the Danger+Intention+ category, and one for each of the other categories[9].

We built the scenarios, with the five situations selected, so that each scenario was a) a specific situation, corresponding to only one situation, b) comprehensible and non-ambiguous, c) concise, with not too much detail and d) not too inductive (not inducing a specific answer).

For the pre-test, the scenarios were preceded by the description of the context. The context was the description of the framework where the hypothetical scenario took place, transmitting to the participant the idea that they were living the moment as a cyclist. Thus, the context given before each scenario was: “Imagine that you are cycling in town, to

[9] Besides, we also considered the possibility to use a neutral situation (annoying, but not dangerous and not intentional to harm), as a control one, but finally, we did not find a situation that fit with these characteristics.

commute to your university or workplace. Traffic is average. The weather is clear and the temperature is warm…". We used the same context for all the scenarios in order to attribute the results only to the variation of the situations and no to the difference in the context. The aim of the context was to represent a situation in urban settings but as normal as possible. Thus, we did not include in the context other complications linked to traffic conditions, such as be in a hurry or be in a traffic jam, which according to the general aggression model (GAM; DeWall & Anderson, 2011) could affect the perception of aggression.

The scenarios were built included the three principal elements of the interaction: the place (where the situation is happening, e.g. on a cycle path or on the road), the cyclist's action (what the cyclist is doing at that precise moment, e.g. arriving at an intersection or cycling on the right side of the road), and the car driver's action (what the car driver is doing, e.g. a car driver is behind you).

In order to ensure that the scenarios were well constructed and that all participants in the main study would have the same idea about them, the five scenarios built were tested in a new pre-test. A face-to-face pre-test was used in order to check whether the participants understood correctly what we wanted to convey in the scenarios. By asking the participants to draw a schema and to provide a corresponding oral explanation, we could determine whether the tested scenarios matched the situations that the participants in the first survey identified as an aggressive behavior. The instructions (written in the protocol sheet) given in the face-to-face pre-test were: "Below are presented five different scenarios. For each one, please explain in your own words what is happening, using a schema with arrows to describe the movements of the protagonists in the scenario".

6.2.3.4 Results

The five scenarios are shown below in the order in which they were presented in the questionnaire. The scenario with the lowest level of danger/intention was the first one presented in order to prevent that this low danger/intention could be seen as even lower if it was considered after the other situations (threshold effect). The two scenarios with the highest danger/intention were also separated to prevent bias in the participants' assessment. Thus, one high danger/intention scenario was placed in the second position and the other one in the last position. The scenarios for danger-/intention+ and for danger+/intention- were placed in the middle. The scenarios were presented as follows:

- **Scenario 1:** To park or to stay on a cycle band (Type D: Danger-/Intention-), "you are on a cycle band, the road is straight and there are no cars driving on the lane on your side. After a while, you see a car parked on the cycle band and you are forced to go on the road lane to avoid it".

- **Scenario 2:** To drive closely behind a cyclist (Type A: Danger+/Intention+), "you are cycling on a straight road, you are following road rules. A car driver is behind you, driving close to you (about 0.50 meters away from you)".

- **Scenario 3:** To insult a cyclist (Type C: Danger-/Intention+), "there is a traffic jam, but you go past on your cycle lane. You are following road rules when a few meters away from you, a car driver insults you by their open window".

- **Scenario 4:** To open one's car door while parked-carelessly-(Type B: Danger+/Intention-), "you are in a two-way street, you are cycling on the right side of the road. There are parking spaces on both sides of the road. As you are approaching, someone in the driver's seat of a parked car on your right opens their door in front of you. You have to brake and to maneuver to avoid it".

- **Scenario 5:** To get close to a cyclist (Type A: Danger+/Intention+), "you are on a cycle band, the road is straight and there are cars driving on the road. The driver in the car next to you gets close (about 0.50 meters) to you from your left side almost forcing you to get closer to the edge of the route".

6.3 Survey Study

6.3.1 Method

6.3.1.1 Participants

The recruitment was done in Paris Universities and Potsdam University. Students were invited, through face-to-face requests, flyers, and poster information, to participate in an online questionnaire addressed to frequent cyclists. Students from Potsdam University participated in the study in exchange for course credits, but it was not possible to reward participants from Paris. The participants answered the questionnaire during October and November 2015.

In total, the sample comprised 174 students (70% female) who declared use the bicycle as a mode of transport: 90 students living in Paris (48 women and 42 men, M=24.7 years old; SD=6.8) and 84 students living in Berlin (74 women and 10 men, M=23.8 years old, SD=5.5). There was a gender difference (χ^2 (1, N = 174) = 25.06, p< .001) but no age difference between the Paris and Berlin students groups (F(1, 172)= 0.96, p=.328). In the analyses, gender and age were controlled.

In the French sample, 12% of the students had a secondary degree, 21% had a bachelor's degree, 59% had a master's degree, and 6% had a Ph.D. degree. In the German sample, 39% of the students had a secondary degree, 21% had a bachelor's degree and 6% had a master's degree. The mean commute distance differed between the groups, for French students it was 9.8 km (SD=9.49) and for German students it was 37.8 km (SD=12.6), F(1, 171)= 274.22, p<.001, η^2 = .616.

6.3.1.2 Material

The questionnaire contained four main sections. The first one included the five scenarios and questions related to the assessment of scenarios; the second section included the Aggression Questionnaire scale (AQ; Buss & Perry, 1992); the third section included questions related to the use of bicycle and other modes of transport; and a fourth section included socio-demographic questions. The first three sections are described in detail below. Unless specified, the answers to this questionnaire were given on a 5-point Likert scale ranging from 1- Not at all to 5-Very much.

a) Scenarios and Related Questions

In the first section of the questionnaire, each scenario was presented with a series of questions. The questions were the same for all of scenarios, measuring:

- **Emotions reactions** (items 1–7): 4 negative (angry, stressed, frustrated, and scared) and 3 positive (calm, easy-going, and excited) emotional reactions were measured. The question used was "To what extent does this situation make you feel…". Negative and positive emotions were interspersed in order to prevent a bias if they were presented together, e.g. accumulation.

- **Perceived danger**, using 4 questions (items 8–11): To what extent do you think this situation is annoying? How likely do you think it is that you would have an accident in this situation? If you had an accident in this situation, how serious do you think the consequences would be? To what extent do you think this situation is dangerous?

- **Perceived intention**, using 4 questions (items 12–15): To what extent do you think the car driver intended to express anger? To what extent do you think the car driver intended to cause you physical harm? To what extent do you think the car driver intended to cause you psychological harm? To what extent do you think the car driver could have acted differently?

- **Perceived aggression** (16): To what extent do you think the car driver's behavior is aggressive?

- **Behavioral reactions of the situation** (items 17–26): 10 reactions were measured (ignoring, smiling, turning away, fleeing, making a remark to the car drive, swearing, insulting, ringing the bell, hostile looking, and kicking the car), using the following question: In this situation, how likely would you be to react in the following ways… The answers were given on a 5-point Likert scale ranging from 1-Very likely to 5-Very likely.

- **Aggressive behavior frequency** (item 27): How frequently have you encountered this situation in your cycling experience in urban settings? And five answers options: never, once, between 2 and 5 times, between 6 and 10 times, and more than 10 times.

b) Trait Aggressiveness

The second section was aimed at identifying whether trait aggressiveness influenced perceived aggression from car drivers. For this, the Aggression Questionnaire (AQ) by Buss and Perry (1992) was used. It contains 29 items, subdivided into four subscales: physical aggression, relational aggression, anger, and hostility. The items, e.g. "Once in a while I can't control the urge to strike another person", were evaluated by participants along a 5-point Likert scale from 1-Extremely uncharacteristic of me, to 5-Extremely characteristic of me.

c) Use of the Bicycle and Other Modes of Transport

The third section of the questionnaire measured the representations participants perceived car drivers had toward cycling. The knowledge representation about the adapted behaviors when interacting with cyclists was measured using two items ($r(174)= .52$, $p <.001$): "In your opinion, to what extent do car drivers know how to behave in interactions with cyclists on the road in urban settings?" and "In your opinion, to what extent do car drivers drive the correct way when they have to interact with a cyclist on the road in urban settings?". The legitimacy representation of cyclists on the road granted by car drivers was measured using two items ($r(174)= .65$, $p <.001$): "In your opinion, to what extent do car drivers consider cyclists as legitimate road users in urban settings?" and "In your opinion, to what extent do car drivers agree to share the road in urban settings with cyclists?".

Then, the cyclist social identity was measured using three questions ($\alpha= .86$). The questions were introduced with "People can use different transportation modes on the road, but not all of them are equally important to how they see themselves as a road user". The first question asked "To what extent do you consider yourself as a…" for four items: Urban cyclist, car driver, pedestrian and public transport user. The second question was "Being a cyclist is an important part of defining who I am", answered on a 5-point Likert scale ranging from 1-Not at all true to 5-Very true. The third question, introduced by "The types of road users can be considered as different groups. People can identify more or less with each of these groups", "To what extent do you identify with the group of…" for four items: Urban cyclists, car drivers, pedestrians, and public transport users. In the first and third questions, the items concerning urban cyclist were used for the cyclist social identity measure, the other items were principally used in order to prevent desirability bias.

Afterwards, characteristics of the cycling practice were measured, including: the frequency of cycling (according to their regular utilitarian use, occasional utilitarian use, leisure use and sport use), the seasonal variation in cycling, the length of cycling experience, the cycling traffic regulation knowledge, the compliance of rules as a cyclist, the declared cycling skills, the distance cycled per week (km), the time cycled per week, the helmet use, the membership of a cycling association and the accident encounter as a cyclist.

The use of other modes of transport (such as car, motorcycle, public transport, cycling and walking) was also measured including the frequency of them, the use of intermodal transport, the mix between public transport and cycling, the possession of a driver's license and the kilometers were driven per year.

d) Socio-demographic measures

The last section of the questionnaire included questions related to socio-demographic information: gender, age, the number of children less than 11 years old, occupation, the level of education, the university, place of residence, and commute distance.

Including the five scenarios, the complete questionnaire contained 133 questions in total. The questionnaire was pre-tested in France and in German before the recruitment of participants. The questionnaire took approximately 36 minutes to be completed.

6.3.2 Results

We will present the results of the questionnaire in four main sections. We will present first the result of the manipulation check of danger and intention in the scenarios, second, the computation of the scores by scenario and global scores, third, the result of the comparison Paris-Berlin, and finally, the result of perceived aggression.

6.3.2.1 Manipulation Check of Danger and Intention in the Scenarios

The findings of the evaluation of danger and intention differed from the third pilot study (carried out among a very small sample). More precisely, the scenario, "to park or to stay on a cycle band", as there was no aggressor in this scenario and it was the first presented to the participants, was considered as a scenario to familiarize the participants, thus we decided to exclude this scenario from the test of hypotheses to avoid any bias.

From the crossing of the variables danger and intention, in total each of the four scenarios belonged to a different category: S1 "to drive closely behind a cyclist" (D-I-), S2 "to insult a cyclist" (D-I+), S3 "to open one's car door while parked—carelessly—" (D+I-), and S4 "to get close to a cyclist" (D+I+); thus, all the categories were represented.

A repeated measure analysis of variance (rANOVA) was run on perceived danger. "High danger" situations (S3 "to open one's car door while parked" and S4 "To get close to a cyclist") were perceived by participants as more dangerous than "low danger" situations (S1"to drive closely behind a cyclist" and S2 "to insult a cyclist") $F(1,173)=548{,}98$, $p< .001$, $\eta^2 =.578$. "High intention" situations (S2 "to insult a cyclist" and S4 "to get close to a cyclist") were perceived as less dangerous than "low intention" situations (S1 "to drive closely behind a cyclist", S3 "to open one's car door while parked"), $F(1,173)=37{,}97$, $p< .001$, $\eta^2 =.032$, but this intention effect was less important than the danger effect.

Likewise, a second repeated measures analysis of variance (rANOVA) was run on perceived intention. "High intention" situations (S2 "to insult a cyclist" and S4 "to get close to a cyclist") were perceived more intentional than "low intention" situations (S1 "to drive closely behind a cyclist" and S3 "to open one's car door while parked"), $F(1,173)=1072{,}24$, $p< .001$, $\eta^2 =.741$. "High danger" situations (S3 "to open one's car door while parked" and S4 "to get close to a cyclist") were perceived by participants as less intentional than the "low danger" situations (S1 "to drive closely behind a cyclist" and S2 "to insult a cyclist"), $F(1,173)=119{,}87$, $p< .001$, $\eta^2 =.168$, but again this danger effect was less important than the intention effect.

We wanted to obtain a difference of danger, and not of intention, between high and low danger situations. Likewise, we wanted to obtain a difference of intention, and not of danger, between high and low intention situations. However, intention varied between high and low danger, and danger varied between high and low intention. This result replicates the results of the pre-test danger/intention where the distance between danger and intention were not very important and the two most dangerous situations were not entirely equivalent. Finally, this result is less clean methodologically, but given our study is based on realistic situations it was not possible to control this. However, the four situations used for the analyses finally represented one of the four categories of danger/intention.

6.3.2.2 Scores by Scenario and Global Scores

PCA, Correlations, and Alphas were run on the items from each scenario in order to regroup them and to test the hypotheses related to perceived aggression, perceived intention, and perceived danger. Table C1 in annexes includes the mean of the items of each scenario for both the Paris and Berlin student groups.

Concerning the questions of the scenarios, in the emotional reactions the item 8 (annoying), and in perceived intention the item 16 (acted differently) were not correlated with the other items. In consequence, these items were not included in the analyses. For the data analyses, we ran two types of analysis: an analysis of each scenario separately, and an analysis of a global score corresponding to the means of the four scenarios.

a) Perceived Aggression

The four items of perceived aggression by scenarios were averaged to create a global score of perceived aggression (α= .627).

b) Perceived Danger

In a first step, we investigated danger as a whole. For each scenario, we averaged the three items measuring danger (items 9–11), in order to obtain a score of Perceived Danger by scenario: PerceivedDanger1 (α= .806), PerceivedDanger2 (α= .855), PerceivedDanger3 (α= .837) and PerceivedDanger4 (α= .868). Thus, these four variables of perceived danger by scenarios were then averaged to create a global score of perceived danger (α= .722).

In a second step, we considered the three items separately composing danger: D1-Risk (item 9), D2-Gravity (item 10), and D3- Dangerousness (item 11). For each item, we averaged the scores obtained on the four different scenarios, to obtain a global score of D1-Risk (α= .658), a global score of D2-Gravity (α= .688) and a global score of D3-Dangerousness (α= .680).

c) Perceived Intention

In a first step, we investigated intention as a whole. For each scenario, we averaged the three items measuring intention (items 13–15), in order to obtain a score of perceived intention by scenario: perceivedintention1 (α= .843), perceivedintention2 (α= .483), perceivedintention3 (α= .898) and perceivedintention4 (α= .859). These four variables of perceived intention by scenarios were then averaged to create a global score of perceived intention (α= .627).

In a second step, we considered the three items separately composing intention: I1- anger expression (item 13), I2- physical harm (item 14), and I3- psychological harm (item 15). For each item, we averaged the scores obtained on the four different scenarios, to obtain a global score of I1- anger expression (α= .435), a global score of I2- physical harm (α= .620) and a global score of I3- psychological harm (α= .569).

d) Negative Emotional Reactions

We also averaged the four items measuring negative emotional reactions, in order to obtain a score of negative emotional reactions by scenario: NegEmotReactionS1 (α= .656), NegEmotReactionS2 (α= .712), NegEmotReactionS3 (α= .638) and NegEmotReactionS4 (α= .693). These four variables of negative emotional reactions by scenarios were then averaged to create a global score of negative emotional reactions (α= .768).

e) Behavioral Reactions

Unfortunately, for the behavioral reactions the item "making a remark to the car driver" was omitted by mistake in the French version of the questionnaire. For this reason, we could not analyze as a whole the variable behavioral reactions in the comparison of the groups.

6.3.2.3 Comparison Paris-Berlin

In this part we will present the results of the comparison of the two groups of cyclists, Berlin students and Paris students. As mentioned before, the statistical analyses were made controlling for gender and age. First, the results concerning the questions related to the scenarios will be presented, as global score, grouping the four scenarios, and also as separated results by scenario when concerned. Then, we present the frequency that participants reported encountering the situation described in the scenarios. Finally, we will present the results of the other measures.

a) Scenarios and Global Score

Perceived Aggression

There was no significant difference between Paris and Berlin students for perceived aggression, $F(1, 172) = .29$, $p= .864$. There was a significant difference between Paris and Berlin students for Perceived Aggression only in scenario 2 "To insult a cyclist", where Paris students had a higher score (M= 4.86, SD =.53) than Berlin students (M= 4.52, SD= .67); $F(1,173)=13.25$, $p<.001$, $\eta^2=.072$), and in scenario 4 "To get close to a cyclist", where Paris students also had a higher score (M= 3.20, SD= 1.38) than Berlin students (M= 3.73, SD= 1.17); $F(1,173)=7.36$, $p=.007$, $\eta^2=.041$).

Perceived Intentions

There was no significant difference between Paris and Berlin students for global score of perceived intention, $F(1, 172) = 1.33$, $p= .250$. Regarding the three types of Intention, there was a significant difference between Paris and Berlin for anger expression ($F(1, 170) = 11.70$, *p*= .001, η^2=.064). The Berlin group had a higher score of anger expression (*M*= 2.67, *SD*= .46) than the Paris group (*M*= 2.43, *SD*= .49). However, there was no significant difference for neither physical nor psychological harm. In Table 15 are presented the analyses of the three types of intention between Paris and Berlin group according to each scenario.

Perceived Dangers

There was no significant difference between Paris and Berlin students for global score of perceived danger (*F*(1, 172) = 1.84, *p*= .176). Regarding the three types of danger, for risk the score was higher for Paris (*M*= 3.31, *SD*= .74) than for Berlin (*M*= 3.07, *SD*= .59); *F*(1, 170) = 5.97, *p*= .016, η^2=.034). For dangerousness the score was higher for Paris (*M*= 3.56, *SD*= .76) than for Berlin (*M*= 3.28, *SD*= .65); *F*(1, 170) = 4.61, *p*= .033, η^2=.026. However, there was no significant difference for gravity. The analyses of the three types of danger between Paris and Berlin by scenarios are presented in Table 15.

Table 15
Results of Paris-Berlin comparison for three types of Danger and three types of Intention by scenario

	S1			S2			S3			S4		
	Paris	Berlin		Paris	Berlin		Paris	Berlin		Paris	Berlin	
Variable	*M (SD)*	*M (SD)*	*p*	*M (SD)*	*M (SD)*	*p*	*M (SD)*	*M (SD)*	*p*	*M (SD)*	*M (SD)*	*p*
D1	2.58 (1.80)	2.07 (0.90)	0.00	2.71 (1.06)	2.13 (0.85)	0.00	4.44 (0.84)	4.38 (0.64)	.642	3.49 (1.11)	3.71 (0.98)	.535
D2	3.21 (1.14)	3.35 (1.07)	0.49	3.08 (1.10)	2.87 (1.21)	0.41	3.89 (1.00)	4.18 (0.84)	.110	3.63 (1.02)	3.88 (0.87)	.151
D3	3.14 (1.08)	2.35 (1.06)	0.00	2.88 (1.18)	2.40 (0.95)	0.02	4.31 (0.91)	4.45 (0.63)	.293	3.91 (1.05)	3.90 (0.96)	.987
I1	1.36 (0.72)	1.26 (0.54)	0.71	4.76 (0.53)	4.85 (0.45)	0.33	1.18 (0.53)	1.38 (0.69)	.025	2.44 (1.24)	3.18 (1.13)	.000
I2	1.21 (0.49)	1.14 (0.47)	0.74	2.34 (1.12)	1.68 (0.91)	0.00	1.24 (0.61)	1.30 (0.60)	.114	1.90 (1.07)	2.38 (1.18)	.000
I3	1.32 (0.68)	1.15 (0.48)	0.23	3.57 (1.44)	3.71 (1.10)	0.36	1.22 (0.60)	1.21 (0.52)	.518	2.26 (1.26)	2.61 (1.22)	.030

Note. S1= "To drive closely behind a cyclist"; S2= "To insult a cyclist"; S3= "To open one's car door while parked-carelessly-"; S4= "To get close to a cyclist"; D1= Risk, D2= Gravity, D3= Dangerousness, I1= Anger Expression, I2= Physical Harm, and I3= Psychological Harm.

Negative Emotional Reactions

There was no significant difference between Paris and Berlin students for Global Score of Negative Emotional Reactions. There was a significant difference between Paris and Berlin groups for Negative Emotional Reactions only in scenario 4 "To get close to a cyclist", where Berlin students had a higher score (*M*= 3.83, *SD* = .69) than Paris students (*M*= 3.26, *SD*= .90); *F*(1,173)=15.24, *p*<.001, η^2=.082).

Behavioral Reactions

We will present the higher score of the behavioral reactions by scenarios and by group in Table 16. For scenarios S2 and S4, the behavioral reaction was the same for Paris and Berlin students.

Table 16
Behavioral reaction by scenario and by group

	S1		S2		S3		S4	
	Paris	Berlin	Paris	Berlin	Paris	Berlin	Paris	Berlin
Behavioral reaction	Turning away	Ignoring	Hostile looking		Turning away	Making a remark*	Hostile looking	
M (*SD*)	4.41 (1.04)	3.50 (1.43)	3.84 (1.44)	3.90 (1.33)	4.49 (.95)	4.15 (1.10)	3.76 (1.38)	4.02 (1.13)

Note. S1= "To drive closely behind a cyclist"; S2= "To insult a cyclist"; S3= "To open one's car door while parked-carelessly-"; S4= "To get close to a cyclist"; * = Item omitted by mistake in the French version of the questionnaire.

Frequency of Aggressive Behavior

The first scenario, "to drive closely behind a cyclist", was the most frequently encountered by our participants, for Paris students (*M*=3.82, *SD*=1.23) and for Berlin students (*M*=3.11, *SD*=1.30). There was a significant difference in frequency (controlling for gender and age) between Paris and Berlin students for the four scenarios (see Table 17).

Table 17
Frequency of encounter for each scenario and by group

	S1			S2			S3			S4		
	Paris	Berlin		Paris	Berlin		Paris	Berlin		Paris	Berlin	
	M (SD)	*M (SD)*	*p*	*M (SD)*	*M (SD)*	*p*	*M (SD)*	*M (SD)*	*p*	*M (SD)*	*M (SD)*	*p*
Frequency	3.82 (1.23)	3.11 (1.30)	.002	2.08 (1.06)	1.65 (.91)	.012	2.58 (1.11)	2.07 (1.05)	.008	2.60 (1.27)	2.01 (1.05)	.001

Note. S1= "To drive closely behind a cyclist"; S2= "To insult a cyclist"; S3= "To open one's car door while parked—carelessly—"; S4= "To get close to a cyclist".

b) Other Measures

Knowledge

There was no significant difference between Paris and Berlin students in terms of the knowledge representation about the adapted behaviors when interacting with cyclists ($F(1, 172) = .297$, $p= .586$).

Legitimacy

Paris students had a higher score on the legitimacy representation of cyclists on the road granted by car drivers (*M*= 2.26, *SD*= .83) than Berlin students (*M*= 1.98, *SD*= .65), $F(1, 172) = 6.28$, $p= .013$, $\eta^2=.035$.

Trait Aggressiveness

There were no significant differences in global score of AQ between Paris and Berlin. When analyzing the subscales of AQ, the only significant difference observed between the groups was for the anger subscale where Paris students had a higher score (*M*= 2.47, *SD*= .81) than Berlin students (*M*= 2.16, *SD*= .67), $F(1, 170) = 6.67$, $p= .002$, $\eta^2=.054$.

Cyclist Social Identity

Paris students (M= 3.95, SD= .97) had a higher cyclist social identity than Berlin students (M= 3.40, SD= 1.12), $F(1, 172) = 11.70$, p= .001, η^2=.064.

6.3.2.4 Predictors of Perceived Aggression

Here we are going to present the analysis of the predictors of perceived aggression. We will present the analysis of perceived danger and of perceived intention separated by global scores and by scenario. Then, the other variables, knowledge, legitimacy, aggressiveness trait (aggression questionnaire), and cyclist social identity will be presented.

a) Perceived Danger and Perceived Intention

Global Scores

A regression of perceived aggression was ran on the three dangers (risk, gravity, dangerousness), and the three intentions (anger expression, physical harm, psychological harm); controlling for global score of negative emotions, cyclist identity, knowledge, legitimacy, group (Paris-Berlin), gender, age, km driven by car and variables related to cycling practice. Perceived aggression thus was significantly related to four variables. The first was the physical harm intention ($F(1, 153)=15.60$, $p < .001$, η^2= .036, 95% CI [.18, .55]), the higher the perceived physical harm intention the higher the perceived aggression. The second was dangerousness ($F(1, 153)=9.77$, p= .002, η^2= .022, 95% CI [.12, .52]), the higher the perceived dangerousness the higher the perceived aggression. The third was the intention to express anger ($F(1, 153)=9.04$, p= .003, η^2= .021, 95% CI [.11, .55]); thus, the higher the perception of the intention to express anger the higher perceived aggression. The last variable was the mix of public transport and bicycles (F(1, 153)=5.26, p = .023, η^2= .012, 95% CI [.01, .12]), when the frequency of mix increase, the perceived aggression increase as well.

Scores by Scenario

The same regression of perceived aggression was run for each scenario separately. In Scenario 1 “to drive closely behind a cyclist”, perceived aggression was predicted by “perceived intention to physical harm I2” ($F(1, 156)=5.36$, p = .022, η^2= .017, 95% CI [.08, .98]). The relationship was positive. In this scenario, Perceived Aggression was also predicted by age, negative emotions, and mix between public transport and bicycle.

In Scenario 2 “to insult a cyclist”, perceived aggression was predicted by “perceived intention to anger expression I1” ($F(1, 156)=21.90$, $p < .001$, $\eta^2 = .090$, 95% CI [.24, .60]). The relationship was also positive. In this scenario, Perceived Aggression was also predicted by the nationality group and by negative emotions.

In Scenario 3 “to open one’s car door while parked”, perceived Aggression was predicted by “perceived intention to physical harm I2” ($F(1, 156)=8.29$, $p = .005$, $\eta^2 = .028$, 95% CI [.16, .88]). The relationship was positive. In this scenario, Perceived Aggression was also predicted by knowledge, gender, helmet use, and mix between public transport and bicycle.

In Scenario 4 “to get close to a cyclist”, perceived aggression was predicted by “perceived intention to express anger I1” ($F(1, 156)=37.79$, $p < .001$, $\eta^2 = .088$, 95% CI [.33, .64]), as well by “dangerous situation D3” ($F(1, 156)=5.66$, $p = .019$, $\eta^2 = .013$, 95% CI [.04, .47]). For both, the relationship was positive.

b) Knowledge

We ran a regression of perceived aggression on the knowledge representation about the adapted behaviors when interacting with cyclists, controlling for group (Paris-Berlin), gender, age, and years of experience. A linear effect of the knowledge representation on perceived aggression was found ($F(1, 168)=24.84$, $p < .001$, $\eta^2 = .121$, 95% CI [-.44,-.19]): the lower the score of knowledge, the higher the score of perceived aggression.

If the intention variables (anger expression, physical harm and psychological harm), were included in the model, perceived aggression was influenced by anger expression ($F(1, 165)=15.14$, $p < .001$, $\eta^2 = .038$, 95% CI [.21, .64]) and by physical harm ($F(1, 165)=24.43$, $p < .001$, $\eta^2 = .062$, 95% CI [.27, .63]) but the effect of knowledge disappeared ($F(1, 165)=3.35$, $p = .069$, $\eta^2 = .008$, 95% CI [-.19,-.01]).

Knowledge was significantly related to the three types of intentions: anger expression, $r(174)=-.310$, $p<.001$; physical harm, $r(174)=-.33$, $p< .001$; and psychological harm ($r(174)=-.38$, $p< .001$. Knowledge and global score of intention were also significantly related, $r(174)=-.39$, $p< .001$. We can, therefore, conclude that there was a mediation of the effect of knowledge on the perceived aggression by intention, more specify by anger expression and by physical harm.

c) Legitimacy

We ran a regression of perceived aggression on the legitimacy representation of cyclists on the road granted by car drivers, controlling for group (Berlin-Paris), gender, age, and years of experience. A linear effect of the legitimacy representation on perceived aggression was found ($F(1, 168)=15.90$, $p < .001$, $\eta^2= .081$, 95% CI [-.40,-.13]); thus, the lower the score of legitimacy, the higher the score of perceived aggression.

However when we included knowledge in the model, the effect of legitimacy on perceived aggression disappeared ($F(1, 167)=1.37$, $p = .243$, 95% CI [-.26, .07]) and the effect of knowledge was significant ($F(1, 167)=9.56$, $p = .002$, $\eta^2= .046$, 95% CI [-.42,-.09]). Legitimacy was significantly related to knowledge ($r(174)= .62$, $p< .001$). But as shown before, knowledge and intention were also related. With the methodology used in this study, it is not possible to know whether knowledge distinctly influences legitimacy and perceived aggression or whether legitimacy influences perceived aggression through knowledge. Nevertheless, the influence of knowledge on perceived aggression is higher than the influence of legitimacy on perceived aggression.

d) Trait Aggressiveness

A linear effect from global score of aggression questionnaire on perceived aggression was significant but only when controlling for age and years of experience ($F(1, 170)=4.20$, $p= .042$, $\eta^2= .023$, 95% CI [.01, .39]), the higher the score of aggression questionnaire the higher the perceived aggression. There was no significant linear effect of the four subscales of aggression questionnaire on perceived aggression.

e) Cycling Social Identity

We ran a regression of perceived aggression on cyclist social identity, controlling for group (Berlin-Paris), gender, age, and years of experience. There was a linear relationship between cyclist social identity and perceived aggression ($F(1, 168)=6.20$, $p= .014$, $\eta^2=.033$, 95% CI [.031, .22]), the higher the score of cyclist social identity, the higher the score of perceived aggression.

6.4 DISCUSSION

The aim of this study was to better understand the cyclists' perceived aggression from car drivers' behaviors when these two actors interact on in urban settings. To test our hypotheses, a questionnaire was used with four scenarios related to perceived aggression, trait aggressiveness, perceived representation of car drivers, and transportation behaviors. This study was carried out through the comparison of two samples of cyclists with different modal share of cycling, specifically students from Berlin (high cycling modal share; 13%, National Survey, 2008; source, EPOMM, 2016) and students from Paris (low cycling modal share; 3%, ENTD, 2008) who use the bicycle as a mode of transport.

Two principal paths were examined in order to test our hypotheses: the first path, explored the impact of the cycling modal share based on the two samples (Berlin and Paris) on perceived aggression, and on the other variables linked to perceived aggression; the second path studied which variables predicted perceived aggression.

Concerning the Paris-Berlin students comparison, there was no significant difference in terms of perceived aggression, perceived danger, perceived intention, knowledge representation about the adapted behaviors when interacting with cyclists, or trait aggressiveness (global score of Aggression Questionnaire, AQ; Buss & Perry, 1992). However, there were significant differences between Paris and Berlin students in terms of the legitimacy representation of cyclists on the road by car drivers, cyclist social identity, and the anger subscale of AQ. Concerning the hypothesis about the predictors of perceived aggression, the variables that had a linear effect on the perception of aggression were: two types of perceived intention (physical harm and anger expression), one type of perceived danger (dangerousness), the knowledge representation about the adapted behaviors when interacting with cyclists, the legitimacy representation of cyclists on the road by car drivers, the aggressiveness trait (global score of AQ), and cyclist social identity.

More specifically, the comparison of perceived aggression between Paris and Berlin students was the main aim of this study, but our hypotheses about it were not confirmed in any sense (H1c and H2c). Two possible explanations can be proposed. The first one is that there is no difference between both cities in terms of perceived aggression even if there are important differences in cycling rates in those cities. In this way, cycling rates would not explain the cyclists' perceived aggression. In other words, a high or a low cycling modal share would not influence the cyclists' perception about car drivers' aggressive behavior when both are interacting.

The second explanation is that our study did not allow us to reach a conclusion regarding these hypotheses because of the samples' differences (H1c and H2c). Indeed, the measures related to cycling practice showed that Paris students in our sample used more frequently the bicycle as a mode of transport than Berlin students. This result is the opposite of what we expected given the official cycling rates of the cities. This difference could be explained by the location where the recruitment took place. The majority of students from Paris Universities who answered the questionnaire were contacted in downtown Paris, where the practice of cycling is more developed (ENTD, 2008) than in the peripheral areas of Paris. Moreover, downtown Paris is a densely populated area in terms of shops and services, making it an ideal location for short distance bicycle trips. Conversely, Berlin students were recruited in Potsdam University, which is located outside Berlin, and does not have a major offer of shops or services nearby, except for those provided by the University itself and are usually within a walking distance.

On the other hand, the questionnaire was addressed to current cyclists in Paris and in Berlin, as it was previously mentioned; however, this could have caused an important difference between the two groups. Participants who answered the questionnaire in Paris (where this mode of transport is less used) could be those who are most committed to this mode of transport and use it in consequence very frequently, whereas the participants who answered the questionnaire in Berlin (where the cycling practice is more common) come from a wider range that includes those who use the bicycle but not as frequently. In other words, as the study focuses exclusively on cyclists, the recruitment process occurred much more swiftly in Berlin as the cyclists there represent a much larger group of the population than they do in Paris (13% cycling modal share in Berlin, National Survey; and 3% of cycling modal share in Paris, ENTD; both data from 2008). So, to obtain our sample of cyclists in Paris we had to contact a much larger number of individuals and those who were cyclists were indeed frequently cyclists. In Berlin, as the number of cyclists increase, so does the variability of their characteristics, resulting in a sample with different cycling frequencies. Therefore, it was easier to recruit cyclists to complete the questionnaire in Berlin, but a high number of them had a low frequency of cycling.

Thus, in the end, in both samples, we have cyclists who use the bicycle as a mode of transport in urban settings (Paris or Berlin), but their levels of practice did not correspond to the official cycling rates of these cities. Besides, the data we regarded as official cycling modal share of Paris and Berlin for this study is from 2008, and since then these rates could have evolved and the gap between these cities may have narrowed. Therefore, this relationship between perceived aggression and cycling modal share must be explored in future studies.

On the other hand, this non-expected frequency of cycling could help to understand the results concerning the difference between Paris and Berlin students in the legitimacy of cyclists on the road and in cyclist social identity, where Paris student had a higher score than Berlin students. This difference could be interpreted in the sense of a higher frequency of practice, which is slightly different from the explanation concerning cycling modal share, although it goes in the same direction. In this sense, more legitimacy is perceived and the cyclist social identity is higher when the cyclists use more frequently the bicycle (Paris) than when the cyclists use less frequently the bicycle (Berlin).

The hypothesis concerning the knowledge representation about the adapted behaviors when interacting with cyclists and perceived aggression (H1) was not validated. First, as there was not a significant difference for the knowledge representation between Paris and Berlin students, the hypothesis (H1b) was not validated; second, as we mentioned before there was no significant difference between Paris and Berlin students for perceived aggression (H1c). However, the results showed a negative linear relationship between the knowledge representation and the perceived aggression. Moreover, this relationship was absorbed by intention, in particular by physical harm and anger expression.

Although there was a linear relationship between the knowledge representation and the perceived aggression, the results showed the direction opposite from expected. Thus our hypothesis, the higher the score of knowledge about the adapted behaviors when interacting with cyclists, the higher the perceived aggression (H1a), was not validated. According to our hypothesis, when cyclists think that car drivers do not know how to behave with cyclists and that car drivers do not drive in the correct way; they should think that car drivers could make mistakes when interacting with cyclists, but that these mistakes (or unsafe behaviors toward cyclists) are not intentional, thus, not aggressive. However, what we found was the opposite. Lower scores in the knowledge representation seem to increase the perception of car drivers' behavior as aggressive, contradicting our hypothesis. A possible explanation for this result could be related to the theory of intergroup conflict (Tajfel & Turner, 1979) in which the in-group negatively evaluates the out-group. Here, the cyclists who evaluated car drivers with a lower score of knowledge (negative representation), at the same time, evaluated with a higher score the behaviors of car drivers as aggressive; both negative evaluations could thus be explained by the intergroup conflict between cyclists and car drivers.

This explanation about the negative evaluations of car drivers related to the intergroup conflict could be tested as a new hypothesis in further studies, consequently, we propose two options. One option consists of measuring in a first place the conflict between car drivers and cyclists with cyclist participants with questions about the relationship with other road users.

The second option consists in manipulating the variable in-group/out-group conflict with two groups of cyclists, one of the groups will be primed with the belonging to the cyclists group (the in-group) and the existence of car drivers as the out-group, and that in general the coexistence on the road is troublesome (conflict); the other group will not be primed with the emphasis of the in-group/out-group and will receive the information that between cyclists and car drivers the coexistence is harmonious (non-conflict). Then, for both options, two variables would be measured: the knowledge representation about the adapted behaviors when interacting with cyclists and the perceived aggression in a conflictive interaction between cyclists and car drivers. The analysis of the relationship between these three measures would allow verifying whether the conflict between these two users explains the difference in the evaluation of the knowledge representation and the perceived aggression. This perspective is in line with the discussion concerning the role of intergroup conflict on the interpretation of the social context where the conflicts emerge; here, the fact the road is shared by different kinds of users.

We also mentioned that the effect of the knowledge representation on the perceived aggression was mediated by the perceived intention. Indeed, the perceived physical harm and anger expression are the variables that seem to best explain the perceived aggression. The more a person perceived an intention of physical harm and an intention to express anger, the more they perceived aggression. This result corroborated our hypothesis on the influence of perceived intention on perceived aggression (H3). This is in line with the definition of aggression (Baron & Richardson, 1994). However, the intention of psychological harm was not a predictor of the perceived aggression. In this sense, cyclists in our sample interpreted a behavior as aggressive more when they perceived an intention to cause a physical harm is perceived than when they perceived an intention to cause a psychological harm. This could be explained because there is also an influence of perceived danger on perceived aggression. An intention to harm physically is more dangerous than an intention to harm psychologically. Thus, at least in the interaction concerning cyclists and car drivers in urban settings it seems to be more useful to categorize a behavioral as aggressive based on the perceived intention to harm physically and the perceived danger than the perceived intention to harm psychologically.

This influence of perceived danger as a predictor of perceived aggression also corroborates our hypothesis (H4). Besides, this influence of perceived danger as a predictor of perceived aggression could also suggests a bias from cyclists who categorize a behavior as aggressive even when there is no harm intention from a car driver; in terms of the definition of aggression as proposed by Baron and Richardson (1994). Indeed, this result also showed that a car driver's behavior can be perceived as aggressive by a cyclist when this behavior implies a danger for the cyclist but not necessarily when it is identified as an intention to harm (physical or psychological), or to express anger toward the cyclist. Additionally, the combination of perceived intention and perceived danger seem to increase the perception of aggression. This is interesting because as we mentioned before in the general aggression model (GAM; DeWall & Anderson, 2011), even if the perception is not accurate (e.g. there was no intention nor danger), this perception could influence the emotion (arousal), the assessment (interpreted) and finally generate an aggressive behavior (in response to what would have been considered intentional and/or dangerous). This is in line with the violence escalation cycle (DeWall et al., 2011), in which two perspectives are confronted. In a starting event where a car driver harms a cyclist, in the cyclist perspective, the car driver's behavior is perceived as an "intentional, unjustified and relatively dangerous event" to which the cyclist should react, while in the car driver's perspective, the behavior was an "unintentional, justified and a relatively mild event". Under those circumstances, the first event and the response end up increasing the probabilities to have an accident, complicating the intergroup relationships, and deteriorating cycling social image. These three consequences are in the opposite direction of encouraging cycling modal share.

Concerning legitimacy of cyclists on the road, it was hypothesized that Berlin students would have a higher score in legitimacy than Paris students (H2b), but the analyses showed the contrary, Paris students had a higher score in legitimacy than Berlin students. This may be due to the frequency of practice of Paris students that was higher than Berlin students in our study. However, as mentioned before, there was no significant difference between Paris and Berlin students for perceived aggression (H2c). The hypothesis of legitimacy (H2a) was validated because there was a negative linear relationship as expected between the legitimacy of cyclists on the road and perceived aggression. In this sense, when cyclists think that car drivers do not legitimate cyclists as part of road users (viz. Do car drivers consider cyclists as legitimate road users in urban settings? Do car drivers agree to share the road in urban settings with cyclists?), more car drivers' behaviors are perceived as aggressive by cyclists. In other words, when cyclists perceived that car drivers give them a legitimate space on the road, they also perceived the non-adapted behaviors of car drivers as a mistake, or at least, less aggressive. Moreover, this relationship between legitimacy and perceived aggression disappeared when controlling the variable knowledge.

This result of the cyclists' perception of legitimacy granted by car drivers is indeed an interesting path for the research of answers about intergroup conflicts in particular, and more largely about the barriers from cycling. It seems that this legitimacy could influence a perception of other negative behaviors as non-intentional and could be interpreted instead, as errors. Public policies educating about the cyclists' legitimate space on the road could be a path to give cyclists confidence and to improve the acceptability and tolerance of cyclists by car drivers; it could thus reduce conflicts, and in consequence that could help to promote cycling and increase the cycling modal share.

Moreover, in this study the results showed that trait aggressiveness (Buss & Perry, 1992) is also a predictor of perceived aggression, corroborating our hypotheses (H5). The higher the score on the aggression questionnaire the higher the perceived aggression score. This is also in line with the GAM (DeWall & Anderson, 2011), in this sense, it is important to distinguish trait aggressiveness as a variable that could be identified as personal input contributing to the issue of aggression in general, and also in particular, to the perception of aggression by cyclists when interacting with car drivers. This result helps to understand another of the multiple factors that influence the conflict between road users.

Concerning social identity, we found that a high cyclist social identity predicts more perceived aggressions from car drivers' behavior, validating our hypothesis (H6). This result corroborates the theory of intergroup conflict (Tajfel & Turner, 1979), in which a member of a group with a high social identity evaluated more negatively the out-group or a member of the out-group. In this case, a cyclist with a higher cyclist social identity evaluates a car driver's behavior as more aggressive than a cyclist with a lower cyclist social identity does. This is an interesting result that could be used to decode the conflict between these two users. Because even when a behavior is not clearly identifiable as aggressive, other variables such as cyclist social identity influence its perception as aggressive, and according to the GAM (DeWall &

Anderson, 2011) this perception could also provoke a negative emotion, such as stress or fear, and a negative answer in response. In this sense it could be important to work with stakeholders, public authorities, cycling associations and in particular with the cyclists who have a higher cyclist social identity in order to make them aware of this relationship with perceived aggression, and to find solutions for specifics conflictive situations.

This study, from the three pilot studies until the main questionnaire, showed interesting results about the perceived aggression in the interaction between car drivers and cyclists in urban settings, including the difference between participants' categorization of aggressive behaviors and the definition of aggression; the application of the concepts of aggression and perceived aggression to cycling; the comparison between cities with different modal shares, even when the data of the sample is not in line with the official public rates; the methods used, and the study of predictors of perceived aggression. Likewise, the perceived aggression from car drivers' behaviors by cyclists was predicted in our study principally by perceived intention, and also by perceived danger, the knowledge representation about the adapted behaviors when interacting with cyclists, the legitimacy representation of cyclists on the road, trait aggressiveness, and cyclist social identity. In consequence, the results contribute to a better knowledge on psychological barriers to cycling, especially concerning perceived aggression, which as the literature postulates and the results corroborated, is influenced by a diversity of variables. This new knowledge will help to develop better strategies to raise the barriers related to the conflictive interactions between cyclists and car drivers, not to mention that it could also help to prevent accidents and to increase the modal share of cycling.

In our study several hypotheses were validated (H2a, H3, H4, H5, and H6) whereas other hypotheses were not validated, some were not significant (H1b, H1c, H2b, and H2c) and one was in the opposite direction (H1a); altogether this study thus remains an innovative contribution to the understanding, theoretical and applied, of the interaction between cyclists and car drivers, their conflicts, and more specifically, the perception of aggression by cyclists. To our knowledge, this was the first time these variables were measured. Thus, this research reunited two fields of knowledge: the study of cycling (transport) and the study of aggression (psychology) in the research on road users' interactions, allowing to use measure tools and to analyze the perception of aggression from cyclists' perspective. It is important to highlight the difficulties inherent to a study of these characteristics in two countries, in terms of difference in cycling practice (which also affects the building of the questionnaire), in terms of language and translations, and, the most important, in the recruitment of participants.

These difficulties could be interpreted as limits of the study, but also as a challenge undertook and to be taken up in future studies.

Future studies should benefit from characterizing where the perceived aggression behaviors between cyclists and car drivers happen, e.g. environmental conditions (rain, hot weather) or contextual factors (traffic jams, peak hours), in order to identify other factors that are involved in perceiving a behavior as more or less aggressive. Future studies should also investigate how perceived aggression from car drivers by cyclists influence cycling practice, in terms of cyclists' behaviors, such as reactive aggression and cyclists' adaptation strategies. For example, cyclists may take another road, decide to cycle at a time with less traffic, use only cycle lanes and not share the road with car drivers, wear a helmet, or in the extreme case, they can decide to stop cycling. Moreover, it is recommended to compare cyclists' point of view with car drivers' point of view, and even take into account other users such as pedestrians. This could help to reduce negative representations about users, road conflict, in-group/out-group conflict, which, among other things, affect the promotion of cycling, but also to encourage a better share of the road space and better relationship between users.

GENERAL DISCUSSION AND CONCLUSION

Utilitarian urban cycling is a sustainable mode of transport that could be a solution contributing to reduce the current problems of urban mobility (e.g. congestion, pollution). However, the cycling modal share in France is low (3%, ENTD, 2008). The perspective used in France to increase cycling modal share was mainly focused on external factors and cycling infrastructure, which seems to improve cyclists' safety but is not enough to lead to an important increase in new users. Consequently, the general aim of this Ph.D. thesis was to contribute to a more integrative approach to a better understanding of utilitarian urban cycling from the perspective of individuals, by identifying the individual factors involved in its use that could help to promote cycling. Thus, it was hypothesized that, in addition to the external factors, such as distance or lack of cycling infrastructure, there are also individual factors, such as representation, motivations toward cycling and personal perceptions of other road users (e.g. cars drivers), which in complement of the external factors could influence positively and negatively the use of utilitarian urban cycling, encouraging this use for some people but also preventing it for others.

This thesis was focused on two research questions related to cycling, the first one was about the individual factors, in terms of representation and motivation that could increase (positive) or prevent (negative) the use of the bicycle as a mode of transport in urban settings. The second question was about the factors related to the cyclists' perception of aggression from car drivers' behaviors in their interactions in urban settings. Perceived aggression was part of the list of negative arguments regarding bicycle use as a mode of transport in urban settings.

To try to answer these two research questions we carried out three studies in order to identify the positive and negative representations and motivations of the bicycle as a mode of transport according to cyclists and non-cyclists (first and second studies), and the perception of aggression from the car driver's behaviors according to cyclists' point of view (third study).

This general discussion begins with a short summary of the principal results of the three studies; afterwards we will discuss the implications for the theoretical framework, the implications for the society, the limits of the studies, and finally the perspectives for future research.

I. SUMMARY OF RESULTS

In general, when people talk about a particular action, in their speech they distinguish the advantages (positive representations) about this action and the motivations to do or to perform it (levers; positive motivations). Likewise, people in their speech distinguish disadvantages (negative representations) and motivations to not do a particular action or behavior, to not perform it (barriers; negative motivations). Based on these characteristics of people's discourse and the literature of representation (Eagly & Chaiken, 1993; Jovchelovitch, 2007; Moscovici, 1973) and motivation (Atkinson, 1958; Fenouillet, 2012; Higgins, 2012; Perugini & Bagozzi, 2001; Ryan & Deci, 2000b), in our first exploratory study the aim was to identify the positive and negative representations, in terms of advantages and disadvantages, and the positive and negative motivations, in terms of levers and barriers, about utilitarian urban cycling with cyclists and non-cyclists as participants, through semi-structured in-depth interviews in the Paris area. Additionally, another aim was to identify whether there were differences between these two types of users concerning representation and motivations. Based on the self-determination theory (Ryan & Deci, 2000b), we expected to find more intrinsic positive arguments for cyclists than non-cyclists and more intrinsic negative arguments for non-cyclists than cyclists.

Through content analyses, we obtained a list of 48 positive and 49 negative arguments related to utilitarian urban cycling by cyclists and non-cyclists. Cyclists mentioned more positive arguments than non-cyclists. Cyclists and non-cyclists frequently cited *physical activity* as an advantage of cycling. Cyclists frequently cited as a lever of cycling the *feeling of freedom*. In this sense, for cyclists, there was a difference between the most frequent advantage and the most frequent lever of cycling. There was no difference between cyclists and non-cyclists for the most frequent advantage of cycling. Concerning the type of arguments, cyclists (for advantages and levers) and non-cyclists (for advantages) cited more extrinsic-external than extrinsic-internal and intrinsic positive arguments. In particular for control and stability, there was no difference in the distribution between cyclists and non-cyclists for advantages (and cyclists for levers); both cited mainly internal (controllable) and stable arguments.

Regarding the negative arguments, non-cyclist cited more disadvantages and also more barriers than cyclists. Cyclists and non-cyclists cited *danger* as one of the most frequent disadvantages of cycling; cyclists also mentioned *rain*, and non-cyclists also mentioned *long distances*. Cyclists and non-cyclists cited as the most frequent barrier of cycling *long distance*, and non-cyclists also cited the *fear of cycling*. Thus, there is no difference between cyclists and non-cyclists. However, there was a difference between the most frequently cited disadvantage of cycling and the most frequently cited barrier to cycling. Concerning the type of arguments, the majority of both negative and positive arguments were extrinsic-external. More precisely, non-cyclists cited more intrinsic barriers than cyclists. Cyclists cited more extrinsic-external disadvantages and barriers than intrinsic ones; non-cyclists did the same for disadvantages. In particular for control and stability, non-cyclists, and to a lesser extent, cyclists, mainly cited external (the control comes from outside) and transient disadvantages and barriers. In general, for the type of argument, utilitarian urban cycling was more associated with its instrumental function (external arguments; e.g. for positive, *easy to park*; for negative, *bicycle theft*) than to an internal function (e.g. for positive, *satisfaction* without rewarding; for negative, *personal difficulti*es) by cyclists and non-cyclists.

This first study through face-to-face interviews allowed us to learn from those who use the bicycle and those who do not. Due to the methodology, some details cannot be reflected in the results, such as the importance given to a particular motivation, and the interview let us know aspects of utilitarian urban cycling experience that could not be coded but for a preliminary study of an issue or a population it is a good start. The next study gave more importance to this question about the weight of the arguments.

Based on these positive and negative representations and motivations, we ran a second study using an online questionnaire in order to determine the weight of each argument, to know whether the main advantages, levers, disadvantages, and barriers of the previous study were also found in this second study with a larger sample and to identify the difference between representation in one hand and motivations, on the other hand. To nourish the knowledge about cycling we added other questions related to cycling practice and we stayed with cyclists and non-cycling population.

According to the cycling frequency and the distribution of participants in the sample, we compared three groups: frequent cyclists, occasional cyclists, and non-cyclists. For positive arguments, the advantage with the highest score was the *physical activity* for frequent cyclists and non-cyclists; as well as in the first study for cyclists and non-cyclists; and it was the second-highest score for occasional cyclists after *ease of parking*. The lever for frequent cyclists and occasional cyclists was also *physical activity*; this was different from the lever most frequently cited in the first study by cyclists, which was *feeling of freedom*. Non-cyclists in the second study had a higher score for enjoying the *good weather* as a possible lever of utilitarian urban cycling. For negative arguments, the highest score for disadvantage and barrier for the three groups was *ice*. As this argument is rarely encountered in France, the highest scores were, in general related to weather issues (*heavy rain, snow*), as well, for the three groups. This was different from what was found in the first study, where the most frequently cited disadvantages were *danger* and *rain* for cyclists and *danger* and *long distances* for non-cyclists, and where the most frequently cited barriers were *long distance* for cyclists and *long distances* and *fear of cycling* for non-cyclists.

Regarding the first research question, concerning the study of the individual factors for using or not using utilitarian urban cycling, we improved the knowledge of these factors. However, we did not succeed in a specific distinction between the two concepts. Therefore, our studies let us know that there is a difference between the representation and the real motivation to cycle (or not to cycle). Particularly, our study went further than other studies that considered both types of variables as only one. The results we found and the methods used contributed to the understanding of both as different variables, but there is still work to do in order to properly measure them, but in particular to differentiate these variables.

Moreover, contrary to the widespread belief (which is present even on the stakeholders' assumptions), the reasons to cycling are not only related to the utilitarian use of a mode of transport such as *traveling*, *gaining time* or *money*. Indeed, even if these reasons take a lot of consideration for cyclists and non-cyclists, there are also other complementary reasons that seem to be valuable for them, in particular, *physical activity*, which could be especially used to promote this mode of transport. Other more intrinsically oriented reasons, such as the *feeling of freedom* and *pleasure* seem to play an important role too.

Additionally, it was surprising that the "green" or *ecological aspect* does not seem to be a very important reason (in terms of frequency of the citation —in the first study— and judgment of the importance as an advantage and as a lever —in the second study—), for cyclists and non-cyclists, even with the enormous problems of air pollution and the continuous information about the need to increase the ecological behavior. In this sense, some studies showed positive results about the argument ecology as a message influencing behaviors, e.g. air-pollution influencing speed limits (Delhomme, Chappé, Grenier, Pinto, &

Martha, 2010) and eco-friendly attitudes influencing active commuting (Bopp, Kaczynski, & Wittman, 2011). Perhaps an overexposure to the ecology message is leading to the absent of interest, to the decrease of influence, or even worse, to the reactance effect (Brehm, 1966). Additionally, environmental problems could be associated with collective issues, perceived as out of reach from individuals (i.e. common dilemma; Vlek & Steg, 2007; Vugt, 2009) while commute and the use of a bicycle as a mode of transport could be perceived as a personal concern, and thus not directly associated with a pro-environmental behavior or as an ecological mode of transport.

We found differences between cyclists and non-cyclists concerning the positive and negative representations and motivations about cycling, but we did not find fundamental differences. According to the theory of representation, it is quite understandable because the information, beliefs and knowledge about an object or action (here the arguments about utilitarian urban cycling) are shared between individuals. In this case cyclists and non-cyclists could have similar arguments because there is a common discourse in the society about utilitarian urban cycling, both for positive and for negative arguments. However, we expected pattern differences for motivations (levers and barriers) because of the theories of motivation someone who performs voluntarily a behavior (cyclists) should be more motivated (i.e. intrinsically) and should have different motivations, and someone who does not perform this behavior (non-cyclists). Thus, our results are surprising concerning this lack of prominent differentiation between cyclists and non-cyclists. Indeed, given the multitude of benefits that non-cyclists say that cycling has, one could wonder why they do not use the bicycle as a mode of transport every day. In this sense, it is possible that the fundamental motivational reasons why some use the bicycle and some do not (differentiation) were not found in our study because of methodological aspects. More particularly, it is possible that the difference between the question posed to cyclists (what currently motivates them) and the question posed to non-cyclists (what would motivate them) played a role. As well, the use of the questionnaire may not be the method more relevant to study this. Perhaps another methodology different from the questionnaire is needed. For example, the researcher could interrogate non-cyclists directly in the conditions where they feel that they are in front of real situations and confronted to express the real motivation (levers and barriers), in this way the difference between cyclists and non-cyclists could be more striking. It may also be that even if non-cyclists are motivated there are also incompressible constraints playing a role, which stresses the importance of developing an integrative approach to utilitarian urban cycling. Thus, the factors that could influence utilitarian urban cycling also depend on the needs of the users and the context that in some cases facilitate and in other cases impede the use of cycling or the modal shift. Besides, it is possible that other variables could explain this lack of differentiation, such as the social context and the cultural values. These variables could be taken into account in other studies. These are questions to investigate, in a field that is still needed to facilitate the modal shift and the encouragement of less polluting modes of transport.

For the purpose of answering the second research question, the third study is mainly focused on perceived aggression as a negative argument for urban cycling. This argument is located in the intersection between two negative arguments of cycling, which were analyzed in the previous studies, "aggression from other users" and "lack of attention of other road users". Perceived aggression was considered an issue in the interaction between cyclists and car drivers. Three pilot studies provided the situations considered as aggressive and the main survey investigated, in more detail, specific conflictive interactions between cyclists and car drivers in order to determine the factors predicting perceived aggression by cyclists. In this third study, we compared cyclist students who frequently used the bicycle as a mode of transport from two different cycling modal share cities: Paris and Berlin.

There was no significant difference in the perception of aggression by cyclists between Paris and Berlin students, although there were differences between the participants from both cities on legitimacy representation of cyclists on the road by car drivers, cyclist social identity, and the anger subscale of AQ, for which Paris participants had higher scores. Perceived aggression was predicted positively by perceived intention to physical harm, by perceived intention to express anger, and by perceived dangerousness. Moreover, cyclist social identity had a positive linear relationship with perceived aggression, the representations of the legitimacy of cyclists on the road had a negative linear relationship, and the knowledge representation about the adapted behaviors when interacting with cyclists had a negative linear relationship. Besides, the relationship between knowledge and perceived aggression was mediated by the intention to harm, and the relationship between legitimacy and perceived aggression was mediated by knowledge.

With regard to the conception of the study on perceived aggression, we took into account that there is a difference in the definition of aggression by psychologists and the use of the term aggression by laypeople (Berkowitz, 1981; Krahé, 2013). In consequence, the use of term aggression in our study meant taking the risk of the concepts being interpreted differently by participants and generate a bias (Drottz-Sjöberg, 1991). For this reason, we suggested that further studies about aggression or perceived aggression make the difference between a layperson concept and the theoretical concept, in particular, because the use of the term "aggression" on the road could be controversial and in consequence could amplify the conflict between the users of transports, according to the in-group/out-group conflicts (Tajfel & Turner, 1979). Accordingly, we tried to reduce this gap between the concepts using three pilot studies, and operationalizing out questions related to the official definition (i.e. setting a theoretical concept with observable and measurable indicators). Thus, in the main study to measure perceived aggression we also used the terms perceived intention (to express anger, to cause physical harm, and to cause psychological harm) and perceived danger (likelihood to have an accident, seriousness of the consequences, and dangerousness).

For this reason, in our study when we considered the term "aggression" in the interactions on the road situation, we generally refer to the "perception of aggression". Principally, on road interactions, the exchange between the actors are not face-to-face, thus it is difficult to know the real intentions of a particular behavior coming from the other actor, the supposed "aggressor". Therefore, in the analysis, we referred the variables studied concerning the interaction in terms of perceptions. The fact that we mentioned a perceived aggression instead of aggression does not imply in itself that there is no conflict between the users. Indeed, this analysis could help to understand the conflict, especially because it highlights the dimension of interpretation and misinterpretation, the personal inputs and the weight of the context (GAM; DeWall & Anderson, 2011). Besides, when there are intergroup conflicts (Tajfel & Turner, 1979), in this case between car drivers and cyclists, the perception of aggression can increase (DeWall et al., 2011) and as we showed the cyclist social identity could also play a role.

II. THEORETICAL IMPLICATIONS

Our results have theoretical implications. In the first part of this thesis, the theoretical framework focused on the conceptualization of representation and motivations. In general, these two concepts are not measured together. Besides, they have not been applied together in the study of the subject of this thesis, the utilitarian urban cycling.

The conceptualization and theories about the representation (mental representation, social representation and attitudes) do not really recognize the existence or the importance of the concept of motivation in the prediction of behavior. More precisely, the conceptualization of mental representation and social representation are principally interested in the content of the representation, in how the representations are created or in its structure. Specifically for social representation, the theories around are focused on the shared feature of representation.

Concerning the theories about attitudes, they are more developed around a model and generally focused on the relation between attitudes and behavior. The models include several factors as predictors of a particular behavior. Although some of these factors are close to the concept of motivations or are sometimes considered by the authors as forms of motivation, these models generally do not consider explicitly the concept of motivation at defined in the most important theories of motivation. For example, in this three-component model of attitudes (Rosenberg & Hovland, 1960; Zanna & Rempel, 1988), the definition of the conative/behavioral component refers to the concept of intention rather than to the concept of motivation; the affective component refers to the emotions rather than to the motivations; and the cognitive component suggests a similarity to the concept of representation that we use in this study: that is knowledge and beliefs, present and past, that the individual has about the attitudinal object. As well, Fishbein and Ajzen (1975) made a distinction between the attitude and other concepts, such as beliefs and behavioral intentions. According to them, attitude corresponds principally to the positive or negative emotions linked to the attitudinal object. For us, the evaluative feature of attitudes is part of the representation, but the main idea that defines our concept of representation is the term they used as a belief, referring to information, knowledge or opinions about the attitudinal object. Besides, the other component they envisage, behavioral intention, is still a measure different than motivation (c.f. difference between intention and desires; Perugini & Bagozzi, 2004). Additionally, in the theory of planned behavior, TPB (Ajzen, 1985) other factors related to the prediction of the behavior are investigated (in this case, we can say extended TPB), but motivation is not explicitly measured, although the self-efficacy component of perceived behavioral control measures in part motivation (Rhodes & Courneya, 2004).

Likewise, on the other hand, the theories of motivation do not recognize the existence of representation (mental representation, social representation or attitudes) as a factor different from motivation, and do not take into account the weight that a representation could have in the acting out of an action. The only model that relatively includes both concepts was the goal-directed behavior model (Perugini & Bagozzi, 2001), in which the representation could be exemplified as the attitude (mainly the evaluative characteristic), and the motivation as the concept they name "desires". The authors also include in their model the intention, subjective norm, perceived control, positive, and negative anticipated emotions, frequency, and recency of the past behavior. For this reason, this model supports the idea that representation and motivation are separated variables exemplified in the same model. In this sense, the model allows a general point of view concerning the implication of other variables that could be taken into account in future studies about utilitarian cycling. In our studies, we were interested in measuring representation and motivation, principally because the two concepts represent different variables in the prediction of the behavior. Additionally, the fact that the theories on a concept do not take into account the other concept (e.g. theories of motivations do not include the representation; theories of representations —mental representation, social representation, attitudes— do not include the motivation), implies that they are never confronted to the existence of the other concepts and that the possible relationship between the concepts is missed. In this sense, it seemed interesting to study these two concepts together and to apply them in the study of the determinants of use regarding utilitarian urban cycling.

The results of the first study strongly support our hypotheses of a distinction between both concepts. However, the result of the second study showed differences between the theoretical concepts rather quantitative than qualitative, but not very conclusive. Perhaps this lack of conclusive differences was because of the method. More precisely, the measures developed for studying and comparing the two concepts were not completely adapted or did not allow for a clear distinction between the two concepts to be made. For instance, the form in which the question was presented (both concepts were measured on the same page-screen of the administration of the questionnaire), could have caused the participants to respond quickly without thinking about differentiating the concepts or by doing a stronger parallel between the concepts than in reality. Apart from this explanation, the results between representation and motivation were different; the scores of advantages were higher than the scores of motivations.

Another explanation is that in the mind of participants the concepts were not clearly different, so that the participants were not aware of the possible difference between concepts on a general behavior, and in particular, on the use of a bicycle as a mode of transport. Thus, they did not make a distinction when answering both questions in the questionnaire, but merely, as the results suggest, considered that both concepts are on the same continuum, with motivation being a "super advantage". This lack of differentiation of the concepts could also show, in participants, the gap between the theories of psychology and the appropriation of concepts by people. For instance, what people refer to when they think of the word "motivation" may be different from what the theory of psychology says about this concept.

This difference (theoretical concept vs. layperson concept) could be problematic since the current state of the methodological resources to access the knowledge of these psychological phenomena requires, in particular, using participants' self-reported responses. At least, we considered measuring them in this way through the questionnaire. If we keep thinking that the two concepts are different but the measure used in this study did not allow us to test it, it is possible that for next studies it will be necessary to develop other methodological measures that let us test this difference.

Moreover, the lack of conclusive differences could also point to a difference between the two concepts not as strong as implied in the theoretical models. That means that perhaps between representation and motivation there is a continuum, where "representations" are the lowest level and "motivations" are the strongest level of the same continuum and this continuum represents the desire, the strength, to achieve a behavior, in this case utilitarian urban cycling.

Another point concerning the theories of motivation is that in general they are used for studying other purposes or are used in other fields such as education, work, and sport. Concerning the application of the conceptualization to utilitarian urban cycling, the theories of motivation, especially the self-determination theory (Ryan & Deci, 2000b) and in particular the intrinsic and extrinsic motivation application, which we used as a basis for conceiving the first two studies, we supposed that these theories were, in fact, relevant to the study of the bicycle as a mode of transport. More specifically, the dimension intrinsic-extrinsic seemed particularly relatable to the study of the bicycle as a mode of transport because, at the same time, it allows to commute (extrinsic) and it is pleasant (intrinsic). However, in the end, we did not find clear patterns of intrinsic motivation for cyclists. This may be due to the fact that to use the bicycle as a mode of transport is an end in itself, in other words, utilitarian urban cycling is an instrumental aim in itself. In this sense, to perform the behavior (to use the bicycle) will give cyclists several external and instrumental rewards: transportation, but other gains as well, such as time; so in this sense the motivations to cycling are already extrinsic. This means that the behavior is probably influenced principally by the instrumental characteristics (extrinsic motivation). At the same time, this does not imply that cyclists do not find an inherent satisfaction (intrinsic motivation), but the motivations for utilitarian urban cycling will be mainly oriented to attain separable outcomes (extrinsic motivation). In consequence, the continuum of self-determination concerning the type of motivation that someone could have a particular goal or behavior, and the distinction between intrinsic and extrinsic, are not necessarily as fitting with the use of a bicycle as a mode of transport as for other fields, such as to be motivated to reach a goal or to perform a behavior at work, in school or in a particular sport (in which intrinsic motivations are the highest level of motivation). This particular instrumental characteristic of utilitarian urban cycling could explain why even cyclists, who are supposed to be more motivated to cycling, do not highlight intrinsic motivation (in the second study), and that between cyclists, occasional cyclists, and non-cyclists, motivations were not fundamentally different. Finally, this could also be explained by other factors, for example, influence of the social context, which could be the same for the three types of users. To sum up, the self-determination theory (Ryan & Deci, 2000b) seems not to be the most adapted for the study of the utilitarian urban cycling.

Concerning the theoretical framework used in the second part of this Ph.D. thesis, aggression in general, and perceived aggression in particular, are concepts rather new for the study of utilitarian urban cycling. At least in transport studies, the concept of aggression has been mainly applied to car drivers (e.g. Richer & Bergeron, 2012), perhaps because the car is the dominant mode of transport in many countries but also because aggressive driving is considered as a form of aggression common in everyday life (Krahé, 2013). We thus innovated when we applied the perception of aggression in the interaction between car drivers and cyclists from the point of view of cyclists. Moreover, as we focused on the cyclists' point of view, we use the concept of perceived aggression. For this reason, it was necessary to operationalize the definition of aggression from Baron and Richardson (1994), to identify the role of the intention for defining aggression from the "victim" perspective. Considering the general aggression model from DeWall and Anderson (2011) as a framework, in particular, the influence of the personal and situational input on the perception of a behavior as aggressive; as well as the mechanisms involved in the perception-interpretation of a particular situation was thus relevant to investigate this particular interaction between car drivers and cyclists, to interpret the results, and to propose new perspectives for future studies.

Additionally, in order to understand the relationship between these two actors, the theory of intergroup conflict from Tajfel and Turner (1979) was an essential guideline to study the perceived aggression and to interpret the results we obtained. For instance, the negative relationship between perceived aggression and knowledge about the adapted behaviors when interacting with cyclists, in the opposite direction as expected, could be explained, as we mentioned before (discussion of the third study), through the theory of intergroup conflict from Tajfel and Turner (1979). In this theory, because of the intergroup conflict between car drivers and cyclists, cyclists considered that car drivers do not know how to behave in the interaction with cyclists, and they considered likewise that the behavior of the car driver was aggressive. Besides, when cyclists considered that car drivers give them less legitimacy on the road, they perceived more aggression (as expected). In consequence, as knowledge about the adapted behaviors when interacting with cyclists mediated the relationship on perceived aggression, the cyclists who considered less legitimacy by car drivers, also considered less knowledge from car drivers, and thus also perceived more aggressive from car drivers' behaviors. This result is also explained under the intergroup conflict theory (Tajfel & Turner, 1979), in which cyclists perceive their in-group (cyclists) and the car drivers (the out-group) as opposing groups, leading to intergroup conflict. This intergroup conflict causes the members of the in-group (cyclists) to consider negatively the members of the out-group (car drivers) and their behaviors. This can reach the point of negatively evaluating drivers' knowledge about the adapted behavior when interacting with cyclists, and of considering or interpreting their behaviors as aggressive (and intentional), even when it is not easy or clear to determine whether the car driver had the intention to harm (which particularly difficult to determine on road traffic interactions). So, in our study, we found that the variable legitimacy, which was mediated by knowledge, negatively predicted the perceived aggression. Additionally, these results concerning legitimacy, knowledge and perceived aggression and intergroup conflict between cyclists and car drivers were also in line with a result concerning cycling social identity, in which cyclists with higher scores in cyclist social identity perceived more aggression from car drivers' behaviors. This second result could be interpreted as a second confirmation that an intergroup conflict between car drivers and cyclists would influence the perception that car drivers behave in an aggressive way toward cyclists from the point of view of cyclists.

On balance with the third study, we added an important contribution in terms of decrypting the definition of aggression and adapting it to the subject of utilitarian urban cycling, through the transition from aggression to perceived aggression on the interaction of car drivers and cyclists in urban settings. Moreover, the contribution concerns the identification of the principal predictors of perceived aggression, in terms of perceived intention, perceived danger, cyclists social identity, the knowledge representations, and the legitimacy representation.

III. SOCIETAL IMPLICATIONS

For the society, our three studies contribute to place the user as the focus of the reflection, knowing their point of view and comparing cyclists (frequent and occasional; users) with non-cyclists (potential users) in a more integrative approach, in which the internal factors and the external factors are complementary. In this sense, the studies carried out allow to progress on the individual factors, such as the reasons to use and not to use the bicycle as a mode of transport. We used two concepts to differentiate the processes: on the one hand, the advantages-disadvantages (representation), that give positive or negative information about an action or behavior, and, on the other hand, the motivations, as the real reasons that boost someone to action, in other words, the motives to acting out, to approach (as levers) and to prevent (as barriers) an action, utilitarian urban cycling.

Likewise, the first two studies gave the opportunity to progress on differentiating representation and motivation, positive and negative, according to the type of users: cyclists and non-cyclists in the first study, and frequent cyclists, occasional cyclists, and non-cyclists in the second study. This could help stakeholders, public authorities, and cycling associations to understand the complexity of this question and also allow them to target their actions for the promotion of utilitarian urban cycling according to the user, the aims, the scope, and the context. In particular, the results could be used in communication campaigns and marketing for utilitarian cycling. More precisely, as we mentioned above, *physical activity* seems to be a particularly important argument, which has not been taken enough into account as an advantage and/or as a lever to promote the use of bicycles. Furthermore, the argument *ecology* should be carefully addressed because if some people are interested in changing behavior because of the current environmental problem, because of overexposure some people could be reactant to.

The lack of important differences between cyclists and non-cyclist could suggest that the campaigns to promote utilitarian urban cycling could be oriented to highlight the similarity (Cialdini, 2007) between the users. In other words, if the fact that there are no substantial differences is stressed, non-cyclists could think that using the bicycle should not be so difficult, given that cyclists do it and there are not a lot of differences between them, nor between the ways they think (representations and motivations). For instance, a message or image could transmit an idea like this: "he uses the bicycle, and he is like me, then why I could not use it too?"

On the other hand, the lack of important differences between cyclists and non-cyclist could also suggest that both already share the same arguments, so making only informational campaigns is not sufficient to promote the use or bring new users, as non-cyclists acknowledge similar positive arguments to cyclists. In this sense, an effort could be made to show the arguments that non-cyclists did not acknowledge, but it could be also interesting to use actions that focus on the experimentation of the use of the bicycle (acting out) that lead to behavioral change. For this, actions based on the theories of commitment (Kiesler, 1971) could be particularly useful. In line with this theory, the behavioral change could be facilitated by different techniques such as the freedom technique (Guéguen & Pascual, 2000) and the foot-in-the-door techniques (Burger, 1999), seeking to produce a particular commitment. These techniques seek to make the participants perform little behaviors (preparatory acts) related to the target behavior or directly experiment the target behavior, these preparatory act increase the commitment to perform the target behavior. In this case, the target behavior is utilitarian urban cycling and the experimentation could be reached through actions during a special day (e.g. Free-car day, mobility day), during special occasions (e.g. the National day), or through a more framed environment such as a workshop organized by schools, by enterprises, and/or by municipalities; this latter through independent events or through the Urban Mobility Plan of the city (Martinez Tabares, 2013).

Experimenting utilitarian urban cycling could also allow confronting the ideas or representations that non-cyclists could have about cycling based mainly on imagination and social influence, and not on real experiences. In addition, to bring an effective behavioral change, this cycling experience should be quite positive, especially to avoid the confirmation of imaginary barriers. In order to insure a positive cycling experience, the experimentation could be set up through personalized mobility marketing, mobility consultants, or the experimentation accompaniment, that at the same time could play a role as social support (Wills, 1991), facilitating the use of the bicycle as a mode of transport.

Our study also allows identifying the positive point of cycling that should be strengthened, in order to make cycling more attractive to non-users, such as the argument *physical activity*, but also the arguments related to *independence*, to *pleasure*, and the *utilitarian aspects*. Likewise, our study allows identifying the negative points that need to be corrected or be improved. Even those negative points that need to solutions or coping strategies could be an opportunity to the innovation and the market. For instance, it could be an opportunity to encourage the R&D to solve a barrier of cycling without a known solution, e.g. solutions for *the weather issues*, *sweating issues*, *effort*, and *lack of parking places* or for decrease the objective *danger*.

Concerning the barriers to cycling that rather raise a question of individual factors, such as *fear of cycling*, *fear of traffic* and in general subjective *danger*, these barriers could give the opportunity to explore and include psychosocial actions in the promotion of utilitarian cycling. For instance, actions making nonusers t experiment urban cycling could gradually reduce *fear* and increase cycling skills and the feeling of self-efficacy (Bandura, 1977), the accompaniment or the personalized marketing. Other solutions can also be contemplated, such as technological solutions using apps on the smartphone or other devices in order to raise these barriers that need more than cycling infrastructure.

The implication of the results of the third study, concerning the intergroup conflict and the perception of aggression on the interaction between users on the road, are first in terms of identification of the problem, because to our knowledge there have not been studies in this field. This could help to understand the conflict between the actors (road users) and open the debate around it, including in the debate the stakeholders, public authorities, and user associations. Second, the results found could also help to develop actions based on education and pedagogy concerning the adapted behaviors on conflictive road situations, for example when someone is taking a driving test or recovering demerit points (in France). Regarding the conflict situations between car drivers and cyclists, and the situations that could be interpreted as aggressive, more education is needed for all of the users, not only for car drivers who in the case of a collision have the greater potential to harm others, but also for cyclists, in order to prevent a dangerous situation or to prevent a secondary behavior from cyclists in response to a behavior previously perceived as aggressive. But in general, education on this issue could help to decode the source of conflicts between these two users. It is important as well to inform and communicate about these difficulties on the road, and the factors that contribute to it, such as the perceived intention of the car driver's behavior, and the perceived danger of the situation, the social representation, such as the knowledge of car drivers and the legitimacy that car drivers granted to cyclists on the road, as well as the cyclists social identity. More precisely, actions preventing intergroup conflict should be developed, and, in particular, specific intervention could be focused on increasing the legitimacy of the cyclists on the road and the knowledge about the adapted behaviors when interacting with cyclists. For this training car drivers and giving cyclists the message that car drivers are trained on these two aspects is also necessary.

IV. LIMITS OF THE STUDIES

The sample size of the first study could be seen as a limit of this study. However, according to a qualitative approach, the number of interviews, the length, and the data treatment were more than satisfying for our in-depth interview study. Moreover, the aim of the study was mostly exploratory, explaining the choice of this methodology. It would also have been better to have the same number of participants in the two groups, as we looked for, but the characteristics of participants let us discover that the former cyclist users (those who are not currently utilitarian cyclists but were before), who were initially expected to be part of the group of non-cyclists, were instead a separated category of users. Consequently, the group of non-cyclists was reduced in number. It would be better to have more former cyclists to be able to have a third group and compare with cyclists and non-cyclists. Unfortunately given the time necessary to analyze interviews it was difficult to add more participants. Indeed, the in-depth interview methodology has an inconvenient concerning the time required to transcribe each interview and to analyze this quantity of material. Therefore, the data obtained in the first study were very rich and interesting, and it being the first study gave the opportunity to better know the subject, utilitarian cycling, and the population, cyclists and non-cyclists.

Concerning the limits of the second study, the questionnaire included an important number of arguments based on the first study in order to identify the most important representations and motivations. We did a selection to limit the number of items, but it was still an important number of arguments and together with the question related to cycling, the questionnaire was very long. Another methodological point concerns a possible ceiling effect on the argument ice (weather issues). This effect could hinder the comparison with the other negative arguments. A ceiling effect was not expected on ice or weather issues because in the first study, the arguments related to weather issues were principally associated to overcome disadvantage for the cyclists and not to barriers. In this second study, the principal concern was the measure of representation and motivation that showed a strong correlation, hindering the distinction of the concepts. This measure still needs more development, and this will be an important and interesting question to solve in the future.

One of the limits of the third study concerns the gap between the modal share of the city and the frequency of cycling reported by the participants of our study. This could be in part explained by the recruitment of participants: the characteristics of the groups (e.g. frequency of cycling in the opposite direction as expected, and the difference in gender in the German sample) complicated the comparison between the groups. Likewise, the relatively small sample size in both cities represents a limit of the study. Compared to the previous studies in which the participants were in the majority active people, the third study was carried out with students, who are easy to recruit but are less representative of our population of interest. Moreover, the last two studies were conducted on questionnaires; it is possible that studies in other conditions or real situations show different results.

Furthermore, utilitarian urban cycling is a subject where the context is very important. The context refers to the social conditions, as well as the physical condition. This is applied for the three studies. Thus, if a study was conducted under similar methods in another city or country, the results would probably be different. For this reason, in our studies, we did not look specifically for generalization across cities or countries, although the methodology that we used could be reproduced and improved in other studies, and the results could be still compared with our results, taking into account the variability of the context.

V. PERSPECTIVES FOR FUTURE RESEARCH

After carrying out the three studies, we could consider that there are more than two types of groups of users (cyclists and non-cyclists) that could be taken into account concerning the study of utilitarian urban cycling. Between cyclists and non-cyclists there are several subgroups of users, such as former cyclists, those who used before the bicycle as a mode of transport, very occasional cyclists, those who use the bicycle but there are not very regular; and new cyclists, those who just started using the bicycle as a mode of transport and who find different levers and barriers than experimented cyclists do.

Additionally, utilitarian urban cycling can be a regular mode of transport, this regularity can be from almost every day to once in the week or once in the month. But utilitarian cycling can also be occasional: people can decide to use the bicycle in function of its availability, a sporadic situation, a particular motivation, or convenience. In order to promote the modal shift from cars to bicycles, it would be better to reach a regular use of the bicycle on commuting, but in cities with low cycling modal share, it could be interesting to explore first the encouragement to occasional trips by bicycle and then strengthen their regularity. In the same way, it is important to consider the transition from another purpose of cycling to utility cycling, such as the transition from recreational cycling to utilitarian cycling.

For future research on representations and motivations, it will be important to include other groups of users, such as former cyclists, occasional cyclists, recreational cyclists, or sportive cyclists. Concerning the perception of aggression and more widely the conflict between users, it will be necessary to include the point of view of car drivers, pedestrians, and bus drivers, and to compare the different point of views about a particular conflictive situation.

To continue to improve the knowledge on the determinants to use or not to use urban utilitarian cycling, it will be important to develop other ways to measure representations and motivations separately or to develop a measure in which it could be possible to distinguish representations from motivations. Improving the measure on the questionnaire is a path to explore, but additional methodologies, different from questionnaires, are also a possibility to be explored.

In future research, it will be important to follow the learning process and the adaptation concerning the use of utility cycling of new users, in order to identify the initial motivations (positive and negative) and the evolution of these in time and with the experience acquired. A diary of experience, forums, apps on a smartphone, interviews, and questionnaires could be helpful methodologies to collect the information. This could be done with random new users in the city, but also with students in schools, or employees of a company, who are starting to use the bicycle as a mode of transport. Indeed, school and companies can be crucial mechanisms to incite new users, but also to monitor this practice. Likewise, cycling schools and cycling associations could play an important role.

More specifically, for the study of conflicts between users, future studies need to continue the identification of conflict situations between cyclists and car drivers, between cyclists and pedestrians, between cyclists and bus drivers, and also between cyclists. This identification will help to determine which characteristics are associated with the conflictive situations, to know whether there are general factors causing the conflict or whether each situation is independent. To go deep in this field will help to find solutions and to prevent the conflict between cyclists and other users, which will contribute to a better share of the road, prevent accidents and promote utilitarian urban cycling.

REFERENCES

Abric, J. C. (1976). *Jeux, conflits et représentations sociales*. Université de Provence, Aix-en-Provence.

ADEME. (2004). *Vers une pratique quotidienne du vélo en ville: Au delà de la piste cyclable, comment favoriser le choix individuel pour le vélo ?* Paris.

ADEME. (2016). *Etude d'évaluation sur les services vélos*.

Ajzen, I. (1985). From intentions to action: A theory of planned behavior. In J. Kuhl & J. Beckman (Eds.), *Action control: From cognition to Behavior* (pp. 11–39). New York: Springer-Verlag. http://doi.org/10.1007/978-3-642-69746-3

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall.

Allport, G. W. (1935). Attitudes. In C. Murchison (Ed.), *Handbook of social psychology*. Worcester, Mass: Clark University Press.

American Psychological Association. (2007). *APA Dictionary of Psychology* (2nd ed.). Washington, DC: American Psychological Association.

Amoros, E., Chiron, M., Thélot, B., & Laumon, B. (2011). The injury epidemiology of cyclists based on a road trauma registry. *BMC Public Health*, *11*(1), 653. http://doi.org/10.1186/1471-2458-11-653

Armoogum, J., Madre, J., & Gascon, M. (2010). Les enquêtes nationales et locales sur la mobilité : sources et méthodes. *La Revue, Décembre*, 207–218.

Asch, S. E. (1948). The doctrine of suggestion, prestige and imitation in social psychology. *Psychological Review*, *55*(5), 250–276. http://doi.org/10.1037/h0057270

Atkinson, J. W. (Ed.). (1958). *Motives in fantasy, action, and society: A method of assessment and study. Motives in fantasy, action, and society: A method of assessment and study.* New York: Van Nostrand. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=psyh&AN=1959-00758-000&site=ehost-live

Austroads. (2005). *Bus-Bike Interaction within the Road Network*. Sydney: Austroads Incorporated.

Ballantine, R. (2000). *Richard's 21st Century Bicycle Book*. London: Pan Books.

Bandura, A. (1977). Self-efficacy: Toward a Unifying Theory of Behavioral Change. *Psychological Review*, *84*(2), 191–215.

Baron, R. A., & Richardson, D. R. (1994). *Human Aggression* (Second). New York: Plenum Press.

Basford, L., Reid, S., Lester, T., Thomson, J., & Tolmie, A. (2002). *Drivers' perceptions of cyclists* (Report N° TRL549). Wokingham, UK.

Basole, R. (2004). The value and impact of mobile information and communication technologies. *Proceedings of the IFAC Symposium on Analysis,* …, 1–7. Retrieved from http://www.ti.gatech.edu/basole/docs/Basole.IFAC04.ValueMobileICT.pdf

Baumann, C., Brennan, T., & Zeibots, M. . . (2012). *Bike rider and bus driver interaction study – Draft report.* Sydney: University of Technology.

Bellucci, F., Bogner, J. E., & Sturchio, N. C. (2012). Greenhouse gas emissions at the urban scale. *Elements*, *8*(6), 445–450. http://doi.org/10.2113/gselements.8.6.445

Bergström, A., & Magnusson, R. (2003). Potential of transferring car trips to bicycle during winter. *Transportation Research Part A: Policy and Practice*, *37*(8), 649–666. http://doi.org/10.1016/S0965-8564(03)00012-0

Berkowitz, L. (1981). The concept of aggression. In P. E. Brain & D. Benton (Eds.), *Multidisciplinary approaches to aggression research* (pp. 3–15). Amsterdam: Elsevier.

Besnier, J. M. (2005). *Les théories de la connaissance*. Paris: Dunod.

Blaizot, S., Papon, F., Haddak, M. M., & Amoros, E. (2013). Injury incidence rates of cyclists compared to pedestrians, car occupants and powered two-wheeler riders, using a medical registry and mobility data, Rhône County, France. *Accident; Analysis and Prevention*, *58*, 35–45. http://doi.org/10.1016/j.aap.2013.04.018

Bolhack, L., Bouchard, A., Duckworth, H., Goddard, M., & Sams, S. (2013). Amsterdam: The Cycling City. In *Urban Sustainability Programs: Case Studies.*

Bopp, M., Kaczynski, A. T., & Wittman, P. (2011). The relationship of eco-friendly attitudes with walking and biking to work. *Journal of Public Health Management and Practice : JPHMP*, *17*(5), E9–E17. http://doi.org/10.1097/PHH.0b013e31821138de

Boquet, Y. (2009). Can Western mobility solutions apply to East Asia's cities? In *Proceedings of the 10th Asian Urbanization Conference, August*. Hong Kong. Retrieved from http://halshs.archives-ouvertes.fr/hal-00767197/

Boyce, C., & Palena, N. (2006). *Conducting in-depth interviews: A Guide for Designing and Conducting In-Depth Interviews for Evaluation Input*. *Pathfinder International Tool Series* (Vol. 2). Watertown, MA: Pathfinder International. Retrieved from http://www.cpc.unc.edu/measure/training/materials/data-quality-portuguese/m_e_tool_series_indepth_interviews.pdf

Brehm, J. W. (1966). *A theory of psychological reactance*. *Academic Press*. New York. http://doi.org/10.1002/hrdq.20027

Bureau of Transportation Statistics. (2008). Modal Split- BTS Transportation Dictionary. Retrieved from http://www.transportation-dictionary.org/Modal_Split

Burger, J. M. (1999). The foot-in-the-door compliance procedure: a multiple-process analysis and review. *Personality and Social Psychology Review*, *3*(4), 303–325. http://doi.org/10.1207/s15327957pspr0304_2

Buss, A. H., & Perry, M. (1992). The Aggression Questionnaire. *Journal of Personality Ans Social Psychology*, *63*(3), 452–459. http://doi.org/10.1037/0022-3514.63.3.452

Cambridge Dictionary. (2016). Cambridge Dictionary Online. *Cambridge University Press*. Retrieved from http://dictionary.cambridge.org

Carver, C. S., & Scheier, M. F. (1990). Principles of self-regulation: Action and emotion. In E. T. Higgins & R. M. Sorrentino (Eds.), *Handbook of motivation and cognition: Foundations of social behavior* (Vol. 2, pp. 3–52). New York: Guilford Press.

Cerema. (2015a). *Fiche Vélo: Le double-sens cyclable dans les rues limitées à 50 km/h. Collection Expériences et pratiques- Fiche n° 34 - Janvier 2015*. Retrieved from http://www.certu-catalogue.fr/fiche-velo-amenagements.html

Cerema. (2015b). *Fiche Vélo: Les bandes cyclables. Collection Références- Fiche n° 02 - mise à jour Février 2015*. Retrieved from http://www.certu-catalogue.fr/fiche-velo-amenagements.html

Cerema. (2016a). *Extension du domaine d'emploi du « cédez-le-passage cycliste au feu rouge ». Collection Références- Fiche n° 13 - Février 2016*. Retrieved from http://www.certu-catalogue.fr/plan-d-actions-pour-les-mobilites-actives-pama.html

Cerema. (2016b). *Fiche Vélo: VeloRéseau cyclable à haut niveau de service: Objectifs et principes d'aménagement. Collection Références- Fiche n° 35 - Juin 2016*. Retrieved from http://www.certu-catalogue.fr/fiche-velo-amenagements.html

Certu. (2012a). *Fiche vélo: Cédez-le-passage cycliste au feu rouge. Collection Références- Fiche n° 05 Décembre 2012*. Retrieved from http://www.certu-catalogue.fr/fiche-velo-amenagements.html

Certu. (2012b). *Fiche Vélo: Les sas à vélos. Collection Dossiers - FICHE n° 11 Août 2012*. Retrieved from http://www.certu-catalogue.fr/fiche-velo-amenagements.html

Certu. (2013). *Fiche Vélo: Démarche de mise à double-sens cyclable. Collection Dossiers - FICHE n° 10 Juillet 2013*. Retrieved from http://www.certu-catalogue.fr/fiche-velo-amenagements.html

Certu. (2013). *Fiche Vélo: Les pistes cyclables. Collection Références- Fiche n° 07 Janvier 2013*. Retrieved from http://www.certu-catalogue.fr/fiche-velo-amenagements.html

Certu. (2013). *Les enquêtes déplacements « standard CERTU »*. Retrieved from http://www.territoires-ville.cerema.fr/IMG/pdf/Les_enquetes_Deplacements_site_web_cle5964c6.pdf

Cesario, J., Higgins, E. T., & Scholer, A. A. (2008). Regulatory Fit and Persuasion: Basic Principles and

Remaining Questions. *Social and Personality Psychology Compass*, *2*(1), 444–463. http://doi.org/10.1111/j.1751-9004.2007.00055.x

Chapman, L. (2007). Transport and climate change: a review. *Journal of Transport Geography*, *15*(5), 354–367. http://doi.org/10.1016/j.jtrangeo.2006.11.008

Chataway, E. S., Kaplan, S., Nielsen, T. A. S., & Prato, C. G. (2014). Safety perceptions and reported behavior related to cycling in mixed traffic: A comparison between Brisbane and Copenhagen. *Transportation Research Part F: Traffic Psychology and Behaviour*, *23*, 32–43. http://doi.org/10.1016/j.trf.2013.12.021

Chatterjee, K., Sherwin, H., Jain, J., Christensen, J., & Marsh, S. (2012). Conceptual Model to Explain Turning Points in Travel Behavior. *Transportation Research Record: Journal of the Transportation Research Board*, *2322*(1), 82–90. http://doi.org/10.3141/2322-09

Chaurand, N., & Delhomme, P. (2013). Cyclists and drivers in road interactions: A comparison of perceived crash risk. *Accident; Analysis and Prevention*, *50*, 1176–84. http://doi.org/10.1016/j.aap.2012.09.005

Chaurand, N., & Martinez Tabares, C. (2016). Subjective risk in urban interactions involving cyclists: perspective from different road users. *Poster Session Presented at International Conference on Traffic and Transport Psychology, ICTTP, 2 August*. Brisbane.

Christmas, S., Helman, S., Buttress, S., Newman, C., & Hutchins, R. (2010). *Road Safety Web Publication No . 17 Cycling , Safety and Sharing the Road : Qualitative Research with Cyclists and Other Road Users*. *Qualitative Research*. Retrieved from http://www2.dft.gov.uk/pgr/roadsafety/research/rsrr/theme1/researchreport/pdf/rswp17.pdf

Cialdini, R. B. (2007). *Influence: The Psychology of Persuasion*. HarperCollins. http://doi.org/10.1146/annurev.ps.56.121004.100003

Cialdini, R. B., Reno, R. R., & Kallgren, C. a. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of Personality and Social Psychology*, *58*(6), 1015–1026. http://doi.org/10.1037/0022-3514.58.6.1015

Code de la route. (2016). French road code [Code de la route] Dernière modification : 31 octobre 2016. Retrieved from https://www.legifrance.gouv.fr/affichCode.do?cidTexte=LEGITEXT000006074228

Conrey, F. R., & Smith, E. R. (2007). Attitude Representation: Attitudes as Patterns in a Distributed, Connectionist Representational System. *Social Cognition*, *25*(5), 718–735. http://doi.org/10.1521/soco.2007.25.5.718

Constant, a., Felonneau, M. L., Lagarde, E., & Messiah, a. (2011). Investigating risk compensation theory in cyclists: results from intelligent video analysis system. *Injury Prevention*, *16*(Supplement 1), A232–A232. http://doi.org/10.1136/ip.2010.029215.827

Corsini, R. J., & Auerbach, A. J. (1998). *Concise Encyclopedia of Psychology* (2nd editio). New York: Wiley.

Cunningham, W. a., Zelazo, P. D., Packer, D. J., & Van Bavel, J. J. (2007). The iterative reprocessing model: A multilevel framework for attitudes and evaluation. *Social Cognition*, *25*(5), 736–760. http://doi.org/10.1521/soco.2007.25.5.736

Cutler, D. M., Glaeser, E. L., & Shapiro, J. M. (2003). Why have americans become more obese? *The Journal of Economic Perspectives*, *17*(3), 93–118.

D'Andrade, R. G., & Strauss, C. (1992). *Human motives and cultural models*. *Human Motives and Cultural Models*. Cambridge, England: Cambridge University Press. http://doi.org/10.1017/CBO9781139166515

Daley, M., & Rissel, C. (2011). Perspectives and images of cycling as a barrier or facilitator of cycling. *Transport Policy*, *18*(1), 211–216. http://doi.org/10.1016/j.tranpol.2010.08.004

Davies, D. G., Halliday, M. E., Mayes, M., & Pocock, R. L. (1997). *Attitudes to cycling: a qualitative study and conceptual framework* (TRL Report No. 266). Retrieved from Transport Research Laboratory website http://www.trl.co.uk/reports-publications/trl-reports/report/?reportid=2434

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.

Deci, E. L., & Ryan, R. M. (2000). The " What " and " Why " of Goal Pursuits: Human Needs and the Self-Determination of Behavior. *Psychological Inquiry*, *11*(4), 227–268. http://doi.org/10.1207/S15327965PLI1104_01

Delhomme, P., Chappé, J., Grenier, K., Pinto, M., & Martha, C. (2010). Reducing air-pollution: a new argument for getting drivers to abide by the speed limit? *Accident; Analysis and Prevention*, *42*(1), 327–38. http://doi.org/10.1016/j.aap.2009.08.013

Delhomme, P., Cristea, M., & Paran, F. (2013). Self-reported frequency and perceived difficulty of adopting eco-friendly driving behavior according to gender, age, and environmental concern. *Transportation Research Part D: Transport and Environment*, *20*, 55–58. http://doi.org/10.1016/j.trd.2013.02.002

Delhomme, P., & Meyer, T. (2002). *La recherche en psychologie sociale: Projets, méthodes et techniques* (2e ed). Paris: Armand Colin.

DeWall, C. N., & Anderson, C. (2011). The General Aggression Model. In M. Mikulincer & P. R. Shaver (Eds.), *Understanding and Reducing Aggression, Violence and Their Consequences.* (pp. 15–33). Washington, DC: American Psychological Association.

DeWall, C. N., Anderson, C. A., & Bushman, B. J. (2011). The general aggression model: Theoretical extensions to violence. *Psychology of Violence*, *1*(3), 245–258. http://doi.org/10.1037/a0023842

DiCicco-Bloom, B., & Crabtree, B. F. (2006). The qualitative research interview. *Medical Education*, *40*(4), 314–321. http://doi.org/10.1111/j.1365-2929.2006.02418.x

Dill, J., & McNeil, N. (2013). Four Types of Cyclists? *Transportation Research Record: Journal of the Transportation Research Board*, *2387*, 129–138. http://doi.org/10.3141/2387-15

Dill, J., Monsere, C. M., & McNeil, N. (2012). Evaluation of bike boxes at signalized intersections. *Accident; Analysis and Prevention*, *44*(1), 126–34. http://doi.org/10.1016/j.aap.2010.10.030

Drottz-Sjöberg, B.-M. (1991). Perception of risk: Studies of risk attitudes, perceptions and definitions. *Risk Analysis*, *11*(4), 607–618. http://doi.org/10.1111/j.1539-6924.1991.tb00650.x

Duncan, B. L. (1976). Differential Social Perception and Attribution of Intergroup Violence: Testing the Lower Limits of Stereotyping of Blacks. *Journal of Personality and Social Psychology*, *34*(4), 590–598. http://doi.org/10.1037//0022-3514.34.4.590

Eagly, A. H., & Chaiken, S. (1993). *The psychology of attitudes*. Fort Worth: Harcourt Brace Janovich Inc.

Edwards, G. (1998). *The development and promotion of measures for vulnerable road users with regard to mobility integrated with safety. Pedal cyclist.* Crowthorne, Great Britain.

ENTD. (2008). Enquête Nationale Transports et Déplacements. Retrieved from http://www.statistiques.developpement-durable.gouv.fr/sources-methodes/enquete-nomenclature/1543/139/enquete-nationale-transports-deplacements-entd-2008.html

Eriksson, L. (2008). *Pro-environmental travel behavior : and transport policy measures*.

European Commission. (2011). *White Paper on Transport: Roadmap to a single European transport area-Toward a competitive and resource-efficient transport system*. Luxembourg: Publications Office of the European Union. Retrieved from http://ec.europa.eu/transport/themes/strategies/doc/2011_white_paper/white-paper-illustrated-brochure_en.pdf

European Commission. (2012). *Action Plan on Urban Mobility – State of Play Theme 1 — Promoting integrated policies*. Retrieved from http://ec.europa.eu/transport/themes/urban/urban_mobility/doc/apum_state_of_play.pdf

European Commission, & Directorate-General for Mobility and Transport. (2014). *Quality of Transport. Special Eurobarometer 422a*.

European Metropolitan network Institute. (2011). *Towards a Knowledge and Research Agenda on Sustainable Urban Mobility*.

European Platform on Mobility Management- EPOMM. (2016). TEMS-The EPOMM Modal Split Tool. Retrieved from http://www.epomm.eu/tems/index.phtml

Fenouillet, F. (2012). *Les théories de la motivation* (2nd ed). Paris: Dunod.

Festinger, L. (1954). A Theory of Social Comparison Processes. *Human Relations*, *7*, 117–140. http://doi.org/10.1177/001872675400700202

Fishbein, M., & Ajzen, I. (1975). Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research. *Reading, MA: Addison-Wesley*. http://doi.org/10.1017/CBO9781107415324.004

Fishman, E. (2016). Cycling as transport. *Transport Reviews*, *36*(1), 1–8. http://doi.org/10.1080/01441647.2015.1114271

Fishman, E., Washington, S., & Haworth, N. (2014). Bike share's impact on car use: Evidence from the United States, Great Britain, and Australia. *Transportation Research Part D: Transport and Environment*, *31*, 13–20. http://doi.org/10.1016/j.trd.2014.05.013

Flament, C. (1994). Structure, dynamique et transformation des représentations sociales. In J. C. Abric (Ed.), *Pratiques sociales et representations* (pp. 37–57). Paris: Presses Universitaires de France.

Flynn, B. S., Dana, G. S., Sears, J., & Aultman-Hall, L. (2012). Weather factor impacts on commuting to work by bicycle. *Preventive Medicine*, *54*(2), 122–4. http://doi.org/10.1016/j.ypmed.2011.11.002

Forgas, J. P., Williams, K. D., & Laham, S. M. (2009). Social Motivation Introduction and Overview. In J. P. Forgas, K. D. Williams, & S. M. Laham (Eds.), *Social Motivation: Conscious and Unconscious Processes* (pp. 1–17). Cambridge, UK: Cambridge University Press.

Forward, S. E. (2014). Exploring people's willingness to bike using a combination of the theory of planned behavioural and the transtheoretical model. *Revue Européenne de Psychologie Appliquée/European Review of Applied Psychology*, *64*(3), 151–159. http://doi.org/10.1016/j.erap.2014.04.002

Freud, S. (1957). Instincts and their vicissitudes. in the standard edition of the complete psychological works of sigmund freud. *The History of the Psycho-Analytic Movement, Papers on Metapsychology and Other Works*, *XIV*, 109–140.

Fyhri, A., Bjørnskau, T., Laureshyn, A., & Beate Sundfør, Hanne Ingebrigtsen, R. (2016). *Safety in Numbers - Uncovering the mechanisms of interplay in urban transport with survey data. International Cycling Safety Conference.*

Gagné, M., & Deci, E. L. (2005). Self-determination theory and work motivation. *Journal of Organizational Behavior*, *26*(4), 331–362. Retrieved from http://10.1002/job.322

Gamble, T., & Walker, I. (2016). Wearing a Bicycle Helmet Can Increase Risk Taking and Sensation Seeking in Adults. *Psychological Science*, 0956797615620784-. http://doi.org/10.1177/0956797615620784

Garrard, J., Crawford, S., & Hakman, N. (2006). Revolutions for Women : Revolutions for Women :, (October).

Garrard, J., Rose, G., & Lo, S. K. (2008). Promoting transportation cycling for women: The role of bicycle infrastructure. *Preventive Medicine*, *46*(1), 55–59. http://doi.org/10.1016/j.ypmed.2007.07.010

Gatersleben, B., & Appleton, K. M. (2007). Contemplating cycling to work: Attitudes and perceptions in different stages of change. *Transportation Research Part A: Policy and Practice*, *41*(4), 302–312. http://doi.org/10.1016/j.tra.2006.09.002

Gatersleben, B., & Haddad, H. (2010). Who is the typical bicyclist? *Transportation Research Part F: Traffic Psychology and Behaviour*, *13*(1), 41–48. http://doi.org/10.1016/j.trf.2009.10.003

Gatersleben, B., & Murtagh, N. (2012). The psychology of sustainable transport. *Psychologist*, *25*(9), 676–679.

Gehlert, T., Dziekan, K., & Gärling, T. (2013). Psychology of sustainable travel behavior. *Transportation Research Part A: Policy and Practice*, *48*, 19–24. http://doi.org/10.1016/j.tra.2012.10.001

Gioria, C., & Lucas, G. (2014). *Evaluation de la mise en œuvre expérimentale de l ' indemnité kilométrique pour les vélos- Synthèse.*

Goodman, A., Sahlqvist, S., & Ogilvie, D. (2013). Who uses new walking and cycling infrastructure and how? Longitudinal results from the UK iConnect study. *Preventive Medicine*, *57*(5), 518–524. http://doi.org/10.1016/j.ypmed.2013.07.007

Gössling, S., & Choi, A. S. (2015). Transport transitions in Copenhagen: Comparing the cost of cars and bicycles. *Ecological Economics*, *113*, 106–113. http://doi.org/10.1016/j.ecolecon.2015.03.006

Graser, A., Aleksa, M., Straub, M., Saleh, P., & Wittmann, S. (2014). Safety of urban cycling : A study on perceived and actual dangers. In *Transport Research Arena.*

Gray, J. A. (1982). *The neuropsychology of anxiety: An enquiry into the functions of the septo-hippocampal system*. New York: Oxford University Press.

Guéguen, N., & Pascual, A. (2000). Evocation of freedom and compliance: the "but you are free of..." technique. *Current Research in Social Psychology*, *5*(18), 264–270.

Guthrie, N., Davies D. G., & Gardner, G. (2001). *Cyclists ' assessments of road and traffic conditions : the development of a cyclability index. TRL Report 490*. Retrieved from www.trl.co.uk

Haubold, H. (2014). *COMMUTING: WHO PAYS THE BILL? Overview of fiscal regimes for commuting in Europe and recommendations for establishing a level playing-field*. Brussels. Retrieved from https://ecf.com/what-we-do/cycling-economy/fiscal-incentives

Hebb, D. O. (1955). Drives and the Conceptual Nervous System. *Psychological Review*, *62*, 243–254.

Heesch, K., & Sahlqvist, S. (2013). Key influences on motivations for utility cycling (cycling for transport to and from places). *Health Promotion Journal of Australia*, *24*(3), 227–233.

Heesch, K., Sahlqvist, S., & Garrard, J. (2011). Cyclists' experiences of harassment from motorists: findings from a survey of cyclists in Queensland, Australia. *Preventive Medicine*, *53*(6), 417–20. http://doi.org/10.1016/j.ypmed.2011.09.015

Heinen, E., Maat, K., & van Wee, B. (2011). Day-to-Day Choice to Commute or Not by Bicycle. *Transportation Research Record: Journal of the Transportation Research Board*, *2230*(1), 9–18. http://doi.org/10.3141/2230-02

Heinen, E., van Wee, B., & Maat, K. (2010). Commuting by Bicycle: An Overview of the Literature. *Transport Reviews*, *30*(1), 59–96. http://doi.org/10.1080/01441640903187001

Héran, F. (2014). *Le retour de la bicyclette. Une histoire des déplacements urbains en Europe, de 1817 à 2050*. Paris: La Découverte.

Herlihy, D. V. (2004). *Bicycle: The History*. New Haven: Yale University Press.

Herzlich, C. (1973). La représentation sociale. In S. Moscovici (Ed.), *Introduction à la psychologie sociale* (pp. 303–325). Paris: Larousse.

Hickman, R., & Banister, D. (2014). *Transport, Climate Change and the City*. Abingdon: Routledge.

Hickman, R., Hall, P., & Banister, D. (2013). Planning more for sustainable mobility. *Journal of Transport Geography*, *33*, 210–219. http://doi.org/10.1016/j.jtrangeo.2013.07.004

Higgins, E. T. (1997). Beyond pleasure and pain. *American Psychologist*, *52*(12), 1280–300. http://doi.org/10.1037/0003-066X.52.12.1280

Higgins, E. T. (1998). Promotion and prevention: Regulatory focus as a motivational principle. In M. P. Zanna (Ed.), *Advances in Experimental Social Psychology* (pp. 1–46). New York: Academic Press.

Higgins, E. T. (2012). *Beyond Pleasure and Pain: How Motivation Works*. New York: Oxford University Press. http://doi.org/10.1093/acprof:oso/9780199765829.001.0001

Hine, J. (1996). Pedestrian travel experiences: Assessing the impact of traffic on behaviour and perceptions of safety using an in-depth interview technique. *Journal of Transport Geography*, *4*(3), 179–199. http://doi.org/10.1016/0966-6923(96)00003-8

Hogg, M. A., & Vaughn, G. (2005). *Social Psychology* (4th ed.). London: Prentice-Hall.

Horton, D. (2007). Fear of Cycling. In D. Horton, P. Rosen, & P. Cox (Eds.), *Cycling and Society* (pp. 134–152). Hampshire, England: Ashgate.

Hull, C. L. (1943). *Principles of Behavior: An Introduction to Behavior Theory.* Oxford, England: Appleton-Century. http://doi.org/10.1037/h0051597

Institute for Transportation & Development Policy, & University of California. (2015). *A Global High*

Shift Cycling Scenario: The Potential for Dramatically Increasing Bicycle and E-bike Use in Cities Around the World, with Estimated Energy, CO2, and Cost Impacts. Retrieved from https://www.itdp.org/wp-content/uploads/2015/11/A-Global-High-Shift-Cycling-Scenario_-Nov-2015.pdf

ITF. (2013). *Cycling, Health and Safety*. Paris: OECD Publishing. http://doi.org/10.1787/9789282105955-en

IVM. (2016). Institut pour la ville en mouvement/City on the Move Institute. Retrieved from http://www.ville-en-mouvement.com/en

Jacobsen, P., & Rutter, H. (2012). Cycling safety. In *City Cycling* (pp. 141–156).

James, W. (1890). *The principals of psychology*. *The principals of psychology* (Vol. Volume I). http://doi.org/10.1037/10538-000

Jodelet, D. (2011). Returning to past features of Serge Moscovici ' s theory to feed the future. *Papers on Social Representations*, *20*, 1–11.

Johnson, M., Newstead, S., Charlton, J., & Oxley, J. (2011). Riding through red lights: the rate, characteristics and risk factors of non-compliant urban commuter cyclists. *Accident; Analysis and Prevention*, *43*(1), 323–8. http://doi.org/10.1016/j.aap.2010.08.030

Jones, E. E., & Davis, K. E. (1966). From acts to dispositions: the attribution process in person perception. In L. Berkowitz (Ed.), *Advances in Experimental Social Psychology* (Vol. 2, pp. 219–266). New York: Academic Press. http://doi.org/10.1016/S0065-2601(08)60107-0

Jovchelovitch, S. (2007). *Knowledge in Context: Representation, Community and Culture*. New York: Routledge.

Kakihara, M., & Sorensen, C. (2001). Expanding the ' Mobility ' Concept. *SIGGROUP Bulletin*, *22*(3), 33–37. http://doi.org/10.1145/567352.567358

Kaufmann, V. (2007). La motilité: une notion clé pour revisiter l'urbain?. In M. Bassand, V. Kaufmann, & D. Joye (Eds.), *Enjeux de la sociologie urbaine* (pp. 171–188). Lausanne: PPUR presses polytechniques.

Kiesler, C. A. (1971). *The Psychology of Commitment*. New York: Academic Press.

Krahé, B. (2013). *The Social Psychology of Aggression* (2nd ed). London, UK; New York, NY: Psychology Press. http://doi.org/10.4324/9780203082171

Krizek, K. J., & Roland, R. W. (2005). What is at the end of the road? Understanding discontinuities of on-street bicycle lanes in urban settings. *Transportation Research Part D: Transport and Environment*, *10*(1), 55–68. http://doi.org/10.1016/j.trd.2004.09.005

LaPiere, R. T. (1934). Attitudes vs Actions. *Social Forces*, *13*(2), 230–237. http://doi.org/10.2307/2570339

Lawson, A. R., Pakrashi, V., Ghosh, B., & Szeto, W. Y. (2013). Perception of safety of cyclists in Dublin

City. *Accident Analysis and Prevention*, *50*, 499–511. http://doi.org/10.1016/j.aap.2012.05.029

Lennon, A., & Watson, B. (2011). "Teaching them a lesson?" A qualitative exploration of underlying motivations for driver aggression. *Accident Analysis and Prevention*, *43*(6), 2200–2208. http://doi.org/10.1016/j.aap.2011.06.015

Lewin, K. (1951). *Field Theory in Social Science: Selected Theoretical Papers.* (D. Cartwright, Ed.)*American Sociological Review*. New York: Harper & Brothers. http://doi.org/10.1037/0021-9010.69.1.85

Loi sur l'air et l'utilisation rationnelle de l'énergie, Pub. L. No. 96–1236 du 30 décembre (1996). JORF nº0001 du janvier 1997. Retrieved from Legifrance http://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000000381337&fastPos=7&fastReqId=99085163&categorieLien=id&oldAction=rechTexte

Louis, D., López-Sáez, M., & Rondinella, G. (2016). Qualitative analysis on cycle commuting in two cities with different cycling environments and policies. *Universitas Psychologica*, *15*(2). http://doi.org/10.11144/Javeriana.upsy15-2.qacc

Luk, J., Hepburn, S., & Thoresen, T. (1995). Real cost of car travel and congestion pricing. *Highway Engineering in Australia*, *27*(6), 9–12.

Lund, I. O., Nordfjærn, T., & Rundmo, T. (2012). Associations between risk judgments and demand for transport risk mitigation. *Journal of Risk Research*, *15*(9), 1171–1182. http://doi.org/10.1080/13669877.2012.705317

Lund, I. O., & Rundmo, T. (2009). Cross-cultural comparisons of traffic safety, risk perception, attitudes and behaviour. *Safety Science*, *47*, 547–553. http://doi.org/10.1016/j.ssci.2008.07.008

Mairie de Bordeaux. (2016). Emprunter un vélo ville de Bordeaux (VVB). Retrieved from http://www.bordeaux.fr/p1248/emprunter

Mann, S., Varey, R., & Button, W. (2000). An exploration of the emotional impact of tele-working via computer-mediated communication. *Journal of Managerial Psychology*, *15*(7), 668–690. http://doi.org/10.1108/02683940010378054

Martin, A., Goryakin, Y., & Suhrcke, M. (2014). Does active commuting improve psychological wellbeing? Longitudinal evidence from eighteen waves of the British Household Panel Survey. *Preventive Medicine*, *69*, 296–303. http://doi.org/10.1016/j.ypmed.2014.08.023

Martinez Tabares, C. (2013). *Comment inciter les personnes à utiliser les modes alternatifs à la voiture individuelle pour leurs déplacements domicile-travail ? Approche psychosociale (Master en psychologie sociale)*. Université Bordeaux Segalen. Retrieved from http://dumas.ccsd.cnrs.fr/dumas-00880040

Martinez Tabares, C., Chaurand, N., & Delhomme, P. (2016a). Cyclists and Non-Cyclists Representations and Motivations of Utilitarian Cycling in France: a survey study. Manuscript in preparation.

Martinez Tabares, C., Chaurand, N., & Delhomme, P. (2016b). Representations and Motivations of Utilitarian Cycling in Paris Area: Comparison between Cyclists and Non-Cyclists. Manuscript submitted for publication.

Maslow, A. H. (1943). A theory of human motivation. *Psychological Review*, *50*(4), 370–396. http://doi.org/10.1037/h0054346

Mason, J., Fulton, L., & McDonald, Z. (2015). A Global High Shift Scenario. *International Journal for Sustainable Transportation*, (November). Retrieved from https://www.itdp.org/wp-content/uploads/2015/11/A-Global-High-Shift-Cycling-Scenario_Nov-2015.pdf

McClelland, D. C., Atkinson, J. W., Clark, R. A., & Lowell, E. L. (1953). *The achievement motive*. New York: Appleton-Century-Crofts.

McClintock, H., & Cleary, J. (1996). Cycle facilities and cyclists' safety: Experience from Greater Nottingham and lessons for future cycling provision. *Transport Policy*, *3*(1/2), 67–77. http://doi.org/10.1016/0967-070X(95)00017-K

McGarty, C. (1999). *The categorization proces in social psychology*. London: Sage.

MEDDE. (2014). *Promoting sustainable mobility cycling - French expertise*. *Collection Expertise Française*. Retrieved from http://www.developpement-durable.gouv.fr/Promoting-Sustainable-Mobility.html

Messiah, A., Constant, A., Contrand, B., Felonneau, M.-L., & Lagarde, E. (2012). Risk compensation: a male phenomenon? Results from a controlled intervention trial promoting helmet use among cyclists. *American Journal of Public Health*, *102 Suppl*, S204-6. http://doi.org/10.2105/AJPH.2012.300711

Metz, D. (2012). *The Limits to Travel: How Far Will You Go?* London, UK: Earthscan.

Miller, D. T., & Ross, M. (1975). Self-serving biases in the attribution of causality: Fact or fiction? *Psychological Bulletin*, *82*(2), 213–225. http://doi.org/10.1037/h0076486

Miller, J. D., & Handy, S. L. (2012). Factors That Influence University Employees to Commute by Bicycle. *Transportation Research Record: Journal of the Transportation Research Board*, *2314*, 112–119. http://doi.org/10.3141/2314-15

Mohan, D., & Tiwari, G. (1999). Sustainable Transport Systems: Linkages Between Environmental Issues, Public Transport, Non-Motorised Transport and Safety. *Economic and Political Weekly*, *XXXIV*(25), 1589–1596.

Moliner, P., & Tafani, E. (1997). Attitudes and social representations: A theoretical and experimental approach. *European Journal of Social Psychology*, *27*, 687–702. http://doi.org/10.1002/(SICI)1099-0992(199711/12)27:6<687::AID-EJSP839>3.0.CO;2-7

Morgan, A. (2014). Representations gone mental. *Synthese*, *191*(2), 213–244.

http://doi.org/10.1007/s11229-013-0328-7

Morris, E. A., & Guerra, E. (2015). Mood and mode: does how we travel affect how we feel? *Transportation*, *42*(1), 25–43. http://doi.org/10.1007/s11116-014-9521-x

Moscovici, S. (1961). *La psychanalyse, son image et son public*. Paris: Presses Universitaires de France.

Moscovici, S. (1973). Foreword. In C. Herzlich (Ed.), *Health and Illness: A social psychological analysis*. London, England: Academic Press.

Moscovici, S. (1997). Social Representations Theory and Social Constructionism [Electronic mailing list messages]. *April 28 - May 27*, pp. 1–7. Retrieved from http://psyberlink.flogiston.ru/internet/bits/mosc1.htm

Moscovici, S. (2000). Social Representation: Explorations in Social Psychology. In G. Duveen (Ed.), *Social Representations* (pp. 3–69). Oxford, UK: Blackwell Publishers.

Mytton, O. T., Panter, J., & Ogilvie, D. (2016). Longitudinal associations of active commuting with wellbeing and sickness absence. *Preventive Medicine*, *84*, 19–26. http://doi.org/10.1016/j.ypmed.2015.12.010

Nevid, J. S. (2012). *Psychology: Concepts and applications* (Fourt Edit). Belmont: Cengage Learning. Retrieved from http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=psyc5&NEWS=N&AN=2006-03419-000

Observatoire des Déplacements à Paris. (2016). *Le bilan des déplacements en 2014 à Paris (transport report).* Retrieved from http://www.paris.fr/services-et-infos-pratiques/deplacements-et-stationnement/deplacements

Observatoire National Interministériel de la sécurité routière (ONISR). (2015). *La sécurité routière en France, Bilan de l'accidentalité de l'année 2014*. Paris. Retrieved from www.securite-routiere.gouv.fr\nCr?dits

Owen, N., Sparling, P. B., Healy, G. N., Dunstan, D. W., & Matthews, C. E. (2010). Sedentary Behavior : Emerging Evidence for a New Health Risk. *Mayo Clinic Proceedings*, *85*(12), 1138–1141. http://doi.org/10.4065/mcp.2010.0444

Palmer, S. (1978). Fundamental aspects of cognitive representation. In E. Rosch & B. Bloom-Lloyd (Eds.), *Cognition and categorization* (pp. 259–303). Hillsdale, NJ: Lawrence Erlbaum Associates.

Papon, F., & De Solère, R. (2010). Les modes actifs : marche et vélo de retour en ville. *La Revue, Commissariat Général Au Développement Durable*, 65–82. Retrieved from http://www.developpement-durable.gouv.fr/developpement-durable/

Park, H., Lee, Y. J., Shin, H. C., & Sohn, K. (2010). Analyzing the time frame for the transition from leisure-cyclist to commuter-cyclist. *Transportation*, *38*(2), 305–319. http://doi.org/10.1007/s11116-010-9299-4

Parkin, J., Wardman, M., & Page, M. (2007). Models of perceived cycling risk and route acceptability. *Accident; Analysis and Prevention*, *39*(2), 364–71. http://doi.org/10.1016/j.aap.2006.08.007

Passafaro, P., Rimano, A., Piccini, M. P., Metastasio, R., Gambardella, V., Gullace, G., & Lettieri, C. (2014). The bicycle and the city: Desires and emotions versus attitudes, habits and norms. *Journal of Environmental Psychology*, *38*, 76–83. http://doi.org/10.1016/j.jenvp.2013.12.011

Perugini, M., & Bagozzi, R. P. (2001). The role of desires and anticipated emotions in goal-directed behaviours: Broadening and deepening the theory of planned behaviour. *British Journal of Social Psychology*, *40*, 79–98.

Perugini, M., & Bagozzi, R. P. (2004). The distinction between desires and intentions. *European Journal of Social Psychology*, *34*, 69–84. http://doi.org/10.1002/ejsp.186 The

Pitt, D. (2013). Mental Representation. In *The Stanford Encyclopedia of Philosophy* (Fall 2013). Retrieved from http://plato.stanford.edu/archives/fall2013/entries/mental-representation/

Preston, J., & Rajé, F. (2007). Accessibility, mobility and transport-related social exclusion. *Journal of Transport Geography*, *15*(3), 151–160. http://doi.org/10.1016/j.jtrangeo.2006.05.002

Price, P. C. (2001). A group size effect on personal risk judgments: Implications for unrealistic optimism. *Memory & Cognition*, *29*(4), 578–586. http://doi.org/10.3758/BF03200459

Prochaska, J. O., & DiClemente, C. C. (1982). Transtheoretical therapy: Toward a more integrative model of change. *Psychotherapy: Theory, Research and Practice*, *19*(3), 276–288. http://doi.org/10.1037/h0088437

Prochaska, J. O., & DiClemente, C. C. (1983). Stages and processes of self-change of smoking: Toward an integrative model of change. *Journal of Consulting and Clinical Psychology*, *51*(3), 390–395. http://doi.org/10.1037/0022-006X.51.3.390

Pucher, J., & Buehler, R. (2006). Why Canadians cycle more than Americans: A comparative analysis of bicycling trends and policies. *Transport Policy*, *13*(3), 265–279. http://doi.org/10.1016/j.tranpol.2005.11.001

Pucher, J., & Buehler, R. (2008). Making Cycling Irresistible: Lessons from The Netherlands, Denmark and Germany. *Transport Reviews*, *28*(4), 495–528. http://doi.org/10.1080/01441640701806612

Pucher, J., & Dijkstra, L. (2003). Promoting Safe Walking and Cycling to Improve Public Health: Lessons from The Netherlands and Germany. *American Journal of Public Health*, *93*, 1509–1516. http://doi.org/10.2105/AJPH.93.9.1509

Pucher, J., Dill, J., & Handy, S. (2010). Infrastructure, programs, and policies to increase bicycling: an international review. *Preventive Medicine*, *50*(Suppl.), 106–125. http://doi.org/10.1016/j.ypmed.2009.07.028

Quételard, B. (2010). Se rendre au travail ou faire ses courses motive toujours un déplacement quotidien sur deux. Le recours à la voiture se stabilise. *La Revue, Commissariat Général Au Développement Durable*, 25–47. Retrieved from http://www.developpement-durable.gouv.fr/developpement-durable/

Reynolds, C. C. O., Harris, M. A., Teschke, K., Cripton, P. a, & Winters, M. (2009). The impact of transportation infrastructure on bicycling injuries and crashes: a review of the literature. *Environmental Health : A Global Access Science Source*, *8*, 47. http://doi.org/10.1186/1476-069X-8-47

Rhodes, R. E., & Courneya, K. S. (2004). Differentiating motivation and control in the Theory of Planned Behavior. *Psychology, Health & Medicine*, *9*(2), 205–215. http://doi.org/10.1080/13548500410001670726

Richer, I., & Bergeron, J. (2012). Differentiating risky and aggressive driving: Further support of the internal validity of the Dula Dangerous Driving Index. *Accident Analysis and Prevention*, *45*, 620–627. http://doi.org/10.1016/j.aap.2011.09.014

Rissel, C., & Wen, L. M. (2011). The possible effect on frequency of cycling if mandatory bicycle helmet legislation was repealed in Sydney, Australia: a cross sectional survey. *Health Promot J Austr*, *22*(3), 178–183. http://doi.org/10.1071/HE12076

Rocci, A. (2007). *De l'automobilité à la multimodalité ? Analyse sociologique des freins et leviers au changement de comportements vers une réduction de l'usage de la voiture Le cas de la région parisienne et perspective internationale. Thèse de doctorat.* Université de Paris 5 – René Descartes. Retrieved from https://halshs.archives-ouvertes.fr/tel-00194390/document

Rocha, R., Cunha, A., Varandas, J., & Dias, J. (2007). Towards a new mobility concept for cities: architecture and programming of semi-autonomous electric vehicles. *Industrial Robot: An International Journal*, *34*(2), 142–149. http://doi.org/10.1108/01439910710727496

Roeckelein, J. E. (Ed.). (2006). *Elsevier's Dictionary of Psychological Theories*. Amsterdam: Elsevier.

Rosenberg, M., & Hovland, C. (1960). Cognitive, affective, and behavioral components of attidudes. In *Attitude Organization and Change: An Analysis of Consistency among Attitude Components* (pp. 1–14). http://doi.org/10.2307/3319768

Ryan, R. M., & Deci, E. L. (2000a). Intrinsic and extrinsic motivations: Classic definitions and new Directions. *Contemporary Educational Psychology*, *25*(1), 54–67. http://doi.org/10.1006/ceps.1999.1020

Ryan, R. M., & Deci, E. L. (2000b). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1), 68–78. http://doi.org/10.1037/0003-066X.55.1.68

Scheiner, J. (2010). Interrelations between travel mode choice and trip distance: trends in Germany 1976-2002. *Journal of Transport Geography*, *18*(1), 75–84. http://doi.org/10.1016/j.jtrangeo.2009.01.001

Schmuck, P., & Vlek, C. (2003). Psychologists can do much to support sustainable development. *European Psychologist*, *8*(2), 66–76. http://doi.org/10.1027//1016-9040.8.2.66

Schwarz, N., & Bohner, G. (2007). The Construction of Attitudes. *Blackwell Handbook of Social Psychology: Intraindividual Processes*, 436–457. http://doi.org/10.1002/9780470998519.ch20

Semler, C., Vest, A., Kingsley, K., Mah, S., Kittelson, W., Sundstrom, C., & Brookshire, K. (2016). *Guidebook for Developing Pedestrian and Bicycle Performance Measures*. Retrieved from http://www.fhwa.dot.gov/environment/bicycle_pedestrian

Shaheen, S. a., Guzman, S., & Zhang, H. (2010). Bikesharing in Europe, the Americas, and Asia. *Transportation Research Record: Journal of the Transportation Research Board*, *2143*, 159–167. http://doi.org/10.3141/2143-20

Shinar, D. (2012). Safety and mobility of vulnerable road users: pedestrians, bicyclists, and motorcyclists. *Accident; Analysis and Prevention*, *44*(1), 1–2. http://doi.org/10.1016/j.aap.2010.12.031

Shinar, D., Bogerd, C., Chliaoutakis, J., Cavallo, V., Crundall, D., Dias, J., … Weber, T. (2015). *Final report of Working Group 2: Traffic psychology*. Brussels, Belgium: COST Action TU1101 / HOPE. Retrieved from http://publications.tno.nl/publication/34618468/Qoug30

Slovic, P., Fischhoff, B., & Lichtenstein, S. (1985). Characterising perceived risk. *Perilous Progress: Managing the Hazards of Technology*, 91–125.

Smith, E. R., & Queller, S. (2001). Mental Representations. In A. Tesser & N. Schwarz (Eds.), *Blackwell Handbook of Social Psychology: Intraindividual Processes* (pp. 111–133).

Souza, A. A. De, Sanches, S. P., & Ferreira, M. A. G. (2014). Influence of attitudes with respect to cycling on the perception of existing barriers for using this mode of transport for commuting. *Procedia - Social and Behavioral Sciences*, *162*(Panam), 111–120. http://doi.org/10.1016/j.sbspro.2014.12.191

St-Louis, E., Manaugh, K., van Lierop, D., & El-Geneidy, A. (2014). The happy commuter: A comparison of commuter satisfaction across modes. *Transportation Research Part F: Traffic Psychology and Behaviour*, *26*, 160–170. http://doi.org/10.1016/j.trf.2014.07.004

Stoffers, M. (2012). Cycling as heritage. Representing the history of cycling in the Netherlands. *The Journal of Transport History*, *33*(1), 92–104.

Stradling, S. . (2003). Reducing car dependence. In J. Hine & J. Preston (Eds.), *Integrated Futures and Transport Choices: UK Transport Policy Beyond the 1998 White Paper and Transport Act* (pp. 100–115). Ashgate.

Strömberg, H., & Karlsson, M. (2016). Enhancing utilitarian cycling : a case study. In *Proceedings of 6th Transport Research Arena, April 18-21, 2016, Warsaw, Poland Enhancing*. Warsaw, Poland.

Tajfel, H., & Turner, J. C. (1979). An integrative theory of intergroup conflict. In *The social psychology of intergroup relations* (pp. 33–47). http://doi.org/10.1016/S0065-2601(05)37005-5

Taniguchi, A., Grääs, C., & Friman, M. (2014). Satisfaction with travel, goal achievement, and voluntary behavioral change. *Transportation Research Part F: Traffic Psychology and Behaviour*, *26*(Part A), 10–17. http://doi.org/10.1016/j.trf.2014.06.004

THE PEP. (2014). *Unlocking new opportunities: jobs in green and healthy transport*.

Thomas, G. O., Walker, I., & Musselwhite, C. (2014). Grounded Theory analysis of commuters discussing a workplace carbon-reduction target: Autonomy, satisfaction, and willingness to change behaviour in drivers, pedestrians, bicyclists, motorcyclists, and bus users. *Transportation Research Part F: Traffic Psychology and Behaviour*, *26*, 72–81. http://doi.org/10.1016/j.trf.2014.06.009

Thomas, W., & Znaniecki, F. (1919). The Polish peasant in Europe and America: Monograph of an immigrant group. *The University of Chicago Press*, *3*, 18–22. http://doi.org/10.1017/CBO9781107415324.004

Tilahun, N. Y., Levinson, D. M., & Krizek, K. J. (2007). Trails, lanes, or traffic: Valuing bicycle facilities with an adaptive stated preference survey. *Transportation Research Part A: Policy and Practice*, *41*(4), 287–301. http://doi.org/10.1016/j.tra.2006.09.007

Triandis, H. C. (1993). Collectivism and individualism as cultural syndromes. *Cross-Cultural Research*, *27*(3–4), 155–180. http://doi.org/10.1177/106939719302700301

UN-HABITAT. (2011). *Cities and Climate Change: Global Report on Human Settlements*. UN-HABITAT.

United Nations. (1998). Kyoto Protocol to framework Convention on Climate Change. http://doi.org/10.2968/064001011

Unwin, N. C. (1995). Promoting the public health benefits of cycling. *Public Health*, *109*, 41–46. http://doi.org/10.1016/S0033-3506(95)80074-3

Ureta, S. (2008). To move or not to move? Social exclusion, accessibility and daily mobility among the low-income population in Santiago, Chile. *Mobilities*, *3*(2), 269–289. http://doi.org/10.1080/17450100802095338

Vallières, É. F., Bergeron, J., & Vallerand, R. J. (2005). The role of attributions and anger in agressive driving behaviours. In G. Underwood (Ed.), *Traffic and Transport Psychology: theory and application* (pp. 181–189). Kidlington, Oxford: Elsevier.

Van Acker, V., van Wee, B., & Witlox, F. (2010). When Transport Geography Meets Social Psychology: Toward a Conceptual Model of Travel Behaviour. *Transport Reviews*, *30*(2), 219–240.

http://doi.org/10.1080/01441640902943453

Vandenbulcke, G., Dujardin, C., Thomas, I., Geus, B. De, Degraeuwe, B., Meeusen, R., & Panis, L. I. (2011). Cycle commuting in Belgium: Spatial determinants and "re-cycling" strategies. *Transportation Research Part A: Policy and Practice*, *45*(2), 118–137. http://doi.org/10.1016/j.tra.2010.11.004

Villieux, A., & Delhomme, P. (2010). Driving anger and its expressions: further evidence of validity and reliability for the Driving Anger Expression Inventory French adaptation. *Journal of Safety Research*, *41*(5), 417–22. http://doi.org/10.1016/j.jsr.2010.08.003

Vlek, C., & Steg, L. (2007). Human Behavior and Environmental Sustainability: Problems, Driving Forces and Research Topics Problems. *Journal of Social Issues*, *63*(1), 1–19. http://doi.org/10.1111/j.1540-4560.2007.00493.x

Vugt, M. Van. (2009). Averting the Tragedy of the Commons: Using Social Psychological Science to Protect the Environment. *Current Directions in Psychological Science*, *18*(3), 169–174. http://doi.org/10.1111/j.1467-8721.2009.01630.x

Wagner, W., Farr, R., Jovchelovitch, S., Lorenzi-Cioldi, F., Markova, I., Duveen, G., & Rose, D. (1999). Theory and method of social representations. *Asian Journal of Social Psychology*, *2*(1), 95–125. http://doi.org/10.1111/1467-839X.00028

Walker, I. (2011a). Bicyclists. In B. E. Porter (Ed.), *Handbook of Traffic Psychology* (pp. 367–373). Elsevier. http://doi.org/10.1016/B978-0-12-381984-0.10026-8

Walker, I. (2011b). Chapter 26 – Bicyclists. In *Handbook of Traffic Psychology* (pp. 367–373). http://doi.org/10.1016/B978-0-12-381984-0.10026-8

Walker, I. (2012). Interview: Vulnerable road users. *The Psychologist*, *25*(9), 680–681. Retrieved from http://www.thepsychologist.org.uk/archive/

Walker, I., Garrard, I., & Jowitt, F. (2014). The influence of a bicycle commuter's appearance on drivers' overtaking proximities: an on-road test of bicyclist stereotypes, high-visibility clothing and sagfety aids in the United Kingdom. *Accident Analysis and Prevention*, *64*, 69–77. http://doi.org/10.1016/j.aap.2013.11.007

Walter, S. R., Olivier, J., Churches, T., & Grzebieta, R. (2013). The impact of compulsory helmet legislation on cyclist head injuries in New South Wales, Australia: A response. *Accident Analysis and Prevention*, *52*(6), 204–209. http://doi.org/10.1016/j.aap.2012.11.028

Wardman, M., Hatfield, R., & Page, M. (1997). The UK national cycling strategy : can improved facilities meet the targets ? *Transport Policy*, *4*(2), 123–133. http://doi.org/10.1016/S0967-070X(97)00011-5

Weber, R. P. (1990). *Basic Content Analysis* (2nd ed.). Newbury Park, California: Sage Publications. http://doi.org/10.2307/2289192

Weiner, B. (1986). *An attributional theory of motivation and emotion*. New York: Springer-Verlag.

Weiner, B. (2000). Intrapersonal and interpersonal theories of motivation from an attributional perspective. *Educational Psychology Review*, *12*(1), 1–14. http://doi.org/10.1023/A:1009017532121

Welleman, T. (1997). The greening or urban transport: planning for walking and cycling in Western cities. In R. Tolley (Ed.), *The Dutch Bicycle Master Plan 1990–1996* (2nd ed., pp. 177–190). Chichester: Wiley.

White, R. W. (1959). Motivation reconsidered: The concept of competence. *Psychological Review*, *66*(5), 297–333.

Wicker, A. W. (1969). Attitudes versus Actions: The Relationship of Verbal and Overt Behavioral Responses to Attitude Objects. *Journal of Social Issues*, *25*(4), 41–78. http://doi.org/10.1111/j.1540-4560.1969.tb00619.x

Willis, D., Manaugh, K., & El-Geneidy, A. (2013). Uniquely satisfied: Exploring cyclist satisfaction. *Transportation Research Part F: Traffic Psychology and Behaviour*, *18*, 136–147. http://doi.org/10.1016/j.trf.2012.12.004

Wills, T. A. (1991). Social support and interpersonal relationships. In M. S. Clark (Ed.), *Prosocial behavior* (pp. 265–289). Thousand Oaks, CA, US: Sage Publications.

Wuerzer, T., & Mason, S. G. (2015). Cycling willingness: Investigating distance as a dependent variable in cycling behavior among college students. *Applied Geography*, *60*, 95–106. http://doi.org/10.1016/j.apgeog.2015.03.009

Zander, A., Passmore, E., Mason, C., & Rissel, C. (2013). Joy, exercise, enjoyment, getting out: A qualitative study of older people's experience of cycling in Sydney, Australia. *Journal of Environmental and PublicHealth*, *2013*, 1–6. http://doi.org/10.1155/2013/547453

Zanna, M. P., & Rempel, J. R. (1988). Attitudes: A new look at an old concept. In D. Bar-Tal & A. W. Kruglanski (Eds.), *The social psychology of knowledge* (pp. 315–334). Cambridge, England: Cambridge University Press.

ANNEXES

A) CYCLING FRAMEWORK

Table A1
Modal share of European cities with more than 500,000 habitants (TEMS—The EPOMM Modal Split Tool, European Platform on Mobility Management- EPOMM, 2016).

City	Country	Year	Population	Bike	Walk	PT	Car
Copenhagen	Denmark	2014	591000	30	17	20	33
Bremen	Germany	2008	547735	25	21	14	40
Antwerp	Belgium	2010	506000	23	20	16	41
Amsterdam	Netherlands	2008	747093	22	20	20	38
Hannover	Germany	2011	518386	19	25	18	38
Rotterdam	Netherlands	2008	582951	16	18	17	49
Dresden	Germany	2008	512546	16	22	21	41
München	Germany	2008	1326807	14	28	21	37
Leipzig	Germany	2008	515418	14	27	19	40
Berlin	Germany	2008	3506239	13	30	26	31
Duisburg	Germany	2005	501564	13	20	11	56
Hamburg	Germany	2008	1735663	12	28	18	42
Köln	Germany	2006	989766	12	24	21	43
Frankfurt	Germany	2008	680000	11	31	20	38
Düsseldorf	Germany	2008	629005	11	27	22	40
Helsinki	Finland	2013	613100	11	32	34	23
Nürnberg	Germany	2011	506000	11	23	22	44
Thessaloniki	Greece	2010	780000	10	10	25	55
Dortmund	Germany	2005	585678	10	18	22	50
Wien	Austria	2015	1797337	7	27	39	27
Dublin	Ireland	2011	1110627	7	15	21	57
Gothenburg	Sweden	2014	543000	7	24	28	41
Bas-Rhin	France	2009	1057000	6	25	8	61
Sevilla	Spain	2011	702355	6	37	22	35
Norway	Norway	2014	5109056	5	21	10	64
Oslo	Norway	2014	634463	5	32	26	37
Stuttgart	Germany	2009	592915	5	27	24	44
Nantes	France	2012	580000	5	27	16	52
Gloucestershire	United Kingdom	2011	861700	4	12	6	78
Valencia	Spain	2012	786189	4	41	23	32
Wrocław	Poland	2011	632996	4	19	35	42
Poznań	Poland	2013	550742	4	13	43	40
Paris	France	2008	2211297	3	47	33	17
Sofia	Bulgaria	2010	1211348	3	14	32	51
Toulouse	France	2004	924000	3	21	9	67
Bordeaux	France	2009	881000	3	21	9	67
West Sussex	United Kingdom	2011	808900	3	11	13	73
Essen	Germany	2001	588168	3	26	17	54
London	United Kingdom	2006	7556900	2	20	37	40
Athens	Greece	2006	3627500	2	8	37	53
West Midlands	United Kingdom	2011	2738100	2	10	18	70

Greater Manchester	United Kingdom	2011	2685400	2	10	17	71
Budapest	Hungary	2014	1744655	2	18	45	35
Essex	United Kingdom	2011	1729200	2	9	18	71
Lancashire	United Kingdom	2011	1461400	2	11	8	79
Sevilla (Agglomeration)	Spain	2007	1450000	2	31	14	53
Lyon	France	2015	1375000	2	34	19	45
Brussels Capital Region	Belgium	2008	1136920	2	3	48	47
Lille	France	2006	1093000	2	32	10	57
Buckinghamshire	United Kingdom	2011	756600	2	9	12	77
Riga	Latvia	2008	706413	2	19	34	45
Barcelona	Spain	2006	4600000	1	46	18	35
Lisbon	Portugal	2001	2800000	1	16	35	48
West Yorkshire	United Kingdom	2013	2227400	1	5	31	63
Bucharest	Romania	2007	1940000	1	22	53	24
Stockholm	Sweden	2006	1889945	1	17	35	47
Brest	France	2003	1855000	1	25	8	66
Warszawa	Poland	2005	1702000	1	21	54	24
Marseille	France	2009	1177000	1	34	11	54
Torino	Italy	2011	900000	1	7	28	64
Zagreb	Croatia	1998	779000	1	25	37	37
Leeds	United Kingdom	2010	770800	1	4	38	57
Kraków	Poland	2010	756183	1	25	46	28
Lviv	Ukraine	2006	733989	1	34	39	26
Palermo	Italy	2015	678492	1	12	9	78
Glasgow	United Kingdom	2011	592000	1	27	33	39
Toulon	France	2008	575000	1	27	5	67
Málaga	Spain	2008	561000	1	38	12	49
Vilnius	Lithuania	2011	554192	1	36	25	38
Sheffield	United Kingdom	2010	534500	1	10	34	55
Tarragona	Spain	2006	528000	1	49	4	46
Saint-Étienne	France	2001	510000	1	29	10	60
Nice	France	2009	508000	1	40	11	48
Madrid	Spain	2012	3233527	0	29	42	29
Genova	Italy	2001	614700	0	21	31	49

Note. PT= Public Transport

B) SECOND STUDY

B1) IDENTIFICATION OF THREE GROUPS OF CYCLISTS

Females and males use other modes of transport differently according to the group:

In the non-cyclists group, females use a car significantly less than males (χ^2 (4, N = 148) = 12.23, p=.016): 46% of females and 30% of males reported that they never use the car, 9% of females and 29% of males said that almost always use the car. Females also use public transport significantly more than males (χ^2 (4, N = 148) = 12.15, p=.016): 62% of females and 38% of males almost always use public transport.

In the occasional cyclists' group, again females use a car significantly less than males (χ^2 (4, N = 98) = 5.68, p=.224): 31% of females and 14% of males never use the car and 14% of females and 27% of males use almost always the car. Females also use public transport significantly more than males (χ^2 (4, N = 98) = 10.27, p=.036): 43% of females and 16% of males almost always use public transport.

This difference between females and males does not exist in the frequent cyclists' group. In general, in the frequent cyclist's group, females and males use cars in a similar way (χ^2 (4, N = 163) = 0.38, p=.984): 14% of females and 15% of males never use the car, 11% of females and 10% of males cyclists use almost always the car. They also use public transport in similar proportions (χ^2 (4, N = 163) = 0.94, p=.919): 15% of female cyclists and 19% of male cyclists almost always use public transport.

B2) TABLES

Table B1
Description of Utilitarian cycling practice for frequent cyclists

	N	*M*	*SD*	Median	Variance	Minimum	Maximum
Year of experience	163	9.3	8.89	6.04	78.98	.25	40.00
Km per week	153	43.0	48.80	25.00	2381.02	2.0	250.0
Hours per week	150	3.5	3.89	2.00	15.12	.13	25.00
Speed calculated	150	16.5	14.90	12.50	221.92	1.00	90.00

Table B2
Hilly areas: Reliability Statistics

Type of User	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
Cyclists	.842	.842	2
Non-cyclists	.764	.764	2
Pure non-cyclists	.846	.846	2

Table B3
Cycling infrastructures

Type of User	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
Cyclists	.871	.874	3
Non-cyclists	.913	.914	3
Pure non-cyclists	.880	.882	3

Table B4
Environment

	Type of user	*M*	*SD*	Variance
Hilly areas				
Hilly area around home	Frequent Cyclists	2.21	1.16	1.351
	Occasional cyclists	2.43	1.04	1.072
	Non-cyclists	2.41	1.16	1.338
Hilly area around workplace (or study place)	Frequent Cyclists	2.22	1.15	1.319
	Occasional cyclists	2.38	1.04	1.086
	Non-cyclists	2.43	1.21	1.468
Cycling infrastructure				
Contraflow cycle lane	Frequent Cyclists	3.28	1.28	1.629
	Occasional cyclists	2.88	1.16	1.351
	Non-cyclists	2.58	1.36	1.846
Cycle lane	Frequent Cyclists	3.59	1.10	1.204
	Occasional cyclists	3.13	1.15	1.313
	Non-cyclists	2.94	1.25	1.554
Cycle path	Frequent Cyclists	3.23	1.25	1.566
	Occasional cyclists	3.15	1.22	1.495
	Non-cyclists	2.75	1.38	1.895

Table B5
Comparison Advantages-Levers for each item

	Advantages		Levers		*Sig. (2-tailed)*		
Argument	*M*	*SD*	*M*	*SD*	*t*	*df*	
Physical activity	3.86	(.96)	3.35	(1.10)	10.72	408	.000
Pleasure of riding a bicycle	3.42	(1.07)	3.06	(1.11)	7.69	408	.000
Carrying objects	2.53	(1.21)	2.35	(1.17)	3.65	408	.000
Time saved	3.55	(1.09)	3.28	(1.13)	5.95	408	.000
Money saved	3.50	(1.24)	3.24	(1.25)	5.10	408	.000
Feeling of freedom	3.39	(1.16)	3.14	(1.17)	5.62	408	.000
Ecological aspect	3.52	(1.20)	3.24	(1.25)	6.14	408	.000
To leave a place when you want	3.63	(1.06)	3.30	(1.10)	8.11	408	.000
To go wherever you want	3.65	(1.05)	3.33	(1.10)	7.86	408	.000
Clearing one's head	3.43	(1.15)	3.16	(1.17)	6.20	408	.000
Good weather	3.63	(1.03)	3.31	(1.10)	7.78	408	.000
The view or the landscape	3.35	(1.14)	3.00	(1.12)	9.46	408	.000
Sociability	2.48	(1.23)	2.33	(1.19)	4.00	408	.000
Ease to park	3.85	(1.10)	3.36	(1.21)	10.38	408	.000

Table B6
Comparison Disadvantages-Barriers for each item

	Disadvantages		Barriers		*Sig. (2-tailed)*		
Argument	*M*	*SD*	*M*	*SD*	*t*	*df*	
Cold	3.73	(1.10)	3.48	(1.21)	6.19	408	.000
Heavy rain	4.35	(.90)	4.18	(1.07)	5.31	408	.000
Moderate rain	3.54	(1.02)	3.45	(1.08)	2.16	408	.031
Snow	4.32	(.99)	4.13	(1.13)	4.84	408	.000
Ice	4.47	(.92)	4.34	(.99)	3.39	408	.001
Wind	3.39	(1.12)	3.20	(1.14)	4.60	408	.000
Longs distances	3.50	(1.11)	3.33	(1.14)	4.08	408	.000
Hills	3.35	(1.11)	3.17	(1.15)	4.37	408	.000
Danger–risk of accident	3.49	(1.21)	3.30	(1.26)	4.29	408	.000
Vulnerability in traffic	3.67	(1.19)	3.43	(1.25)	5.95	408	.000
Difficulty to carrying objects	3.10	(1.05)	2.92	(1.14)	4.24	408	.000
Lack of attention of other road users	3.63	(1.13)	3.36	(1.23)	5.77	408	.000
Aggression from other users	3.22	(1.20)	2.92	(1.27)	6.29	408	.000
Difficulty to find a parking spot at work/on the street	2.81	(1.29)	2.60	(1.25)	4.82	408	.000
No place to put the bicycle at home	3.10	(1.33)	2.83	(1.37)	5.74	408	.000
Fear of cycling	2.26	(1.36)	2.26	(1.33)	-.06	408	.953
Fear of traffic	3.03	(1.33)	2.90	(1.36)	2.90	408	.004
Physical effort/ Tiredness	2.49	(1.18)	2.44	(1.16)	1.20	408	.230
Sweating	2.78	(1.16)	2.73	(1.20)	1.01	408	.315
Spare clothes	2.86	(1.20)	2.67	(1.22)	4.17	408	.000
Take a shower	2.93	(1.32)	2.74	(1.28)	4.11	408	.000

C) THIRD STUDY

Table C1
Items by scenario according to Paris-Berlin group

	Scenario 2		Scenario 3		Scenario 4		Scenario 5	
	Paris	Berlin	Paris	Berlin	Paris	Berlin	Paris	Berlin
Item	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Emotions reactions								
1 Angry	3.39 (1.27)	2.70 (1.22)	4.13 (1.22)	4.32 (.87)	3.72 (1.30)	3.90 (1.08)	3.64 (1.19)	4.24 (.83)
2 Calm	2.67 (1.34)	2.99 (1.17)	1.81 (1.15)	1.88 (.91)	1.54 (.78)	1.50 (.67)	1.87 (1.09)	1.56 (.77)
3 Stressed	1.88 (1.08)	2.54 (1.11)	3.06 (1.46)	3.39 (1.18)	3.89 (1.15)	3.80 (1.08)	3.48 (1.20)	3.89 (1.05)
4 Easy going	2.47 (1.21)	2.98 (1.20)	1.61 (1.06)	1.68 (.89)	1.27 (.51)	1.40 (.58)	1.44 (.79)	1.46 (.70)
5 Frustrated	3.34 (1.35)	2.56 (1.30)	2.88 (1.49)	3.18 (1.29)	2.66 (1.37)	2.89 (1.31)	2.80 (1.34)	3.24 (1.30)
6 Excited	1.21 (.57)	2.29 (1.10)	1.17 (.62)	3.80 (1.03)	1.09 (.29)	4.24 (.82)	1.11 (.38)	3.93 (1.13)
7 Scared	1.52 (.85)	1.57 (.85)	2.31 (1.20)	2.49 (1.19)	3.87 (1.18)	3.76 (1.12)	3.10 (1.17)	3.95 (1.03)
Perceived danger								
8 Annoying	4.14 (1.11)	2.98 (1.23)	4.54 (.91)	4.37 (.92)	4.34 (.86)	4.21 (.87)	4.37 (.92)	4.40 (.75)
9 Likely to have an accident	2.58 (1.08)	2.07 (.90)	2.71 (1.06)	2.13 (.85)	4.44 (.84)	4.38 (.64)	3.49 (1.11)	3.71 (.98)
10 Seriousness of the consequences	3.21 (1.14)	3.35 (1.07)	3.08 (1.10)	2.87 (1.21)	3.89 (1.00)	4.18 (.84)	3.63 (1.02)	3.88 (.87)
11 Dangerousness	3.14 (1.08)	2.35 (1.06)	2.88 (1.18)	2.40 (.95)	4.31 (.91)	4.45 (.63)	3.91 (1.05)	3.90 (.96)
Perceived intention								
12 Express anger	1.36 (.72)	1.26 (.54)	4.76 (.53)	4.85 (.45)	1.18 (.53)	1.38 (.69)	2.44 (1.24)	3.18 (1.13)
13 Physical harm	1.21 (.49)	1.14 (.47)	2.34 (1.12)	1.68 (.91)	1.24 (.61)	1.30 (.60)	1.90 (1.07)	2.38 (1.18)
14 Psychological harm	1.32 (.68)	1.15 (.48)	3.57 (1.44)	3.71 (1.10)	1.22 (.60)	1.21 (.52)	2.26 (1.26)	2.62 (1.22)
15 Acted differently	4.27 (.93)	3.98 (1.04)	4.87 (.43)	4.75 (.58)	4.56 (.89)	4.63 (.65)	4.34 (.89)	4.51 (.75)
Perceived aggression								
16 Perceived aggression	1.89 (1.11)	1.67 (.88)	4.86 (.53)	4.52 (.67)	1.71 (1.06)	1.67 (.88)	3.20 (1.38)	3.73 (1.17)
Behavioral reactions								
17 Ignoring	2.93 (1.51)	3.50 (1.43)	3.19 (1.45)	2.81 (1.43)	1.82 (1.10)	1.75 (1.15)	2.60 (1.44)	2.31 (1.25)
18 Smiling	1.41 (.90)	1.79 (1.05)	2.19 (1.52)	1.77 (1.29)	1.27 (.85)	1.19 (.63)	1.36 (.88)	1.18 (.56)
19 Turning away	4.41 (1.04)	2.49 (1.26)	2.50 (1.45)	2.77 (1.35)	4.49 (.95)	1.75 (1.03)	3.46 (1.48)	2.13 (1.17)
20 Fleeing	2.98 (1.68)	1.69 (1.03)	2.17 (1.36)	2.42 (1.28)	2.21 (1.53)	1.94 (1.26)	2.73 (1.51)	3.06 (1.43)
21 Making a remark*		2.33 (1.37)		3.76 (1.36)		4.15 (1.10)		3.39 (1.38)
22 Swearing	1.86 (1.28)	2.30 (1.35)	2.47 (1.50)	3.13 (1.48)	2.39 (1.59)	3.55 (1.50)	2.13 (1.38)	3.42 (1.54)
23 Insulting	1.76 (1.24)	1.52 (.99)	2.81 (1.50)	2.36 (1.34)	2.32 (1.44)	2.00 (1.31)	2.06 (1.36)	2.26 (1.43)
24 Ringing the bell	2.73 (1.56)	2.63 (1.53)	1.54 (1.06)	1.50 (.98)	3.38 (1.66)	3.60 (1.52)	3.02 (1.59)	3.25 (1.58)
25 Hostile looking	3.62 (1.45)	2.75 (1.38)	3.84 (1.44)	3.90 (1.33)	3.58 (1.48)	3.62 (1.40)	3.76 (1.38)	4.02 (1.13)
26 Kicking the car	1.70 (1.17)	1.13 (.43)	1.60 (1.17)	1.24 (.72)	1.74 (1.35)	1.25 (.88)	1.84 (1.36)	1.38 (.94)
Aggressive behavior frequency								
27 Frequency	3.82 (1.23)	3.11 (1.30)	2.08 (1.06)	1.65 (.91)	2.58 (1.11)	2.07 (1.05)	2.60 (1.27)	2.01 (1.05)

Note. Scenario 2= "To insult a cyclist"; Scenario 3= "To open one's car door while parked—carelessly—"; Scenario 4= "To get close to a cyclist"; * = Item omitted in the French version of the questionnaire.

D1) QUESTIONNAIRE SECOND STUDY

D1) Questionnaire Second Study

IFSTTAR

Questionnaire vélo

Dans le cadre d'un projet de recherche, l'Institut Français des Sciences et Technologies des Transports, de l'Aménagement et des Réseaux réalise une enquête sur les déplacements en ville.

Pour cela, nous avons besoin de recueillir des informations sur vos déplacements et connaître votre avis.

Cette enquête vous prendra environ 15 minutes.

Vos réponses aux questions posées sont anonymes et ne seront utilisées qu'à des fins scientifiques.

Merci de votre participation.

Sortir et effacer le questionnaire | Charger un questionnaire non terminé | Suivant >>

IFSTTAR

Questionnaire vélo

0% 100%

Quelle est environ la taille de la ville où vous habitez ?

- ○ Moins de 25 000 habitants
- ○ Entre 25 000 et 100 000 habitants
- ○ Entre 100 001 et 300 000 habitants
- ○ Entre 300 001 et 1 million d'habitants
- ○ Plus d'1 million d'habitants Paris/région parisienne

Quel âge avez-vous ?

- ○ Moins de 18 ans 18 à 34 ans
- ○ 35 à 49 ans
- ○ 50 ans et plus

Êtes -vous?

- ○ Une femme
- ○ Un homme

Sortir et effacer le questionnaire | Reprendre plus tard | Suivant >>

IFSTTAR

Questionnaire vélo

0%___________________________100%

Le vélo peut avoir différentes utilisations :

-Loisir, pour se balader

-Sport, pour faire une activité physique

-Moyen de transport (utilitaire), pour se déplacer d'un point A à un point B.

En moyenne au cours des 6 derniers mois (hors vacances), à quelle fréquence avez-vous utilisé le vélo comme moyen de transport (pour vous rendre à un endroit donné) ?

- ○ Jamais 1 fois
- ○ Entre 2 et 5 fois 1 fois par mois
- ○ 2 ou 3 fois par mois 1 fois par semaine
- ○ Entre 2 et 4 fois par semaine 5 fois par semaine
- ○ Tous les jours

1 trajet aller et retour compte pour 1 fois

Sortir et effacer le questionnaire | Reprendre plus tard | Suivant >>

IFSTTAR

Questionnaire vélo

0% 100%

Vélo comme moyen de transport

Dans la première partie de ce questionnaire nous nous intéressons au vélo comme moyen de transport en ville.

Les gens associent différentes caractéristiques positives ou négatives au vélo comme moyen de transport en ville. Nous allons vous présenter une liste de ces caractéristiques. Nous voulons savoir à quel point chacune de ces caractéristiques est importante pour vous. Nous voulons également savoir à quelle fréquence vous estimez que cette caractéristique intervient dans votre décision de faire ou non du vélo.

Voici une liste de caractéristiques positives qui peuvent être associées à la pratique du vélo en ville.

A. Veuillez indiquer à quel point vous considérez chacune de ces caractéristiques comme un avantage du vélo comme moyen de transport en ville, c'est-à-dire un aspect positif lié à la pratique du vélo.

Par exemple :

- Si vous considérez qu'une caractéristique n'est pas un avantage pour vous, sélectionnez «Pas du tout important».

- Si au contraire vous considérez qu'une caractéristique est un avantage très important pour vous, choisissez «Très important».

Les valeurs intermédiaires servent à nuancer votre réponse.

B. Veuillez également indiquer à quel point, pour vous, chacune de ces caractéristiques est une motivation à utiliser le vélo comme moyen de transport en ville, c'est-à-dire fait partie des raisons qui vous poussent à faire du vélo.

Par exemple :

- Si une caractéristique n'est pas une motivation à faire du vélo, sélectionnez «Pas une motivation».

- Si une caractéristique est une motivation, sélectionnez dans les réponses la force de cette motivation, entre "Faible", "Moyenne", "Forte" et "Très forte". Par exemple, si une caractéristique est une très forte motivation à faire du vélo, sélectionnez «Très forte».

Pour chaque caractéristique veuillez répondre à la question "Avantages", colonne "A", et à la question "Motivations", colonne "B".

	A. Avantage...	**B. Motivation...**
L'activité physique	Veuillez choisir ... ▼	Veuillez choisir ... ▼
Le plaisir de rouler	Veuillez choisir ... ▼	Veuillez choisir ... ▼
La possibilité de transporter des choses	Veuillez choisir ... ▼	Veuillez choisir ... ▼
Le gain de temps/ la rapidité du déplacement	Veuillez choisir ... ▼	Veuillez choisir ... ▼
L'argent économisé	Veuillez choisir ... ▼	Veuillez choisir ... ▼
Le sentiment de liberté	Veuillez choisir ... ▼	Veuillez choisir ... ▼
Le côté écologique	Veuillez choisir ... ▼	Veuillez choisir ... ▼
La possibilité de partir quand on veut	Veuillez choisir ... ▼	Veuillez choisir ... ▼
La possibilité d'aller où on veut	Veuillez choisir ... ▼	Veuillez choisir ... ▼
La possibilité de se vider l'esprit/se détendre	Veuillez choisir ... ▼	Veuillez choisir ... ▼
Le fait de profiter du beau temps	Veuillez choisir ... ▼	Veuillez choisir ... ▼
Le fait de profiter de la vue, du paysage	Veuillez choisir ... ▼	Veuillez choisir ... ▼
L'échange de la pratique du vélo avec d'autres personnes (ex: proches, association cycliste, collègues)	Veuillez choisir ... ▼	Veuillez choisir ... ▼
La facilité à se garer	Veuillez choisir ... ▼	Veuillez choisir ... ▼

Sortir et effacer le questionnaire | Reprendre plus tard | Suivant >>

Voici une liste de caractéristiques négatives qui peuvent être associées à la pratique du vélo en ville.

A. Veuillez indiquer à quel point vous considérez chacune de ces caractéristiques comme un inconvénient du vélo comme moyen de transport en ville, c'est-à-dire un aspect négatif lié à la pratique du vélo.

Par exemple :

- Si vous considérez qu'une caractéristique n'est pas un inconvénient pour vous, sélectionnez «Pas du tout important».

- Si au contraire vous considérez qu'une caractéristique est un inconvénient très important pour vous, choisissez «Très important».

Les valeurs intermédiaires servent à nuancer votre réponse.

B. Veuillez également indiquer à quel point, pour vous, chacune de ces caractéristiques est un obstacle à l'utilisation du vélo comme moyen de transport en ville, c'est-à-dire fait partie des raisons qui vous empêchent d'utiliser le vélo.

Par exemple :

- Si une caractéristique n'est pas un obstacle qui vous empêche de faire du vélo, sélectionnez « Pas un obstacle».

- Si une caractéristique est un obstacle, sélectionnez dans les réponses la force de cet obstacle, entre "Faible", "Moyen", "Fort" et "Très fort". Par exemple, si une caractéristique est un très fort obstacle à faire du vélo, sélectionnez «Très fort».

Pour chaque caractéristique veuillez répondre à la question "Inconvénients", colonne "A", et à la question "Obstacles", colonne "B".

	A. Inconvénient...	**B. Obstacle...**
Le froid	Veuillez choisir ... ▼	Veuillez choisir ... ▼
La pluie forte	Veuillez choisir ... ▼	Veuillez choisir ... ▼
La pluie modérée	Veuillez choisir ... ▼	Veuillez choisir ... ▼

	A. Inconvénient...	**B. Obstacle...**
La neige	Veuillez choisir ...	Veuillez choisir ...
Le verglas	Veuillez choisir ...	Veuillez choisir ...
Le vent	Veuillez choisir ...	Veuillez choisir ...
Les grandes distances	Veuillez choisir ...	Veuillez choisir ...
Les côtes	Veuillez choisir ...	Veuillez choisir ...
Le danger (le risque d'avoir un accident)	Veuillez choisir ...	Veuillez choisir ...

	A. Inconvénient...	B. Obstacle...
La vulnérabilité (la gravité des conséquences d'un accident)	Veuillez choisir ...	Veuillez choisir ...
La difficulté de transporter des affaires à vélo	Veuillez choisir ...	Veuillez choisir ...
Les autres usagers (automobilistes, piétons, etc) qui ne font pas attention aux cyclistes	Veuillez choisir ...	Veuillez choisir ...
Les autres usagers (automobilistes, piétons, etc) qui sont agressifs envers les cyclistes	Veuillez choisir ...	Veuillez choisir ...
La difficulté pour le garer sur le lieu de destination (travail, études, commerce)	Veuillez choisir ...	Veuillez choisir ...
Le manque de place pour le stocker chez soi	Veuillez choisir ...	Veuillez choisir ...
La peur de faire du vélo (monter sur un vélo, tomber, etc.)	Veuillez choisir ...	Veuillez choisir ...
La peur de la circulation	Veuillez choisir ...	Veuillez choisir ...
L'effort physique	Veuillez choisir ...	Veuillez choisir ...
La transpiration lors de l'utilisation du vélo	Veuillez choisir ...	Veuillez choisir ...
Le besoin d'avoir des vêtements de rechange	Veuillez choisir ...	Veuillez choisir ...
Le besoin de prendre une douche après le trajet	Veuillez choisir ...	Veuillez choisir ...

Sortir et effacer le questionnaire | Reprendre plus tard | Suivant >>

IFSTTAR

Questionnaire vélo

0% 100%

Vous avez dit que vous utilisez le vélo ***"Tous les jours ".***

Depuis combien de temps l'utilisez-vous comme moyen de transport?

Année(s)

Mois

Donnez votre réponse en nombre d'années et nombre de mois (même si l'un de ces nombres est 0).

Exemple: 3 An(s) 0 Mois ; 0 An(s) 5 Mois ; 2 An(s) 6 Mois

En moyenne (hors vacances), combien de kilomètres par semaine parcourez-vous à vélo pour des déplacements utilitaires (comme moyen de transport) ?

Km par semaine

En moyenne (hors vacances), combien de temps par semaine mettez-vous pour parcourir ces km à vélo?

Heure(s)

Minutes

Donnez votre réponse en nombre d'heures et nombre de minutes par semaine (même si l'un de ces nombres est 0).

Exemple: 3 Heure(s) 0 Minutes par semaine ; 0 Heure(s) 45 Minutes par semaine; 2 Heure(s) 30 Minutes par semaine

Sortir et effacer le questionnaire | Reprendre plus tard | Suivant >>

Questionnaire vélo

0% 100%

A quelle fréquence utilisez-vous le vélo pour chacun des déplacements suivants ?

	Jamais	Rarement	Parfois	Souvent	La plupart du temps
Déplacements réguliers: domicile-travail ou domicile-études	○	○	○	○	○
Déplacements occasionnels: faire des courses, rendre visite à ses proches, se rendre sur un lieu de loisir-sport, etc.	○	○	○	○	○

Comment votre utilisation du vélo change-t-elle en fonction des saisons ?

	Beaucoup moins en hiver qu'en été	Un peu moins en hiver qu'en été	Autant en hiver qu'en été	Un peu plus en hiver qu'en été	Beaucoup plus en hiver qu'en été
J'utilise le vélo...	○	○	○	○	○

Quel type de vélo utilisez-vous le plus souvent comme moyen de transport

- Vélo personnel (VTT, VTC, Vélo de ville)
- Vélo personnel pliable
- Vélo personnel à assistance électrique
- Vélo de location longue durée
- Vélo en libre-service (ex : Vélib')

IFSTTAR

Questionnaire vélo

0% 100%

Je voudrais utiliser davantage le vélo comme moyen de transport

- Pas du tout d'accord
- Pas d'accord
- Ni pas d'accord, ni d'accord

J'envisage d'utiliser davantage le vélo comme moyen de transport pour des trajets réguliers (comme aller à mon lieu de travail/études) dans les 3 prochaines années

- Pas du tout d'accord
- Pas d'accord
- Ni pas d'accord, ni d'accord

J'envisage d'utiliser davantage le vélo comme moyen de transport pour des déplacements occasionnels (ex: acheter du pain, rendre visite à des proches, aller au cinéma, etc.) dans les 3 prochaines années

- Pas du tout d'accord
- Pas d'accord
- Ni pas d'accord, ni d'accord

Sortir et effacer le questionnaire | Reprendre plus tard | Suivant >>

IFSTTAR

Questionnaire vélo

0% 100%

J'ai les compétences pour utiliser le vélo comme moyen de transport en ville

- ○ Pas du tout d'accord
- ○ Pas d'accord
- ○ Ni pas d'accord, ni d'accord

Dans la zone où j'habite il y a trop de côtes pour pouvoir faire du vélo

- ○ Pas du tout d'accord
- ○ Pas d'accord
- ○ Ni pas d'accord, ni d'accord

Dans la zone où je travaille / j'étudie il y a trop de côtes pour pouvoir faire du vélo

- ○ Pas du tout d'accord
- ○ Pas d'accord
- ○ Ni pas d'accord, ni d'accord

Y a-t-il des aménagements cyclables autour de chez vous ou sur vos trajets habituels ?

	Ne sais pas/ Ne connais pas	Aucun 1				Beaucoup 5
Double sens cyclable (sens unique classique pour les véhicules motorisés, mais ouvert à la circulation des cyclistes dans les deux sens)	○	○	○	○	○	○
Bandes cyclables (voie de circulation réservée aux cyclistes incluse sur la chaussée et marquée par des bandes de peinture)	○	○	○	○	○	○
Pistes cyclables (voie de circulation réservée aux cyclistes séparée physiquement de la chaussée)	○	○	○	○	○	○

Quelle est la distance maximale (en km) que vous accepteriez de parcourir à vélo, lors d'un déplacement utilitaire sur terrain plat ?

[ ] **Km**

Chez vous combien il y a-t-il de vélo(s) que vous pouvez utiliser?

[ ]

Y a-t-il un endroit approprié pour stocker un vélo chez vous ?

- ○ Non
- ○ Oui

Y a-t-il un endroit adapté/sûr pour garer un vélo près de votre lieu de travail / d'études?

- ○ Non
- ○ Oui

Depuis combien de temps habitez-vous à votre adresse actuelle?

Année(s) [ ]

Mois [ ]

Donnez votre réponse en nombre d'années et nombre de mois (même si l'un de ces nombres est 0).

Exemple: 3 An(s) 0 Mois ; 0 An(s) 5 Mois ; 2 An(s) 6 Mois

Pensez-vous déménager dans les 6 prochains mois?

- ○ Non
- ○ Oui

Sortir et effacer le questionnaire | Reprendre plus tard | Suivant >>

IFSTTAR

Questionnaire vélo

0% 100%

Faites-vous partie d'une association cycliste?

- Aucune association Association/club sportive
- Association urbaine de promotion du vélo
- Autre association liée au vélo (veuillez préciser):

Actuellement, à quelle fréquence utilisez-vous le vélo comme loisir, pour vous balader ?

- Jamais
- 1 fois par an
- Entre 2 et 6 fois par an
- Entre 7 et 11 fois par an
- 1 fois par mois
- Plusieurs fois par mois
- 1 fois par semaine
- Plusieurs fois par semaine
- Tous les jours ou presque

1 trajet aller et retour compte pour 1 fois

En moyenne, combien de kilomètres par an parcourez-vous à vélo comme loisir, pour vous balader ?

Km par an

En moyenne, combien de temps dure un de vos trajets vélo pour le loisir ?

Heure(s)

Minutes

Actuellement, à quelle fréquence utilisez-vous le vélo seulement pour faire du sport (comme activité physique, et pas comme moyen de transport ou simple balade) ?

- Jamais
- 1 fois par an
- Entre 2 et 6 fois par an
- Entre 7 et 11 fois par an
- 1 fois par mois
- Plusieurs fois par mois
- 1 fois par semaine
- Plusieurs fois par semaine
- Tous les jours ou presque

1 trajet aller et retour compte pour 1 fois

En moyenne, combien de kilomètres par an parcourez-vous à vélo pour faire du sport ?

[ ] **Km par an**

En moyenne, combien de temps dure un de vos trajets vélo sportifs ?

Heure(s) [ ]

Minutes [ ]

Sortir et effacer le questionnaire | Reprendre plus tard | Suivant >>

IFSTTAR

Questionnaire vélo

0% 100%

À quelle fréquence utilisez-vous les moyens de transport suivants ?

	Jamais	Rarement	De temps en temps	Souvent	La plupart du temps
Voiture (conducteur/conductrice)	○	○	○	○	○
Voiture (passager/passagère)	○	○	○	○	○
Scooter/ Moto (conducteur/conductrice)	○	○	○	○	○
Scooter/ Moto (passager/passagère)	○	○	○	○	○
Transports en commun	○	○	○	○	○
Marche à pied (plus de 5 minutes)	○	○	○	○	○

Quelle est votre situation familiale?

- ○ Célibataire
- ○ En couple/marié(e)
- ○ Divorcé(e)/séparé(e)/veuf(ve)

Combien avez-vous d'enfants de moins de 18 ans à charge?

(marquez 0 si vous n'avez pas d'enfants)

Quel est votre niveau d'études?

- Sans diplôme
- Niveau brevet
- Niveau bac
- BTS/licence
- Master & supérieur

Quelle est votre activité?

- J'exerce une activité professionnelle
- Je suis lycéen(ne) / étudiant(e) / en formation
- Je suis retraité(e)
- Je suis homme/femme au foyer
- Je suis à la recherche d'un emploi
- Autre (veuillez préciser):

Avez-vous un ou des lieu(x) de travail ou d'études/formation fixe(s) ?

- Je travaille/j'étudie depuis mon domicile
- J'ai un lieu de travail/d'études fixe, hors de mon domicile
- J'ai plusieurs lieu de travail/d'études fixe, hors de mon domicile
- Je n'ai pas de lieu de travail/d'études fixe

Quelle est environ la distance (en km) entre votre domicile et votre lieu de travail ou votre lieu d'études actuel ?

[ ] **Km**

Sortir et effacer le questionnaire | Reprendre plus tard | Suivant >>

D2) QUESTIONNAIRE THIRD STUDY

IFSTTAR

Interaction cyclistes et automobilistes en ville

Nous réalisons, dans le cadre d'une étude sur l'expérience et le ressenti des cyclistes en ville, un questionnaire portant sur les interactions que les cyclistes ont avec des automobilistes.

Le questionnaire comprend deux parties, et prend environ 15-20 minutes.

Les données ne seront utilisées qu'à des fins scientifiques, et seront traitées de façon anonyme et confidentielle.

Merci de votre participation!

Ce questionnaire s'adresse aux personnes qui utilisent un vélo comme moyen de transport au moins une fois par semaine en milieu urbain.

Sortir et effacer le questionnaire	Charger un questionnaire non terminé	Suivant >>

Interaction cyclistes et automobilistes en ville

0% 100%

Partie A- Scenario1

Partie A

Nous allons vous présenter 5 situations différentes. Pour chaque situation, veuillez répondre aux questions en cochant la case entre 1 et 5 qui correspond à ce que vous pensez.

Pour chacune des situations, veuillez imaginer que vous êtes en train de rouler à vélo en ville pour vous rendre à votre université ou à votre travail. Vous respectez le code de la route. Le ciel est dégagé, il fait doux...

Situation 1:

Vous roulez sur une route en ligne droite. Un automobiliste arrive derrière vous. Il s'approche de vous (à environ 1 mètre de vous) et vous colle.

*** Dans quelle mesure cette situation vous ferait vous sentir...**

	Pas du tout 1	2	3	4	Beaucoup 5
En colère	○	○	○	○	○
Calme	○	○	○	○	○
Stressé(e)	○	○	○	○	○
Décontracté(e)	○	○	○	○	○
Frustré(e)	○	○	○	○	○
Enthousiaste	○	○	○	○	○
Effrayé(e)	○	○	○	○	○

(1= Pas du tout; 5=Beaucoup)

*** Selon vous, dans quelle mesure cette situation est agaçante ?**

○ 1 Pas du tout agaçante ○ 2 ○ 3 ○ 4 ○ 5 Très agaçante

*** Selon vous, dans quelle mesure est-il probable que vous ayez un accident dans cette situation ?**

1 Pas du tout probable	2	3	4	5 Très probable

*** Si vous aviez un accident dans cette situation, dans quelle mesure pensez-vous que les conséquences seraient graves ?**

1 Pas graves du tout	2	3	4	5 Très graves

*** Dans quelle mesure pensez-vous que cette situation est dangereuse ?**

1 Pas du tout dangereuse	2	3	4	5 Très dangereuse

*** Dans quelle mesure pensez-vous que l'automobiliste adopte ce comportement dans le but d'exprimer de la colère ?**

1 Pas du tout	2	3	4	5 Beaucoup

*** Dans quelle mesure pensez-vous que l'automobiliste a l'intention de vous causer des dommages physiques?**

1 Pas du tout	2	3	4	5 Beaucoup

*** Dans quelle mesure pensez-vous que l'automobiliste a l'intention de vous nuire sur le plan psychologique?**

○ 1 Pas du tout ○ 2 ○ 3 ○ 4 ○ 5 Beaucoup

*** Dans quelle mesure pensez-vous que l'automobiliste aurait pu agir différemment ?**

○ 1 Pas du tout ○ 2 ○ 3 ○ 4 ○ 5 Beaucoup

*** Dans quelle mesure pensez-vous que le comportement de l'automobiliste est agressif ?**

○ 1 Pas du tout ○ 2 ○ 3 ○ 4 ○ 5 Beaucoup

*** Dans cette situation, quelle est la probabilité que vous réagissiez de chacune des manières suivantes...**

	Pas du tout probable 1	2	3	4	Très probable 5
En ignorant le comportement	○	○	○	○	○
En souriant	○	○	○	○	○
En vous écartant de la voiture	○	○	○	○	○
En quittant la route	○	○	○	○	○
En faisant une réflexion au conducteur	○	○	○	○	○

En lançant des gros mots/obscénités	○	○	○	○	○
En insultant le conducteur	○	○	○	○	○
En donnant un coup de sonnette	○	○	○	○	○
En lançant des regards malveillants au conducteur	○	○	○	○	○
En tapant sur la voiture (quand elle est à votre portée)	○	○	○	○	○

De quelle autre manière serait-il probable que vous réagissiez? (facultatif)

*** A quelle fréquence avez-vous rencontré cette situation au cours de votre pratique du vélo dans un contexte urbain ?**

○ Jamais ○ Rarement ○ De temps en temps ○ Souvent ○ Très souvent

Interaction cyclistes et automobilistes en ville

0% 100%

Partie A- Scenario2

Pour chacune des situations, veuillez imaginer que vous êtes en train de rouler à vélo en ville pour vous rendre à votre université ou à votre travail. Vous respectez le code de la route. Le ciel est dégagé, il fait doux...

Situation 2:

Vous êtes sur une bande cyclable*, la route est droite et il n'y a pas de voitures circulant sur la voie longeant la bande cyclable. A un moment, vous voyez une voiture garée sur la bande cyclable avec le conducteur à l'interieur et vous êtes obligé(e) de passer sur la voie de circulation pour l'éviter.

* Bande cyclable: voie de circulation réservée aux cyclistes incluse sur la chaussée et délimitée par des bandes de peinture

*** Dans quelle mesure cette situation vous ferait vous sentir...**

	Pas du tout 1	2	3	4	Beaucoup 5
En colère	○	○	○	○	○
Calme	○	○	○	○	○
Stressé(e)	○	○	○	○	○
Décontracté(e)	○	○	○	○	○
Frustré(e)	○	○	○	○	○
Enthousiaste	○	○	○	○	○
Effrayé(e)	○	○	○	○	○

(1= Pas du tout; 5=Beaucoup)

*** Selon vous, dans quelle mesure cette situation est agaçante ?**

○ 1 Pas du tout agaçante ○ 2 ○ 3 ○ 4 ○ 5 Très agaçante

*** Selon vous, dans quelle mesure est-il probable que vous ayez un accident dans cette situation ?**

- 1 Pas du tout probable
- 2
- 3
- 4
- 5 Très probable

*** Si vous aviez un accident dans cette situation, dans quelle mesure pensez-vous que les conséquences seraient graves ?**

- 1 Pas graves du tout
- 2
- 3
- 4
- 5 Très graves

*** Dans quelle mesure pensez-vous que cette situation est dangereuse ?**

- 1 Pas du tout dangereuse
- 2
- 3
- 4
- 5 Très dangereuse

*** Dans quelle mesure pensez-vous que l'automobiliste adopte ce comportement dans le but d'exprimer de la colère ?**

- 1 Pas du tout
- 2
- 3
- 4
- 5 Beaucoup

*** Dans quelle mesure pensez-vous que l'automobiliste a l'intention de vous causer des dommages physiques?**

○ 1 Pas du tout ○ 2 ○ 3 ○ 4 ○ 5 Beaucoup

*** Dans quelle mesure pensez-vous que l'automobiliste a l'intention de vous nuire sur le plan psychologique?**

○ 1 Pas du tout ○ 2 ○ 3 ○ 4 ○ 5 Beaucoup

*** Dans quelle mesure pensez-vous que l'automobiliste aurait pu agir différemment ?**

○ 1 Pas du tout ○ 2 ○ 3 ○ 4 ○ 5 Beaucoup

*** Dans quelle mesure pensez-vous que le comportement de l'automobiliste est agressif ?**

○ 1 Pas du tout ○ 2 ○ 3 ○ 4 ○ 5 Beaucoup

*** Dans cette situation, quelle est la probabilité que vous réagissiez de chacune des manières suivantes…**

	Pas du tout probable 1	2	3	4	Très probable 5
En ignorant le comportement	○	○	○	○	○
En souriant	○	○	○	○	○

En vous écartant de la voiture	○	○	○	○	○
En quittant la route	○	○	○	○	○
En lançant des obscénités	○	○	○	○	○
En insultant le conducteur	○	○	○	○	○
En donnant un coup de sonnette	○	○	○	○	○
En lançant des regards malveillants au conducteur	○	○	○	○	○
En tapant sur la voiture (quand elle est à votre portée)	○	○	○	○	○

De quelle autre manière serait-il probable que vous réagissiez? (facultatif)

*** A quelle fréquence avez-vous rencontré cette situation au cours de votre pratique du vélo dans un contexte urbain ?**

○ Jamais ○ Rarement ○ De temps en temps ○ Souvent ○ Très souvent

IFSTTAR

Interaction cyclistes et automobilistes en ville

0% 100%

Partie A- Scenario3

Pour chacune des situations, veuillez imaginer que vous êtes en train de rouler à vélo en ville pour vous rendre à votre université ou à votre travail. Vous respectez le code de la route. Le ciel est dégagé, il fait doux…

Situation 3:

Vous êtes dans une rue étroite à sens unique, vous roulez dans le sens de la circulation sur le côté droit de la chaussée. Une voiture arrive derrière vous, elle ne peut pas vous dépasser et reste derrière vous. Au bout d'un moment, l'automobiliste dans cette voiture vous insulte à travers sa vitre ouverte.

*** Dans quelle mesure cette situation vous ferait vous sentir…**

	Pas du tout 1	2	3	4	Beaucoup 5
En colère	○	○	○	○	○
Calme	○	○	○	○	○
Stressé(e)	○	○	○	○	○
Décontracté(e)	○	○	○	○	○
Frustré(e)	○	○	○	○	○
Enthousiaste	○	○	○	○	○
Effrayé(e)	○	○	○	○	○

(1= Pas du tout; 5=Beaucoup)

*** Selon vous, dans quelle mesure cette situation est agaçante ?**

○ 1 Pas du tout agaçante ○ 2 ○ 3 ○ 4 ○ 5 Très agaçante

*** Selon vous, dans quelle mesure est-il probable que vous ayez un accident dans cette situation ?**

1	2	3	4	5
Pas du tout probable				Très probable

*** Si vous aviez un accident dans cette situation, dans quelle mesure pensez-vous que les conséquences seraient graves ?**

1	2	3	4	5
Pas graves du tout				Très graves

*** Dans quelle mesure pensez-vous que cette situation est dangereuse ?**

1	2	3	4	5
Pas du tout dangereuse				Très dangereuse

*** Dans quelle mesure pensez-vous que l'automobiliste adopte ce comportement dans le but d'exprimer de la colère ?**

1	2	3	4	5
Pas du tout				Beaucoup

*** Dans quelle mesure pensez-vous que l'automobiliste a l’intention de vous causer des dommages physiques?**

1 Pas du tout | 2 | 3 | 4 | 5 Beaucoup

*** Dans quelle mesure pensez-vous que l'automobiliste a l'intention de vous nuire sur le plan psychologique?**

1 Pas du tout | 2 | 3 | 4 | 5 Beaucoup

*** Dans quelle mesure pensez-vous que l'automobiliste aurait pu agir différemment ?**

1 Pas du tout | 2 | 3 | 4 | 5 Beaucoup

*** Dans quelle mesure pensez-vous que le comportement de l'automobiliste est agressif ?**

1 Pas du tout | 2 | 3 | 4 | 5 Beaucoup

*** Dans cette situation, quelle est la probabilité que vous réagissiez de chacune des manières suivantes…**

	Pas du tout probable 1	2	3	4	Très probable 5
En ignorant le comportement	○	○	○	○	○

En souriant	○	○	○	○	○
En vous écartant de la voiture	○	○	○	○	○
En quittant la route	○	○	○	○	○
En lançant des obscénités	○	○	○	○	○
En insultant le conducteur	○	○	○	○	○
En donnant un coup de sonnette	○	○	○	○	○
En lançant des regards malveillants au conducteur	○	○	○	○	○
En tapant sur la voiture (quand elle est à votre portée)	○	○	○	○	○

De quelle autre manière serait-il probable que vous réagissiez? (facultatif)

*** A quelle fréquence avez-vous rencontré cette situation au cours de votre pratique du vélo dans un contexte urbain ?**

○ Jamais ○ Rarement ○ De temps en temps ○ Souvent ○ Très souvent

IFSTTAR

Interaction cyclistes et automobilistes en ville

0% 100%

Partie A- Scenario4

Pour chacune des situations, veuillez imaginer que vous êtes en train de rouler à vélo en ville pour vous rendre à votre université ou à votre travail. Vous respectez le code de la route. Le ciel est dégagé, il fait doux...

Situation 4:

Vous êtes dans une rue à double sens et vous roulez à droite. Il y a des places de parking des deux côtés de la route. Au moment où vous arrivez, un automobiliste garé sur votre droite ouvre sa portière juste devant vous pour sortir de la voiture. Vous devez freiner et manœuvrer pour l'éviter.

*** Dans quelle mesure cette situation vous ferait vous sentir...**

	Pas du tout 1	2	3	4	Beaucoup 5
En colère	○	○	○	○	○
Calme	○	○	○	○	○
Stressé(e)	○	○	○	○	○
Décontracté(e)	○	○	○	○	○
Frustré(e)	○	○	○	○	○
Enthousiaste	○	○	○	○	○
Effrayé(e)	○	○	○	○	○

(1= Pas du tout; 5=Beaucoup)

*** Selon vous, dans quelle mesure cette situation est agaçante ?**

○ 1 Pas du tout agaçante ○ 2 ○ 3 ○ 4 ○ 5 Très agaçante

*** Selon vous, dans quelle mesure est-il probable que vous ayez un accident dans cette situation ?**

1 Pas du tout probable	2	3	4	5 Très probable

*** Si vous aviez un accident dans cette situation, dans quelle mesure pensez-vous que les conséquences seraient graves ?**

1 Pas graves du tout	2	3	4	5 Très graves

*** Dans quelle mesure pensez-vous que cette situation est dangereuse ?**

1 Pas du tout dangereuse	2	3	4	5 Très dangereuse

*** Dans quelle mesure pensez-vous que l'automobiliste adopte ce comportement dans le but d'exprimer de la colère ?**

1 Pas du tout	2	3	4	5 Beaucoup

*** Dans quelle mesure pensez-vous que l'automobiliste a l'intention de vous causer des dommages physiques?**

1 Pas du tout | 2 | 3 | 4 | 5 Beaucoup

*** Dans quelle mesure pensez-vous que l'automobiliste a l'intention de vous nuire sur le plan psychologique?**

1 Pas du tout | 2 | 3 | 4 | 5 Beaucoup

*** Dans quelle mesure pensez-vous que l'automobiliste aurait pu agir différemment ?**

1 Pas du tout | 2 | 3 | 4 | 5 Beaucoup

*** Dans quelle mesure pensez-vous que le comportement de l'automobiliste est agressif ?**

1 Pas du tout | 2 | 3 | 4 | 5 Beaucoup

*** Dans cette situation, quelle est la probabilité que vous réagissiez de chacune des manières suivantes…**

	Pas du tout probable 1	2	3	4	Très probable 5
En ignorant le comportement	○	○	○	○	○
En souriant	○	○	○	○	○

En vous écartant de la voiture	○	○	○	○	○
En quittant la route	○	○	○	○	○
En lançant des obscénités	○	○	○	○	○
En insultant le conducteur	○	○	○	○	○
En donnant un coup de sonnette	○	○	○	○	○
En lançant des regards malveillants au conducteur	○	○	○	○	○
En tapant sur la voiture (quand elle est à votre portée)	○	○	○	○	○

De quelle autre manière serait-il probable que vous réagissiez? (facultatif)

*** A quelle fréquence avez-vous rencontré cette situation au cours de votre pratique du vélo dans un contexte urbain ?**

○ Jamais ○ Rarement ○ De temps en temps ○ Souvent ○ Très souvent

IFSTTAR

Interaction cyclistes et automobilistes en ville

0% 100%

Partie A- Scenario5

Pour chacune des situations, veuillez imaginer que vous êtes en train de rouler à vélo en ville pour vous rendre à votre université ou à votre travail. Vous respectez le code de la route. Le ciel est dégagé, il fait doux...

Situation 5:

Vous êtes sur une bande cyclable*, la route est en ligne droite, des voitures y circulent. L'automobiliste dans la voiture à côté de vous, sur votre gauche, vous serre (à environ 0,50 mètres), vous forçant presque à vous rapprocher du bord de la route.

* Bande cyclable: voie de circulation réservée aux cyclistes incluse sur la chaussée et délimitée par des bandes de peinture

*** Dans quelle mesure cette situation vous ferait vous sentir...**

	Pas du tout 1	2	3	4	Beaucoup 5
En colère	○	○	○	○	○
Calme	○	○	○	○	○
Stressé(e)	○	○	○	○	○
Décontracté(e)	○	○	○	○	○
Frustré(e)	○	○	○	○	○
Enthousiaste	○	○	○	○	○
Effrayé(e)	○	○	○	○	○

(1= Pas du tout; 5=Beaucoup)

*** Selon vous, dans quelle mesure cette situation est agaçante ?**

○ 1 Pas du tout agaçante ○ 2 ○ 3 ○ 4 ○ 5 Très agaçante

*** Selon vous, dans quelle mesure est-il probable que vous ayez un accident dans cette situation ?**

○ 1 Pas du tout probable	○ 2	○ 3	○ 4	○ 5 Très probable

*** Si vous aviez un accident dans cette situation, dans quelle mesure pensez-vous que les conséquences seraient graves ?**

○ 1 Pas graves du tout	○ 2	○ 3	○ 4	○ 5 Très graves

*** Dans quelle mesure pensez-vous que cette situation est dangereuse ?**

○ 1 Pas du tout dangereuse	○ 2	○ 3	○ 4	○ 5 Très dangereuse

*** Dans quelle mesure pensez-vous que l'automobiliste adopte ce comportement dans le but d'exprimer de la colère ?**

○ 1 Pas du tout	○ 2	○ 3	○ 4	○ 5 Beaucoup

*** Dans quelle mesure pensez-vous que l'automobiliste a l’intention de vous causer des dommages physiques?**

○ 1 Pas du tout	○ 2	○ 3	○ 4	○ 5 Beaucoup

*** Dans quelle mesure pensez-vous que l'automobiliste a l'intention de vous nuire sur le plan psychologique?**

○ 1 Pas du tout ○ 2 ○ 3 ○ 4 ○ 5 Beaucoup

*** Dans quelle mesure pensez-vous que l'automobiliste aurait pu agir différemment ?**

○ 1 Pas du tout ○ 2 ○ 3 ○ 4 ○ 5 Beaucoup

*** Dans quelle mesure pensez-vous que le comportement de l'automobiliste est agressif ?**

○ 1 Pas du tout ○ 2 ○ 3 ○ 4 ○ 5 Beaucoup

*** Dans cette situation, quelle est la probabilité que vous réagissiez de chacune des manières suivantes…**

	Pas du tout probable 1	2	3	4	Très probable 5
En ignorant le comportement	○	○	○	○	○
En souriant	○	○	○	○	○
En vous écartant de la voiture	○	○	○	○	○
En quittant la route	○	○	○	○	○
En lançant des obscénités	○	○	○	○	○

En insultant le conducteur	○	○	○	○	○
En donnant un coup de sonnette	○	○	○	○	○
En lançant des regards malveillants au conducteur	○	○	○	○	○
En tapant sur la voiture (quand elle est à votre portée)	○	○	○	○	○

De quelle autre manière serait-il probable que vous réagissiez? (facultatif)

*** A quelle fréquence avez-vous rencontré cette situation au cours de votre pratique du vélo dans un contexte urbain ?**

○ Jamais ○ Rarement ○ De temps en temps ○ Souvent ○ Très souvent

IFSTTAR

Interaction cyclistes et automobilistes en ville

0% 100%

Partie B1

Partie B

Cette partie comporte une série d'affirmations ; pour chacune, veuillez dire dans quelle mesure cette affirmation vous correspond, en cochant une case entre «1 - pas du tout vrai » et «5 - tout à fait vrai».

*

	Pas du tout vrai 1	Plutôt pas vrai 2	Ni vrai Ni faux 3	Plutôt vrai 4	Tout à fait vrai 5
Si je dois avoir recours à la force pour protéger mes droits, je le fais.	○	○	○	○	○
Parfois j'ai le sentiment que la vie est injuste à mon égard.	○	○	○	○	○
Certain(e)s de mes ami(e)s pensent que j'ai un tempérament impulsif.	○	○	○	○	○
Quand je ne suis pas d'accord avec mes ami(e)s, je ne mâche pas mes mots pour le leur dire.	○	○	○	○	○
Certain(e)s m'ont tellement poussé(e) à bout que nous en sommes venu(e)s aux mains.	○	○	○	○	○
Je sais que certain(e)s de					

mes “ami(e)s” parlent de moi dans mon dos.					
Quand je suis contrarié(e), je le laisse paraître.					
Quand on me provoque suffisamment, je suis capable de frapper quelqu’un.					
J’ai l’impression que la chance sourit toujours aux autres.					
Je m’emporte rapidement, mais je me calme aussi vite.					
Si quelqu’un me frappe, je rends le coup.					
Parfois je ressens de l’amertume à propos de ce qui m’arrive.					
Quand les gens m’agacent, je leur dis leurs quatre vérités.					
Je suis quelqu’un d’humeur égale.					
Il m’est arrivé de menacer physiquement des personnes de mon entourage.					
Je me méfie des inconnu(e)s trop aimables avec moi.					
Parfois je me mets hors de moi sans véritable raison.					

Je contredis souvent les opinions des autres.	○	○	○	○	○
Je ne trouve jamais de raison valable pour frapper quelqu'un.	○	○	○	○	○
Il m'arrive d'être rongé(e) par la jalousie.	○	○	○	○	○
De temps en temps je ne parviens pas à maîtriser l'envie de frapper quelqu'un.	○	○	○	○	○
Je ne peux pas m'empêcher de me disputer avec ceux/celles qui ne sont pas de mon avis.	○	○	○	○	○
J'ai du mal à conserver mon sang froid.	○	○	○	○	○
Quand les gens sont trop gentils, je me demande ce que cela cache.	○	○	○	○	○
Je me bagarre un peu plus que la moyenne.	○	○	○	○	○
	Pas du tout vrai 1	Plutôt pas vrai 2	Ni vrai Ni faux 3	Plutôt vrai 4	Tout à fait vrai 5
Mes ami(e)s disent que j'ai tendance à me disputer.	○	○	○	○	○
Je me sens parfois comme un baril de poudre prêt à exploser.	○	○	○	○	○
Parfois il me semble que les gens se moquent de	○	○	○	○	○

moi dans mon dos.					
Il m'est arrivé d'être hors de moi au point de casser quelque chose.	○	○	○	○	○

IFSTTAR

Interaction cyclistes et automobilistes en ville

0% 100%

Partie B2

* **Selon vous, dans quelle mesure les automobilistes savent comment se comporter lors des interactions en ville avec des cyclistes dans la rue ?**

1	2	3	4	5
Ils ne savent pas du tout				Ils savent très bien se comporter

* **Selon vous, dans quelle mesure les automobilistes conduisent de manière appropriée lorsqu'ils interagissent en ville avec des cyclistes dans la rue ?**

1	2	3	4	5
Pas du tout appropriée				Très appropriée

* **Selon vous, dans quelle mesure les automobilistes considèrent les cyclistes en ville comme des usagers de la route légitimes ?**

1	2	3	4	5
Pas du tout légitimes				Très légitimes

* **Selon vous, dans quelle mesure les automobilistes acceptent de partager en ville la route avec les cyclistes ?**

1	2	3	4	5
N'acceptent pas du tout				Acceptent tout à fait

IFSTTAR

Interaction cyclistes et automobilistes en ville

0% 100%

B3 Identité cycliste

* **Les gens peuvent utiliser différents modes de transport, mais ces modes n'ont pas la même importance dans la façon dont ils se voient en tant qu'usagers.**

Dans quelle mesure vous considérez-vous comme un(e)...

	Pas du tout 1	2	3	4	Tout à fait 5
Cycliste urbain	○	○	○	○	○
Automobiliste	○	○	○	○	○
Piéton(ne)	○	○	○	○	○
Utilisateur(trice) des transports en commun	○	○	○	○	○

* **Être cycliste est un élément important pour définir qui je suis.**

○ 1 Pas du tout vrai ○ 2 ○ 3 ○ 4 ○ 5 Tout à fait vrai

* **Il y a différents types d'usager de la route, qui peuvent être considérés comme des groupes distincts. Les gens peuvent s'identifier plus ou moins avec chacun de ces groupes.**

Dans quelle mesure vous identifiez-vous avec le groupe des...

	Pas du tout 1	2	3	4	Tout à fait 5
Cyclistes urbains	○	○	○	○	○
Automobilistes	○	○	○	○	○
Piétons	○	○	○	○	○
Utilisateurs des transports en commun	○	○	○	○	○

IFSTTAR

Interaction cyclistes et automobilistes en ville

0% 100%

B4 Frequence transports

Le vélo peut avoir différentes utilisations :

-**Loisir**, pour se balader

-**Sport,** pour faire une activité physique

-**Utilitaire, comme moyen de transport,** pour se déplacer d'un point A à un point B.
L'usage utilitaire peut être:

- pour des **déplacements réguliers** (ex: domicile-travail ou domicile-études)
- pour des **déplacements occasionnels** (ex: faire des courses, rendre visite à des amis, se rendre sur un lieu de loisir-sport, etc.)

*** À quelle fréquence utilisez-vous le vélo pour chacune des raisons suivantes ?**

	Jamais	Rarement	Parfois	Souvent	La plupart du temps
Utilitaire, déplacements réguliers	○	○	○	○	○
Utilitaire, déplacements occasionnels	○	○	○	○	○
Loisir	○	○	○	○	○
Sport	○	○	○	○	○

*** Vous utilisez le vélo...**

○ Beaucoup moins en hiver qu'en été
○ Un peu moins en hiver qu'en été
○ Autant en hiver qu'en été
○ Un peu plus en hiver qu'en été
○ Beaucoup plus en hiver qu'en été

*** Depuis combien de temps utilisez-vous le vélo comme moyen de transport ?**

(Donnez votre réponse en nombre d'années et nombre de mois, même si l'un de ces nombres est 0.)

Exemples:

Si vous utilisez le vélo depuis 3 ans et 6 mois, indiquez: An(s) : **3** Mois : **6**

Si vous utilisez le vélo depuis 5 mois, indiquez: An(s) : **0** Mois : **5**

An(s)

Mois

*** Comment évalueriez-vous vos compétences pour la pratique du vélo utilitaire ?**

1 Pas du tout de compétences	2	3	4	5 Beaucoup de compétences

Les questions suivantes concernent des estimations des kilomètres parcourus et du temps passé à vélo selon différents types de trajets possibles à vélo.

*** En moyenne (hors vacances), *combien de kilomètres* par semaine parcourez-vous à vélo pour...**

Exemples:

Si vous roulez à vélo **10 km par semaine**, inscrivez **10** dans la case.

Marquez **0** pour les types de trajets pour lesquels vous n'utilisez pas le vélo.

des déplacements utilitaires (comme moyen de transport), réguliers et occasionnels ? Km/Semaine

le loisir, pour vous balader ? Km/Semaine

faire du sport, pour faire une activité physique ? Km/Semaine

* **En moyenne (hors vacances), *combien de temps* par semaine roulez-vous à vélo pour...**

__**Exemples:**__

Si vous roulez à vélo **2 heures et 30 minutes** par semaine, inscrivez **2** dans la case **Heures** et **30** dans la case **Minutes**.

Si vous roulez à vélo **45 minutes** par semaine, inscrivez **0** dans la case **Heures** et **45** dans la case **Minutes**.

	Heures	Minutes
des déplacements utilitaires (comme moyen de transport), réguliers et occasionnels ?		
le loisir, pour vous balader ?		
faire du sport, pour faire une activité physique ?		

IFSTTAR

Interaction cyclistes et automobilistes en ville

0% 100%

B5

*** Dans quelle mesure pensez-vous avoir des connaissances sur le code de la route concernant les cyclistes ?**

- ○ 1 Pas du tout de connaissances
- ○ 2
- ○ 3
- ○ 4
- ○ 5 Beaucoup de connaissances

*** À quelle fréquence respectez-vous le code de la route à vélo ?**

- ○ 1 Presque jamais
- ○ 2
- ○ 3
- ○ 4
- ○ 5 Tout le temps

*** À quelle fréquence portez-vous un casque quand vous êtes à vélo?**

	Ne s'applique pas (je n'utilise pas le vélo pour ce type d'utilisation)	Jamais	Rarement	Parfois	Souvent	Toujours ou presque
Vélo utilitaire	○	○	○	○	○	○
Vélo loisir	○	○	○	○	○	○
Vélo sportif	○	○	○	○	○	○

*** Faites-vous partie d'une association cycliste ?**

- ☐ Aucune association
- ☐ Association sportive
- ☐ Association urbaine de promotion du vélo
- ☐ Autre association liée au vélo, veuillez préciser :

*** À quelle fréquence utilisez-vous les moyens de transport suivants ?**

	Jamais	Rarement	Parfois	Souvent	La plupart du temps
Voiture (conducteur/trice)	○	○	○	○	○
Voiture (passager/gère)	○	○	○	○	○
Scooter/ Moto (conducteur/trice)	○	○	○	○	○
Scooter/ Moto (passager/ère)	○	○	○	○	○
Transports en commun (bus, métro, tram, RER, train)	○	○	○	○	○
Vélo (personel ou en libre service)	○	○	○	○	○
Marche à pied (plus de 5 minutes)	○	○	○	○	○

*** À quelle fréquence combinez-vous le vélo avec les transports en commun pour vous déplacer ?**

○ 1 Jamais ○ 2 ○ 3 ○ 4 ○ 5 La plupart du temps

*** Avez-vous le permis de conduire automobile ?**

○ Oui ○ Non

*** En moyenne (hors vacances), *combien de kilomètres* par an parcourez-vous en voiture en tant que conducteur en ville?**

Seuls des nombres peuvent être entrés dans ce champ. Marquez 0 si vous ne conduisez pas.

Km/An

IFSTTAR

Interaction cyclistes et automobilistes en ville

0% 100%

B6 Accidents à vélo

*** En tant que cycliste, combien d'accidents avez-vous eus?**

Veuillez prendre en compte tous les accidents, que ce soit des accidents sans conséquences, des accidents n'ayant entraîné que des dégâts matériels, des accidents graves, des chutes, des accidents impliquant un autre usager (automobiliste, piéton, etc.), etc.

2

Veuillez préciser pour les accidents les plus récents l'année où ils se sont produits

Seuls des nombres peuvent être entrés dans ce champ

Année de l'accident le plus récent	
Année du 2ème accident le plus récent	
Année du 3ème accident le plus récent	

Veuillez préciser pour les accidents les plus récents: a. les usagers impliqués et b. les conséquences pour vous.

	a. Usagers impliqués	b. Gravité/conséquences pour vous
Accident le plus récent	Sans réponse ▼	Sans réponse ▼
2ème accident le plus récent	Sans réponse ▼	Sans réponse ▼
3ème accident le plus récent	Sans réponse ▼	Sans réponse ▼

IFSTTAR

Interaction cyclistes et automobilistes en ville

0% 100%

Sociodemographiques

*** Êtes-vous?**

- Un homme
- Une femme

*** Quel est votre âge?**

ans

*** Combien avez-vous d'enfants de moins de 11 ans à charge?**

Si vouz n'avez pas, veillez marquer 0.

*** Quelle est votre activité?**

- Je suis étudiant(e)
- J'exerce une activité professionnelle
- Je ne suis pas étudiant(e) et je n'ai pas d'activité professionnelle

*** Quel est votre niveau d'études?**

- Sans diplôme
- BEP, CAP
- Niveau brevet
- Niveau bac
- BTS/licence
- Master
- Doctorat ou plus

*** Où habitez-vous ?**

- Paris intramuros (département 75)
- Petite Couronne, Île de France (départements 92, 93 et 94)
- Grande Couronne, Île de France (départements 77, 78, 91 et 95)
- Autre, veuillez précisez le numéro du département :

*** Depuis combien de temps habitez-vous en Île de France?**

An(s)

Mois

*** Où étudiez-vous/travaillez principalement ?**

- Paris intramuros (département 75)
- Petite Couronne, Île de France (départements 92, 93 et 94)
- Grande Couronne, Île de France (départements 77, 78, 91 et 95)
- Autre, veuillez précisez le numéro du département :

*** Depuis combien de temps étudiez-vous/travaillez-vous en Île de France?**

An(s)

Mois

*** Quelle est environ la distance (en km) entre votre domicile et votre lieu de travail ou d'études actuel?**

Km

E) RESUME SUBSTANTIEL EN FRANÇAIS DE LA THESE DE DOCTORAT

FACTEURS INDIVIDUELS LIES A L'USAGE DU VELO UTILITAIRE EN VILLE : REPRESENTATIONS, MOTIVATIONS ET AGRESSION PERÇUE

La mobilité est un besoin important de la société, donnant accès à l'éducation, au travail, à la santé (Hickman, Hall et Banister, 2013). Cette mobilité, comprise comme le déplacement des personnes d'un lieu A vers un lieu B, lorsqu'elle est utilisée dans un but spécifique comme pour aller travailler, étudier, acheter des fournitures est qualifiée de "mobilité à des fins utilitaires" ou de "mode de transport utilitaire". Comme l'a mentionné l'Institut du Réseau Métropolitain Européen (European Metropolitan Network Institute), la mobilité urbaine signifie liberté et choix pour les citoyens et développement économique et social pour l'ensemble des villes (2016). De plus, pour certains individus, la mobilité urbaine est une condition préalable à l'inclusion sociale (Kaufmann, 2007; Preston & Rajé, 2007; Ureta, 2008) surtout, si l'on tient compte du fait que sortir de son environnement immédiat ouvre l'accès à un monde d'opportunités. Par conséquent, la valeur de la mobilité urbaine va au-delà du simple déplacement géographique des individus puisqu'elle fournit aux individus qui se déplacent une plus large ouverture d'esprit, à travers différentes interactions entre les espaces, les contextes et les individus (Kakihara & Sorensen, 2001).

Cependant, le contexte actuel de la mobilité urbaine présente plusieurs inconvénients, notamment l'utilisation et la distribution actuelles des principaux modes de transport (voitures, transports publics) qui posent un certain nombre de problèmes importants en termes de pollution, de congestion routière, coût du carburant et la saturation des transports publics, qui affectent la qualité de vie des habitants (Delhomme, Cristea, & Paran, 2013; Mohan & Tiwari, 1999). Cela s'explique notamment par la densité et la concentration de la population des zones urbaines. Selon le Programme des Nations Unies pour les établissements humains (ONU-HABITAT, 2011), alors que les zones urbaines ne couvrent que 2 % de la surface terrestre mondiale, ces zones urbaines sont responsables de plus de 70 % des émissions mondiales de gaz à effet de serre. De même, plus de 50 % de la population mondiale vit actuellement en zones urbaines et on s'attend à ce qu'elle augmente (Bellucci, Bogner, & Sturchio, 2012).

Parmi ces problèmes de mobilité urbaine, la pollution causée par les véhicules de transport motorisés est une préoccupation majeure et a conduit à la Commission européenne (2011) à cibler une réduction de 60% des émissions de CO_2 liées aux transports d'ici 2050. La France s'est fixé pour objectif de réduire de 25% les niveaux d'émissions de gaz à effet de serre de 1990 à 2050 (cf. le protocole de Kyoto, 1998; la Loi sur l'air et l'utilisation rationnelle de l'énergie, LAURE, 1996). La voiture individuelle, qui est le mode de transport dominant dans la plupart des pays occidentaux, est également l'un des principaux facteurs de pollution atmosphérique (Chapman, 2007; Metz, 2012; Stradling, 2003). Outre les conséquences pour la santé publique des émissions de polluants, d'autres facteurs externes liés à l'usage de la voiture, en particulier le coût social, ont un impact négatif important, tels que les accidents de la route, la congestion du trafic, l'étalement urbain, l'occupation de l'espace public, le bruit et le stress (European Metropolitan network Institute, 2011; Hickman & Banister, 2014; Rocha, Cunha, Varandas, & Dias, 2007), ce qui affecte l'habitabilité générale (Fishman, 2016).

D'un point de vue économique, la voiture individuelle est l'une des alternatives de transport les plus coûteuses pour les citoyens. Les dépenses des ménages pour la voiture individuelle incluent le coût du véhicule, du carburant, de l'huile moteur, l'usure du véhicule, l'entretien, les réparations, l'assurance et les taxes du propriétaire, sans parler de la dépréciation avec le temps de la voiture. De même, il est coûteux pour les municipalités et le gouvernement, qui doivent inclure dans leur budget la construction, l'entretien et la gestion des infrastructures et des réseaux routiers pour les voitures et autres véhicules motorisés (Gössling & Choi, 2015 ; Luk, Hepburn et Thoresen, 1995). Outre les coûts économiques, l'utilisation de la voiture individuelle nuit à la santé publique et à la santé des individus, non seulement en raison des effets de l'émission de polluants, mais aussi du mode de vie sédentaire qui augmente de plus en plus (Cutler, Glaeser, & Shapiro, 2003; Owen, Sparling, Healy, Dunstan, & Matthews, 2010). Ces conséquences négatives de l'utilisation des voitures individuelles semblent plus troublantes si l'on tient compte du fait que, selon Stradling (2003), jusqu'à 80 % des trajets pourraient être effectués en utilisant un autre mode de transport. Cependant, en raison, entre autres, de son symbole de liberté personnelle et de son statut social élevé (Boquet, 2009), les individus sont généralement devenus dépendants de l'utilisation de la voiture individuelle (Stradling, 2003).

En ce qui concernent les autres modes de transport et leur impact sur la mobilité urbaine, les transports publics ne génèrent pas de problèmes au même niveau que ceux causés par la voiture individuelle. Toutefois selon Boquet (2009), les transports publics ne sont pas toujours disponibles et la saturation pendant les heures de pointe est un épisode fréquent. De plus, les transports publics représentent une contrainte pour le passager en raison des itinéraires et des horaires fixes, ce qui conduit à une expérience de mobilité incomplète pour les passagers. Les passagers perçoivent également négativement les transports publics parce qu'ils ressentent une perte de leur espace personnel. En outre, les transports publics peuvent être dans certains cas, tels que les autobus sans voies réservées, inefficaces en temps, car ils peuvent être soumis à la congestion du trafic, tout comme les voitures individuelles. Par ailleurs, le développement des transports publics implique la construction d'infrastructures et/ou des investissements importants, rendant leur mise en œuvre lente et coûteuse pour les municipalités et les gouvernements.

D'autre part, la marche est le mode de transport le plus vert, sans facteurs externes négatifs. C'est un mode de transport sain qui offre une totale autonomie de voyage et qui n'est pas onéreux. Cependant, la marche est limitée en termes de distance et de vitesse (Metz, 2012). Par conséquent, la marche exige plus de temps que les autres modes de transport pour réaliser un déplacement, devenant un contrainte dans les sociétés occidentales orientées vers le gain du temps. En termes de mobilité urbaine, il convient notamment pour couvrir de très courtes distances qui sont les plus fréquentes (ADEME, 2004).

Ainsi, l'utilisation de la voiture individuelle apparaît comme la solution la moins optimale pour la question de la mobilité urbaine. Concernant les transports publics et la marche, bien qu'ils représentent de meilleures solutions a la voiture individuelle, ils ne peuvent répondre à la demande actuelle de mobilité urbaine. Dans ce contexte, une solution possible aux problèmes de mobilité urbaine, en particulier aux problèmes liés à la pollution atmosphérique, est de promouvoir des modes de transport plus respectueux de l'environnement comme le vélo et d'explorer le potentiel de transfert modal de la voiture individuelle au vélo. Selon le rapport du Forum International des Transports (ITF), le vélo, lorsqu'il est utilisé à des fins utilitaires (c'est-à-dire non sportif ou récréatif) est une contribution importante aux problèmes de mobilité car il est l'un des modes de transport le plus vertueux pour le développent durable, car il ne nécessite pas d'énergie fossile, ne pollue pas, améliore la santé des cyclistes avec l'activité physique, provoque moins de perturbations sonores et a moins d'impact sur la congestion car il occupe moins d'espace public que tous les autres modes de transports motorisés (ITF, 2013). En outre, il s'agit d'un mode de transport relativement rapide sur de courtes distances (Gatersleben & Appleton, 2007) et, en raison de ses faibles coûts, le vélo pourrait également contribuer à réduire les dépenses des ménages. De plus, le vélo assure l'indépendance des horaires et des itinéraires de transports publics.

Au total, le vélo comme moyen de transport contribue à l'amélioration de la qualité de la vie urbaine (Van Acker, Van WEE et Witlox, 2010) et augmente même le sentiment de bonheur (St-Louis, Manaugh, van Lierop et El-Geneidy, 2014). La marche et le vélo sont associés à la nature, à la forme physique et à la santé mentale (Thomas, Walker et Musselwhite, 2014), mais comparé à la marche, le vélo permet d'aller plus vite et plus loin (Metz, 2012).

En raison des conséquences positives du vélo en tant que mode de transport, la plupart des pays européens ont essayé, au cours des quinze dernières années, d'améliorer la part modale du vélo (Héran, 2014; Pucher & Dijkstra, 2003), conduisant à un regain d'intérêt des usagers et des réflexions des autorités publiques et des décideurs sur le statut du vélo en milieu urbain. En général, pour promouvoir le vélo en ville, les autorités publiques et les décideurs ont mis en œuvre plusieurs actions, telles que l'infrastructure cyclable, les changements de signalisation et de législation. Ces actions se caractérisent principalement par des mesures «externes», conçues par des ingénieurs ou des urbanistes d'un point de vue technique, comme la construction de pistes cyclables. Cependant, la part modale vélo n'a pas évolué proportionnellement à ces efforts (Gatersleben & Murtagh, 2012), et le vélo n'est toujours pas un mode de transport majeur dans la plupart des pays européens (Metz, 2012, Pucher et Buehler, 2008).

De même, en France, les actions menées par les pouvoirs publics et les élus pour promouvoir l'usage du vélo utilitaire en ville ont principalement été axées sur les infrastructures et les installations cyclables (par exemple, pistes cyclables, système de vélo en libre-service). On peut s'attendre à ce que ces efforts aient eu des effets positifs notables en France car ce pays possède de nombreuses conditions favorisant une pratique efficace du vélo utilitaire en ville (par exemple, en France, 50 % des déplacements en voiture sont inférieurs à 3 km, ADEME, 2004). Cependant, ces actions n'ont pas significativement amélioré la part modale du vélo, qui n'atteint que 3 % en France (Papon & De Solère, 2010).

Compte tenu des nombreux arguments positifs qui soutiennent le vélo comme mode de transport, ainsi que du nombre élevé d'individus qui réunissent les conditions pour se déplacer à vélo (par exemple en termes de distance de déplacement) et des efforts importants déployés par les pouvoirs publics et les élus dans les dernières années pour promouvoir le vélo utilitaire en ville, la persistance de la faible part modale du vélo dans la plupart des pays européens, notamment en France, devient un problème pertinent pour l'ensemble de la société. On pourrait arguer que ce mode de transport est difficile à encourager car les actions mises en œuvre pour la promouvoir sont insuffisantes et ne ciblent pas les principaux déterminants de l'usage du vélo utilitaire en ville. Bien que les problèmes d'infrastructure aient été abordés, il est évident que d'autres facteurs jouent un rôle important dans l'amélioration de la part modale du vélo utilitaire en ville et qu'il est nécessaire de les identifier.

RECHERCHE DES FACTEURS EXTERNES IMPLIQUES DANS L'USAGE DU VELO

Parmi les facteurs qui influent sur la pratique du vélo utilitaire en ville, les plus fréquemment cités dans la littérature se rapportent à la dimension de l'utilité, par exemple le temps et la distance du trajet (Park, Lee, Shin, & Sohn, 2010; Wuerzer & Mason, 2015); et la topographie, comme les pentes ou les collines (Vandenbulcke et al., 2011), les problèmes climatiques, la température et les saisons, comme la pluie, la neige et le froid (Ahmed, Rose, & Jakob, 2013; Bergström & Magnusson, 2003; Flynn, Dana, Sears, & Aultman-Hall, 2012), et les conditions du trafic routier, comme la densité du trafic et la vitesse des autres véhicules (Souza, Sanches, & Ferreira, 2014). Ces facteurs externes sont également couramment abordés par les autorités publiques et les décideurs à travers les infrastructures cyclables (par exemple, pistes cyclables) ou les installations cyclables (par exemple, signalisation pour le vélo) (Pucher & Buehler, 2008; Pucher, Dill, & Handy, 2010; Reynolds, Harris, Teschke, Cripton, & Winters, 2009; Tilahun, Levinson, & Krizek, 2007). Ces solutions sont connues sous le nom de «mesures dures», que nous considérons comme «externes». Cependant, certaines études suggèrent que si l'amélioration de l'infrastructure et des installations cyclables peuvent accroître la sécurité de l'usage du vélo utilitaire en ville (Krizek & Roland, 2005; McClintock & Cleary, 1996), elles ne sont pas totalement efficaces pour la promotion de l'usage du vélo car elles n'ont pas entraîné une augmentation de la part modale du vélo (Wardman, Hatfield, & Page, 2012; Welleman, 1997), notamment pour aller travailler ou pour se rendre sur les lieux d'études (Heesch & Sahlqvist, 2013) ou chez les individus qui n'utilisent habituellement pas le vélo (Bergström et Magnusson, 2003, Goodman, Sahlqvist, & Ogilvie, 2013); qui deviennent alors de nouveaux utilisateurs.

La relative inefficacité de ces mesures, comme en atteste la faible part modale du vélo, souligne l'importance de considérer d'autres déterminants chez les usagers de la route. En effet, en dépit de l'influence exercée sur le vélo par rapport à ces facteurs externes, la décision d'utiliser ou non un vélo comme mode de transport peut également être influencée par des déterminants subjectifs/internes qui sont rarement ou non pris en compte, comme les facteurs psychologiques (tels que la peur du vélo, la confiance dans ses propres aptitudes et compétences à faire du vélo, les motivations), personnels (comme la mauvaise/bonne condition physique, les valeurs environnementales), et sociaux (comme les stéréotypes négatifs, l'approbation sociale). Cette diversité de déterminants subjectifs/internes qui pourrait avoir un impact sur le choix modal suggère qu'il est très important de prendre en compte le point de vue de l'individu pour la pratique du vélo utilitaire en ville. En particulier, nous soulignons l'importance des facteurs individuels liés au contexte social et environnemental impliqués dans l'usage ou le non usage du vélo comme mode de transport. Par conséquent, la recherche de ces facteurs psychologiques ou déterminants est impérative pour le développement du vélo utilitaire en ville.

RECHERCHE DES FACTEURS INDIVIDUELS SOUS-JACENTS A L'USAGE DU VELO

Comme nous venons de le mentionner, la majeure partie de la recherche sur le vélo utilitaire en ville se focalise sur les aspects techniques ou environnementaux - facteurs externes - à travers l'infrastructure et les installations cyclables. Cependant, récemment, un certain nombre d'études ont commencé à s'intéresser aux aspects psychologiques tels que les facteurs sociodémographiques, les attitudes liées à l'usage du vélo, l'image sociale du vélo, la typologie des cyclistes et divers autres facteurs influençant le comportement des cyclistes. Pour identifier les caractéristiques les plus fréquemment associées à l'usage du vélo, Gatersleben et Appleton (2007) ont montré, au Royaume-Uni, que les cyclistes qui se rendent au travail apprécient la flexibilité relative de l'usage du vélo plutôt que les avantages pour la santé et l'environnement. Ils ont également trouvé une relation positive entre les attitudes envers le vélo et les cinq premières étapes du changement ("Pré-contemplation", "Contemplation", "Préparation à l'action", "Action" et "Maintien") décrites dans le modèle transthéorique du changement (Prochaska & DiClemente, 1983). Au fur et à mesure que les individus progressent de la première à cette dernière étape, les attitudes des usagers envers le vélo deviennent plus positives et leurs perceptions des différentes barrières personnelles et externes changent. De même, en Suède, Forward (2014) a montré à travers une étude dans laquelle les participants ont évalué quinze croyances comportementales sur le vélo, que les caractéristiques liées au «bien-être et les préoccupations environnementales» sont les plus associées au vélo dans la dernière étape de changement; tandis que les croyances concernant «la vitesse et l'efficacité» et «l'inconfort» sont venues en deuxième et en troisième place, respectivement. Cependant, lorsque les participants étaient en première étape du changement (pré-contemplation), les résultats étaient différents : «le bien-être et les préoccupations environnementales» demeuraient les principales croyances liées à l'usage du vélo, mais «d'inconfort» prenait la deuxième place, laissant «la vitesse et l'efficacité» en troisième lieu. En lien avec Gatersleben et Appleton (2007), Forward (2014) a également constaté que les effets perçus de l'usage du vélo étaient plus positifs comme les individus avançaient à travers des étapes de changement de Prochaska et DiClemente, des non-cyclistes vers les cyclistes ayant un usage fréquent du vélo.

Davies, Halliday, Mayes et Pocock (1997) ont noté, au Royaume Uni, dans le cadre de sept entretiens individuels et de focus groups (entre huit et douze participant-e-s), que les images à l'égard du vélo sont négatives, sont "harassés", "imbibés par la pluie", "individus épuisés", "ayant à négocier des côtes" et "menacés par les camions". Pour certains automobilistes, les cyclistes sont également considérés comme négligents ou irresponsables lorsqu'ils adoptent des comportements tels que rouler à vélo sans lumières après la tombée de la nuit. Plus récemment, Daley et Rissel (2011), en Australie, ont constaté que bien que l'usage du vélo soit généralement considéré comme positif, comme une activité respectueuse de l'environnement, les comportements de certains cyclistes ont été perçus négativement, ce qui a influencé négativement les opinions sur l'usage du vélo, en particulier des non-cyclistes. Ils ont également trouvé que l'image publique de l'usage du vélo pouvait servir de barrière ou de facilitateur quant à l'usage du vélo. En France, l'image du vélo a traversé plusieurs phases, en suivant de près le rythme d'usage de la bicyclette. Cette image a été principalement positive dans les premiers stades du vélo (XIXème siècle) quand le vélo est devenu populaire, puis l'image s'est détériorée avec le déclin du vélo (XXème siècle), et finalement, a recommencé à s'améliorer avec le retour du vélo. Aujourd'hui, l'usage du vélo est perçu de façon fortement contrastée, avec une partie de la population qui le soutient et l'autre qui s'y oppose (Héran, 2014).

En ce qui concerne le type de cyclistes, plusieurs études ont tenté d'aller plus loin dans la catégorisation des cyclistes urbains en définissant une typologie des usagers. Dans une enquête par questionnaire en Angleterre, Gatersleben et Haddad (2010) ont identifié quatre types de stéréotypes des cyclistes associés à l'usage du vélo utilitaire en ville : « responsable », « style de vie », « banlieusard » et « hippy-go-lucky ». Cette typologie a été obtenue à partir des réponses des cyclistes et des non-cyclistes. Ces auteurs ont également montré que la fréquence de l'usage du vélo semblait changer la perception du stéréotype. Les usagers qui ont fait du vélo récemment ont associé les cyclistes typiques aux stéréotypes « responsables », « banlieusard » et « hippie-go-lucky » et à un usage du vélo pour les activités quotidiennes normales (par exemple, les achats et les déplacements domicile-travail), tandis que les usagers qui n'ont pas utilisé la bicyclette récemment ont davantage associé les cyclistes typiques au « style de vie » et à quelqu'un qui aime vraiment le vélo et qui investit beaucoup de temps et d'argent au vélo. Dans un autre sondage téléphonique mené à Portland (États-Unis), Dill et McNeil (2013) ont également identifié quatre types de cyclistes ayant des caractéristiques différentes : « les forts et intrépides »; « les enthousiastes et confiants »; « les intéressés mais préoccupés »; et « sous aucune circonstance, ni comment » (no way, no how). En général, dans ces études, les cyclistes sont perçus positivement et la typologie des cyclistes urbains a permis de différencier leurs intérêts.

Miller et Handy (2012) ont étudié les facteurs qui influencent les déplacements à vélo. Ils montrent que les préférences individuelles telles que le goût du vélo - contrairement au goût pour la conduite - et le confort du vélo sont des déterminants clés de l'usage du vélo, alors que les facteurs sociodémographiques traditionnellement associés à l'usage du vélo comme le sexe, l'âge ou le revenu, n'ont pas eu d'effets directs. Passafaro et al. (2014) ont montré en Italie que les anticipations d'émotions positives et de comportements passés sont les deux principaux déterminants du désir des gens de circuler à vélo en milieu urbain. Dans une étude qualitative, Heesch et Sahlqvist (2013), s'intéressant aux facteurs influençant la pratique du vélo urbain, auprès d'un échantillon de cyclistes utilitaires et non-utilitaires, ont constaté que les motivations les plus fréquemment rapportées étaient des facteurs environnementaux construits (par exemple, des itinéraires cyclistes bien conçus et séparés) suivis de facteurs socio-culturels (par exemple, une plus grande acceptation, une meilleure prise de conscience et une meilleure prise en compte de la sécurité des autres usagers de la route).

De nos jours, la question du bien-être de la population est devenue fondamentale. Plusieurs études récentes ont souligné que le vélo utilitaire en ville, plus que d'autres modes de transport, est fortement associé au bien-être et au bonheur (Morris & Guerra, 2014; St-Louis et al., 2014; Taniguchi, Grääs, & Friman, 2014; Willis, Manaugh, & El-Geneidy, 2013), et aussi à l'absence de maladie (Mytton, Panter, & Ogilvie, 2016). De même, une autre étude a montré que les modes de transport actifs (vélo et marche à pied) sont associés à un plus grand bien-être, comparés aux déplacements en voiture, et que le passage de la voiture à des modes de déplacement plus actifs est associé à une amélioration du bien-être (Martin, Goryakin, & Suhrcke, 2014).

Le bien-être est l'un des aspects positifs du vélo utilitaire en ville qui pourrait être considéré comme une motivation psychologique capable de persuader ou de motiver intérieurement quelqu'un à commencer et/ou à continuer à faire du vélo. Dans les études précédemment décrites, il existe d'autres résultats significatifs concernant les facteurs psychologiques impliqués dans l'usage du vélo mais qui sont encore à peine pris en compte. Outre le bien-être, d'autres motivations pourraient faire partie des facteurs internes sous-jacents à la pratique du vélo. Ces motivations pourraient être intégrées dans une approche du vélo utilitaire en ville qui inclut également les facteurs externes qui influencent la pratique du vélo, ainsi que les facteurs internes, plus spécifiquement les motivations psychologiques. Les facteurs externes et internes semblent être des composantes essentielles dans le développement d'une approche intégrée du vélo qui pourrait être utilisée pour sa promotion.

Ce type d'approche n'a pas vraiment été complètement exploré auparavant. Cette absence et la nécessité de cette approche intégrée font partie des principales raisons de cette thèse de doctorat.

Egalement, un élément fondamental dans le développement de ce modèle est une analyse appropriée des aspects négatifs de l'usage du vélo, autrement dit, ce qui empêche quelqu'un d'utiliser une bicyclette à des fins utilitaires ? Tout comme les aspects positifs de l'usage du vélo, ses aspects négatifs doivent également être explorés, à partir des deux approches : externe et interne, et en particulier, la préoccupation de la sécurité routière.

Ainsi, lorsqu'on doit décider de faire du vélo ou de ne pas en faire dans un but utilitaire, un utilisateur potentiel doit faire face à un processus décisionnel et évaluer un ensemble complet de différents types d'arguments positifs et négatifs liés à l'usage du vélo utilitaire en ville. Les facteurs qui facilitent l'usage du vélo pourraient inclure les avantages positifs généraux du vélo (facteurs représentationnels), et les raisons spécifiques ou incitations personnelles à faire du vélo (facteurs motivationnels), que nous appellerons des «leviers» dans cette thèse doctorale. D'autre part, les facteurs qui découragent l'usage du vélo utilitaire en ville pourraient inclure les inconvénients généraux à faire du vélo (facteurs représentationnels) et les difficultés ou réticences personnelles envers le vélo (facteurs motivationnels), comme par exemple la peur de la circulation, que nous appellerons des «barrières».

Les facteurs représentationnels et motivationnels pourraient être considérés comme deux parties différentes de l'évaluation d'un objet ou d'une action. Le concept de représentation que nous avons utilisée intègre trois concepts théoriques : la représentation mentale comme «un encodage de l'information en mémoire» (Smith & Queller, 2001, p. 111), les représentations sociales qui sont des «systèmes de valeurs, d'idées et de pratiques qui permettent la communication entre les membres d'une communauté» (Moscovici, 1973, p. xiii); et l'attitude comme «une tendance psychologique qui s'exprime en évaluant une entité particulière avec un certain degré de faveur ou de défaveur» (Eagly & Chaiken, 1993, p. 1). En d'autres termes, le concept de représentation dans notre étude se réfère à l'information, les connaissances, les évaluations cognitives et les croyances sur l'usage du vélo utilitaire en ville et les caractéristiques y sont associées. La motivation peut être définie comme « une hypothétique force intra-individuelle protéiforme, qui peut avoir des déterminants internes et/ou externes multiples, et qui permet d'expliquer la direction, le déclenchement, la persistance et l'intensité du comportement ou de l'action » (Fenouillet, 2012, p. 9). Ainsi, le facteur représentationnel agirait en une première étape du processus décisionnel d'utiliser ou non le vélo, alors que le facteur motivationnel agirait en deuxième étape de façon plus décisive du même processus.

De plus, les arguments relatifs à l'usage du vélo utilitaire en ville peuvent aussi être étudiés en fonction de plusieurs dimensions, outre la valence positive et négative, telles que l'orientation intrinsèque/extrinsèque (Ryan & Deci, 2000). La motivation intrinsèque de l'usage du vélo est liée aux individus qui s'intéressent au vélo sans récompense externe, tandis que les motivations extrinsèques à l'usage du vélo sont liées aux conséquences externes de l'usage du vélo. Les dimensions étudiées pourraient intégrer d'autres aspects tels que le sentiment que nous pouvons ou ne pouvons pas contrôler les leviers ou les barrières quant à l'usage du vélo, cette dimension se réfère à la contrôlabilité (Weiner, 1986). D'un côté, un argument qualifié de contrôle interne est un argument que nous pouvons modifier si nous voulons le faire/pratiquer. De l'autre côté, un argument qualifié de contrôle externe est un argument que nous ne pouvons pas facilement modifier. En tant que tel, les arguments liés à l'usage du vélo peuvent être sous contrôle externe (par exemple, embouteillages, parking de bicyclettes, pollution) ou sous contrôle interne (par exemple aller n'importe où, prendre des raccourcis, aller plus vite). Les arguments relatifs au vélo peuvent également être classés comme stables ou épisodiques (Weiner, 1986). Par exemple, l'existence de pistes cyclables est un argument stable tandis que la pluie est un argument épisodique (non-stable). Ces dimensions, contrôlabilité et stabilité nous permettent d'explorer les types d'arguments liés à l'usage du vélo qui peuvent être abordés autrement en fonction d'un obstacle ou d'un facilitateur, aussi en termes de capacité à être contrôlée, et de leur stabilité. Ainsi, les facteurs liés à l'usage du vélo (avantages, inconvénients, leviers et barrières) peuvent également inclure le type de dimension : intrinsèque/extrinsèque, contrôlable et stable. En outre, lorsque les gens sont motivés à faire du vélo mais rencontrent des inconvénients ou des barrières qui compliquent la pratique du vélo, ils peuvent ou non mettre en œuvre des stratégies pour éviter ces inconvénients ou barrières. Les stratégies pourraient être à travers un comportement particulier (par exemple, en mettant plusieurs verrous ou un cadenas pour éviter le vol de la bicyclette) ou une réévaluation (par exemple réévaluation cognitive des inconvénients) pour surmonter les obstacles. Ainsi, les stratégies d'un individu pour utiliser le vélo peuvent dépendre de leurs propres représentations et motivations liées à l'usage du vélo.

La perception et l'évaluation de chaque argument pour ou contre l'usage du vélo sont également influencées par la diversité des caractéristiques de l'individu en termes de connaissances, d'expériences, d'habitudes, de valeurs et de personnalité; par ses origines sociale et culturelle; et aussi, par ses besoins personnels, ses désirs et ses attentes du moment. Ainsi, le résultat de la perception d'un argument, d'un objet ou d'une action peut être interprété à l'aide de références différentes qui varient d'un individu à l'autre (variabilité interindividuelle) et un individu peut également modifier l'évaluation de ses arguments au cours de sa vie (variabilité intra-individuelle) ; par conséquent, le résultat pourrait refléter fidèlement la réalité, mais il pourrait aussi être en quelque sorte déformé sans être nécessairement factuel (Duncan, 1976).

Sur la base de facteurs subjectifs, une distance déterminée (par exemple sept kilomètres) pour un trajet spécifique à vélo pourrait être évaluée différemment par deux individus. Un individu pourrait considérer qu'il s'agit d'une distance cyclable appropriée, tandis qu'un autre pourrait le considérer comme trop long à faire à vélo. Cette différence concerne la variabilité entre les individus. Plus précisément, quand quelqu'un se sent incapable de surmonter une barrière donnée, ce peut être parce qu'un tel obstacle ne peut pas être objectivement contrôlé ou surmonté, ou à cause d'une évaluation personnelle et subjective qui augmente sa perception de la difficulté rendant impossible ce qui pourrait autrement être une complication gérable par lui-même dans d'autres circonstances ou par un autre individu. En ce sens, une évaluation subjective de tous les facteurs considérés pourrait être utilisée par l'individu pour soupeser les inconvénients et/ou les barrières avec les avantages et/ou les motivations afin de décider en conséquence d'utiliser ou non le vélo comme mode de transport.

Par conséquent, les facteurs individuels, en termes de représentations et de motivations, positives et négatives, leurs caractéristiques et leurs perceptions (interprétations personnelles), doivent être intégrés dans le spectre des raisons qui pourraient influencer positivement ou négativement l'usage du vélo utilitaire en ville. Actuellement, la proportion et le poids de ces avantages, inconvénients, leviers et barrières dans la prise de décision de la pratique du vélo comme mode de transport sont peu connus.

RISQUES OBJECTIF ET SUBJECTIF QUANT A L'USAGE DU VELO UTILITAIRE EN MILIEU URBAIN

L'une des préoccupations les plus importantes à propos de l'usage du vélo est liée à la sécurité routière (Passafaro et al., 2014). Le terme "sécurité" désigne l'état de sécurité; en d'autres termes, être en sécurité, soit être libre ou protégé-e- contre l'apparition ou le risque de blessure ou de danger (Cambridge Dictionary, 2016). Slovic, Fischhoff et Lichtenstein (1985) ont défini le risque objectif comme «des mesures quantitatives des conséquences du danger exprimées sous la forme de probabilités conditionnelles de subir un préjudice» (p. 92). Malgré la vulnérabilité d'un cycliste comparée à la protection d'un automobiliste à l'intérieur d'une voiture ou d'autres véhicules protégés par la carrosserie, le vélo urbain n'est pas le mode de transport objectivement le plus dangereux. En ce qui concerne le cas de Paris, parmi le nombre total de décès en circulation en 2014, 20 étaient piétons (51 %), 14 motocyclistes (36 %), 2 utilisateurs de voitures (5 %) et seulement 3 cyclistes (8 %) (Observatoire des Déplacements à Paris, 2016). En se basant uniquement sur ces données (hors transport public), les piétons semblent être le type d'usager le plus à risque dans le trafic parisien, suivi par les motocyclistes. Les passagers de voiture et les cyclistes sont presque au même niveau. Cependant, la part modale de ces modes de transport n'est pas la même. Selon l'Observatoire des Déplacements à Paris (2016), à Paris la marche est le moyen de transport le plus utilisé (49 %), suivie des transports publics (34 %), la voiture (11 %), le vélo (3 %), et autre mode (1 %). Ainsi, compte tenu de la part modale et des décès dans la circulation routière, le taux indique que le mode de transport le plus dangereux à Paris est la motocyclette (11,6 %), suivie du vélo (1,7 %), la marche (0,7 %) et les voitures (0,3 %). Toutefois, la majorité des piétons et des cyclistes tués survient lorsqu'un véhicule automobile heurte un piéton ou un cycliste, soit sur la route soit sur le trottoir (Semler et al., 2016). Selon l'Observatoire français de la sécurité routière (ONISR, 2015), sur 159 cyclistes tués en 2014 en France, environ 79 % ont été tués dans une collision avec un véhicule à moteur à quatre roues.

Selon Amoros, Chiron, Thélot et Laumon (2011), dans une étude basée sur 13 684 victimes cyclistes entre 1996 et 2008 dans le département du Rhône, la majorité des cyclistes adultes et adolescents blessés en ville (n = 7 981) ont été impliqués dans un accident impliquant seulement le vélo (67,1 %) par rapport aux accidents impliquant un véhicule à moteur (30,9 %). Dans la même étude, la gravité des blessures a été classée selon six types de gravité. La proportion la plus importante de blessures chez les cyclistes urbains adulte et adolescent était faible (64,7 %), suivie de modérée (28,1 %), grave (5,6 %), sévère (0,9 %), critique (0,2 %) et mortelle dans 0,6 % des accidents.

Concernant les données d'accidents, les accidents mortels, la classification de la gravité des blessures, les modes de transport impliqués dans un accident et les parts modales de transports montrent que certains usagers de modes de transport sont plus vulnérables (par exemple les motocyclistes, les cyclistes et les piétons) que les usagers des autres modes de transport (par exemple les automobilistes ou passagers des véhicules à moteur à quatre roues). Même si la majorité des accidents causés par les cyclistes était des accidents à vélo, la plupart du temps, ils n'étaient pas graves. Les accidents des cyclistes les plus graves surviennent lorsqu'un véhicule automobile est impliqué. Ainsi, le danger n'est pas une condition inhérente au vélo, le risque découle de l'interaction des cyclistes avec les véhicules à moteur.

De plus, pour les cyclistes, le risque de blessure peut provenir de différentes sources. Il peut venir, comme nous l'avons montré précédemment, d'une source externe, comme l'interaction avec d'autres usagers de la route mais aussi de sources externes supplémentaires qui peuvent être la météo (par exemple la pluie) et l'infrastructure routière (par exemple, des fissures dans la surface du sol). D'autre part, le risque de blessure peut également provenir d'une source interne, comme la fatigue ou la perte de concentration. En outre, un cycliste pourrait tomber à tout moment, soit en raison d'une source interne ou externe, puisque l'équilibre nécessaire pour faire du vélo peut facilement être perdu. Par conséquent, en raison de ces multiples sources de danger, les cyclistes peuvent sentir ou percevoir qu'ils sont effectivement plus vulnérables que les autres usagers de la route. Cette perception provient d'une évaluation personnelle et est donc liée au risque subjectif du vélo (et donc pas nécessairement précis).

Le risque objectif et le risque subjectif sont tous deux des facteurs très importants impliqués dans l'usage du vélo, mais il existe des différences essentielles entre eux. Ainsi, le risque objectif est principalement basé sur des informations quantitatives sur les faits avérés, tandis que le risque subjectif est personnel et se réfère « à l'évaluation de la probabilité d'un accident ou d'un événement négatif et le jugement de la gravité des conséquences en cas d'accident» (Lund, Nordfjærn, & Rundmo, 2012, p. 1171). En outre, la mesure n'est pas simple. En ce qui concerne le risque objectif du vélo, il est important de faire appel au dossier et aux données sur les accidents, les blessures et les décès afin d'essayer de quantifier le risque objectif du vélo urbain. Néanmoins, la pénurie notoire de données en raison de la sous-déclaration (Blaizot, Papon, Haddak, & Amoros, 2013) concernant les accidents des cyclistes entrave l'exploration sur ce sujet et ouvre plus de questions qu'elle n'apporte de réponses. Quant à l'évaluation du risque subjectif, les processus psychologiques impliqués dans les jugements du risque ne sont pas encore complètement estimés (Price, 2001). Bien que, selon Lund et Rundmo (2009), des facteurs comme «la familiarité avec la source de risque et le contrôle perçu de la situation sont censés avoir un effet sur la perception du risque» (p. 548). Cependant, le problème du risque subjectif est que «des individus sont souvent des juges inexacts sur les risques» (p. 548).

Les cyclistes sont considérés comme des usagers de la route «vulnérables» par les autorités routières (Shinar, 2012), ce qui se comprend car les véhicules à moteur, en particulier les voitures et les poids lourds (par exemple les camions) sont plus puissants que les bicyclettes en termes de masse et de vitesse. Ainsi, dans les interactions entre ces différents types d'usagers, les cyclistes sont en effet moins protégés. Dans la mobilité urbaine, les vélos et les autobus sont aux extrémités opposées du spectre en termes de taille, de masse et de manœuvrabilité; tandis que les vélos sont petits, légers et agiles, les bus sont grands, lourds et rigides (Austroads, 2005). Par conséquent, des conflits de sécurité peuvent croître lorsque des autobus ou autres véhicules à moteur et des vélos sont sur la route et partagent le même espace (Baumann, Brennan, & Zeibots, 2012). De plus, même si aucune collision ne se produit, le passage des véhicules à proximité des vélos peuvent conduire les cyclistes à se sentir en danger et à les décourager de faire du vélo (Guthrie, Davies, & Gardner, 2001; Parkin, Wardman, & Page, 2007; Walker, Garrard, & Jowitt, 2014). Dans une étude sur les interactions entre cyclistes et automobilistes, Chaurand et Delhomme (2013) ont montré que les cyclistes percevaient davantage de risques lorsque l'autre véhicule était une voiture plutôt qu'un autre vélo. Les interactions problématiques entre les cyclistes et les usagers de la route sont fréquemment non intentionnelles, mais se produisent en raison de l'ignorance et/ou de l'incompétence des usagers de la route qui ne remarquent pas les cyclistes (Noël, Helman, Buttress, Newman et Hutchins, 2010). Ceci est différent de quand les cyclistes sont remarqué-e-s ou vus mais ne sont pas respecté-e-s, c'est-à-dire quand les voitures ne cèdent pas le passage aux intersections ou aux ronds-points (Fyhri, Bjørnskau, Laureshyn et Beate Sundfør, Hanne Ingebrigtsen, 2016). Il y a une différence notable entre un-e- cycliste qui pense qu'il/elle n'a pas été vu-e- et celui/celle qui pense qu'il/elle a été vu-e- mais a été ignoré-e- ou n'a pas été respecté-e-. Les cyclistes peuvent penser qu'ils ne sont pas respectés, ou pire encore, qu'ils sont attaqués intentionnellement ou agressés car le comportement de l'automobiliste ne correspond pas au comportement routier correct et attendu selon le code de la route. Cette différence devient cruciale dans les interactions conflictuelles et la perception d'agressivité entre les cyclistes et les automobilistes.

D'autre part, les cyclistes pourraient également zigzaguer entre les voitures, comportement qui peut représenter une nuisance pour les automobilistes. Il y a aussi d'autres transgressions commises par des cyclistes, comme griller un feu rouge (Johnson, Newstead, Charlton, & Oxley, 2011), qui peuvent irriter les automobilistes. En outre, les automobilistes peuvent se sentir envahis par les cyclistes qui occupent les routes qu'ils ont depuis longtemps considérés comme étant exclusivement les leur. Comme l'a expliqué Walker (2012), les cyclistes «se livrent à une activité qui est jugée légèrement inappropriée dans une culture qui considère la conduite comme normative et souhaitable et, sans doute, considère le vélo comme anticonventionnel et peut-être même infantile» (p. 680). En raison de leur faible vitesse, les cyclistes empêchent parfois les automobilistes d'avancer, ainsi les automobilistes peuvent à certains moments se sentir frustrés et gênés par les cyclistes (par exemple, percevoir le temps perdu, occupant leur espace). De tels sentiments peuvent amener des automobilistes à adopter des comportements négatifs qui pourraient être considérés comme «agressifs» par les cyclistes. Un comportement agressif est défini comme «toute forme de comportement dirigé avec le but de blesser ou de blesser un autre être vivant qui est motivé à éviter un tel traitement» (Baron & Richardson, 1994, p. 7). Les comportements agressifs des automobilistes incluent des comportements tels que conduire trop près, crier des abus ou faire des gestes obscènes (Heesch, Sahlqvist & Garrard, 2011; Villieux & Delhomme, 2010). Ces comportements, à leur tour, peuvent amener le cycliste se sentir mal à l'aise, vulnérable, harcelé, peur et/ou en colère.

Plusieurs enquêtes enregistrent l'expérience des cyclistes qui mesurent l'agression perçue (et non l'agression objective). Cette distinction est importante, car il s'agit d'agression perçue qui impactera les émotions, les attitudes, les motivations et les comportements des cyclistes. Dans un sondage téléphonique mené auprès d'un échantillon aléatoire de 1880 adultes australiens en 2004, davantage de femmes (46 %) que d'hommes (38 %) étaient d'accord ou fortement d'accord pour dire que "les conducteurs agressifs les faisaient arrêter le vélo ou la marche" (Assureurs automobiles australiens associés, 2004). De plus, dans une autre étude australienne, 66 % des 2 403 cyclistes de Victoria ont déclaré avoir été victimes de harcèlement intentionnel des occupants des véhicules à moteur au cours des 12 derniers mois (Garrard, Crawford et Hakman, 2006). Cependant, la perception de l'agression peut ne pas refléter exactement l'agression réelle, car la perception peut être influencée par l'expérience antérieure des cyclistes, les émotions, la personnalité et l'évaluation de la situation et de l'environnement. En effet, les comportements non agressifs des automobilistes (provenant par exemple, d'une inattention ou d'erreurs) peuvent être perçus comme agressifs et intentionnels, et avoir les mêmes conséquences sur les comportements et les émotions des cyclistes que les comportements objectivement agressifs.

En conséquence, la perception de la sécurité, du risque perçu, de la peur dans la circulation routière et plus largement l'expérience routière subjective des cyclistes est susceptible d'influencer les attitudes, les représentations, les motivations et les intentions de faire du vélo, en particulier lorsque les cyclistes perçoivent un comportement spécifiquement dangereux des automobilistes comme intentionnel. L'impact de ces facteurs doit donc être étudié et pris en compte afin de réduire les inquiétudes concernant la sécurité routière des cyclistes et accroître l'efficacité des actions de promotion cycliste.

En résumé, l'objectif général de cette thèse doctorale est de contribuer par une approche plus intégrative à une meilleure compréhension de l'usage du vélo utilitaire en milieu urbain du point de vue de l'individu. Plus précisément, nous nous concentrerons sur les facteurs individuels et leurs diverses sources d'influence à la fois du contexte social et environnemental, et sur l'interaction de ces sources entre elles, qui en complément des facteurs externes pourraient avoir un impact sur la pratique du vélo utilitaire en ville. En particulier, l'accent sera mis sur les facteurs individuels en termes de représentations positives et négatives, les motivations à l'égard du vélo et les obstacles au vélo, ainsi que la perception qu'ont les cyclistes de l'agression liée aux comportements des automobilistes. L'objectif est d'identifier les principaux facteurs individuels influençant l'usage du vélo, permettant d'examiner comment ils fonctionnent et comment mieux les comprendre. Cet objectif s'inscrit dans un intérêt plus général de trouver les moyens influencer le comportement des usagers et, en fin de compte, d'augmenter la part modale du vélo utilitaire. Sans oublier la compréhension de l'agression perçue lors d'interactions routières entre automobilistes et cyclistes et les mécanismes qui l'influencent qui pourraient, en outre, contribuer à une grande préoccupation pour améliorer la sécurité routière.

Cette thèse s'est focalisée sur deux questions de recherche liées au vélo utilitaire en milieu urbain. La première porte sur les facteurs individuels, en termes de représentation et de motivation qui pourraient influencer l'usage (positive) du vélo ou en empêcher l'usage comme mode de transport en milieu urbain. La deuxième question porte sur le facteur lié à la perception par les cyclistes des comportements agressifs des automobilistes dans l'interaction de ces deux types d'acteurs en milieu urbain et des facteurs qui pourraient influencer cette agression perçue, laquelle faisait partie de la liste des arguments négatifs pour ne pas utiliser le vélo comme mode de transport en milieu urbain.

En particulier, pour essayer de répondre à ces deux questions de recherche, nous avons réalisé trois études afin d'identifier les représentations positives et négatives et les motivations à faire du vélo comme mode de transport chez les cyclistes et les non-cyclistes (première et deuxième études) et l'agression perçue des automobilistes en les cyclistes selon le point de vue des cyclistes (troisième étude).

Nous allons exposer des principaux résultats des trois études, puis discuté des implications au niveau théorique ainsi qu'au niveau sociétal et présenté les limites des études ainsi que les perspectives de recherches futures.

PRINCIPAUX RESULTATS

Grâce à des analyses de contenu des entretiens, nous avons obtenu une liste de 48 arguments positifs et 49 négatifs liés au vélo utilitaire en ville par les cyclistes et les non-cyclistes. Pour les arguments positifs, les cyclistes ont mentionné des arguments plus positifs que les non-cyclistes. Les cyclistes et les non-cyclistes ont souvent cité l'activité physique comme un avantage du vélo. Les cyclistes ont cité fréquemment comme un levier de l'usage du vélo le sentiment de liberté. En ce sens, pour les cyclistes, il y avait une différence entre la représentation positive (avantage) la plus fréquente et la motivation positive (levier) la plus fréquente de l'usage du vélo. Il n'y avait aucune différence entre les cyclistes et les non-cyclistes pour les avantages les plus fréquents de l'usage du vélo. Concernant le type d'arguments, les cyclistes (pour les avantages et les leviers) et les non-cyclistes (pour les avantages) ont cité des arguments plus extrinsèques externes que extrinsèques-internes et intrinsèques. En particulier pour le contrôle et la stabilité, il n'y avait aucune différence dans la répartition entre les cyclistes et les non-cyclistes pour les avantages (et les cyclistes pour les leviers); les deux ont cité principalement des arguments internes (contrôlables) et stables.

Pour les arguments négatifs, les non-cyclistes ont cité davantage d'inconvénients (représentation négative) et davantage de barrières (motivation négative) que les cyclistes. Les cyclistes et les non-cyclistes ont cité le danger comme l'une des inconvénients les plus fréquents du vélo urbain utilitaire. Les cyclistes ont également mentionné la pluie, et les non-cyclistes ont également mentionné les longues distances. Les cyclistes et non-cyclistes ont cité comme la barrière la plus fréquente quant à l'usage du vélo les longues distances, et les non-cyclistes ont également cité la peur du vélo. Il n'y a donc aucune différence entre cyclistes et non cyclistes. Cependant, il existait une différence entre l'inconvénient cité le plus fréquemment et la barrière citée la plus fréquemment quant à l'usage du vélo. Concernant le type d'arguments, le grand nombre d'arguments négatifs était principalement de type extrinsèque-externe (il en est de même pour les arguments positifs). Plus précisément, les non-cyclistes ont cité davantage de barrières intrinsèques que les cyclistes. Pour les inconvénients et pour les barrières, les cyclistes ont cité davantage d'arguments extrinsèque-externes qu'intrinsèques, ainsi que les non-cyclistes seulement pour les inconvénients. En particulier, pour le contrôle et la stabilité, les non-cyclistes, et dans une moindre mesure les cyclistes, ont principalement cités des arguments externes (le contrôle vient de l'extérieur) et transitoires pour les désavantages et les barrières. En général, pour le type d'argument, le vélo utilitaire en ville est davantage associé à sa fonction instrumentale (arguments externes, par exemple positif, "facile à stationner" ; et pour négatif, "le vol de vélos") qu'à une fonction interne (par exemple pour argument positif, "satisfaction sans récompense" ; pour argument négatif, "difficultés personnelles") par les cyclistes et les non-cyclistes.

Cette première étude à travers des entretiens semi-directifs en face-à-face nous a permis d'apprendre de ces deux perspectives, selon qu'ils pratiquent ou non le vélo dans un but utilitaire. Il y avait aussi quelques précisions qui ne peuvent pas être introduites dans les résultats, tels que l'importance accordée à une motivation particulière. Et cela était peut-être une caractéristique de la méthodologie, l'entretien nous a permis de connaître les aspects de l'expérience utilitaire vélo en milieu urbain qui ne pouvait pas être codé, mais pour commencer à étudier un problème ou une population, c'est un bon début. La prochaine étude a donné plus d'importance à la question du poids des arguments.

Sur la base de ces représentations et motivations positives et négatives, nous avons réalisé une deuxième étude en utilisant un questionnaire en ligne afin de déterminer le poids de chaque argument. L'objectif était de savoir si les principaux avantages, leviers, inconvénients et barrières de l'étude précédente ont également été retrouvés dans cette deuxième étude comprenant un échantillon plus large et d'identifier les différences entre les représentation d'une part, et les motivations d'autre part. Pour nourrir les connaissances sur l'usage du vélo nous avons ajouté d'autres questions liées à la pratique utilitaire du vélo chez les cyclistes et les non-cyclistes comme la population précédemment étudiée.

Selon la fréquence d'usage du vélo utilitaire en ville et la répartition des participants dans l'échantillon, nous avons comparé trois groups : des cyclistes habituels, des cyclistes occasionnels et des non-cyclistes. Pour les arguments positifs, l'avantage (la représentation positive) avec le score le plus élevé est l'activité physique chez les cyclistes habituels et les non-cyclistes; tout comme dans la première étude pour les cyclistes et les non-cyclistes. L'activité physique est le deuxième score le plus élevé des cyclistes occasionnels avec la facilité de stationnement. Le levier (la motivation positive) des cyclistes habituels et des cyclistes occasionnels est aussi l'activité physique. Ce qui est différent de la motivation la plus fréquemment citée dans la première étude par les cyclistes qui était le sentiment de liberté. Les non-cyclistes de cette deuxième étude ont un score plus élevé pour profiter du beau temps comme une motivation possible du vélo utilitaire en ville.

Pour les arguments négatifs, le score le plus élevé pour les inconvénients (représentation négative) et pour les barrières (motivation négative) dans les trois groupes est le verglas. Comme cet argument est rarement rencontré en France, ce sont en général les scores les plus élevés en matière de météo (fortes pluies, neige), pour les trois groupes. Ce qui est différent de ce qui a été trouvé dans la première étude, où les inconvénients les plus fréquemment cités étaient le danger et la pluie chez les cyclistes et le danger et de longues distances chez les non-cyclistes, et où les barrières les plus fréquemment citées étaient les longues distances chez les cyclistes et les longues distances et la peur du vélo chez les non-cyclistes.

En ce qui concerne la première question de recherche, l'étude des facteurs individuels pour utiliser ou non le vélo utilitaire ville, a permis d'accroître les connaissances de ces facteurs. Cependant, nous n'avons pas réussi à établir de distinction spécifique entre les deux concepts. Nos études ont montré qu'il y a en effet une différence entre les représentations (positives et négatives) et les motivations (à faire ou non du vélo). En particulier, notre étude est allée plus loin que les études qui ont considéré les deux types de variables comme une seule. Les résultats que nous avons trouvés et les méthodes utilisées ont contribué à la compréhension des deux comme différentes variables, mais il reste encore un travail à faire pour les mesurer, et en particulier pour les différencier.

Contrairement à la croyance répandue (qui est souvent présente chez les décideurs), les raisons de l'usage du vélo ne sont pas seulement liées à l'utilisation utilitaire d'un mode de transport comme se déplacer, gagner du temps ou économiser de l'argent. En effet, même si ces raisons sont souvent prises en considération chez les cyclistes et les non-cyclistes, il existe d'autres raisons complémentaires qui leur semblent utiles, notamment l'activité physique qui pourrait être particulièrement utilisée pour promouvoir ce mode de transport. D'autres raisons plus intrinsèques, telles que le sentiment de liberté et le plaisir semblent jouer un rôle important aussi.

De plus, il est surprenant que l'aspect écologique ne semble pas être très important (en termes de fréquence de citations - dans la première étude - et le jugement de l'importance comme un avantage et comme un levier dans la seconde étude), chez les participants cyclistes et non cyclistes, même avec les énormes problèmes de pollution atmosphérique et l'information continue sur la nécessité d'accroître les comportements écologiques. En ce sens, certaines études ont montré des résultats positifs pour l'argument écologie dans un message pour influencer les comportements; par exemple, la pollution de l'air influençant le comportement de vitesse des automobilistes (Delhomme, Chappé, Grenier, Pinto et Martha,

2010) et les attitudes écologiques influençant les déplacements actifs (Bopp, Kaczynski et Wittman, 2011). Peut-être une surexposition au message écologique, qui est actuellement utilisé, conduit-elle à l'absence d'intérêt, à la diminution de l'influence, voire pire, à l'effet de réactance (Brehm, 1966) ? De plus, des problèmes environnementaux pourraient être associés à des problèmes collectifs perçus comme étant hors de portée des individus (c.-à-d. dilemme social, Vlek & Steg, 2007; Vugt, 2009), tandis que la mobilité urbaine et l'usage du vélo comme mode de transport pourraient être perçus comme une préoccupation à caractère personnel, et donc ne pas être directement associée à un comportement pro-environnemental ou comme mode de transport écologique.

Nous avons constaté des différences entre les cyclistes et les non-cyclistes en ce qui concernent les représentations positives et négatives et les motivations quant à l'usage du vélo, mais nous n'avons pas trouvé de différences fondamentales. Selon la théorie de la représentation, ce résultat s'avère compréhensible parce que les informations, les croyances et les connaissances sur un objet ou une action, ici les arguments quant à l'usage du vélo utilitaire en ville, sont partagées entre les individus. Dans ce cas, les cyclistes et les non-cyclistes pourraient avoir des arguments semblables parce qu'il existe un discours commun dans la société sur l'usage du vélo utilitaire en ville, et ceci pour des arguments positifs (avantages) et négatifs (inconvénients). Cependant, nous nous attendions à des différences sur le plan des motivations. Sur la base des théories de la motivation, une personne qui exécute volontairement un comportement (les cyclistes) devrait être davantage motivée (c'est-à-dire intrinsèquement motivée) et avoir des motivations différentes de celles qui n'accomplissent pas ce comportement (les non-cyclistes). Ainsi, nos résultats sont surprenants en ce qui concerne cette absence de différenciation importante entre les cyclistes et les non-cyclistes. En effet, étant donné la multitude d'avantages que les non-cyclistes disent quant à l'usage du vélo a, on pourrait se demander pourquoi ils n'utilisent pas le vélo comme moyen de transport. En ce sens, il est possible que les raisons motivationnelles fondamentales pour lesquelles certains utilisent le vélo et d'autres ne le l'utilisent pas (différenciation) n'aient pas été trouvées dans notre étude en raison des aspects méthodologiques. Plus particulièrement, il est possible que la question posée aux cyclistes (sur ce qui les motive actuellement) différente de celle posée aux non-cyclistes (sur ce qui les motivera), a joué un rôle. De plus, l'utilisation du questionnaire peut ne pas être la méthode la plus pertinente pour ce type d'étude. Peut-être faut-il une autre méthode ? Par exemple, une méthode permettant au chercheur d'interroger directement les non-cyclistes dans des conditions où ils se sentent face à des situations réelles et confrontés à exprimer la véritable motivation (leviers et barrières), de cette façon la différence entre cyclistes et non-cyclistes pourrait être plus importante. Il se peut également que même si les non-cyclistes sont motivés, il existe également des contraintes incompressibles jouant un rôle. D'où l'importance de développer une approche intégrative de l'usage du vélo utilitaire en milieu urbain. Ainsi, les facteurs qui pourraient influencer la pratique du vélo utilitaire en ville sont aussi en fonction des besoins des usagers et du contexte qui dans certains cas facilitent et dans d'autres cas empêchent l'utilisation du vélo ou le transfert modal. De plus, il est possible que d'autres variables puissent expliquer ce manque de différenciation, comme le contexte social et les valeurs culturelles. Ces variables pourraient être prises en compte dans d'autres études. Ce sont là des questions pour poursuivre l'investigation dans ce domaine qui est encore nécessaire pour faciliter le transfert modal et l'encouragement des modes de transport moins polluants.

Dans le but d'essayer de répondre à la deuxième question de recherche, la troisième étude est principalement axée sur l'agression perçue comme un argument négatif quant à l'usage du vélo urbain. Cet argument est situé à l'intersection de deux arguments négatifs de l'usage du vélo, qui ont été analysés dans les études précédentes : l'une est l'agression d'autres utilisateurs et, l'autre, le manque d'attention des autres usagers de la route. L'agression perçue a été considérée comme un problème dans l'interaction entre les cyclistes et les automobilistes. Trois études pilotes ont fourni les situations considérées comme agressives et l'enquête principale a étudié plus en profondeur les interactions conflictuelles spécifiques entre cyclistes et automobilistes afin de déterminer les facteurs prédisant l'agression perçue des automobilistes par les cyclistes. Dans cette troisième étude, nous avons comparé des étudiants cyclistes qui utilisaient fréquemment la bicyclette comme mode de transport dans deux villes ayant des parts modales contrastées du vélo : Paris 3 % (EMD, 2008) et Berlin 13 % (National survey, 2008).

Il n'y avait pas de différence significative dans l'agression perçue des automobilistes par les cyclistes entre les étudiant-e-s de Paris et de Berlin. Bien qu'il y ait eu des différences entre les participant-e-s des deux villes sur la représentation de la légitimité des cyclistes sur la route par les automobilistes, l'identité sociale des cyclistes et la sous-échelle de colère du questionnaire d'Agressivité (AQ ; Buss & Perry,1992)), pour laquelle les participant-e-s de Paris ont des scores plus élevés. L'agression perçue était prédite positivement par l'intention perçue à l'égard du mal physique, par l'intention perçue d'exprimer la colère et par la dangerosité perçue. De même, l'agression perçue, l'identité sociale du cycliste ont une relation linéaire positive, les représentations de la légitimité des cyclistes sur la route ont une relation linéaire négative et enfin, la représentation des connaissances sur les comportements adaptés lors de l'interaction avec les cyclistes ont une relation linéaire négative. En outre, la relation entre la connaissance et l'agression perçue est médiée par l'intention de nuire, et la relation entre la légitimité et l'agression perçue est médiée par la connaissance.

En ce qui concerne la conception de l'étude sur l'agression perçue, nous avons pris en compte qu'il existe une différence dans la définition de l'agression par les psychologues et l'utilisation du terme agression par individus non-experts (Berkowitz, 1981; Krahé, 2013). En conséquence, l'utilisation du terme agression dans notre étude a eu le risque de générer une confusion entre les concepts et de générer un biais (Drottz-Sjöberg, 1991). C'est pour cette raison que nous suggérons pour des futures études sur l'agression ou l'agression perçue de faire la différence entre un concept des individus non-experts et le concept théoriquement défini, notamment parce que l'utilisation du terme «agression» sur la route pourrait être controversée et pourrait amplifier le conflit entre les usagers des transports, selon les conflits in-group/out-group (Tajfel & Turner, 1979). Par conséquent, nous avons tenté de réduire cet écart entre les concepts en utilisant trois études pilotes, et en fonction de la définition officielle, le concept d'agression a été opérationnalisé (c'est-à-dire développement d'un concept théorique avec des indicateurs observables et mesurables). Ainsi, dans l'étude principale pour mesurer l'agression perçue, nous avons également utilisé les termes intention perçue (d'exprimer la colère, de faire du mal physiquement et psychologiquement) et le danger perçu (le risque d'avoir un accident, la gravité des conséquences et la dangerosité).

Pour cette raison, dans notre étude, lorsque nous avons considéré le terme «agression» lors d'interactions dans des situations routières, nous nous sommes généralement référer à «d'agression perçue». Principalement, dans les interactions routières, l'échange entre les acteurs n'est pas en face-à-face, il est donc difficile de connaître les intentions réelles d'un comportement particulier provenant de l'autre acteur, le prétendu «agresseur». Par conséquent, dans l'analyse, nous nous sommes référés aux variables étudiées concernant l'interaction en termes de perceptions. Le fait de mentionner une agression perçue plutôt qu'une agression n'implique pas en soi qu'il n'existe pas de conflit entre les usagers. En effet, cette analyse pourrait aider à comprendre le phénomène (c'est-à-dire le conflit), surtout parce qu'elle met en évidence la dimension de l'interprétation et de l'interprétation erronée, les apports personnels et le poids du contexte (GAM; DeWall & Anderson, 2011). En outre, lorsqu'il y a des conflits intergroupes (Tajfel et Turner, 1979), dans ce cas entre automobilistes et cyclistes, la perception de l'agression peut augmenter (DeWall, Anderson & Bushman, 2001) et comme nous l'avons montré, l'identité sociale du cycliste pourrait également contribuer.

IMPLICATIONS THEORIQUES

Nos résultats ont des implications théoriques. Dans la première partie de cette thèse, le cadre théorique était axé sur la conceptualisation de la représentation et des motivations. En général, ces deux concepts ne sont pas mesurés ensemble. En outre, ils n'ont pas été appliqués ensemble dans l'étude du sujet de cette thèse, le vélo utilitaire en milieu urbain.

La conceptualisation et les théories sur la représentation (représentation mentale, représentation sociale et attitudes) ne reconnaissent pas réellement l'existence ou l'importance du concept de motivation dans la prédiction du comportement. Plus précisément, la conceptualisation de la représentation mentale et de la représentation sociale s'intéressent principalement au contenu de la représentation, à la façon dont les représentations sont créées ou à ses structures. En particulier pour la représentation sociale, les théories autour sont axées sur le caractère partagé de la représentation.

En ce qui concernent les théories sur les attitudes, elles sont davantage développées autour d'un modèle et se concentrent généralement sur la relation entre les attitudes et le comportement. Les modèles comprennent plusieurs facteurs comme prédicteurs généralement d'un comportement spécifique. Bien que certains de ces facteurs soient proches du concept de motivation ou sont parfois considérés par les auteurs comme une forme de motivation, ces modèles ne considèrent généralement de manière explicite le concept de motivation tel qu'il est défini dans la plupart des théories importantes de la motivation. Par exemple, dans ce modèle d'attitudes à trois composantes (Rosenberg & Hovland, 1960 ; Zanna & Rempel, 1988), la définition de la composante conative/comportementale renvoie plutôt au concept d'intention qu'au concept de motivation. La composante affective renvoie plutôt aux émotions qu'aux motivations. Et la composante cognitive suggère plutôt une ressemblance avec le concept de représentation que nous utilisons dans cette étude, c'est-à-dire les connaissances et les croyances présentes et passées que l'individu a sur l'objet attitudinal. De même, Fishbein et Ajzen (1975) ont fait une distinction entre l'attitude et d'autres concepts, tels que les croyances et les intentions comportementales. Selon eux, l'attitude correspond principalement aux émotions positives ou négatives liées à l'objet attitudinal. Pour nous, la caractéristique évaluative des attitudes fait partie de la représentation, mais l'idée principale qui définit notre concept de représentation est le terme qu'ils ont utilisé comme une croyance, se référant à l'information, le savoir ou les opinions sur l'objet d'attitude. En outre, l'autre composante qu'ils envisagent, l'intention comportementale est encore une mesure différente de la motivation (c.f. différence entre l'intention et les désirs, Perugini & Bagozzi, 2004). De plus, dans la théorie du comportement planifié (TCP, Ajzen, 1985), d'autres facteurs reliés à la prédiction du comportement peuvent être investis (dans ce cas, nous pouvons parler de la TCP étendue) mais la motivation n'est pas explicitement mesurée bien que la composante de l'auto-efficacité du contrôle comportemental perçu meure en partie la motivation (Rhodes & Courneya, 2004).

De même, d'autre part, les théories de la motivation ne reconnaissent pas l'existence de la représentation (représentation mentale, représentation sociale ou attitudes) comme un facteur différent de la motivation, et ne tiennent pas compte du poids qu'une représentation pourrait avoir dans la performance d'un comportement (c'est-à-dire l'exécution d'une action). Le seul modèle qui inclut relativement les deux concepts est le modèle de comportement dirigé vers un but (Perugini & Bagozzi, 2001), dans lequel la représentation pourrait être exemplifiée comme l'attitude (principalement la caractéristique évaluative) et la motivation comme le concept nommé "désir". Les auteurs incluent également, dans leur modèle, l'intention, la norme subjective, le contrôle perçu, les émotions anticipées positives et négatives, la fréquence et la récence du comportement passé. Pour cette raison, ce modèle soutient l'idée que la représentation et la motivation sont des variables séparées exemplifiées dans le même modèle. En ce sens, le modèle permet un point de vue général sur l'implication d'autres variables qui pourraient être prises en compte dans les futures études sur le vélo utilitaire. Mais compte tenu de nos objectifs, nous nous sommes intéressés à mesurer ces deux variables : la représentation et la motivation. Cela principalement parce que les deux concepts représentent différentes variables dans la prédiction du comportement. De plus, le fait que les théories d'un concept ne tiennent pas compte de l'autre concept (par exemple, les théories des motivations n'incluent pas la représentation, les théories des représentations - représentation mentale, représentation sociale, attitudes - ne comprennent pas la motivation) fait qu'ils ne sont jamais confrontés à l'existence des autres concepts et que la relation possible entre les concepts est manquée. En ce sens, il a semblé intéressant d'étudier ensemble ces deux concepts et de les appliquer dans l'étude des déterminants de l'utilisation du vélo utilitaire en milieu urbain.

Les résultats de la première étude appuient fortement nos hypothèses de distinction entre les deux concepts. Cependant, les résultats de la seconde étude montrent quelques différences entre les concepts théoriques, plutôt quantitatifs que qualitatifs, mais ne sont pas très concluants. Peut-être que cette absence de différences concluantes est due à la méthode utilisée, et plus précisément aux mesures développées pour étudier et comparer les deux concepts qui ne sont pas complètement adaptées ou qui n'ont pas permis de faire une distinction entre les deux concepts. Par exemple, la forme sous laquelle la question a été présentée (les deux concepts ont été mesurés sur la même page-écran de l'administration du questionnaire), pourrait faire que les participants ont répondu rapidement sans penser à différer les concepts ou ils ont répondu en faisant un parallèle entre les deux concepts peut-être plus fort que dans la réalité. En dehors de cette explication, les résultats entre la représentation et la motivation étaient différents dans la mesure où les scores des avantages étaient plus élevés que les scores des motivations.

Une autre explication est que dans l'esprit des participants, les concepts ne peuvent pas être clairement différents, de sorte que les participants ne sont pas conscients de la différence possible de chaque concept pour un comportement général, et en particulier quant à l'usage du vélo comme mode de transport. Ainsi, ils n'ont pas fait de distinction en répondant aux deux questions du questionnaire, mais simplement, comme les résultats le suggèrent, considèrent que les deux concepts sont sur le même continuum, la motivation étant un «super avantage». Cette absence de différenciation des concepts pourrait aussi montrer, chez les participants, l'écart entre les théories de la psychologie et l'appropriation des concepts par les individus non-experts. Par exemple, en ce qui concerne ce que les gens disent quand ils pensent au mot «motivation» peut être différent de ce que la théorie en psychologie dit de ce concept.

Cette différence (concept théorique versus notion des individus non-experts) pourrait être problématique puisque l'état actuel des ressources méthodologiques pour accéder à la connaissance de ces phénomènes psychologiques requiert, en particulier, l'utilisation des réponses auto-déclarées des participants. Au moins, nous avons envisagé de les mesurer de cette façon à travers le questionnaire. Si nous continuons de penser que les deux concepts sont différents, mais la mesure utilisée dans cette étude ne nous a pas permis de le tester, il est possible que pour les études suivantes sera nécessaire de développer d'autres mesures méthodologiques qui permettent de tester cette différence.

De plus, le manque de différences concluantes pourrait également indiquer une différence entre les deux concepts mais pas aussi forte que celle impliquée dans les modèles théoriques. Cela signifie que peut-être entre représentation et motivation il y a un continuum, où les «représentations» sont le niveau le plus bas et les «motivations» sont le niveau le plus élevé du même continuum et ce continuum représente le désir, la force d'atteindre le comportement; dans notre cas, le vélo utilitaire en milieu urbain.

Un autre point concernant les théories de la motivation est qu'en général elles sont utilisées pour étudier d'autres buts ou sont utilisés dans d'autres domaines tels que l'éducation, le travail et le sport. Concernant l'application de la conceptualisation à l'usage du vélo utilitaire en milieu urbain, les théories de la motivation, notamment la théorie de l'autodétermination (Ryan & Deci, 2000) et en particulier l'application de la motivation intrinsèque et extrinsèque sur laquelle nous avons basé les deux premières études qui nous semblait tout à fait pertinente. Plus précisément, la dimension intrinsèque-extrinsèque semblait particulièrement appropriée à l'étude du vélo comme mode de transport car elle permettait en même temps de prendre en compte des motivations de type il permet de se déplacer (extrinsèque) et, d'autre part, il est agréable (intrinsèque). Cependant, nous n'avons pas trouvé de patterns clairs de motivations intrinsèques chez les cyclistes pour un usage utilitaire du vélo en milieu urbain. En effet, cela peut être dû au fait que l'utilisation du vélo comme moyen de transport est une fin en soi, c'est-à-dire que le vélo a un but instrumental en soi. En ce sens, réaliser le comportement (utiliser le vélo) donnera au cycliste plusieurs récompenses externes et instrumentales: le transport, mais aussi, d'autres gains comme le temps; donc cet aspect est déjà une motivation extrinsèque. Cela signifie probablement que le comportement est influencé principalement par les caractéristiques instrumentales (motivation extrinsèque). En même temps, cela n'implique pas que le cycliste ne trouve pas de satisfaction inhérente (motivation intrinsèque), mais les motivations pour le vélo urbain utilitariste seront principalement orientées pour atteindre des résultats séparables (motivation extrinsèque). En conséquence, cette distinction entre intrinsèque et extrinsèque et le continuum de l'autodétermination quant au type de motivation qu'une personne pourrait avoir un but ou un comportement particulier ne sont pas nécessairement adaptés à l'étude de l'utilisation du vélo comme moyen de transport, mais pourrait l'être pour l'étude d'autres domaines. Par exemple, être motivé pour atteindre un but ou pour effectuer un comportement au travail, à l'école ou dans un sport particulier; dans lequel les motivations intrinsèques sont le plus haut niveau de motivation. Cette caractéristique instrumentale particulière du vélo utilitariste en milieu urbain pourrait expliquer pourquoi même les cyclistes, censés être plus motivés par le vélo, ne mettent pas en évidence la motivation intrinsèque (dans la deuxième étude). Ainsi entre les motivations des cyclistes habituels, des cyclistes occasionnels et des non-cyclistes il n'y avait pas de différences fondamentales. En fin de compte, cela pourrait s'expliquer plutôt par d'autres facteurs, par exemple, l'influence du contexte social, ce qui pourrait être le même pour les trois types d'utilisateurs. Au total, cette théorie de l'autodétermination (Ryan & Deci, 2000) semble ne pas être la plus adaptée à l'étude du vélo utilitaire en milieu urbain.

En ce qui concerne le cadre théorique utilisé dans la deuxième partie de ce Ph.D., l'agression en général et l'agression perçue en particulier, sont des concepts plutôt nouveaux pour l'usage du vélo utilitaire en ville. Au moins dans la recherche en transport, le concept d'agression a été principalement appliqué à l'étude de la voiture (par exemple, Richer & Bergeron, 2012), cela est peut-être dû au fait que la voiture est le mode de transport dominant dans de nombreux pays, mais aussi parce que la conduite agressive est considérée comme une forme d'agression commune dans la vie quotidienne (Krahé, 2013). Nous innovons donc lorsque nous appliquons l'agression perçue dans l'interaction entre automobilistes et cyclistes du point de vue des cyclistes. En outre, parce que nous nous sommes centrés sur le point de vue des cyclistes, nous utilisons en particulier le concept d'agression perçue. Pour cette raison, il était nécessaire : de rendre opérationnelle la définition de l'agression de Baron et Richardson (1994), en particulier en identifiant le rôle de l'intention pour définir l'agression du point de vue de la «victime» ; de considérer le modèle général d'agression de DeWall et Anderson (2011) comme un cadre, en particulier, prendre en compte l'influence de l'apport personnel et situationnel sur la perception d'un comportement comme agressif; ainsi que les mécanismes impliqués dans la perception-interprétation d'une situation particulière afin d'étudier cette interaction particulière entre automobilistes et cyclistes, d'interpréter les résultats et de proposer une nouvelle perspective pour les études futures.

De plus, pour comprendre la relation entre ces deux types d'acteurs, la théorie des conflits intergroupes de Tajfel et Turner (1979) a été une aide essentielle pour étudier l'agression perçue et interpréter les résultats obtenus. Par exemple, la relation négative entre la connaissance des comportements adaptés lors d'interactions avec les cyclistes et l'agression perçue, dans le sens opposé à celui attendu, pourrait s'expliquer à travers la théorie de conflit intergroupes de Tajfel et Turner (1979). Ainsi, en raison du conflit intergroupe entre les automobilistes et les cyclistes, les cyclistes ont estimé que les automobilistes ne savaient pas toujours comment se comporter lors d'interactions avec les cyclistes, également que le comportement de l'automobiliste était agressif. En outre, quand les cyclistes ont considéré que les automobilistes leur donnent moins de légitimité sur la route, ils ont perçu comme prévu plus d'agression. En conséquence, comme les connaissances sur les comportements adaptés lors d'interactions avec les cyclistes ont influencé la relation sur l'agression perçue, les cyclistes considèrent que les automobilistes leur donne moins de légitimité sur la route et que les automobilistes ont également moins de connaissances sur les comportements à adopter et donc perçoivent plus d'agression de la part des automobilistes. Ce résultat est également expliqué dans la théorie des conflits intergroupes (Tajfel et Turner, 1979), dans laquelle les cyclistes perçoivent leurs groupes (cyclistes) et les automobilistes (l'autre groupe) comme des groupes opposés, menant à des conflits intergroupes. Ce conflit intergroupe fait que les membres du groupe (cyclistes) considèrent négativement les membres de l'autre groupe (automobilistes) et leurs comportements ; au point d'évaluer négativement leurs connaissances sur le comportement adapté lors d'interactions avec les cyclistes, ainsi qu'à considérer ou interpréter leurs comportements comme agressifs (et intentionnels), même lorsqu'il n'était pas facile ou clairement établi que l'automobiliste avait l'intention de nuire (c'est-à-dire particulièrement difficiles à déterminer sur les interactions routières). Ainsi, nous avons constaté que la variable légitimité, qui était médiée par la connaissance, prédisait négativement l'agression perçue. Enfin, ces résultats concernant la légitimité, les connaissances et l'agression perçue et les conflits intergroupes entre les cyclistes et les automobilistes étaient également en lien avec un autre résultat concernant l'identité sociale du cycliste, dans lequel les cyclistes ayant des scores plus élevés dans l'identité sociale cycliste percevaient plus d'agressions des automobilistes. Ce deuxième résultat pourrait être interprété comme une seconde confirmation qu'un conflit intergroupe entre automobilistes et cyclistes influencerait la perception que les automobilistes se comportent de manière agressive envers les cyclistes du point de vue des cyclistes.

Au total, dans la troisième étude, nous avons apporté une contribution importante à la définition de l'agression en l'adaptant à l'usage du vélo utilitaire en milieu urbain, à travers le passage de l'agression à l'agression perçue lors d'interactions des automobilistes et des cyclistes en milieu urbain. De plus, la contribution concerne l'identification des principaux prédicteurs de l'agression perçue, en termes d'intention perçue, de danger perçu, d'identité sociale des cyclistes, de représentations des connaissances et de représentation de la légitimité.

IMPLICATIONS SOCIETALES

Pour la société, nos trois études contribuent à placer l'utilisateur au centre de la discussion, en connaissant leur point de vue et en comparant les cyclistes (habituels et occasionnels) aux non-cyclistes (utilisateurs potentiels) comme une approche plus intégrative, prenant en compte les facteurs internes et les facteurs externes comme complémentaires. En ce sens, les études effectuées permettent de progresser quant à la connaissance des différents facteurs, tels que les raisons d'utiliser et de ne pas utiliser le vélo comme mode de transport. Nous avons utilisé deux concepts pour différencier les processus : d'une part, les avantages-inconvénients (représentation), qui donnent des informations positives ou négatives sur une action ou un comportement ; et, d'autre part, les motivations, comme les vraies raisons qui stimulent quelqu'un à l'action. En d'autres termes, les motivations à agir, dans les deux sens, pour s'approcher (comme des leviers) et pour empêcher (comme des barrières) l'action ; ici la pratique du vélo utilitaire en milieu urbain.

De même, les deux premières études ont permis de progresser sur la différenciation de la représentation et de la motivation, positives et négatives, selon le type d'utilisateurs : cyclistes et non cyclistes (la première étude), et cyclistes habituels, cyclistes occasionnels et non-cyclistes (deuxième étude). Cela permettrait aux décideurs, aux autorités publiques et aux associations de cyclistes de comprendre la complexité de cette question et de leur permettre de cibler les actions de promotion du vélo utilitaire en milieu urbain en fonction du type d'utilisateur, des buts, du domaine et du contexte. En particulier, les résultats pourraient être utilisés dans les campagnes de communication et de marketing pour l'usage du vélo utilitaire. Plus précisément, comme nous l'avons mentionné plus haut, l'activité physique semble être un argument particulièrement important, qui n'a pas suffisamment été pris en compte comme un avantage et/ou comme un levier pour promouvoir l'usage du vélo. En outre, l'aspect écologique devrait être soigneusement traité, car si certaines personnes sont intéressées à changer de comportement en raison du problème environnemental actuel, d'autres personnes pourraient être réfractaires à cet argument.

L'absence de différences importantes entre cyclistes et non-cyclistes pourrait suggérer que les campagnes de promotion de l'usage du vélo utilitaire en milieu urbain puissent être orientées pour mettre en évidence la similitude (Cialdini, 2007) entre les utilisateurs. En d'autres termes, s'il n'y a pas de différences substantielles, comme cela a été montré, les non-cyclistes pourraient penser que l'usage du vélo utilitaire en milieu urbain ne devrait pas être si difficile car les cyclistes le font et il n'y a pas beaucoup de différence entre eux et la façon dont ils pensent (représentations et motivations). Par exemple, un message ou une image transmet une idée comme celle-ci : « il utilise le vélo, et il est comme moi, alors pourquoi je ne pourrais pas l'utiliser aussi ? ».

D'autre part, l'absence de différences importantes entre les cyclistes et les non-cyclistes pourrait également suggérer que les deux ont partagé les mêmes arguments, de sorte que les campagnes d'information seules ne suffisent pas pour en promouvoir l'usage ou pour atteindre de nouveaux usagers. En effet, les non-cyclistes reconnaissent des arguments positifs similaires aux cyclistes. En ce sens, on pourrait s'efforcer de montrer les arguments que les non-cyclistes ne reconnaissent pas, mais encore plus frappant pourrait être d'utiliser des actions qui mettent l'accent sur le changement des comportements plutôt que de changer seulement les attitudes (représentation). Pour cela, des actions fondées sur les théories de l'engagement (Kiesler, 1971) pourraient être particulièrement utiles. Selon cette théorie, le changement de comportement pourrait être facilité par des techniques différentes (cf. le paradigme du sentiment du liberté, le pied dans la porte, l'engagement public et la visibilité de l'acte) cherchant à produire un engagement particulier, également ces techniques pourraient faciliter en sorte que les participants adoptent de petits comportements (actes préparatoires) liés au comportement cible ou expérimentent directement le comportement cible, ces actes préparatoires augmentent l'engagement à réaliser le comportement cible. Dans ce cas, le comportement cible est l'usage du vélo utilitaire en milieu urbain et l'expérimentation pourrait être réalisée au cours d'une journée spéciale (par exemple, une journée sans voiture, journée de mobilité), lors d'occasions spéciales (par exemple, la journée nationale) ou dans un autre type d'environnement tel qu'un atelier organisé par les écoles, les entreprises et/ou les municipalités. Cette dernière peut organiser des ateliers dans des événements indépendants ou à travers le Plan de Mobilité Urbaine de la ville (Martinez Tabares, 2013).

Expérimenter la pratique du vélo utilitaire en milieu urbain pourrait également permettre de confronter les idées ou les représentations que les non-cyclistes pourraient avoir sur le vélo basées principalement sur l'imagination et l'influence sociale et non sur des expériences réelles. En outre, pour permettre un changement de comportement efficace, cette expérience du vélo devrait être très positive, en particulier, pour éviter la confirmation des barrières imaginaires. Afin d'assurer une expérience de vélo positive, ce processus d'expérimentation pourrait être mis en place à travers du marketing personnalisé de la mobilité, de consultants en mobilité ou de l'accompagnement expérimental, qui pourrait jouer un rôle de soutien social (Wills, 1991), facilitant l'utilisation du vélo comme mode de transport.

Notre étude permet également d'identifier le point positif du vélo pour renforcer, afin de rendre plus attrayant le vélo chez les non-utilisateurs, tels que l'argument de l'activité physique, mais aussi les arguments liés à l'indépendance, au plaisir, et les aspects utilitaires. De même, notre étude permet d'identifier les points négatifs qui doivent être corrigés ou améliorés. Même ces points négatifs qui nécessitent de développer une solution ou de trouver des stratégies d'adaptation pourrait être une opportunité pour l'innovation et le marché. Par exemple, il pourrait être une occasion d'encourager la R&D à résoudre une barrière à l'usage du vélo en ville sans une solution connue actuellement ; par exemple, des solutions aux problèmes liés à la météo, aux problèmes de transpiration, à l'effort et au manque de places de stationnement ou pour diminuer le danger objectif.

Concernant les obstacles au vélo qui pose plutôt une question de facteurs individuels, tels que la peur du vélo, la peur du trafic et en général le danger subjectif ; ces obstacles pourraient donner l'occasion d'explorer et d'inclure des actions psychosociales dans la promotion du vélo utilitaire. Par exemple, des actions spécifiques pour que les non-utilisateurs expérimentent le vélo urbain, cette expérimentation pourrait progressivement réduire la peur et augmenter les compétences à pratiquer le vélo et le sentiment d'auto-efficacité (Bandura, 1977), l'accompagnement ou le marketing personnalisé. Mais aussi, d'autres solutions peuvent être envisagées, comme le complément technologique à l'aide d'applications sur les Smartphones ou d'autres dispositifs afin de lever ces barrières qui ont besoin plus que de l'infrastructure cyclable.

L'implication des résultats de la troisième étude, concernant le conflit intergroupe et l'agression perçue lors l'interactions entre usagers de la route, sont d'abord en termes d'identification du problème, car à notre connaissance il n'y a pas eu d'études sur ce plan. Cela pourrait aider à comprendre le conflit entre les acteurs (les usagers de la route) et ouvrir le débat sur l'agression perçue, y compris dans le débat des décideurs, les autorités publiques et l'association des utilisateurs. Deuxièmement, les résultats trouvés pourraient également contribuer à développer des actions basées sur l'éducation et la pédagogie concernant les comportements adaptés sur les situations conflictuelles de la route, par exemple lorsque quelqu'un effectue un test de conduite ou récupère des points sur le permis de conduire. Concernant les situations conflictuelles entre les automobilistes et les cyclistes et les situations qui pourraient être interprétées comme agressives, il faut davantage d'éducation envers tous les usagers, non seulement les automobilistes qui, en cas de collision, ont un potentiel plus élevé de blesser les autres usagers. Mais aussi pour les cyclistes pour qu'ils évitent le plus possible des situations identifiées comme dangereuses ou de répondre de manière inappropriée au comportement d'autrui qu'ils perçoivent comme agressif. En général, l'éducation sur cette question pourrait aider à décoder la source de conflit entre ces deux usagers. De plus, il est important d'informer et de communiquer sur ces difficultés de la route et les facteurs qui contribuent, comme l'intention perçue du comportement de l'automobiliste, le danger perçu de la situation, les représentations des automobilistes sur ces connaissances sur les comportements envers les cyclistes et la légitimité que les automobilistes accordent aux cyclistes sur la route, ainsi que l'identité sociale des cyclistes. Plus précisément, des actions visant à prévenir les conflits intergroupes devraient être développées et, en particulier, une intervention spécifique pourrait être axée sur l'augmentation de la légitimité des cyclistes sur la route et la connaissance des comportements adaptés lors d'interactions avec les cyclistes. Pour cela il est nécessaire de proposer des formations aux automobilistes et également donner aux cyclistes le message que les automobilistes sont effectivement formés sur ces deux aspects.

LIMITES DES ETUDES

La taille de l'échantillon de la première étude pourrait être vue comme une limite de cette étude. Cependant, selon une approche qualitative, le nombre d'entretiens, leur longueur et le traitement des données issues des entretiens ont été plus que satisfaisants pour notre étude basée sur des entretiens approfondis. De plus, le but de l'étude était essentiellement exploratoire, expliquant le choix de cette méthodologie. De plus, il serait préférable d'avoir le même nombre de participants dans les deux groupes de cyclistes et de non cyclistes, comme nous l'avons recherché, mais les caractéristiques des participants nous permettent de découvrir alors les anciens cyclistes (ceux qui ne sont pas actuellement des cyclistes utilitaires alors qu'ils l'étaient auparavant) ce qui n'était pas attendu comme une autre catégorie d'usagers, ils étaient initialement prévus d'être dans le groupe des non-cyclistes. Par conséquent, le nombre de non-cyclistes a diminué. Il serait préférable d'avoir plus d'anciens cyclistes pour pouvoir avoir un troisième groupe et les comparer aux groupes de cyclistes et de non-cyclistes. Cependant, l'analyse des données pour trois groupes serait encore plus exigeante. En effet, la méthodologie de l'entretien en profondeur a une limite quant au temps nécessaire à la retranscription de chaque entretien et à l'analyse de cette quantité de matériel. Par conséquent, les données obtenues dans la première étude étaient très riches et intéressantes, et le fait d'être la première étude a permis de mieux connaître le sujet, le vélo utilitaire, la population, les cyclistes et les non-cyclistes.

Concernant les limites de la deuxième étude, le questionnaire a inclus un nombre important d'arguments basés sur la première étude afin d'identifier les représentations et les motivations les plus importantes. Nous avons fait une sélection pour limiter le nombre d'items, mais c'était encore un nombre important d'arguments et ensemble avec les questions du vélo, le questionnaire était très long. Un autre point méthodologique concerne un éventuel effet plafond de l'argument verglas (problèmes météorologiques). Cet effet pourrait entraver la comparaison avec les autres arguments négatifs. On ne s'attendait pas à un effet plafond de l'argument verglas ou des problèmes liés à la météo parce que, comparés à la première étude, les arguments liés à la météo étaient principalement associés aux inconvénients surmontés des cyclistes et non à des barrières. Dans cette seconde étude, la principale préoccupation a été focalisée sur la mesure des représentations et des motivations qui a montré une forte corrélation, entravant la distinction des concepts. Cette mesure nécessite encore plus de développement, donc nous posons une question mais nous n'avons pas de réponse. Ce sera une question importante et intéressante à résoudre à l'avenir.

L'une des limites de la troisième étude concerne l'écart entre la part modale du vélo des villes (Paris et Berlin) et la fréquence d'usage du vélo déclarée par les participants de notre étude. Cela pourrait s'expliquer en partie par le recrutement des participants. La caractéristique des groupes (par exemple la fréquence d'usage du vélo dans le sens opposée à celle prévue et la différence de genre dans l'échantillon allemand) ont compliqué la comparaison entre les groupes. De même, la taille restreinte de l'échantillon dans les deux villes représente une limite de l'étude. Comparées aux études précédentes dans lesquelles les participants étaient majoritairement des personnes actives, la troisième étude a été réalisée auprès d'étudiant-e-s, ce qui représente un recrutement plus facile pour la participation. De plus, les deux dernières études ont été menées par questionnaires; il est possible que des études dans d'autres conditions ou des situations réelles montrent des résultats différents.

Par ailleurs, le vélo utilitaire en milieu urbain est un sujet où le contexte est très important. Le contexte se réfère aux conditions sociales ainsi qu'aux conditions physiques. Ceci concerne les trois études. Ainsi, si une étude est menée selon des méthodes similaires dans une autre ville, les résultats seraient probablement différents. Pour cette raison, dans nos études, nous ne recherchons pas la généralisation, bien que la méthodologie que nous avons utilisée puisse être reproduite, voire améliorée, dans d'autres études et les résultats pourraient encore être comparés avec nos résultats en tenant compte de la variabilité du contexte.

PERSPECTIVES POUR DES RECHERCHES FUTURES

Après avoir réalisé les trois études, nous pourrions considérer qu'il existe plus de deux types de groupes d'usagers (cyclistes et non-cyclistes) qui pourraient être pris en compte pour l'étude de l'usage du vélo utilitaire en milieu urbain. Entre les cyclistes et les non-cyclistes, il existe plusieurs types de groupes d'usagers, tels que les anciens cyclistes, ceux qui utilisaient avant la bicyclette comme moyen de transport; Et les cyclistes très occasionnels, ceux qui utilisent la bicyclette, mais sans régularité; Et les nouveaux cyclistes, ceux qui commencent juste à utiliser la bicyclette comme moyen de transport et qui trouvent différents leviers et barrières que les cyclistes expérimentés.

De plus, le vélo utilitaire en milieu urbain peut être un mode de transport régulier, cette régularité peut inclure une pratique de tous les jours, y compris deux ou trois fois par semaine, à une fois par semaine ou une fois par mois. Mais le vélo utilitaire peut aussi être occasionnel; les gens peuvent décider d'utiliser la bicyclette en fonction de leur disponibilité, d'une situation sporadique, (une motivation particulière), ou à la convenance. Pour favoriser le transfert modal, de la voiture au vélo, il serait préférable d'utiliser régulièrement le vélo au moment du trajet, mais dans les villes à faible part modale, il serait intéressant d'explorer d'abord les encouragements des déplacements occasionnels à vélo et ensuite de renforcer leur régularité. De plus, il est important de considérer la transition d'un autre but du vélo au vélo utilitaire; par exemple, la transition du vélo récréatif ou de vélo sportif au vélo utilitaire.

Pour la recherche future, il sera important d'inclure d'autres groupes d'usagers; concernant les représentations et les motivations, qui comprennent par exemple les anciens cyclistes, les cyclistes occasionnels, les cyclistes récréatifs ou les cyclistes sportifs. En ce qui concerne la perception de l'agression et plus largement le conflit entre les usagers, inclure le point de vue des automobilistes, des piétons et des conducteurs d'autobus ; et de comparer les différents points de vue pour des situations conflictuelles spécifiques.

Pour continuer à améliorer la connaissance des déterminants pour utiliser ou non le vélo utilitaire en milieu urbain, il sera important de développer une mesure dans laquelle il serait possible de distinguer les représentations des motivations.

Il sera important de suivre le processus d'apprentissage et d'adaptation concernant l'usage du vélo utilitaire des nouveaux utilisateurs notamment afin de connaître les motivations initiales (positives et négatives) et l'évolution de celles-ci dans le temps et avec l'expérience acquise. Un journal d'expérience, des forums, des applications sur le Smartphone, des entretiens et le questionnaire pourraient être des méthodologies utiles pour collecter les informations. Cela pourrait être fait avec de nouveaux usagers aléatoires dans la ville, mais aussi cette piste concerne les étudiants dans les écoles, ou les employés d'une entreprise, qui commencent à utiliser le vélo comme moyen de transport. L'école et les entreprises peuvent être des mécanismes cruciaux pour inciter les nouveaux utilisateurs, mais aussi, pour le suivi de cette pratique. De même, les écoles du vélo et les associations cyclistes pourraient jouer un rôle important.

Plus spécifiquement pour l'étude des conflits entre usagers, les études futures doivent continuer à identifier les situations de conflit entre cyclistes et automobilistes, entre cyclistes et piétons, entre cyclistes et chauffeurs d'autobus, mais aussi entre cyclistes. Cette identification aidera à déterminer quelles caractéristiques sont associées aux situations conflictuelles, à savoir s'il y a des généralités provoquant le conflit ou si chaque situation est indépendante. L'approfondissement dans ce domaine aidera à trouver des solutions et à prévenir le conflit entre les cyclistes et les autres usagers, ce qui contribuera à un meilleur partage de la route, à prévenir les accidents et à promouvoir l'usage du vélo utilitaire en milieu urbain.