

# Qualitative Analysis on cycle Commuting in Two Cities with Different Cycling Environments and Policies\*

Análisis cualitativo sobre la movilidad al trabajo en bicicleta: Comparación de dos ciudades con diferentes infraestructuras y políticas ciclistas

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## ABSTRACT

This work presents the results of a qualitative study of the rating of the bicycle as the transport mode to travel to the workplace. Twenty-one semi-structured interviews were performed in two Spanish cities, Vitoria-Gasteiz and Madrid, with different cycling infrastructures and percentages of bicycle usage. The results were categorized and interpreted within the framework of the theory of planned behavior (Ajzen, 1991). The results indicate that the bicycle is considered a reliable and flexible transport mode in instrumental terms, and that providing objective information about its advantages could increase its attraction for non-cyclists. Other intrinsic benefits, such as its effects on physical fitness, are highly valued. The benefits of bicycle usage on the environment do not seem to be aspects that directly motivate its use. These symbolic beliefs contribute to its revaluation as a transport mode, and may increase the acceptance of public policies favoring it. The analysis also shows a prototypical image of the cyclist as a young, active, and socially aware person. The perception of risk of accidents is the main obstacle for non-cyclists, but not among riders. The latter make internal attributions about their personal safety, choosing routes with less traffic, riding the bicycle in a safer way. Control beliefs distinguish between beliefs associated with external factors (like infrastructure and other measures provided by public bodies to increase cycling) and those attributed to internal factors (perception of self-efficacy in the face of drawbacks, clothing, climatology, or insecurity). Presenting these coping strategies to people contemplating the possibility of cycling can increase their motivation. These results may be particularly useful when designing measurement instruments that take these differences of perception of control into account.

## Keywords

cycling; qualitative research; attitudes; planned behavior model

## RESUMEN

Este trabajo presenta los resultados de un estudio cualitativo sobre la valoración de la bicicleta como modo de transporte para viajar al lugar de trabajo. Se llevaron a cabo veintiuna entrevistas semi-estructuradas, en dos ciudades españolas, Vitoria-Gasteiz y Madrid, con diferentes infraestructuras ciclistas y porcentajes de uso. La categorización e interpretación de los resultados se realizó bajo el marco de la teoría de la acción planificada

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(Ajzen, 1991). Los resultados indican que la bicicleta se considera un modo fiable y flexible en términos instrumentales, y que facilitar información objetiva acerca de dichas ventajas podría incrementar su atractivo entre los no usuarios. Otros beneficios de carácter intrínseco, como sus efectos sobre la forma física, son muy valorados. Los beneficios del uso de la bicicleta sobre el medio ambiente no parecen ser aspectos que motiven, de forma directa, a su utilización. Estas creencias simbólicas sí contribuyen a su revaloración como modo de transporte, y pueden incrementar la aceptación de políticas públicas que lo favorezcan. El análisis también muestra una imagen prototípica del usuario de la bicicleta como alguien joven, activo y consciente. La percepción de riesgo de accidente es el principal obstáculo para el no usuario, no así entre los usuarios. Estos realizan atribuciones internas respecto a su seguridad personal, y eligen rutas con menos tráfico, manejando la bicicleta de una forma más segura. Las creencias de control permiten distinguir entre aquellas asociadas con factores externos (carriles-bici, servicios de préstamo de bicicletas) de las atribuidas a factores internos (percepción de autoeficacia para afrontar inconvenientes, como indumentaria, climatología o inseguridad). Dar a conocer estas estrategias de afrontamiento a aquellas personas que contemplan la posibilidad de utilizar la bicicleta, pueden elevar su motivación. Estos resultados pueden ser especialmente útiles a la hora de diseñar instrumentos de medida, que consideren estas diferencias en percepción de control.

**Palabras Clave**

movilidad ciclista; investigación cualitativa; actitudes; teoría de la acción planificada

## Introduction

Cycling as transport mode provides important advantages to riders and to the entire city, not only in aspects related to pollution. Many works also underline the health benefits, as its daily use helps to palliate obesity and to improve cardiovascular functioning, health problems that are more severe in countries where the car is the protagonist (Jacobson, King, & Yuan, 2011). These benefits greatly surpass the risk of traffic accidents involving cyclists and contradict the perception of cycling as a dangerous activity (Pucher, Dill, & Handy, 2010). From another viewpoint, Börjesson and Eliasson (2012) note that in many contexts, the bicycle is a cheap, fast, and reliable transport mode, requiring little space and physical investment, so it deserves to be considered an efficacious transport mode, and not simply a means to favor health or the environment.

By means of qualitative methodology, this article examines beliefs about transport cycling in commuting journeys (to the workplace or study center). Accordingly, we consider it important to study in depth the differences in the beliefs of the different users, on the one hand, and in different settings, on the other. The investigation focused on two Spanish cities whose public policies favor the increase of their citizens' bicycle usage: Vitoria-Gasteiz and Madrid. Both of them have very different indicators of usage, dimension, and topography. Whereas in Madrid, the bicycle is used for less than 1% of the commute trips (City of Madrid, 2007), in Vitoria-Gasteiz, with a clearly increasing tendency, it already exceeds 10% (City of Vitoria-Gasteiz, 2011).

## Study contexts: Vitoria-Gasteiz and Madrid

Vitoria-Gasteiz is a medium-sized city in the north of Spain. With a population of around 240,000 inhabitants and over 33 Km<sup>2</sup>, the city is the capital of the Basque region and is a compact and self-contained urban settlement, with an industry-based economy and considerable environmental assets, such as a 700 hectare Green Belt. Well known in Spain for its environmental commitment, Vitoria-Gasteiz has also been acknowledged internationally as was granted with the European Green Capital Award in 2012 for its successfully implemented environmental policies and wide-spread sustainable practices among its citizens. Among them, walking and cycling stand out when compared with similar cities. Walking represents 54% of all trips (City of Vitoria-Gasteiz, 2011), whereas cycling accounts for almost 7% of the modal split, the highest rate in Spain, steadily increasing since 2006, when the rate was around 3%. Cycling in Vitoria-Gasteiz is favored by the flat topography of the city, the compactness of its urban development (6 km extension in diameter) and by a good provision of infrastructure, programmes, and services geared to increasing the role of sustainable modes. The rest of trips are made by car (29%) and by public transport

(8%), and policies are in place to further reduce the percentage of private motorized trips (City of Vitoria-Gasteiz, 2007).

Madrid is the capital of Spain, the third largest metropolitan area in Europe after London and Paris, with 6.3 million inhabitants. Its inner city, the area within the M-30 orbital motorway, where the interviewees for this study live and work, concentrates a high density of population (1.1 million inhabitants within 51 Km<sup>2</sup>) and employments (0.93 million jobs). There, the majority of all trips are made by public transport (40%), followed by walking (33.5%) and by private motorized vehicles (26.3%) (CRTM, 2006). According to the last available mobility survey of 2004, inside the central area, only 0.1% of trips are made by bicycle, although more recent data estimate a 5-fold increase of that figure, assessing cycling trips to be around 0.6% of all trips (Fernández-Heredia, 2012). It has been calculated that approximately 54% of motorized trips in Madrid's central area cover distances of less than 3 km (Vega Baez, 2006) and approximately 15% of the trips currently made by car could be made by cycling within the same trip time and without affecting trip characteristics (García-Palomares, Gutiérrez, & Latorre, 2012; Monzón, Vega Baez, & Lopez-Lambas, 2011). In recent years, local planners in Madrid have shown a growing interest in promoting cycling despite the hilly topography of the city. In 2012, an additional 8 Km of infrastructure for this purpose have been created along a central and high symbolic arterial street, and it has recently been announced that a future public bicycle system will begin in the Spring of 2014, with about 1,500 public bicycles within the central area (City of Madrid, 2013).

## Theoretical framework

Our theoretical framework was the theory of planned behavior (TPB), whose central element is the individual's intention to perform a behavior, in this case, to cycle to the workplace or study center (Ajzen, 1991). Each variable is assumed to tap different motivational factors, which indicate the degree to

which people are deliberately prepared to carry out a behavior and the effort they are willing to make to achieve it: attitudes towards the behavior, subjective social norm, and perception of control over the behavior.

According to this theory, the attitudinal component reflects beliefs about the positive and negative consequences of cycling. Diverse works have revealed the utility of considering attitudes as a predictor of bicycle usage, analyzing beliefs about its advantages and disadvantages (Gatersleben & Appleton, 2007; Heinen, Maat, & van Wee, 2011; Heinen, van Wee, & Maat, 2010; Xing, Handy, & Mokhtarian, 2010).

Perceived control of behavior, another component of TPB, is defined here as the degree to which people believe it is possible to cycle to work, the degree to which they feel capable of it, or whether they perceive it as easy or difficult to do. These types of beliefs are essential determinants of bike journeys, as revealed in diverse studies (e.g., De Bruijn, Kremers, Singh, van den Putte, & van Mechelen, 2009; Heinen et al., 2011; Winters, Davidson, Kao, & Teschke, 2011).

The subjective norm refers to the pressure exerted by the social context on individual decisions. According to Gatersleben and Haddad (2010), variables like social norms, social identity, and stereotypes have received relatively little attention from researchers of bicycle mobility. De Geus, Bourdeaudhuij, Jannes, and Meeusen (2008) found that it is more likely for people to cycle to work if relatives, friends, or coworkers do so (modeling) or they accompany the user on the journeys, which is an indicator of social support.

## Goals of the study

The specific goal of this study is to analyze the beliefs about the advantages and disadvantages of cycling to work or to the study center, reflected in the spontaneous discourse of people who live in the two cities in which the investigation was carried out. This analysis includes the rating by individuals of the structural factors of the environment, as well as of socio-economic variables, aspects that play a

crucial role in determining the choice of transport mode. This information may provide useful data on which to base the development of strategies to change behavior (Bergström & Magnusson, 2003; Davies, Gray, Gardner, & Harland, 2001; Gatersleben & Appleton, 2007).

We chose qualitative methodology based on interviews, in order to obtain first-hand information without prior determinants imposed by the researchers. This methodology seemed particularly useful, taking into account the scarcity of investigations on bicycle usage in Spain from a psychosocial perspective (Fernández-Heredia, Monzón, & Jara-Díaz, 2013). The content analysis of the participants' observations can serve to create or adapt questionnaires to perform quantitative studies of the beliefs about cycling. This would allow the reliable contrast of similarities of the results obtained in works carried out in other countries with a longer tradition of bicycle usage.

Our interest focused exclusively on describing the contents that emerged in the participants' verbal interactions. The analysis of the linguistic or ideological aspects that could qualify this content, a characteristic of the methodology, which is traditionally known as discourse analysis (e.g., Antaki, Billig, Edwards, & Potter, 2003) was not the object of study of this investigation.

## Method

### *Participants and Design of the Sample*

There were 11 participants residing in the city of Madrid and 10 in Vitoria-Gasteiz (see tables 1 and 2) who were contacted through third persons, who did not know the goals of the investigation. None of the participants knew the interviewers. As the target of investigation focuses on commute trips, the recruitment criterion was that all the interviewees traveled to their workplace or study center at least one day per week. The sample was structured to include a sufficient number of bicycle users as well as users of other modes. Car users ( $n = 6$ ), public transportation users ( $n = 3$ ), cyclists ( $n = 8$ ), and people who commute on foot regularly ( $n = 4$ ) were

contacted. The number of males is higher ( $n = 14$ ) than that of females ( $n = 7$ ), whereas the age range, from 18 to 59 years, is adequately represented. There were a greater number of young participants (18-39 years) in the city of Madrid versus Vitoria-Gasteiz, where we performed more interviews with middle aged people (40-59 years).

## Procedure

The semi-structured interviews had a duration of about 35 minutes. They were performed in the facilities of the National Open University (UNED) of Madrid and Vitoria-Gasteiz and were directed by the authors. They were audio-recorded, with the participants' explicit authorization, and subsequently transcribed by people hired for this purpose. Previously, the participants filled in a card with data about their transport habits for different activities and their sociodemographic data. After the interview, the participants received a token for 20€.

A predefined guideline was used in the interviews. The interviews began with a brief presentation of the research project ("mobility in cities, transport modes"), and the interviewees were requested to express their general opinions about the traffic and transportation situation of their cities. Next, the interviewer asked questions about bicycle usage for commute trips, requesting the participants to state their opinion about: advantages and disadvantages of cycling; aspects that hinder or facilitate the use of bicycles as transport mode; what influenced or would influence greater bicycle usage; what would have to occur to increase cycling; what their relatives, friends, or coworkers think or would think about cycling; what cycling users are like.

## Data Analysis

In order to perform the content analysis of the interviews, the authors coded the content of the participants' verbal expressions separately. Following the procedure recommended by Straus and Corbin (1994), firstly, specific phenomena to which participants alluded were identified, grouping the concepts

**TABLE 1.**  
*Characteristics of the sample*

Transport mode	Sex	Group Age
On foot	Males	18-39
Bus	Females	18-39
Car	Males	18-39
Car	Males	18-39
Car	Males	18-39
Bicycle	Males	40-59
Bicycle	Males	18-39
Bicycle	Males	18-39
Bicycle	Males	18-39
Subway	Females	18-39
Subway	Females	40-59

Source: Own work.

**TABLE 2.**  
*Characteristics of the sample: Vitoria-Gasteiz*

Transport mode	Sex	Group Age
On foot	Males	40-59
On foot	Females	40-59
On foot	Females	40-59
Car	Females	40-59
Car	Females	40-59
Car	Males	40-59
Bicycle	Males	40-59
Bicycle	Males	60+
Bicycle	Males	40-59
Bicycle	Males	18-39

Source: Own work.

belonging to the same phenomenon in categories. Subsequently, a consensus was reached about the descriptors assigned to each category, following a criterion of interjudge agreement to resolve any disagreements. Next, the categories of analysis were classified in broader categories, based on the model of TPB, also resorting to the criterion of interjudge agreement. The last point comprehended a process of synthesis of the analyzed discourse, going beyond its mere description. To interpret the material obtained in the interview, the method of *thematic analysis* was used, described in detail in the work of

Braun and Clarke (2006), used in other recent works in the area of urban mobility (Buys & Miller, 2011; Fishman, Washington, & Haworth, 2012).

## Results

In Table 3, the categories extracted from the data analysis are shown. In the case of the factor *Attitude towards the Behavior*, three sub-categories were created to identify both the nature of the beliefs (instrumental, symbolic) and the affective aspects associated with the bicycle. In line with

the theoretical works of Dittmar (1992) and Ennis and Zanna (1993, 2000), this classification has been applied in research of ecological behavior in general and of urban mobility in particular. Gatersleben and Steg (2012) indicate that these behaviors are not only explained by beliefs associated with instrumental factors (such as cost or time spent), but they can also be predicted (even more precisely) by beliefs associated with symbolic (expression of identity, status or group membership) and affective motivations (pleasure, anger, relaxation).

## Attitude towards the behavior

Attitudes towards the behavior of commute cycling reflect instrumental beliefs, that is, associated with its utility, and we observed beliefs of positive and negative valence. The following categories were grouped in this section:

**Versatility, flexibility.** This describes the beliefs associated with flexibility of usage, parking, and the possibility of making different types of trips.

In this discourse, we observed beliefs alluding to bicycle usage as a synonym of freedom. It is consi-

**TABLE 3.**  
*Categories employed for the analysis.*

### Attitude towards the behavior

#### Instrumental beliefs

- Versatility, flexibility
- Reliability: predictability of trip time
- Safety: risk of accidents
- Safety: interaction with drivers and pedestrians
- Safety: risk of bicycle theft
- Economy
- Health
- Exposure to climatology
- Comfort

#### Symbolic beliefs

- Benefits for the environment
- Expression of values and status

#### Associated affective aspects

- Fear
- Anxiety
- Arousal
- Pleasure

#### **Social norm**

- Descriptive norm
- Subjective norm
- Prototypes of cyclists

#### **Perceived control of behavior**

- Availability of bike paths
- Car speed reduction and car restrictions
- Availability of bike hire services
- Availability of parking places
- Hilliness of the city

Source: Own work.

dered a transport mode that is always available and does not depend on timetables or passage frequency, as occurs with public transport. Nor does it present parking problems, like the car, making it easy to carry out errands.

- “You can go door-to-door fairly quickly, you just pick up the bicycle at a certain point and park it at the door of your destination, and this is important.” *On foot, male, 40-59, Vitoria-Gasteiz.*
- “You leave home whenever you wish, you don’t depend on the bus or the subway.” *Public transportation, female, 40-59, Madrid.*
- “If I see a parking place for bikes, I always try to leave it at the parking place. But in general, I park wherever I can, either by a lamppost or away from one, I don’t care.” *Bicycle, male, 40-59, Vitoria-Gasteiz.*
- “If I must do three errands in the city, there’s no comparison, I have to go on an errand, and with the car, you just cannot go.” *Bicycle, male, 60+, Vitoria-Gasteiz.*

Nevertheless, on the negative side, bicycle usage is perceived as problematic to transport objects or people. However, the difficulty of keeping it at home or leaving it in public spaces is also mentioned.

- “To carry papers or a computer, it is pretty complicated.” *Car, male, 40-59, Vitoria-Gasteiz.*
- “A lot of parents who travel by car take their kids to school, and they go to work by car; that would also be a problem.” *Public transportation, female, 40-59, Madrid.*
- “For me, the main disadvantage is the trouble of taking it in and out, you have to go up the entrance stairs, put it in the elevator, have an adequate place to keep it at home.” *On foot, male, 40-59, Vitoria-Gasteiz.*

#### **Reliability and predictability of trip time.**

This category includes assessment of aspects related to the time spent on the trip or to the foreknowledge of its duration (reliability and predictability).

The interviewees’ comments reflect that most of them consider it a fast transport mode and—more relevant—it is possible to predict the trip time.

- “You really always need the same time to arrive to your destination unless you fall down or have a blowout, you don’t have to wait for traffic jams or anything”. *Bicycle, male, 18-39, Madrid*
- “The main advantage for me is the speed at which I move around the city on a day-to-day basis”. *Bicycle, male, 40-59, Vitoria-Gasteiz.*
- “Living in the city center, you need less time than with any other transport, less than walking, less than the subway. It’s faster and very comfortable.” *Car, male, 18-39, Madrid.*

However, in Madrid, they also think that the bicycle is less efficient than the subway, a transport mode considered fast and reliable.

- “I think it would take more time by bike, the bicycle is slower than the subway”. *Public transportation, female, 18-39, Madrid.*

**Safety: risk of accidents.** This refers to the degree to which the bicycle can be considered a safe mode to travel to work or the study center. Especially for non-riders, riders are perceived as *more fragile*, threatened by moving or parked cars. The latter refers to blows due to suddenly opening car doors.

- “Disadvantages? Well, they can run over you...they come and give you a nasty blow.” *Public transportation, female, 40-59, Madrid.*
- “In a car, you are protected by the door. On a bicycle, it’s you, you are not protected, a slight brush, a car overtaking you quickly can knock you over. Unfortunately, many people have died in accidents this way”. *Car, male, 18-39, Madrid.*

However, perception of personal risk decreases with experience of bicycle usage. According to the interviewees, both one’s cycling “style” and the following of certain safety rules are considered as ways to avoid accidents. In this aspect, there are notable

differences in the beliefs of urban cyclists versus the rest of the interviewees in perceived control over the consequences of their behavior.

- “Whether or not you are hit by a car also depends on you...you automatically take at least some precautions, trusting that whatever you have done before will continue to protect you”. *Bicycle, male, 18-39, Madrid.*
- “There are three main elements to guarantee safety: the mirror, the lights, and the bell...I also feel safer when I ride in the center of the lane and never stray from it”. *Bicycle, male, 40-59, Madrid.*
- “In order to be able to cycle on the road, you must know the highway code, there are some signs that normal people do not know”. *Bicycle, female, 40-59, Vitoria-Gasteiz.*

**Safety: interaction with drivers and pedestrians.** This describes the relations (real and desired) among cyclists and other public space users and their effects on safety. This category only includes beliefs with a negative valence.

In Madrid and in Vitoria-Gasteiz, situations are mentioned in which motor vehicles do not respect the cyclists’ space, and in some cases, they shout at the cyclists, putting them in danger.

- “People [IN CARS] pass you wherever they want to, they drive at any speed they want, and even if they see a cyclist, I think they don’t care...they have such an air of superiority, as if everything belongs to the people who travel by car”. *Public transportation, female, 40-59, Madrid.*
- “Lots of times, they honk at you, as if to say “get out, you’re bothering me, you’re blocking the traffic”. *Bicycle, male, 18-39, Madrid.*
- “The buses are the most dangerous; the drivers knock you off the road and then say they didn’t see you”. *Bicycle, male, 60+, Vitoria-Gasteiz.*

Cyclists also describe problems related to pedestrians invading the bike paths:

- “When there is a bike path, people invade it; they see a pathway with a painted line and follow it”. *Bicycle, male, 18-39, Madrid.*
- “The lady with the shopping cart, the baby carriage, they all invade the bike path because it’s softer”. *Bicycle, male, 60+, Vitoria-Gasteiz.*

There are also complaints about the “invasion” of sidewalks by cyclists, especially in Vitoria-Gasteiz, a city where this custom is quite frequent:

- “At those times, I’m sorry, but the cyclist is an invader of the pedestrian, because he is not showing the least good manners.” *Car, male, 40-59, Vitoria-Gasteiz.*
- “Youngsters often ride like crazy people. I think we still have to learn a little about respect. Both the riders and the pedestrians”. *On foot, female, 40-59, Vitoria-Gasteiz.*

**Safety: risk of bicycle theft.** This reflects the belief about bicycle theft, as well as the measures a cyclist can take to protect him/herself from possible thefts.

Concern about bicycle theft is obvious; this phenomenon exists in both cities and has affected the participants of the study or their relatives and friends. This transport mode is relatively easy to steal, and this even conditions some journeys:

- “I’d cycle to the train station if I were not afraid of leaving my bicycle there”. *Bicycle, male, 18-39, Madrid.*
- “They stole my nephew’s bicycle three times, even with a padlock; he went inside to get something and when he came back out, it was gone”. *Car, female, 40-59, Vitoria-Gasteiz.*

Cyclists use two preventive strategies for possible thefts: invest in more expensive and complex security systems or use unobtrusive, cheaper bicycles, so as not to attract thieves’ interest. Their comments show that they think that avoiding thefts is the user’s responsibility.

- “You have to have two [BIKES], one of them a piece of junk. There are also people who have very good bikes but they dis-



guise them to make them look like junk, they paint them black.” *Bicycle, male, 18-39, Madrid.*

- “With regard to security from theft and so on, well, you have to invest in security, people usually have the same philosophy we had with our cars, which displayed our social status, and we transferred it to the bicycle”. *Bicycle, male, 40-59, Vitoria-Gasteiz.*

**Economy.** This reflects the discourse related to transport cost.

This category only has positive comments, mentioning the advantages in personal economy involved in bicycle usage:

- “It’s 3,000 euros per year [SAVINGS FROM CYCLING TO WORK INSTEAD OF GOING BY CAR], that’s my calculation more or less according to the kilometers I travel, and I include everything, even the depreciation of the car I would have to buy”. *Bicycle, male, 40-59, Madrid.*
- “I have to buy the public transport pass, once you pay for a bike, you have it, it doesn’t need gasoline”. *Public transportation, female, 40-59, Madrid.*

**Health.** Beliefs associated with the influence of bicycle usage in physical fitness and health.

No negative beliefs related to health emerge in the participants’ discourse. Bicycle usage as a transport mode is perceived as the possibility to ensure that one performs physical activity, seen as necessary, which would also facilitate higher levels of psychological well-being:

- “[IF BICYCLES WERE USED MORE] people would perform more exercise and feel less stressed”. *Public transportation, female, 40-59, Madrid.*
- “What with our lifestyle, you forget about physical exercise because you are always very busy, and at least [THE BICYCLE] makes you be a little more alert, you move and at nighttime, you fall into bed and go to sleep fast. *Bicycle, male, 18-39, Madrid.*

**Exposure to climatology.** Belief about the influence of climate in bicycle usage.

Rain and excessive cold or heat affect bicycle usage, and most of the interviewees agree that this is a disadvantage of cycling versus other means of transportation.

- “Either the weather is good—that is, not extreme—because when it is very hot, you can’t use it, and nor can you use it when it is very cold—but the disadvantage is that you are somewhat conditioned by the weather” *Bicycle, male, 18-39, Madrid.*
- “It’s not getting wet, but the fact that [IN THE RAIN] I can’t see well, and especially at night, I think car drivers will have trouble seeing me and braking and reacting”. *Bicycle, female, 40-59, Vitoria-Gasteiz.*

However, especially among cyclists, they note that the way the rider copes with climatological determinants can, to a great measure, relieve their discomfort. For instance, an example of these control beliefs is observed in their comments of high bicycle usage in European countries with a worse climate:

- “These things can be foreseen and avoided. For example, Holland, Denmark, or Germany are places with a pretty harsh climatology insofar as rain, cold, and wind, and they use bicycles a lot. If you have the minimum equipment, which can be a raincoat, the kind you fold up so it is no bigger than a belt, a cape that covers you completely... the only part that gets wet is the lower leg, so you cover that part up and no problem. And the cold isn’t so bad, because when you start peddling, your body begins to heat up.” *Bicycle, male, 18-32, Madrid.*
- “It’s a rainy day, and well...I usually get soaking wet four or five times a year, but I accept that and it’s no problem”. *Bicycle, male, 40-59, Vitoria-Gasteiz.*

**Comfort.** Comfort in cycling clothing, or drawbacks related to personal hygiene (sweat).

Some differences in these aspects are seen in the attitudes of cyclists and non-cyclists. They underlined the need of specific clothing and the impossibility of dressing “elegantly” to go to the workplace or study center (suit, tie, heels). The mention of sweat is another difficulty that emerges spontaneously as a barrier for non-cyclists.

- “You can’t go to an important meeting in a tie, a suit in the case of women, and wearing sneakers”. *Car, male, 40-59, Vitoria-Gasteiz.*
- “I mean, if the work requires wearing a suit and tie-if you are a street sweeper, or a fishmonger or something like that, well, maybe you can clean up a little and it’s not very important-but maybe a person in a suit... well, you may get dirtier riding a bicycle”. *Car, male, 18-39, Madrid.*
- Several of my colleagues cycle to work and sometimes they look awful, a little..., and you have to tell them, “well, the best thing is that you go have a shower and then start to work” *On foot, male, 40-59, Vitoria-Gasteiz.*

However, bicycle users minimize the possible drawbacks related to clothing, because they can be solved if there are facilities at work where the cyclist can change his or her clothing, or keep a change of clothing. This shows the link between beliefs about the consequences of behavior and control beliefs.

- “I have a “Barbie” closet in my office, with various kinds of clothing, to change clothes”. *Bicycle, male, 18-39, Madrid.*
- “I try to see the weather report the day before and before getting my bike, I look at the sky to see what it’s like, and depending on that, I wear a pair of rain-proof pants or I get a cap, or a coat, something so that if it rains, I can change clothes”. *Bicycle, male, 40-59, Vitoria-Gasteiz.*

The demand for special bicycle clothing is relativized, attributing this idea to cultural differences or higher acceptance of this transport mode in other geographical areas:

- “A friend of mine lives in Germany and her husband is a director; well, he cycles every day to work, wearing a suit and all, and no problem” *Public transportation, female, 40-59, Madrid.*
- “It is surprising, it shocks us, maybe in other countries it isn’t so shocking because women wear high heels and dresses”. *Bicycle, male, 40-59, Madrid.*

Besides the beliefs related to the functional nature of cycling as a transport mode, we observe in the discourse other beliefs related to symbolic aspects such as identity, values, or status.

**Benefits for the environment.** Influence of bicycle usage in city pollution.

The participants consider that the bicycle provides other advantages, beyond its practical benefits as an individual transport mode, such as its environmental effects. This belief emerges quickly in the discourse of non-cyclists from Madrid, as a socially desirable element.

- “Not polluting, certainly, then... of course, we wouldn’t have these big traffic jams, that’s for sure. *Public transportation, female, 18-39, Madrid.*
- “It would be better regarding pollution if we all cycled”. *Public transportation, female, 40-59, Madrid*
- “The main advantage I see is that it is healthy, it does not pollute, it produces a benefit for society, and it has a lot more advantages than drawbacks, I really don’t see any drawbacks”. *Bicycle, male, 40-59, Vitoria-Gasteiz.*

However, the environmental factor is not what leads cyclists to use this vehicle but another kind of instrumental or affective advantage:

- “After all, you don’t pollute and so on, but that is not what would motivate me to use the bicycle. My ecological awareness takes second place...”. *On foot, male, 18-39, Madrid.*

**Expressive values.** Some of the interviewees still identify bicycle usage with people with low income, or who somehow deviate from the norm:

- “At first, when you see a well-prepared person, you are surprised to see them on a bicycle, it isn’t habitual, it seems more like something for youngsters or people like that. *On foot, female, 40-59, Vitoria-Gasteiz.*
- “[BICYCLE USAGE] is generalizing a bit but, at this time, cycling as the habitual transport mode is still somewhat extravagant. *Bicycle, male, 60+, Vitoria-Gasteiz.*

But the revaluation of the bicycle as transport mode is “revindicated” by the participants, showing the evolution of their postures in this regard:

- “The car is a social status symbol, some people think that the fact of cycling means you don’t have economic resources, but I have a car too... I think it’s a personal option that people do not think about”. *Bicycle, male, 40-59, Vitoria-Gasteiz.*
- I’ve met or I have lots of executive friends who cycle to work, top executives; well, I don’t think it is a negative image, quite the opposite. *On foot, male, 40-59, Vitoria-Gasteiz.*

Sometimes bicycle usage is even related to the expression of certain values:

- “[TRAVELLING BY BICYCLE] also provides advantages of personal coherence, because I believe in a different city; then using it is coherent with my thinking, that’s the main thing” (*Bicycle, male, 40-59, Madrid*),

or to an “extension” of oneself, as a part of one’s personal identity:

- “The bike becomes a prolongation of yourself” (*Bicycle, male, 18-39, Madrid*).

With regard to the affective aspects associated with bicycle usage, fear of being run over or falling emerge as a negative factor associated with the belief of accident risk, and more extremely among non-cyclists:

- “It is dangerous to cycle in the city, except for certain areas”. *On foot, male, 40-59, Vitoria-Gasteiz.*

In contrast, a series of affective consequences are very positively valued. Pleasant emotions derived from enjoying the physical environment and the countryside during the trip. In contrast to aggressiveness, stress, or boredom experienced in other means of transportation is the pleasant feeling of positive arousal caused by cycling:

- “I would love it [CYCLING TO WORK], I enjoy nature very much. It would liberate me, it would feel like a massage”. *Public transportation, female, 40-59, Madrid.*
- “Instead of travelling half asleep in the subway or aggressively in a car or on motor bike, when you go by bike, it is very pleasant, and you begin to wake up a little”. *Bicycle, male, 18-39, Madrid.*
- “It’s like walking but you travel more distance in the same time, with the bike, you can stop and also enjoy the architecture, and watch other people walking”. *Bicycle, male, 18-39, Madrid.*

## Social norms

**Descriptive norm.** This reflects citizens’ beliefs about bicycle usage.

Both in Madrid and in Vitoria-Gasteiz (more definitely), the participants say they perceive an obvious increase in the number of cyclists travelling in the city:

- “When I came to this city, very few people cycled as a hobby or as a sport, but nowadays...Nowadays it’s like a fashion” *Public transportation, female, 18-39, Madrid.*
- “But much more so here in Vitoria-Gasteiz”. *Car, male, 40-59, Vitoria-Gasteiz.*
- Some of them relate this increase to the implementation of measures such as the construction of bike paths:
- “Now they use bicycles much more than before, yes, I think so. Moreover, there are other facilities that did not exist before, there are more bike paths, more park places for bikes”. *On foot, male, 40-59, Vitoria-Gasteiz.*

- “I think there are more [BIKES], as they have made more bike paths”. *Public transportation, female, 40-59, Madrid.*

However, they acknowledge the effect of the “example” or model of their behavior for others, or the behavior of certain public figures, as well as imitating what goes on in other European countries with higher bicycle usage. These aspects are mentioned by some participants as an important source of influence to begin to cycle for transport purposes:

- “They take a famous figure, like a singer, a famous politician, they interview them and they say: *No, I cycle for this, that, and the other reason.* And you say: *if this person cycles, we could all cycle*”. *Bicycle, male, 40-59, Madrid.*
- “What encourages people the most is the example, *come with me today, I am cycling to work.* Then, when a person gets on the bike and tries it and says: *ah, well, it wasn’t so difficult or so hard or so dangerous*”. *Bicycle, male, 18-39, Madrid.*

**Subjective norm.** This includes beliefs about their referents’ opinion if they cycled to work.

Some cyclists describe situations in which their family, friends, or coworkers are surprised and even concerned because the interviewee chooses to cycle:

- “I can’t go to see my parents; I cannot cycle to have dinner at my parents’ place because they cannot bear for me to cycle at night”. *Bicycle, male, 18-39, Madrid.*
- “They look as if you were a weird being, they make the classic jokes of *you’re going to be all sweaty*, sometimes there are also some admiring comments, they admire you a little... I travel by car but this guy is really weird”. *Bicycle, male, 40-59, Madrid.*
- “At the beginning, it was as if cycling were for crazy people”. *Bicycle, male, 18-39, Madrid.*

**Cyclist prototypes.** The prototype of people who use the bicycle to travel to work or to the stu-

dy center is that of a young man, people interested in sport practice, and with “ecological values”

- “I think they are fellows...someone who uses a bicycle every day and so on, is someone who has...he likes sport, he likes to take care of himself, he likes a healthy life...that’s the idea I get”. *Public transportation, female, 18-39, Madrid.*
- “They are very active people, active, strong people. For them, sport is important, they get their bicycle--they have a strong personality and they are physically strong”. *Car, male, 18-39, Madrid.*
- “They are usually people with a different mentality. They are very aware, especially now with all the material [IN EDUCATION], that they are teaching natural sciences, environmental sciences... people are thinking things over a lot.” *Car, male, 18-39, Madrid.*

## Perceived control

This category includes aspects that the interviewees think facilitate cycling. The principal beliefs described involve the “efficacy” of bike paths, parking places, and public bike hire services. They also include beliefs favoring the regulation of motorized traffic, reducing the circulation speed of vehicles, or restricting their access to certain areas. Other environmental aspects, like hilliness, or distances travelled as an obstacle to cycling, are mentioned less frequently.

**Availability of bike paths.** Non-users think that bike paths are necessary to promote bicycle usage, and they should be segregated from the rest of the traffic, implying some fear of traveling next to cars:

- “First, there should be more bike paths... because I think many people would be encouraged”. *Public transportation, female, 40-59, Madrid.*
- “[BIKE PATHS COULD BE BUILT] parallel to the highway, and fenced off so there would be no accidents”. *Car, male, 18-39, Madrid.*

- In Madrid, they appreciate the bike paths, but think they are not well connected and they are intended exclusively for leisure or sports use:
- “The bike paths they built are not meant to move around the city, they are for sport”. *On foot, male, 18-39, Madrid.*
- Cyclists do not confer so much importance to the existence of bike paths, even preferring to cycle on the roadway:
- “I am alright riding on the road, so whether or not there are bike paths, I don’t care, I shall go on riding”. *Bicycle, male, 40-59, Vitoria-Gasteiz.*
- “When there is no bike path, I feel much better on the road”. *Bicycle, male, 60+, Vitoria-Gasteiz.*
- “Those of us who use the bicycle on a daily basis don’t need a bike path”. *Bicycle, female, 40-59, Vitoria-Gasteiz.*
- “They could build parking places around the city, people could leave their cars and hire a bike or go by public transportation” *Public transportation, female, 40-59, Madrid.*
- “Hiring bikes would be very interesting, it is quite extended in Barcelona, they should have bikes for hire in almost all the workplaces. People should use mixed transport, people should travel to a hiring point, they should go by bus or subway and then on a bicycle”. *Bicycle, male, 18-39, Madrid.*

**Speed reduction and car restrictions.** Interviewed cyclists consider that decreasing the authorized speed for cars is essential to reduce the difficulties of cycling, along with designing streets that allow either sharing the space among cars, bicycles, and pedestrians, or total car usage restriction (pedestrianization).

- “I would make the streets compatible for everyone; car drivers know they cannot travel at 50 km/hour because then they would prevail over everything.” *Bicycle, male, 40-59, Madrid.*
- “I think they should limit cars even more in the city center, because there are sufficient means of transportation so as not to have to go by car to the center.” *On foot, female, 40-59, Vitoria-Gasteiz.*

**Availability of bike hire services.** With regard to public bike hire services (also known as bike-sharing systems), they are positively valued in the city of Madrid, as an ideal way to “encourage” people to use the bicycle to go to work. This would ideally be one stage of the trip or for distances less than 4 or 5 kilometers:

In Vitoria-Gasteiz, however, this kind of systems seem unnecessary. Many people have a bicycle, which is valued as a material possession. The current system is considered less flexible and more uncomfortable than having one’s own bicycle, and some people consider it a superfluous investment for the city.

**Availability of parking places.** The difficulty bicycle users face is the scarcity or poor conditions of the specific places to park bicycles, thus protecting them from theft and bad weather. This problem is noted with regard to homes and workplaces,

- “There should be more parking lots around the entire city, especially at the points that are going to be the destination of large masses of cyclists”. *Bicycle, male, 40-59, Vitoria-Gasteiz.*
- “At work, we managed to park our bicycles in an adequate place, but you travel to other centers from the same company and they have nothing. This is discouraging for some people who would consider the bicycle as a transport mode to go to work”. *Bicycle, male, 40-59, Madrid.*

Folding bikes are considered an interesting option to solve parking problems, as well as to facilitate the interchanging with other transport modes; the general increase in cycling mobility in Madrid is attributed to this type of bicycles.

- “Every day there are more folding bikes in Madrid. Folding bicycles Yes, ..., I think it’s because of the advantage that they don’t steal them.

You can put it anywhere” (*Bicycle, male, 18-39, Madrid*),

- “The advent of folding bikes has increased bicycle usage now, because they are easy to keep at home--not everyone has a parking place at home-- it’s easy to leave it at work and you can always take it with you folded up in the subway or trolley, from the time you enter the facilities. Also, in suburban trains, there is no problem” (*Bicycle, male, 18-39, Madrid*).

**Hilliness of the city.** In Madrid, bicycle users consider that the hilliness of this city is not ideal for cycling, an aspect that does not emerge in the discourse of the interviewees in Vitoria-Gasteiz:

- “Madrid is not prepared for travelling by bicycle, there slopes going up, slopes going down.” *Bicycle, male, 18-39, Madrid*.

## Discussion

This work analyzes in detail the beliefs about cycling as a transport mode to travel to work or to the study center, from the viewpoint of the theory of planned behavior. The results obtained reveal the utility of this model, whose contents emerge spontaneously in the participants’ discourse.

In the analysis of attitudes towards behavior, categorization of beliefs as instrumental and symbolic, or their affective aspects, has been useful, with participants displaying a higher number of practical beliefs. This coincides with other works indicating that people recognize the influence of these kinds of aspect more than others of a less rational nature (Steg, 2005) and it is easier for them to verbalize them.

We observed beliefs related to the instrumental aspects of the bicycle such as its flexibility, time employed, safety, benefits for health, and economy. The flexibility of the bicycle is one of its clear advantages. This belief is linked among the participants to the broader concept of *freedom*, and our results are coherent with those of Heinen and Handy (2012).

However, on the negative side, non-users perceive the drawback that it is difficult to transport

objects and people by bicycle. This may be an important obstacle, for example, for those who perform a work of a commercial nature, and it can reduce the probability of cycling to work, as mentioned by Heinen, Maat, and van Wee (2013). These authors argue that an alternative would be for the companies to limit the need for transportation of objects to certain days of the week and so, the employees could choose to go by bicycle on the remaining days. These solutions are feasible in contexts with high ratios of bicycle usage, but they may be difficult to apply in places where bicycle usage as a transport mode is a marginal practice, like those in this study.

Another relevant advantage is that the bicycle is considered a reliable mode. This benefit is clearer in Vitoria-Gasteiz, whereas in Madrid, it is somehow qualified, possibly due to the greater distances that must be travelled. This attribute, linked to the prediction of trip time, and its distinction from other aspects whose perception is more deferred--such as the cost of the trip or the environmental impact--has been commented in other works (Anable & Gatersleben, 2005; Huey & Everett, 1996). This result underlines the need to make cycling efficiency visible to non-users, for example, by providing objective data such as mean trip speeds by bicycle for a series of frequent trajectories compared to other modes of transportation.

The association of the bicycle to the risk of personal accidents is undoubtable among non-users, and it matches the tendency observed in other works carried out in contexts where cycling is a minority practice (Fishman et al., 2012; Horton, 2007; Jacobsen, Racioppi, & Rutter, 2009). However, the perception of dangerousness becomes blurry among cyclists. They make internal, stable, and controllable attributions about accidents, and feel they are responsible for their own safety. Non-users, in contrast, attribute accidents to external, stable, and uncontrollable causes, such as the aggressive behavior of car drivers and the dangerousness of motorised traffic. Nevertheless, we do not know whether a low perception of risk is a consequence of bicycle usage or, in contrast, it is the low perception of risk that contributes to its usage (Heinen & Handy, 2012).

Interaction with cars is considered conflictive in both cities, and, in general terms, is expressed as a struggle by cyclists to conquer a space that, apparently, car drivers do not want to yield, an aspect noted in other investigations (McKenna & Whatling, 2007). In Vitoria-Gasteiz, despite a significant percentage of cyclists, there are still problems between the latter and car drivers. Many cyclists avoid riding on the road and choose instead to use separate bike paths or sidewalks, in those where they are still allowed to ride, but which creates problems with the pedestrians.

Beliefs about physical well-being and the positive effects on health of bicycle usage are present in cyclists and non-cyclists in both cities, and are considered (along with economic advantages) as one of the intrinsic strengths of bicycles. As in other works (Heinen & Handy, 2012; Van Bekkum, Williams, & Morris, 2011), the bicycle is specifically mentioned as an opportunity to do daily exercise for people with a sedentary lifestyle.

Another kind of belief that emerges with regard to commute cycling reflects symbolic aspects associated with its advantages or drawbacks. The main symbolic factor, linked to value orientation, is the environmental benefits of bicycle usage. This belief is shared by all (especially by non-users) but it can be considered as what is desirable or socially prescriptive: people “should” ride bicycles. Nevertheless, it does not seem to be a central belief that helps to increase the short-term intention of using this mode, coinciding with Heinen and Handy (2012), Van Bekkum et al. (2011) and Fernández-Heredia et al. (2013). However, from our viewpoint, in cities with a public policy that favors cycling, its ecological benefit may activate personal, ecological norms or norms related to environmental concerns. These could contribute to the acceptance of some measures of sustainable transport (for example, restricted car use). Various works reveal the contribution of personal norms to attitudes and intentions to use public transportation and, in general, alternatives to car usage (Bamberg, Hunecke, & Blöbaum, 2007; Gardner & Abraham, 2010).

In general, we observed a reappraisal of this transport mode, and not only due to its environ-

mental benefits. The image of the cyclist as low-status person with no access to a car has changed and, in our study, in line with other works, cycling is associated with young, active, and aware people (Daley & Rissel, 2011; Goodman, Guell, Panter, Jones, & Ogilvie, 2012; Steinbach, Green, Datta, & Edwards, 2011). Although this is positive, it has the drawback of establishing a cyclist prototype that acts like a “barrier” to other collectives that do not match that prototype. According to Gatersleben and Haddad (2010), when more people consider the “typical” cyclist as someone who uses a bicycle for daily activities, the more current non-users will intend to use it in the future, in line with the work of Xing et al. (2010). As noted by Mannetti, Pierro, and Livi (2004), this occurs because, before acting in a certain way, people compare themselves with the prototype associated with that behavior. The greater the match of one’s self-concept with the prototype, the greater will be the intention to perform the behavior.

Affective aspects acquire special relevance. Drawing from the two-dimensional model of Russell (1980), which classifies basic emotions as a function of two axes, pleasant-unpleasant (pleasure or displeasure) and arousal-nonarousal (excitement or calm), riders’ experience could be placed at pleasant-arousal, whereas travelling by car would produce unpleasant-arousal (aggressiveness), whereas other modes, like public transportation, are associated with negative-nonarousal (boredom). However, for current non-users, the predominant emotion is fear, as established in the literature (Horton, 2007; Parkin, Wardman, & Page, 2007).

It must be taken into account that some instrumental elements that are related to bicycle trajectories, such as versatility and autonomy, facilitate positive affect. The deterioration of some of these conditions, due to the loss of control over certain circumstances of the trip, increase the level of stress during the trip, as shown by Evans, Wener, and Phillips (2002).

Three dimensions of the social norm have been detected: descriptive, prescriptive, and modeled by imitation. In Madrid, where the bicycle

is still scarce outside of leisure or sport circles, cycling to work is seen as infringing the social norm, perceived as extravagant or marginal, in line with the findings of other authors (Daley & Rissel, 2011; Xing et al., 2010). Nevertheless, according to our results, cyclists have some influence on their environment, showing their coworkers that it is feasible to use this transport mode. In Vitoria-Gasteiz, where cycling is more normalized, the interviewees do not mention situations of rejection or disapproval of cycling. As the percentage of cyclists increases, they may exert social pressure on others to motivate them to cycle, as occurs in populations where cycling is generalized (Heinen & Handy, 2012).

With regard to the perceived control of behavior, there are two typologies of beliefs related to bicycle usage: beliefs related to control of external aspects (controllability) or of internal aspects (self-efficacy).

Among the control beliefs, it seems that for non-cyclists, the existence of bike paths separated from traffic is essential. However, current riders confer more importance to speed reduction of cars in order to travel on the road safely. This measure requires less investment and, according to our results, may be more efficacious in cities that already have some cycling infrastructure.

With regard to bike hire services, in Vitoria-Gasteiz, it is seen as secondary, as the bicycle is considered a material possession within reach of everyone (64% of the population has access to a bicycle (City of Vitoria-Gasteiz, 2011). In contrast, in the city of Madrid, where the distance travelled often exceeds 5 kilometers<sup>1</sup>, this service would be a motivator, because public bicycles could be used to cover part of the journey. Distance has an important impact on the individual decision to cycle to work (Heinen et al., 2011) and, in cities with an incipient use of this mode, the implementation of hiring services has increased the number

of cyclists (Murphy & Usher, 2013; Nadal, 2007; Romero, 2008).

The lack of parking places in the workplace and in the homes is an added difficulty for cycling, according to the participants. Setting aside a compulsory parking space for bicycles depending on the number of workers in the work center could be a useful measure in companies. In Madrid, the foldable bicycle is considered as an alternative to these problems, although the high cost of these models and the unequal regulation of its use in public transport means that it is not generalizable at the short term.

Self-efficacy beliefs emerge in the participants' discourse when they mention the possible disadvantages of bicycle usage. For example, beliefs of personal safety have a very negative connotation for non-cyclists. However, cyclists avoid the possible negative consequences by modifying the way they cycle, choosing routes with less traffic or incorporating safety elements. With regard to protection from theft, the users' alternative is to use anti-theft systems or to use unattractive bicycles. A similar pattern was found with regard to clothing, sweat, and adverse climatology. Riders cope with these difficulties by adapting their clothing to the expected weather. The creation of simple messages, with information about safety guidelines, how to cycle in traffic and to adapt one's clothing, targeting groups of non-riders, could be an effective way to raise their confidence in bicycle usage.

Our investigation shows an important degree of coincidence with observations in other geographical areas with higher percentages of bicycle usage, which could promote the possibilities of reproducing the public policies that were successful in these settings. Among them, the ones that present a package of various simultaneous interventions (Pucher et al., 2010) and that combine both "soft" and "hard" (Bamberg, Fujii, Friman, & Gärling, 2011) measures seem more effective. Nevertheless, it is important to obtain prior data about the target populations of interventions, and the components of the theory of planned behavior could provide rich information to the planner.

1 According to the Encuesta Domiciliaria de Movilidad (Household Survey of Mobility, CRTM, 2006), every person who travels in Madrid's inner city covers an average distance of 12 km for all the daily trips, with a mean length of 3.8 km for each trip.



Accordingly, the results obtained may be useful to adapt measurement questionnaires in order to perfect the validity of the scales designed within the framework of the theory of planned behavior. For example, it is recommended to incorporate more beliefs in the questionnaires, especially those associated with perceived control of behavior. Only one or two items are used to measure the variable perceived control in the prediction of bicycle usage (for example, De Bruijn et al., 2009; or Heinen et al., 2011) and our results indicate that beliefs related to self-efficacy should be differentiated from those related to controllability (especially in populations with low ratios of bicycle usage). This is coherent with works like that of Kraft, Rise, Sutton, and Røysamb (2005), who showed that, for behaviors such as physical exercise or recycling, perceived control of behavior emerges as a multidimensional construct made up of two related but independent components.

The limitations that are characteristic of the qualitative methodology of this work (possible lack of representativeness of the data, interpretative nature of the results) are minimized when taking into account its use in combination with quantitative methodologies. Following Hammersley (2002), this qualitative investigation is meant to be used as a prior stage to the creation of questionnaires (as a facilitation) that will allow the analysis of broader samples and the consideration of the conjoint influence of the variables of the model.

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