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THIAGO CARVALHO DOS REIS SILVEIRA

TRAVEL MODE CHOICE BEHAVIOR: AN INTEGRATED FRAMEWORK OF SOCIAL PSYCHOLOGY AND MARKETING THEORY

DISSERTATION

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THIAGO CARVALHO DOS REIS SILVEIRA

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DISSERTATION

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Supervisor: Prof. Dr. Cezar Augusto Romano

Co supervisor: Prof. Dr. Tatiana Maria Ceci Gadda

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I, as I now know myself, am not the final form of my being. We must constantly die one way or another to the selfhood already achieved (Campbell, Joseph, 1988).

RESUMO

SILVEIRA, Thiago C. dos R. **Travel Mode Choice Behavior: An Integrated Framework of Social Psychology and Marketing Theory.** 2020. 259 f. Dissertação (Mestrado em Engenharia Civil) – Universidade Tecnológica Federal do Paraná. Curitiba, 2020.

Em transportes, a pesquisa de comportamento pode ser dividida em três grandes áreas: marketing, psicologia social e planejamento urbano. Embora, construtos de campos teóricos diferentes já tenham sido analisados juntos, poucos estudos examinaram como um conjunto de variáveis de diferentes teorias interagiriam e influenciariam a formação de intenções comportamentais e de laços de lealdade. O objetivo principal deste trabalho envolveu o desenvolvimento de um modelo teórico integrado baseado em uma revisão sistemática da literatura de marketing e de psicologia social para investigar a formação de intenções comportamentais e de laços de lealdade em relação à dois modos de transporte, carro e transporte público. Uma *survey* foi desenvolvida e aplicada em Curitiba, Brasil coletando informações sobre valor percebido, qualidade percebida, satisfação, lealdade, atitudes, normas pessoais e sociais, percepção de controle comportamental, intenções comportamentais e hábito. Os dados foram utilizados para testar e validar o modelo teórico integrado com base na aplicação de análise confirmatória fatorial e na modelagem de equações estruturais. Os resultados indicam que a formação de intenções comportamentais e dos laços de lealdade entre as amostras ocorre de maneira distinta. Por exemplo, atitudes, qualidade percebida, normas pessoais, percepção de controle comportamental e satisfação são os construtos com o maior efeito na variável de interesse para usuários de carro. Em contrapartida, valor percebido, satisfação, atitudes, qualidade percebida, percepção de controle comportamental e normas pessoais são os mais relevantes para usuários de transporte público. A maior vantagem e contribuição do modelo teórico integrado é a conexão de conceitos de marketing, comumente utilizados na realidade de gestores públicos, a conceitos da psicologia social, chave para o desenvolvimento de intenções comportamentais e hábito. Portanto, auxiliando no desenvolvimento de políticas públicas mais detalhadas que possam ser aplicadas a fim de promover cidades mais sustentáveis.

Palavras-chave: Escolha Modal; Transporte Público; Carro; Modelo Teórico, SEM.

ABSTRACT

SILVEIRA, Thiago C. dos R. **Travel Mode Choice Behavior: An Integrated Framework of Social Psychology and Marketing Theory.** 2020. 259 f. Dissertação (Mestrado em Engenharia Civil) – Universidade Tecnológica Federal do Paraná. Curitiba, 2020.

Current travel behavior research can be divided into three main fields: marketing, social psychology, and land-use, which are derived from different theories and beliefs. Even though, constructs from different theoretical frameworks, such as travel satisfaction and attitudes, have been previously studied together, few studies have analysed how a set of constructs from different theories would interact and influence the formation of behavioral intentions and user loyalty. In this sense, the main goal of this research entailed developing a comprehensive framework based on a systematic review of both marketing and social psychology theories as to investigate the formation of behavioral intentions and loyalty bonds towards two commute travel modes, namely commuting by car and by public transport. To this end, a survey was developed and applied in Curitiba, Brazil regarding perceived value, perceived quality, travel satisfaction, user loyalty, attitudes, social and personal norms, perceived behavioral control, behavioral intentions and habit. The collected data was used to test and validate the integrated framework through a two-step approach based on both confirmatory factor analysis (CFA) and structural equation modeling (SEM). The results highlighted that the formation of behavioral intentions and loyalty bonds across the samples occurred differently. For instance, attitudes, perceived quality, personal norms, perceived behavioral control, and travel satisfaction were the constructs with the largest effect on the main variable in the car sample. On the other hand, perceived value, travel satisfaction, attitudes, perceived quality, perceived behavioral control, and personal norms were the most relevant in the public transport sample. Overall, the main advantage and contribution of the integrated framework is being able to connect the influence of marketing constructs, which are commonly used by public managers, to social psychology factors, which are key to the development of behavioral intentions and habit. Therefore, aiding the planning of more detailed, strategic and adaptable public policies that could be applied to achieve more sustainable cities.

Keywords: Travel Behavior; Public Transport; Car; Integrated Framework, SEM.

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SUMMARY

1 INTRODUCTION

Cities are often characterized by a sprawled development. This phenomenon promotes longer and more frequent trips (SHOUP, 2006), thus reducing public transport efficiency and inducing individual mode dependency (LITMAN, 1999). As a result, more and more people enjoy a sense of freedom, status and independency, which is usually associated with car usage (STEG, 2005). However, the increasing fleet comes with consequences. It contributes to major environmental and social issues, such as air pollution, increase in traffic accident rates and congestion volumes (FILIPOVIĆ et al., 2009). On the same note, the transportation sector is responsible for 24.3% of global carbon dioxide emissions from fuel combustion (INTERNATIONAL ENERGY AGENCY, 2018), thus a large contributor to climate change. In Brazil, due to a strong fossil fuel culture and dependency, the sector is responsible for a significantly higher share of the carbon dioxide emissions from fuel combustion (47.6%).

This scenario has led several governments worldwide to actively search ways to encourage sustainable transportation modes. For instance, the inclusion of promoting safe, affordable, accessible and sustainable mobility as a development goal by the United Nations (UNITED NATIONS, 2015) and the landmark efforts from the European Union to lay transport policies that endorse sustainable growth (EUROPEAN COMISSION, 2014). However, the degree of success of such travel demand management (TDM) policies on promoting sustainable options is believed to rely on how well travel patterns and travel behavior is understood. As human behavior is nuanced and complex assessing its heterogeneity becomes relevant for the development of more adaptable and effective strategies (ABENOZA; CATS; SUSILO, 2017).

Current research on travel behavior can be divided into three different fields: marketing, social psychology, and land use, which are derived from different central focuses, theories and beliefs. Marketing studies are concerned with travel behavior and service performance through business and marketing constructs, such as perceived service quality, perceived value, customer satisfaction and customer loyalty (*e.g.* DE OÑA; MACHADO; DE OÑA, 2015; LAI; CHEN, 2011; MACHADO et al., 2018; VAN LIEROP; BADAMI; EL-GENEIDY, 2017). Social psychology research is based on predictive and explorative models of behavior (*e.g.* ANABLE, 2005; BAMBERG;

SCHMIDT, 2003; CHEN; CHAO, 2011; FU; JUAN, 2017a, 2017b) derived from different theories, such as the theory of planned behavior (AJZEN, 1985), the value-belief-norm theory (STERN, 2003), and habit (VERPLANKEN et al., 1994, 1998; VERPLANKEN; AARTS; VAN KNIPPENBERG, 2002). Finally, land-use studies try to measure the effect of the built environment on travel behavior (VAN ACKER; WITLOX, 2010) through factors, such as density, diversity, design, destinations and distances to public transport (EWING; CERVERO, 2010).

Even though, travel satisfaction, a construct from marketing theory, has been examined within land-use and social psychology frameworks and attitudes, from social-psychology, have been incorporated to both marketing and land-use analysis, few studies have investigated how a set of constructs from different theoretical perspectives would interact together on explaining behavioral intentions toward their travel mode choice behavior. Moreover, according to our literature review based on the Scopus database, about 80% of top published studies on the topic are concentrated in North America and Europe, thus there is little evidence of how this phenomenon works in developing countries. Building upon previous travel behavior literature, this study proposes a theoretical model based on social psychology and marketing theories for travel mode choice behavior. The framework is composed of perceived value, perceived quality, travel satisfaction, and user loyalty from marketing theory and attitudes, social norms, perceived behavioral control, personal norms, behavioral intentions, and habit, from social psychology theory. Land-use was not evaluated due to research constraints.

The main goal of this research entailed developing a more comprehensive framework based on a systematic review of both marketing and social psychology theories as to investigate the formation of behavioral intentions and loyalty bonds towards commute travel. In this sense, the integrated framework was studied based on two different commuting patterns, namely commuting by car and commuting by public transport. The results were also compared to the customer-loyalty theory (MINSER; WEBB, 2010) and the theory of planned behavior (AJZEN, 1985, 1987, 1991, 2011; AJZEN; MADDEN, 1986) explaining power on the construct. To this end, a survey was designed and applied in Curitiba, Brazil. The collected data was used to test and validate the model through a two-step procedure based on both confirmatory factor analysis (CFA) and structural equation modeling (SEM), which allows the analysis of both direct and indirect complex relationships (HAIR et al., 2014).

1.1 OBJECTIVES

1.1.1 Main Objective

The main objective of this study consisted in investigating the formation of behavioral intentions and loyalty bonds toward different commute behaviors based on an integrated framework derived from a systematic review of both social psychology and marketing theories.

1.1.2 Specific Objectives

- Develop an integrated model framework based on a systematic review of social psychology and marketing theories;
- Examine the found correlations between descriptive variables, latent constructs and observed variables;
- Validate, analyse and compare the integrated model framework results and its hypothesized dependence relationships for and between the studied travel modes;
- Compare the results for the models comprising the customer-loyalty theory (MINSER; WEBB, 2010), the theory of planned behavior (AJZEN, 1985) and the developed integrated framework for each studied travel mode;
- Derive possible policy implications from the results based on previous literature.

1.2 JUSTIFICATIVE

In developing countries, a strong correlation is found between increasing motorization rates, income inequality and income growth (KUTZBACH, 2009). Increasing road capacity is a frequent, but unfeasible solution to address this escalating trend on car ownership as cities are bound by financial and geographical constraints (ERCAN et al., 2017). Therefore, as to promote sustainable development a paradigm shift is needed. In other words, urban development should be though as to reduce economic, social and environmental impacts of conventional transportation systems (LITMAN, 1999) , such as air pollution, increase in traffic accident rates and congestion volumes (FILIPOVIĆ et al., 2009). Globally, there has been many efforts to encourage sustainable modes. For example, the promotion of alternative fuels, cohesive infrastructure and passengers' rights in Europe (EUROPEAN COMISSION, 2014), the Sustainable Development Strategy in Canada (TRANSPORT CANADA, 2017), and its inclusion as a development goal by the United Nations (UNITED NATIONS, 2015). However, there is still much action required to reduce the carbon dioxide emissions from the transportation sector as well as to align urban development with sustainable goals and as to improve the quality of life of urban citizens.

The current literature indicates that the success of transport policies depends on the extent to which psychological and motivational factors affecting travel behavior are understood (DONALD; COOPER; CONCHIE, 2014). Thus, it is necessary to take steps on furthering the knowledge on this topic as to fuel discussions on sustainable growth and aid policy makers to develop strategies to promote more compact and sustainable cities through improving infrastructure efficiency and reducing energy consumption, carbon dioxide emissions, individual mode dependency and urban sprawling. This study assessed whether an integrated theoretical approach to travel mode choice behavior, through marketing and social psychology theories, would improve its current understanding. For that end, structural equation modelling was used to test a model based on a systematic review of the travel behavior literature, which was examined for two different travel mode choices as to evaluate possible differences in behavior.

1.3 RESEARCH DELIMITATION

A survey was applied in Curitiba, Brazil from late May through June 2019 regarding perceived value, perceived quality, travel satisfaction, user loyalty, attitudes, social and personal norms, perceived behavior control, behavioral intentions and habit for commute trips. As to limit survey length, the research scope was limited to two travel modes: car and public transport, which represents 70.9% of the modal split in Curitiba (IPPUC, 2019). The remaining 29.1% are composed of different travel modes, which could be evaluated in further studies, however a large enough sample for each group would be required to achieve statistical reliability. Moreover, at this point, a recursive approach was adopted to analyse the relationships among constructs, which means that the model only evaluates predictor-outcome paths and feedback loops are not assessed.

2 TRAVEL BEHAVIOR AND TRAVEL MODE CHOICE LITERATURE

Travel behavior research started in the early 60's, however it gained momentum in the 90's. At the time, landmark transport policies, such as the Maestricht Treaty (1992) in the European Union and the Eco-92 Summit in South America, started laying ground on passengers' rights and environmental concerns. Alongside, the New Urbanism movement started promoting principles for sustainable community development, which included walkability, connectivity, and mixed, diverse and high-density land use connected to public transit (DE VOS et al., 2012). By the new millennia, manuals to measure public transport service quality were released both in North America (TCRP 100, 2003; TRB, 1999) and Europe (EN 13816:2002, 2002), serving as base for many studies (DE OÑA et al., 2015; GUIRAO; GARCÍA-PASTOR; LÓPEZ-LAMBAS, 2016; TYRINOPOULOS; ANTONIOU, 2008), since then the rate of yearly publications have been constantly increasing.

As a line of research, travel behavior studies have as motivation contemporary issues, such as continuous urbanization, climate change, increase in energy expending and demographic change. Thus, focusing on how transport policies, infrastructure and new technologies can help solve these issues by evaluating its effects on diverse aspects of travel behavior. The overall goal is to aid policy makers to promote more compact and sustainable cities by improving infrastructure investment efficiency and by reducing energy consumption, carbon dioxide emissions, urban sprawling and individual mode dependency.

A common trend among travel behavior studies is the use of structural equation modelling (SEM) as to evaluate complex interactions among several constructs at once. It is a confirmatory tool that can handle several endogenous and exogenous observed variables as well as latent unobserved variables in the form of linear combinations (GOLOB, 2003). Data is often collected through customer satisfaction surveys (CSS), which are well disseminated among both researchers and operating companies (GUIRAO; GARCÍA-PASTOR; LÓPEZ-LAMBAS, 2016). Recently, heterogeneity has become a major concern, since different attitudes might lead to different behaviors, thus affecting policy and infrastructure development efficiency. As to address this issue, different *ad-hoc* and *a priori* cluster analysis techniques are being used as to draw customer profiling. Analysis within the field are usually based on three different research areas: land-use, marketing, and social psychology.

Land-use studies are concerned with the effects of the built environment on travel behavior (VAN ACKER; WITLOX, 2010) through factors, such as density, diversity, design, destinations and distances to transit (EWING; CERVERO, 2010). Marketing research initial emphasis was on service quality evaluation through cost effectiveness and technical improvements (HENSHER; DANIELS, 1995). As the construct evolved, the focus started to shift towards the user perspective (DE OÑA; DE OÑA, 2015) and on understanding customer behavior. Likewise, perceived value, customer satisfaction, customer involvement, and customer loyalty are also of interest inside the marketing framework. Finally, the attention of social psychology studies lies on developing predictive and explorative models derived from different theories as to understand travel behavior. The theory of planned behavior (TPB) developed by Ajzen (1985) is often used as ground to achieve this goal. It postulates that, when under volitional control, behavior is reasoned, deliberate and motivated by the strength of intentions, which are influenced by attitudes, social norms and perceived behavioral control. The theory has been widely tested in several fields to positive results (AJZEN, 2011; BAMBERG; SCHMIDT, 2003). However, it has been questioned on whether it is enough to fully explain behavior. Some argue that behavior is not always reasoned (VAN ACKER; VAN WEE; WITLOX, 2010; VERPLANKEN et al., 1994, 1998; VERPLANKEN; AARTS; VAN KNIPPENBERG, 2002). In this sense, the theory of repeated behavior (RONIS; YATES; KIRSCHT, 1989) argues that initial behavior is indeed regulated by intentions, however as it is repeated, decision making stops being well-reasoned and is largely influenced by habit. Another source of criticism comes from the norm-activation theory (SCHWARTZ, 1977). It presents the personal norm construct, which is viewed as a moral or personal obligation to perform or not a behavior (BAMBERG; SCHMIDT, 2003). It has been found to increase explained variance on behavior (BECK; AJZEN, 1991) and to be a determinant of car-use reduction (GARVILL; MARELL; NORDLUND, 2003; NORDLUND; GARVILL, 2003).

In transportation, these fields have already tried to predict diverse behaviors, such as overall travel behavior (*e.g.* THØGERSEN, 2006), low-carbon travel intentions (*e.g.* LIU et al., 2017) and public transport use (*e.g.* BAMBERG; RÖLLE; WEBER, 2003; FU; JUAN, 2017b; FU; ZHANG; CHAN, 2018). However, here our focus will stay on travel mode choice literature. Anable (2005) and Bamberg and Schmidt (2003) are seminal papers on the topic. The former identified groups of potential mode switchers based on an extended view of the theory of planned behavior, which included measures of personal norms and habit. The author's rationale assumed that the same behavior might originate from different reasons and that the same attitudes can lead to different behaviors. Thus, classifying market segments based solely on socio-demographic characteristics, as was usual, would oversimplify customer heterogeneity. A combination of exploratory factor analysis and cluster analysis was applied on the data, yielding 6 segments varying on travel mode switch intentions toward sustainable modes and correlated policy implications.

On the other hand, Bamberg and Schmidt (2003) designed an intervention aiming to evaluate its effects on public transit ridership. Data was collected two-months prior and 8-months after the introduction of an overtly publicized semester ticket plan. Among the respondents, it was found that the proportion of people using the bus jumped from 15% to 36% between inquires. Their analysis suggested that the elements from the theory of planned behavior were sensitive to new information and the effects of habit were put into question. However, this conclusion might be contested. As suggested by Fujii and Kitamura (2003), a significant contextual change is required for the effects of habit to be broken and for new relevant information to be acquired. In this case, the semester ticket plan would be the contextual change prompting a more deliberate thought process, thus it is expected that the TPB latent constructs to be more relevant than habit. An evidence for this reasoning is that cross-sectional studies, which do not include intervention experiments, often find a significant negative effect of habit on mode switching intentions, which is stronger than the individual effects of the TPB variables (CHEN; CHAO, 2011). Therefore, habit probably hinders the effects of attitudes, social norms, and perceived behavioral control inhibiting the formation of a new behavior. Then, as to reduce car usage, it is important to increase mode choice awareness through contextual changes in the form of travel demand management (TDM) measures (GARVILL; MARELL; NORDLUND, 2003).

Likewise, Gardner (2009) tested habit as a moderator in the intention-behavior relationship for travel mode choice for commuting, in the UK, and for cycling usage, in The Netherlands. For both, behavior was found to be positively correlated to past behavior on stable conditions, intention to be a statistically significant predictor of behavior, and habit to moderate the effects of intention on behavior. Consequently, when habit is weak, intention predicts behavior, but when it is strong, intention has a negligible effect on it. This conclusion is supported by other studies, such as

Verplanken et al. (1998), who showed that when habitual and intention tendencies diverge, behavior will often align with habit and not with intentions.

In the literature, two different but not mutually exclusive approaches exist to habit. The first is an *associationist* approach, which assumes that a behavior enacted frequently on a stable context enables a neural connection to be formed between behavioral cues and responses (WOOD; QUINN; KASHY, 2002; WOOD; TAM; WITT, 2005). The second is a *script-based* approach, which believes that certain sequences of actions can be triggered on appropriate circumstances, therefore the scheme would guide the decision-making process by directing attention and information selection and usage (AARTS; VERPLANKEN; VAN KNIPPENBERG, 1998; VERPLANKEN; AARTS, 1999). Friedrichsmeier, Matthies and Klöckner (2012) tested both approaches for car-use. Their study found evidence supporting only the first approach, in which context stability and behavior frequency indicate the formation of habit. However, they do not discard the relevance of the second approach to explain behavior stability on different contexts.

Apart from habit and the theory of planned behavior, several researchers concentrate their assessment of mode choice on attitudes. Attitudes toward a behavior are expected to originate from salient beliefs that an individual hold regarding the outcomes of a behavior. As beliefs are naturally positive or negatively valued, the person naturally develops a disposition to act in a certain way towards it (AJZEN, 1985). Anable and Gatersleben (2005) analyse studies regarding work and leisure trips evaluating the effects of instrumental and affective attitudes on mode choice. Their findings highlight a stronger influence of instrumental factors, such as cost, environment, convenience, predictability and flexibility, for commute journeys, while people attach more importance to affective attributes like excitement and freedom to leisure trips. Similar results were drawn from a study on the effects of attitudes and personality traits on mode choice. In their research, Johansson, Heldt and Johansson (2006) confirmed cost and flexibility as important for commuting, adding comfort and travel time as well, while pro-environment attitudes were found to increase the likelihood of choosing an environmentally friendly travel mode.

Moreover, Diana and Mokhtarian (2009) evaluated objective, subjective, and desired measures of mobility as to analyse the different modal "baskets", which are a combination of different mode choices, used, perceived and/or desired within their collected sample. Four clusters were derived highlighting user multi-modality, varying in degrees of car and transit usage. An important finding was that all groups saw cycling as an attractive alternative and desired to travel by car more as a passenger than as a driver, which are both relevant for policy discussions on travel behavior. Similarly, Cote and Diana (2017) developed a classification system based on user multimodality. Two different sets of clusters were derived through a non-hierarchical algorithm, one for trip-level comparisons and one for individual-level multimodality. As a result, carpooling was found to drive interest for multi-modality, while park-and-ride facilities and being allowed to carry a bicycle on public transport were seem as important steps to achieve modal diversion.

Initially, travel behavior literature was heavily focused on the influence of land-use on travel patterns (SCHEINER; HOLZ-RAU, 2007). As social psychology constructs, such as attitudes, started being evaluated, the influence of urban form on travel started being challenged, since its effects were largely reduced in the presence of other variables (CAO; MOKHTARIAN; HANDY, 2009; EWING; CERVERO, 2010; VAN ACKER; VAN WEE; WITLOX, 2010; YE; TITHERIDGE, 2016). De Vos et al. (2012), for example, evaluated the influence of both the built environment and travel-related attitudes on travel mode choice. Walking, cycling and public transport use were mainly explained by attitudes, while the built environmental showed only a limited influence on mode selection. Nonetheless, many still advocate for its assessment (CERVERO, 2002), since there is evidence in favor of a significant individual effect of the built environment on travel behavior and mode choice even when other factors are accounted for (CAO; HANDY; MOKHTARIAN, 2006; KITAMURA; MOKHTARIAN; LAIDET, 1997). In this sense, Scheiner and Holz-Rau (2007) modelled the influences of residential location-attitudes, lifestyle and the urban form on mode choice. They found a stronger influence of subjective attitudes, however the objective spatial structure still remained significant.

Travel satisfaction is often found to have a strong connection to attitudes, thus influencing modal selection (DE VOS et al., 2016; DIANA, 2012) and modal shift (DE VOS; WITLOX, 2016, 2017). Both constructs are even considered by some as synonyms, but theoretically they have different conceptual definitions, moreover while satisfaction is transient and situation specific, attitudes are more enduring (FU; JUAN, 2017b). Even so, based on psychometric analysis, Friman, Larhult and Gärling (2013) developed a self-report measure of travel satisfaction, the satisfaction with travel scale (STS), based upon both cognitive and affective components of subjective well-being.

De Vos et al. (2016) used this scale as to try to explore the conceptual relationship between travel satisfaction and mode choice. It concluded that travel satisfaction can be affected by mode choice, while mode choice is influenced by both the built environment, travel-related attitudes and mode-specific attributes. These findings are supported by the results of other studies (*e.g.* YE; TITHERIDGE, 2016). However, as previously stated, the influence of urban characteristics on mode choice is still largely debated. Furthermore, it is also likely that travel satisfaction exerts an influence on mode choice, since recurring trip satisfaction with a determined mode is believed to strengthen behavior (OLSEN, 2007).

The previous findings lead to the belief in the existence of a cyclical relationship between travel satisfaction and mode choice. De Vos and Witlox (2017) proposed a theoretical model indicating that the perception of every trip made will slightly affect satisfaction with daily travel, which in turn will affect long-term well being, choice of residential location, travel attitudes and travel mode choice. These four elements will then play a role on the perception of the next trip. It also argues that satisfaction with daily travel, long-term well being, choice of residential location and travel attitudes will also directly or indirectly affect mode choice. Therefore, over time travel mode choice becomes habitual. Hence, if a person feels intermediate or high levels of travel satisfaction towards their chosen mode, a mode switch is not likely. Therefore, a significant disruption would be needed (FUJII; KITAMURA, 2003) as to make relevant information salient (AARTS; VERPLANKEN; VAN KNIPPENBERG, 1998) and for it to influence new behavioral choices (VERPLANKEN et al., 2008).

In this section, it was showed that current research on travel behavior and mode choice has been focusing on the effects of attitudes, habit, travel satisfaction, and urban form on travel mode choice. However, there have been few attempts to combine theories from social psychology, marketing and land-use into a comprehensive model. This study proposes a first step by evaluating whether joining main constructs from social psychology and marketing theories would improve the existing explaining power on behavioral intentions and loyalty towards mode choice. Therefore, attitudes, social norms, perceived behavioral control, personal norms, and habit and perceived value, perceived quality, travel satisfaction, and user loyalty were integrated into a single framework. Individually, both sets of constructs have been previously used to explain travel behavior to positive results, therefore this approach is expected to bring new insights into the literature and aid strategic policy development as to promote sustainable transportation modes. A survey was applied in Curitiba, Brazil, to collect data regarding the latent constructs for two different commute travel modes. In the next sections of this chapter, land-use, marketing, social psychology, and policy development, which were touched upon here will be explained in further detail. Even though, land-use theory will not be assessed in this study, it is still relevant to understand it due to its importance on the evolution of the field.

2.1 LAND-USE THEORY APPLIED TO TRAVEL BEHAVIOR

The belief that travel behavior could be explained by the urban form boosted the development of transportation geography or land-use as a research field through out the 1970's (SCHEINER; HOLZ-RAU, 2007). Several studies tried to measure the effects of several built environment characteristics at both aggregated and disaggregated levels on travel behavior (VAN ACKER; VAN WEE; WITLOX, 2010). In this sense, most studies are based on a 5D approach, which is composed of density, diversity, design, destinations and distance to transit (EWING; CERVERO, 2010). Empirical studies showed that land-use significantly influenced mode choice (CERVERO, 2002), therefore denser, more mixed communities with high access to public transport would lead to less driving (HANDY; CAO; MOKHTARIAN, 2005).

However, as social psychology constructs started being added to predictive models, the notion of a causal relationship between the built environment and travel behavior started being challenged (NÆSS, 2015). Many studies found the influence of urban design to be largely reduced or to be deemed insignificant when travel-related attitudes were taken into account, indicating that its effects were being overestimated (VAN ACKER; MOKHTARIAN; WITLOX, 2014). Thus, researchers started theorizing that the differences in mode choice and travel demand across neighborhoods might be due to self-selection (DE VOS et al., 2012; SCHWANEN; MOKHTARIAN, 2005). Thus, people would select themselves into neighborhoods that are aligned with their travel attitudes and that enable them to maximize the use of their preferred travel mode (DE VOS et al., 2016), which can be also interpreted as maximized personal utility (MCFADDEN, 1979, 2001, 2007). In this way, when someone is not able to meet their spatial preferences due to different constraints, a residential dissonance is expected to occur. This mismatch between preferred and actual house location is likely to affect mode choice, since their ideal mode choice might not be available (DE VOS et al., 2012).

Even though, social psychology research seems to back this reasoning (*e.g.* CAO; MOKHTARIAN; HANDY, 2009; EWING; CERVERO, 2010; VAN ACKER; VAN WEE; WITLOX, 2010; YE; TITHERIDGE, 2016), many studies still find a separate influence of the built environment on travel behavior, even when self-selection is accounted for (CAO; HANDY; MOKHTARIAN, 2006; KITAMURA; MOKHTARIAN; LAIDET, 1997). It has also been argued that the built environment also has a long-term influence on shaping travel behavior and travel-related attitudes (YE; TITHERIDGE, 2016), which might be due both to the options available in their location and finding consonance to perceived social norms. Along these lines, urban policies that promote mixed land-use, increased accessibility to public transit and decreased travel distances are expected to aid in the reduction of driving (HANDY; CAO; MOKHTARIAN, 2005), but might not reach the desired effects alone.

2.2 SOCIAL PSYCHOLOGY THEORY APPLIED TO TRAVEL BEHAVIOR

In the 90's, social psychology started being used more actively in travel demand and mode choice models. The theory of planned behavior (AJZEN, 1985, 1991), an extension from the theory of reasoned action (HILL; FISHBEIN; AJZEN, 2006), offered a reasoned and structured account of behavior. It assumed behavior as a deliberative assessment of available options (GARDNER, 2009) and was found to increase model explaining power on behavior (AJZEN, 1991; BAMBERG; SCHMIDT, 2003). The theory postulates that performed actions are moderated by behavioral intentions, which are determined by attitudes toward the behavior, subjective norm and perceived behavioral control. Intentions are believed to capture motivational factors, which are strong indicators of future behavior (LAI; CHEN, 2011). As a rule, the greater the expected positive outcomes, the social pressure pro-behavior and the perception of feasibility of carrying out the behavior, the stronger will be the intentions to perform the action under consideration. In transportation, this theory has already been used to predict travel behavior (*e.g.* THØGERSEN, 2006), mode choice (*e.g.* BAMBERG; SCHMIDT, 2003; ERIKSSON; GARVILL; NORDLUND, 2008), mode switch intentions (*e.g.* CHEN; CHAO, 2011), low-carbon travel intentions (*e.g.* LIU et al., 2017) and public transport use (*e.g.* BAMBERG; RÖLLE; WEBER, 2003; FU; JUAN, 2017c, 2017b).

Attitudes are based on an evaluation of possible outcomes and attributes of behaviors, which are linked to beliefs. As beliefs are naturally positive or negatively valued, a person will quickly develop a disposition to act in accordance towards the behavior (AJZEN, 1991). Previous research has shown that attitudes significantly contribute to mode choice (NORDLUND; GARVILL, 2003). Many studies have used them to derive travel psychographic profiles and market segments, drawing policies for car use reduction (ANABLE, 2005; PRONELLO; CAMUSSO, 2011; SHIFTAN; OUTWATER; ZHOU, 2008). However, the direct relationship between attitudes and behavior is found to be inconsistent and low (GÄRLING; GILLHOLM; GÄRLING, 1998), while intentions can predict it with considerable accuracy (AJZEN, 2005).

Social norms and perceived behavioral control are not usually assessed alone when predicting travel behavior. Normative beliefs are the main component of social norms, which are related to the perceived social pressure to engage or not in a behavior (AJZEN, 1991). Even though, not a part of this theory, there is evidence that personal norms are a better determinant of car use reduction than social norms (NORDLUND; GARVILL, 2003). Personal norms are defined as a sense of moral obligation to perform a behavior due to an interplay of cognitive, emotional and social factors (SCHWARTZ, 1977), which are relevant for pro-environmental behaviors (STERN, 2003). It has been found to be influenced by social norms, to have a direct and strong impact on perceived behavioral control and attitudes and to improve model predictive value on travel behavior (BAMBERG et al., 2011; LIU et al., 2017). Moreover, perceived behavioral control stands for a person's perception of resources, opportunities and difficulty to perform a behavior (AJZEN, 1991). It plays an important part for behaviors which are not totally under volitional control. For example, the availability of a car, both a resource and an opportunity, regulates perceived behavioral control and is found to predict less use of public transport and an increase in driving (THØGERSEN, 2006). In sum, the theory of planned behavior incorporates central concepts of social and behavioral sciences, accounting for a considerable proportion of variance on explaining behavior.

Even though, the theory of planned behavior recognizes the effects of routine behaviors, it argues that behavior is always regulated by some level of cognitive effort (AJZEN, 2011; BAMBERG; SCHMIDT, 2003). Another line of research argues that after a behavior is performed repeatedly under stable conditions, it becomes habitual and is no longer reasoned (AARTS; VERPLANKEN; VAN KNIPPENBERG, 1998; VERPLANKEN; AARTS, 1999; WOOD; TAM; WITT, 2005), which is the case for daily commute and mode choice (THØGERSEN, 2006). One of the main arguments supporting this view is the role of past behavior. It is found to significantly improve prediction of future behavior, which was viewed as an indicator of habit strength. However, Ajzen (1991) reasoned that other constructs, such as attitudes and social norms, all carry residuals of past experiences, therefore it could not safely predict the formation of habit. Based on the *script-based* approach, Verplanken et al. (1994) developed a response-frequency measure to habit. It consists in presenting a set of naturally occurring situations and asking for participants to quickly make a choice among the available options, the more frequent the mode appears the more habitual it is. This approach has been tested by several researchers (*e.g.* BAMBERG; SCHMIDT, 2003; FRIEDRICHSMEIER; MATTHIES; KLÖCKNER, 2012; FUJII; KITAMURA, 2003; GARDNER, 2009) feeding evidence to the claim of a strong and positive correlation between past behavior, habit and behavior prediction (THØGERSEN, 2006).

One consequence of habit is that it is difficult to influence it with rational arguments, as new relevant information tends to be overlooked (GÄRLING; AXHAUSEN, 2003). In this way, a strong habitual driver is not expected to think about other transportation modes as alternatives or to acquire information about them (GÄRLING; FUJII; BOE, 2001). Fujii and Kitamura (2003) hypothesized that a significant contextual change would be required to break a habit. In the case of car use, it could range from offering free tickets to public transport and instigating deliberate travel planning (ERIKSSON; GARVILL; NORDLUND, 2008) to road capacity reduction and road pricing (FUJII; KITAMURA, 2003). These interventions are found to provide a new decision context, in which people are more sensitive to new information and motivational factors (BAMBERG; RÖLLE; WEBER, 2003). Several studies have analysed the impact of these actions on travel behavior, the general conclusion is that such measures can lead to an increase in public transportation use (THØGERSEN; MØLLER, 2008). For example, Eriksson, Garvill and Nordlund (2008) conducted an experiment instigating a group of participants to actively plan their travel. The results after the intervention showed that mode choice became more deliberate, the association between car habit and car use became insignificant and the relation between car use and personal norms turned significant. However, on the long term, the success of these measures depends on the availability of a public transport system perceived as a viable alternative (BAMBERG; RÖLLE; WEBER, 2003), which relies on a positive net value perception of service quality, perceived value and customer satisfaction.

2.3 MARKETING THEORY APPLIED TO TRAVEL BEHAVIOR

Marketing theory started being applied in transportation research as to evaluate the cost efficiency and service performance of public transportation systems (HENSHER; DANIELS, 1995). However, it was noted that these measures were not directly linked to the customer perspective, given that passengers evaluate the service by many other attributes not linked to how much the system is being used (HENSHER, 2007). The SERVQUAL scale developed by Parasuraman, Zeithaml and Berry (1985) helped to disseminate the evaluation of service performance based on user experience. Since then, service quality has been found to positively influence perceived value, customer satisfaction and customer loyalty (LAI; CHEN, 2011; MACHADO et al., 2018; MINSER; WEBB, 2010) and it is believed to be a key factor for retaining and increasing transit ridership (DE OÑA; MACHADO; DE OÑA, 2015). Moreover, several cross-sectional studies have analysed perceived service quality performance by attribute and its influence on overall satisfaction (*e.g.* ABENOZA; CATS; SUSILO, 2017; DELL'OLIO; IBEAS; CECIN, 2011; EBOLI; MAZZULA, 2009) and loyalty (*e.g.* VAN LIEROP; BADAMI; EL-GENEIDY, 2017). Moreover, both customer satisfaction and customer loyalty have also been analysed apart from service quality (ABOU-ZEID; FUJII, 2015; DE VOS; WITLOX, 2017).

Utility-maximization theory has been used to explain the link between travel satisfaction and mode choice (DE VOS et al., 2016; YE; TITHERIDGE, 2016). It argues that people make choices as to increase positive outcomes (MCFADDEN, 1979, 2001, 2007). Most studies have focused on its cognitive aspect, *i.e.* decision utility, through the evaluation of service attributes, such as cost, travel time and punctuality. However, this notion has been challenged by social psychology. It added the concept of experienced utility, which implies that utility is also influenced by feelings and emotions, thus related to satisfaction and well-being (KAHNEMAN; WAKKER; SARIN, 1997). From this theoretical framework, Friman et al. (2013) developed a psychometric measure of travel satisfaction based on both cognitive and affective components of subjective well-being, the satisfaction with travel scale (STS), which consists of nine items measured in a 7-point scale ranging from -3 to + 3.

Travel satisfaction is also associated with the development of a key strategic behavior, customer loyalty. Customer loyalty is defined as "a deeply held commitment to repurchase or re-patronize a preferred product or service in the future" (AMEER, 2013). Initially, intentions to continue using a product or service and the willingness to recommend it were its two main measures (FU; ZHANG; CHAN, 2018). Later studies deemed it illogical to study loyalty without acknowledging satisfaction, due to its strong association. However, there is an ongoing debate on whether satisfaction is part of the concept of loyalty or not. Those who believe in satisfaction as a part of the concept argue, for example, that public transit users who are not overall satisfied will leave the system as soon as they have an alternative (FIGLER et al., 2011). The contrary argument is that satisfaction has only a strong influence on loyalty but is not an integrating part of the concept itself (LAI; CHEN, 2011). In sum, there is not a standardized procedure to measure it and the research on its formation is still on early stages.

Minser and Webb (2010) found a direct relationship between service value, service quality and customer satisfaction on loyalty behavior with public transit. Also, public image and problem experience were estimated to have an indirect positive and negative effect, respectively, on customer loyalty. Few other studies have started looking into how different constructs work into the formation of loyalty bounds with public transit (LAI; CHEN, 2011; VAN LIEROP; EL-GENEIDY, 2016; ZHAO; WEBB; SHAH, 2014). For example, Jen, Tu and Lu (2011) proposed that satisfaction has a mediator position between service quality and customer loyalty, which is known as the Satisfaction-Loyalty Theory. Additionally, Van Lierop, Badami and El-Geneidy (2017) argue that loyalty should be analysed in relation to more affective concepts, such as involvement and attitudes. Another point that needs to be addressed is its influence on mode choice and travel behavior on multi-modal studies.

Furthermore, we could only find studies using marketing theory to explain travel behavior applied to public transit. Fu and Juan (2017) attempted to develop an integrated framework uniting the theory of planned behavior and the customer-satisfaction theory. However, only a limited amount of service attributes was assessed, which might be a cause for the limited correlation found among many variables, such as between satisfaction and travel behavior. On the other hand, the study lays evidence on an existing relationship between satisfaction and attitudes and habits. Lai and Chen (2011) analysed the influence of perceived value, service quality, satisfaction and involvement on behavioral intentions, which are indicators of future actions and loyalty (ZEITHAML; BERRY; PARASURAMAN, 1996). According to the model results, apart from satisfaction with only direct effects, all constructs showed both a direct and an indirect influence on behavioral intentions. Similar studies have been carried out by de Oña, Machado and de Oña (2015) and Machado-León, de Oña and de Oña (2016). Except for the role of involvement, all other findings were supported.

Involvement is defined as a sense of concern, care, importance, personal relevance, and significance toward an attitude, object or activity (OLSEN, 2007), which is based on an individual's inherent needs, values and interests (ZAICHKOWSKY, 1985). Machado-León, de Oña and de Oña (2016) attempted to define whether involvement would have a moderator, mediator or antecedent role on the relationship between service quality, customer satisfaction and behavioral intentions. However, even though it was found to have a positive direct effect on intentions to reuse and to recommend the service, it was not possible to gather enough evidence to support any model. Later, Machado et al*.* (2018) findings suggested that involvement affects behavioral intentions indirectly through customer satisfaction.

2.4 POLICY DEVELOPMENT

Urban sprawling is associated with a higher need for travel (VAN ACKER; VAN WEE; WITLOX, 2010). It is characterized by low density development, which incurs in living, working, shopping and recreational locations to be spatially separated. More frequent and longer trips end up inducing car dependency (VAN LIEROP; BADAMI; EL-GENEIDY, 2017), once it offers speed, flexibility and convenience (STEG, 2005). However, the increasing number of vehicles circulating have a negative impact on social, economical and environmental issues (FILIPOVIĆ et al., 2009). For example, it is related to traffic congestion (LITMAN, 1999), increase in traffic accident rates (GÖSSLING, 2013), fuel consumption, noise levels, and carbon dioxide emissions. According to the International Energy Agency (2018), the transportation sector was responsible for 24.3% of global carbon dioxide emissions from fuel combustion in

2016. In the Americas, it is the largest emitting sector, accounting for 36%, but reaching 47.6% in Brazil.

This scenario has led to the development of transport policies intending to increase public and active transport demand (FUJII; KITAMURA, 2003). These policies are known as travel demand management (TDM) measures (ABOU-ZEID; FUJII, 2015), which are divided into soft and hard. Hard measures target infrastructural and management changes (BAMBERG et al., 2011), such as road tolls, congestion charges, and increase in fuel prices (FRIMAN; LARHULT; GÄRLING, 2013). Soft policies are based on techniques of information dissemination aiming to persuade drivers to switch to more sustainable modes (GÄRLING; FUJII, 2009), which involve travel planning at workplaces and schools, personalized travel demand, and informational and marketing campaigns (CAIRNS et al., 2008). Even though, soft policy programs often yield positive results (CAIRNS et al., 2008; GÄRLING; FUJII, 2009; MÖSER; BAMBERG, 2008; TAYLOR, 2007), research lacks a strong methodological and theoretical support (BAMBERG et al., 2011; RICHTER; FRIMAN; GÄRLING, 2011), which makes them difficult to compare and evaluate its cost-effectiveness. Some authors have found evidence of a synergy effect between soft and hard policy measures, indicating that when combined their results are strengthened (CAIRNS et al., 2008; GÄRLING; SCHUITEMA, 2007).

The synergy effect might be rooted on a positively tested hypothesis proposed by Fujii, Gärling and Kitamura (2001). They reason that temporary structural changes, such as roadblocks, might induce lasting psychological changes. Their research argues that an abrupt change in travel routine, such as a temporary highway closure, led habitual drivers to be more aware and to develop positive attitudes toward public transport. In the literature, habit is often seen as an impediment to behavioral change (FRIEDRICHSMEIER; MATTHIES; KLÖCKNER, 2012; VERPLANKEN; AARTS; VAN KNIPPENBERG, 2002), since the decision process is no longer deliberate (GÄRLING; GARVILL, 1993) and discards new relevant information (GÄRLING; AXHAUSEN, 2003). Thus, a significant contextual change would be necessary to break the pattern and enable travel mode switch (FUJII; KITAMURA, 2003). The success of policies also depends on the degree to which they are adaptable to heterogeneous needs and preferences (DE OÑA; DE OÑA; LÓPEZ, 2016).

3 THEORETICAL FRAMEWORK

In this chapter, the analysed constructs will be presented regarding their definitions and their use on transportation research. Finally, according to analysed literature from chapter 2 and sections 3.1 and 3.2, a theoretically integrated model structure will be proposed.

3.1 MARKETING CONSTRUCTS

3.1.1 Perceived Value

It is agreed among most researchers that perceived value comes from a trade-off between perceived benefits and costs (KOTLER; KELLER, 2012; LOVELOCK; WRIGHT, 2001; ZEITHAML, 1988). In the transportation literature, it is also believed to guide customer choices between different travel mode alternatives (JEN; TU; LU, 2011; MACHADO et al., 2018). Perceived benefits are based on tastes, circumstances and preferences (MINSER; WEBB, 2010), while perceived costs are defined by both monetary and non-monetary sacrifices (ZEITHAML, 1988). Perceived costs are found repeatedly to negatively affect perceived benefits (MACHADO et al., 2018) and perceived value (WIDIANTI et al., 2015).

Perceived service quality is often concluded to have a positive effect on perceived value (FU; ZHANG; CHAN, 2018; LAI; CHEN, 2011; ZEITHAML, 1988). Recently, studies have linked involvement to have a positive influence on perceived value (MACHADO et al., 2018). The level of involvement that a customer has with a product or service is believed to be an important determinant of customers' evaluations and behavior (CHEN; TSAI, 2007). Nevertheless, perceived value has also been tested with positive results to affect involvement (LAI; CHEN, 2011) and corporate image (FU; ZHANG; CHAN, 2018), thus indicating a bidirectional relationship between the constructs. Perceived value has also been identified as a predecessor to satisfaction. Lai and Chen (2011) argued that improvements in service quality that do not result on an increase in perception of value are not likely to lead to passenger satisfaction. This construct is also deemed a predictor of behavioral intentions (CAMPBELL; BRAKEWOOD, 2017).

3.1.2 Perceived Quality

Perceived quality is a complex, fuzzy, abstract (PARASURAMAN; ZEITHAML; BERRY, 1985) and multi-dimensional (BERRY; ZEITHAML; PARASURAMAN, 1985) concept characterized by intangibility, heterogeneity and inseparability (LOVELOCK; WRIGHT, 2001). It is believed to be a cognitive judgement (AMEER, 2013; OÑA; OÑA, 2015) based on a comparison between customer expectations and perceived service performance (GRÖNROOS, 1988). Even though, perceived quality is well stablished as a personal judgement on what is received from a service (BORDAGARAY et al., 2014), there is no consensus on how to measure customer expectations. In the literature, it has been defined as an ideal performance (MATTSSON, 1992); as a desired quality (GILBERT; WONG, 2003); as an adequate or tolerable quality (HU; JEN, 2006); and as predictions of service, ideal standard, or attribute importance (KENNETH TEAS, 1994). Some authors, recommend the use of the later, given its association with the attitude salience concept from the Theory of Planned Behavior (AJZEN, 1985, 1991). It argues that people can hold many beliefs about a given behavior, but only a few will be salient. Those who prevail are determinants of intentions and actions. Therefore, customer expectations should be monitored (DE OÑA et al., 2015). It is needed that transit agencies understand their users' heterogeneity, priorities and needs as to retain and increase public transit ridership (TYRINOPOULOS; ANTONIOU, 2008).

Its evaluation involves subjective measures, which usually leads to qualitative and imprecise data. Given its multi-dimensional nature, a researcher needs to choose from an extensive number of service attributes, which are usually grouped into dimensions. Several different service attribute dimensions have been proposed (*e.g.* EBOLI; MAZZULLA, 2008; EN 13816:2002, 2002; PARASURAMAN; ZEITHAML; BERRY, 1985; TRB, 1999), however the only consensus is that service attributes should be chosen according to context. Literature research, focus groups, pilot surveys, and statistical tests are often used as to increase model predictive value (CARRILLAT; JARAMILLO; MULKI, 2007).

Two different methodologies are often used for evaluating service quality, namely aggregation and disaggregation. Aggregated approaches obtain overall service quality indexes. As the analysis results in a single number, it is useful for comparing different systems and for performing longitudinal analysis. They can be based either on performance-expectation models, such as the SERVQUAL scale (PARASURAMAN; ZEITHAML; BERRY, 1985), or performance only models, as the SERVPERF scale (CRONIN; TAYLOR, 1992). The main difference is related to how the data is analysed, while performance-expectation models are derived from a gap analysis between two different measures (perceived and expected service), performance only models have as premise perceived performance as already the result of a comparison from expected and actual service.

Disaggregated approaches analyse service attributes individually, thus permitting a more detailed cross-sectional evaluation of the service. Thus, aiding priority evaluation for service improvements and planning (MOUWEN, 2015). It can also be divided into performance-expectation models and performance only models. A common measure of performance only studies is based on importance-performance analysis, which results in an improvement strategy chart (MARTILLA; JAMES, 1977). Although ambiguous, it has been largely applied to evaluate transit service systems due to its simple and visual outcome. The importance measure can be drawn from either stated or statistically inferred methods, however both have advantages and disadvantages (ABENOZA; CATS; SUSILO, 2017). Performance-expectation studies are usually based on the concept of the zone of tolerance from Parasuraman, Berry and Zeithaml (1991), which also results in a quadrant chart, but are derived from comparing desired, perceived and adequate service. Moreover, it could also be evaluated through diverse statistical analyses, which do not fall into these classifications, such as bivariate Pearson correlations, regression analysis, ordered logit and probit models, path analysis and structural equation modelling (SEM).

Heterogeneity also needs to be considered, once depending on individual context and attitudes (ABENOZA; CATS; SUSILO, 2017) perception about different service attributes vary (DELL'OLIO; IBEAS; CECÍN, 2010; EBOLI; MAZZULLA, 2011; REDMAN et al., 2013). For example, studies involving commuters found punctuality, frequency, security, and information services as the most important (GUIRAO; GARCÍA-PASTOR; LÓPEZ-LAMBAS, 2016), while students, value easier ticket purchase, security and reliability (EBOLI; MAZZULA, 2009) and seniors are concerned with comfort (DELL'OLIO; IBEAS; CECÍN, 2010). Eboli and Mazzulla (2013) warn that if respondents are not correctly sampled considerable statistical errors might occur during data analysis.

As an overall construct, the influence of service quality on customer satisfaction, customer loyalty and behavioral intentions has gained evidence. It is traditionally believed to be a direct predecessor to customer satisfaction (DE OÑA et al., 2013; FU; JUAN, 2017b) and has been found to influence loyalty and behavioral intentions both directly and indirectly through customer satisfaction (LAI; CHEN, 2011; MACHADO et al., 2018; MINSER; WEBB, 2010) and perceived value (WEN et al., 2005). Moreover, there are indications that it both affects (FU; ZHANG; CHAN, 2018) and is affected (MINSER; WEBB, 2010) by public image perception. Fu, Zhang and Chan (2018) have studied the Expectation-Confirmation Theory (OLIVER, 1976, 1980) on perceived value, perceived service quality, public image, satisfaction, and loyalty. Their model results imply that managing cost expectations through public image might have better results on perceived service quality enhancement than heavy investments on infrastructure, which shades light into the importance of maintaining good relationships with its customers.

3.1.3 Travel Satisfaction

Customer satisfaction is an affective judgement of expected and perceived performance. This construct is often used interchangeably with perceived service quality, however the later is often considered to be a cognitive judgement of the same comparison (AMEER, 2013). It can be measured in relation to specific components, a combination of components, or the overall service (VAN LIEROP; BADAMI; EL-GENEIDY, 2017). Customer satisfaction surveys (CSS) are the most disseminated tool for gathering this type of data (DE OÑA; MACHADO; DE OÑA, 2015).

Most of the transportation research involving this concept investigates which service attributes have the greatest impact on overall satisfaction scores (ABENOZA; CATS; SUSILO, 2017). Several authors (DE OÑA et al., 2013; DELL'OLIO; IBEAS; CECIN, 2011; VAN LIEROP; BADAMI; EL-GENEIDY, 2017) highlight on-board cleanliness, comfort, behavior and attitudes from the personnel, safety, punctuality, and image as key factors to improving user satisfaction. However, for comfort, customers will only fell satisfied when basic service attributes, such as reliability, availability and frequency (TRB, 2013; VAN LIEROP; BADAMI; EL-GENEIDY, 2017), are met. Additionally, travel and transfer time have been found to affect travel satisfaction negatively (DE VOS; WITLOX, 2016; ETTEMA et al., 2012; MAO; ETTEMA; DIJST, 2016; MOKHTARIAN; SALOMON; SINGER, 2015).

Travel satisfaction is believed to be a driver of positive attitudes, which influence modal selection (DE VOS; WITLOX, 2016; DIANA, 2012) and modal shift (DE VOS; WITLOX, 2017). They are even, sometimes, considered synonyms, however they have different conceptual definitions, while satisfaction is transient and situation specific, attitudes are more enduring (FU; JUAN, 2017b). Satisfaction is also associated with user retention and prospection (ABENOZA; CATS; SUSILO, 2017; DE OÑA et al., 2016; MINSER; WEBB, 2010; SHIFTAN; SHEFER, 2015; VAN LIEROP; EL-GENEIDY, 2016). However, an increase in satisfaction depends on transit agencies and public administrators understanding travelers' heterogeneous needs and priorities, using appropriate measures and assessing the data to re-evaluate service parameters to define service improvements through soft and hard policies (TYRINOPOULOS; ANTONIOU, 2008). There is a growing interest on soft transport policies, such as travel demand and marketing campaigns, since empirical evidence shows that it is usually more cost-effective on increasing transit ridership than infrastructural improvements (BAMBERG et al., 2011). A reduction on auto-based trips on urban areas would be beneficial to reduce traffic congestion (LITMAN, 2015), traffic accident rates and major environmental and social impacts of car dependency (FILIPOVIĆ et al., 2009; GÖSSLING, 2013).

In the literature, satisfaction is often found to mediate the influence of service quality on the formation of loyalty behaviors (CHIOU; CHEN, 2012; DE OÑA et al., 2016; VAN LIEROP; BADAMI; EL-GENEIDY, 2017), which are both linked to have a positive influence on satisfaction (FU; ZHANG; CHAN, 2018; MACHADO et al., 2018; MINSER; WEBB, 2010). A positive image of the service provider is also associated with an increase on the odds of a user being satisfied and to keep using public transport (VAN LIEROP; EL-GENEIDY, 2018), which are both indicators of loyalty. It has also been widely identified as a strong determinant of behavioral intentions (CHEN; LAI, 2011; MACHADO-LEÓN; DE OÑA; DE OÑA, 2016).

3.1.4 User Loyalty

Loyalty is an indicator of future behavior (LAI; CHEN, 2011). It can be interpreted as a sign of whether a customer will continue to user the service or switch to a different provider (ZEITHAML; BERRY; PARASURAMAN, 1996). As mentioned on section 2.3, there is an ongoing debate on how it should be defined. Even though, intentions to continue using a product and willingness to recommend it have been central to the construct rationale (OLIVER, 2010), customer satisfaction has become a point of debate. There are some who believe it is a determinant part of the loyalty definition (FIGLER et al., 2011), while there are others who argue it is the main driver of loyalty, but not a part of it (OLSEN, 2007). Nevertheless, satisfaction should be expected to influence loyalty behavior on model results. Moreover, research has yet to delve into a possible affective side to loyalty through the analysis of psychological constructs, such as attitudes and involvement (VAN LIEROP; BADAMI; EL-GENEIDY, 2017).

3.2 SOCIAL PSYCHOLOGY CONSTRUCTS

3.2.1 Attitudes

Attitudes are related to how positively or negatively a person evaluates the outcomes of a behavior. Therefore, behaviors deemed with desirable consequences are favored, while negative situations are avoided (AJZEN, 1991). Unexpectedly, attitudes are not reliable predictors of behavior, which led some to question its scientific validity (GÄRLING; GILLHOLM; GÄRLING, 1998). A breakthrough came from Fishbein and Ajzen (1975) in the form of the theory of reasoned action. They proposed intention as a mediator between behavior and attitudes, which consistently improved behavioral prediction power (SHEPPARD; HARTWICK; WARSHAW, 2002). As mentioned before, the theory of reasoned action was later transformed into the theory of planned behavior by the addition of perceived behavioral control to the theoretical model, which allowed behaviors not totally under volitional control to be analysed through this theory, such as travel behavior.

In transportation research, attitudes have been analysed both from the perspective of the theory of planned behavior (*e.g.* BAMBERG; RÖLLE; WEBER, 2003; BAMBERG; SCHMIDT, 2003) and as an independent construct (*e.g.* SHIFTAN; OUTWATER; ZHOU, 2008). The later is usually assessed with the intent to derive customer profiles and market segments (*e.g.* ANABLE, 2005; PRONELLO; CAMUSSO, 2011; SHIFTAN; OUTWATER; ZHOU, 2008). Moreover, it has been found to directly influence travel mode satisfaction (DE VOS; WITLOX, 2017) and travel mode choice (JOHANSSON; HELDT; JOHANSSON, 2006; YE; TITHERIDGE, 2016). However, satisfaction is also found to influence attitudes (DIANA, 2012; FU; JUAN, 2017b). De Vos and Witlox (2017) proposed that the perception of every trip will slightly affect travel satisfaction and in the long term it will impact overall travel attitudes, residential location and mode choice, thus forming a cyclical process between the constructs. In this way, if satisfaction experienced is perceived as medium or high, a person will not be expected to fell compelled to change their travel mode. This reasoning should be taken into consideration for developing both policies trying to increase and retain public transport ridership and to reduce car usage.

3.2.2 Social Norms

According to the theory of planned behavior, social norm is deemed as a perceived social pressure or subjective norm related to the degree to which family and peers would approve the performance of a behavior (AJZEN, 1991). However, in the literature, it is also defined as what is generally perceived as normal, common or acceptable behavior (MOSCOVICI, 1985). It has also been suggested that habit is developed in line with attitudes, personal and social norms (KLÖCKNER; MATTHIES, 2004). Therefore, desired changes in behavior, such as car use reduction, should be backed by policies that support contextual and social norm changes (ERIKSSON; GARVILL; NORDLUND, 2008).

Social norms have been used on travel behavior research alongside other TPB constructs. Bamberg and Schmidt (2003) applied the theory of planned behavior to analyse the effects of offering a semester ticket plan for university students on public transport. Their results highlighted that attitudes, perceived behavior control and social norms are all sensitive to new information, which resulted in more favorable intentions toward bus usage and increase in ridership. Nevertheless, this influence of social norms on behavior was not found for studies on stable contexts (THØGERSEN, 2006). Thus, it is likely that contextual change is needed not only for breaking habits, but also for cultural changes. However, there is not enough empirical evidence to support or refuse this reasoning since most research is cross-sectional. Social norms are expected to influence perceived behavioral control, attitudes, behavioral intentions, perceived norms, perceived service quality and customer satisfaction (AJZEN, 1991; FU; JUAN, 2017b; LIU et al., 2017).

3.2.3 Perceived Behavioral Control

The idea that the amount of resources and opportunities available to a person limit their likelihood of performing a behavior is what prompted the development of perceived behavioral control as a concept (AJZEN, 1991). Its addition to the theory of planned behavior enabled the analysis of behavior not totally under volitional control, since it allowed measuring the influence of the perceived ease or difficulty of performing an action on behavioral intentions. However, since it is a subjective measure, if respondents are overly optimistic, it might influence model results (FUJII; GÄRLING, 2003). Thus, the researcher should be aware during data collection and analysis.

In transportation research, perceived behavioral control is a relevant predictor of mode choice. For example, the availability of a car is found to predict less use of public transport and an increase in driving (THØGERSEN, 2006). Car availability is expected to be lower in denser areas with greater access to public transport, even if the effects of attitudes and residential self-selection are accounted for, thus highlighting the importance of urban planning for car use reduction (VAN ACKER; MOKHTARIAN; WITLOX, 2014). It has also been found to influence habit formation, perceived service quality and customer satisfaction (FU; JUAN, 2017b).

3.2.4 Personal Norms

Derived from the norm-activation theory (SCHWARTZ, 1977) and the value-belief-norm theory (STERN, 2003), personal norms are defined as a moral obligation to perform a given action or behavior. Thus, if not followed, it would lead to negative emotions, such as regret and guilt. This construct was found to add a significant contribution of 3 to 6% on behavioral intention prediction (AJZEN, 1991) for contexts in which pro-social/environmental behavior was relevant, which is the case for car use reduction (BAMBERG et al., 2011). In this sense, Eriksson, Garvill and Nordlund (2008) designed an experiment intending to induce deliberate consideration while planning a trip. Their results suggested that for strong car users, the intervention was able to turn mode choice into a more deliberate action, since the association between car use and habit became non-significant and the correlation between car use and personal norms became significant. It indicates that habit might block the action of personal norms and that disruptive actions are necessary to break car use habit and induce a decrease in driving. Moreover, personal norms were found to directly influence perceived behavioral control and indirectly affect behavioral intentions to choose low-carbon travel modes (LIU et al., 2017).

3.2.5 Habit

The discussion on whether behavior performed under stable contexts is deliberate or if it becomes a habit is extensive. There are those who believe human behavior is always regulated at some extent by some level of cognitive effort (BAMBERG; SCHMIDT, 2003), therefore constantly repeating an action would be explained by behavioral intention being formed repeatedly (GÄRLING; AXHAUSEN, 2003). However, another line of research argues that when a certain pattern of actions is associated with achieving a goal, an automated response is formed within that specific setting (GARDNER, 2009). Thus, behavior ceases to be deliberate and become a habit (AARTS; VERPLANKEN; VAN KNIPPENBERG, 1998; VERPLANKEN et al., 1998). This view is supported by empirical evidence, since it was noted that when habitual and intention tendencies diverge, behavior often aligns with habit (VERPLANKEN et al., 1998). Regardless of the chosen theoretical approach, a measure of habit should be added to a behavior model only when it is able to improve explaining power (AJZEN, 1991).

There are two different, but not mutually exclusive, approaches to habit in the literature: *associationist* and *script-based*, which were named by Friedrichsmeier, Matthies and Klöckner (2012). The associationist approach argues that a neural connection is formed when behavior is performed frequently in a stable context between behavioral cues and responses (WOOD; QUINN; KASHY, 2002; WOOD; TAM; WITT, 2005). The *script-based* approach suggests that when a person is faced with a specific goal, a scheme or sequence of actions is triggered guiding attention and information selection and usage (AARTS; VERPLANKEN; VAN KNIPPENBERG, 1998; VERPLANKEN et al., 1998), which led to the development of the first measure of habit for mode choice. Verplanken et al. (1994) developed a response-frequency tool consisting of presenting a group of usual situations and asking respondents to quickly choose a travel mode, the more frequently it appears the more habitual it is. This measure came in response to the criticism of using past behavior as an indicator of habit, even though past behavior was believed to be a strong indicator of future behavior, Ajzen (1991) argued against its use, since it is not exclusive to habit and has residuals on others constructs, such as attitudes, social norms and perceived behavioral control.

Habit is believed to be an obstacle to behavioral change (FRIEDRICHSMEIER; MATTHIES; KLÖCKNER, 2012; VERPLANKEN; AARTS; VAN KNIPPENBERG, 2002), once the decision-making process is no longer reasoned (GÄRLING; GARVILL, 1993), new and relevant information is not registered and discarded (GÄRLING; AXHAUSEN, 2003). This reasoning is relevant when trying to achieve modal shift towards more sustainable options. Fujii, Gärling and Kitamura (2001) argue that significant contextual changes, which could come in the form of soft or hard actions, are necessary to break a habit pattern and enable mode switch. This notion has been tested through interventions, such as offering free public transport passes (ABOU-ZEID; FUJII, 2015) and active travel planning (ERIKSSON; GARVILL; NORDLUND, 2008) to positive results. The general conclusion is that such measures can lead to increase in public transportation use (THØGERSEN; MØLLER, 2008), however their success on the long term relies on the availability of a public transport system perceived as a viable alternative (BAMBERG; RÖLLE; WEBER, 2003).

Satisfaction could also have a role on habit formation. The theoretical model proposed by De Vos and Witlox (2017) indicates that the perception of every trip slightly affects satisfaction with daily travel, which in turn affect long-term well being, choice of residential location, travel attitudes and travel mode choice. Then, the result will influence the next trip and so on. On the long term, it will lead to a habitual travel mode. Therefore, if a person feels intermediate or high levels of travel satisfaction towards their chosen mode, a natural mode switch is not likely, which again requires a significant contextual change for a behavioral modification.

3.3 INTEGRATED FRAMEWORK: PROPOSED MODEL STRUCTURE

The proposed integrated framework will investigate how constructs from both marketing and social psychology theories interact as to explain the formation of behavioral intentions and loyalty bonds towards different travel mode choices. In the literature, even though travel satisfaction and travel related attitudes have been analysed inside different perspectives, concepts such as perceived value and social norms usually are kept within their original conceptual framework. Therefore, the studied model is composed of perceived value, perceived quality, travel satisfaction, and user loyalty from marketing theory, and attitudes, social norms, perceived behavioral control, personal norms, behavioral intentions, and habit from social psychology. We expect to further the understanding on what prompts mode choice, therefore aiding policy development.

In marketing theory, perceived value is often modelled as a predecessor to service quality, however, both perceived value and perceived quality have been found to positively influence each other (*e.g.* FU; ZHANG; CHAN, 2018; LAI; CHEN, 2011; ZEITHAML, 1988). Likewise, Lai and Chen (2011) argue that improvements in service quality that do not result in an increase in perceived value are not expected to lead to travel satisfaction. A reasoning corroborated by model results from Fu, Zhang and Chan (2018). Additionally, both perceived value and perceived quality are frequently deemed predecessors to travel satisfaction (DE OÑA et al., 2013; FU; JUAN, 2017b; LAI; CHEN, 2011). Based on these findings, it is hypothesized the following:

H_1 Perceived value and perceived quality have a positive correlational relationship.

H_2 Perceived value positively influences travel satisfaction.

H_3 Perceived quality positively influences travel satisfaction.

According to McFadden's utility-maximization theory, humans are believed to make behavioral choices as to increase positive outcomes. In this process, people are expected to evaluate both cognitive utility, the evaluation of tangible attributes, and experienced utility, feelings and emotions linked to satisfaction and well-being. In this sense, the concept of utility is similar to attitudes, which were defined by Ajzen (1991) as "the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question". Therefore, attitudes are also likely to be influenced by both cognitive and affective aspects related to their mode choice.

Several authors indeed proposed and found an association between travel satisfaction, which is an affective judgement of expected and perceived performance, and travel-related attitudes, consequently influencing mode choice (DE VOS et al., 2016; DIANA, 2012). De Vos and Witlox (2017) argue a continuous non-recursive relationship between both constructs. In this way, travel satisfaction, which is transient and situation specific, would be a key factor in forming travel-related attitudes in the long-term scenario. Thus, people perceiving recurring medium or high satisfaction levels with their current transportation modes are not expected to perform a mode switch (OLSEN, 2007). Nevertheless, there is not much evidence of how the more rational and cognitive counterparts to travel satisfaction, perceived value and perceived quality, would affect attitudes, since they are not often assessed in behavioral models. However, as argued from marketing studies both perceived value and perceived quality are predecessors to travel satisfaction, thus it is expected that they would have an indirect effect on attitudes through travel satisfaction.

Attitudes, as well as social norms, personal norms, and perceived behavioral control, are related to beliefs (AJZEN, 1991), which are innately perceived as positive or negative. Therefore, the formation of, for instance, an attitude would occur rather naturally and quickly. Nonetheless, even though, a person can hold many beliefs about the outcomes of a behavior, only a few will be salient at a given moment. This selected group is elicited by personal experiences and external sources (AJZEN, 2005). Moreover, people's beliefs are also expected to lean towards a state of balance or consistency (HEIDER, 1944). Therefore, holding conflicting beliefs would lead to dissonance and, consequently, tension and change (FESTINGER, 1964). In this sense, as travel satisfaction is derived from experienced utility and influenced by cognitive utility, it is expected to impact social norms, personal norms, and perceived behavioral control. However, as personal norms are associated with pro-environmental behavior, they are expected to be negatively affected by travel satisfaction in the car sample. Thus, the following hypothesis are developed:

H_4 Travel satisfaction positively influences attitudes.

H_5 Travel satisfaction positively influences social norms.

H_6 Travel satisfaction positively influences perceived behavioral control.

H_{7a} Travel satisfaction negatively influences personal norms (car sample).

H_{7b} Travel satisfaction positively influences personal norms (public transport sample).

As previously discussed, the theory of planned behavior offered a reasoned and structured explanation to behavior, which was tested in several fields, including transportation, to positive results (BAMBERG; SCHMIDT, 2003; GARDNER, 2009). It argues that the decision to perform a determined action is deliberate and moderated by behavioral intentions, which in turn are regulated mainly by attitudes toward the behavior, social norms, and perceived behavioral control. Moreover, personal norms become relevant to behavioral studies when pro-social/environmental beliefs are significant, such as in the case of mode choice (STERN, 2003). In the literature, it has been previously found to add a significant contribution of 3 to 6% to behavioral intention predictive value (AJZEN, 1991).

Intentions are assumed to capture motivational factors, which are strong indicators of future behavior (LAI; CHEN, 2011). They are defined as a signal of how much effort a person is willing to exert as to perform a behavior (AJZEN, 1991). In the framework of this study, as respondents are being studied according to their current mode choice, behavioral intentions are conceptually similar to user loyalty. User loyalty is characterized as a sign of whether a customer will continue to user the service or switch to a different provider (ZEITHAML; BERRY; PARASURAMAN, 1996). Additionally, both constructs are often operationalized according to the same dimensions, willingness to re-use and willingness to recommend (FU; JUAN, 2017b; FU; ZHANG; CHAN, 2018; MACHADO et al., 2018; MACHADO-LEÓN; DE OÑA; DE OÑA, 2016; WIDIANTI et al., 2015). Consequently, the following hypothesis are proposed:

H_8 Attitudes positively influence behavioral intentions and user loyalty.

H_9 Social norms positively influence behavioral intentions and user loyalty.

H_{10} Perceived behavioral control positively influence behavioral intentions and user loyalty.

H_{11a} Personal norms negatively influence behavioral intentions and user loyalty (car sample).

H_{11b} Personal norms positively influence behavioral intentions and user loyalty (public transport sample).

According to Kahneman (2011), human thinking is subject to heuristics, which relates to simplifying difficult problems into simpler ones. In a general sense, it is a way for the mind to optimize energy consumption; however, it makes the thought process susceptible to illusions and biases. Therefore, it is ruled most of the time by impressions, intuitions and feelings, and not constantly by deliberate reasoning, as proposed by Ajzen (1991), which is more effortful. For instance, as a person becomes skilled in a task, the demand for energy decreases as less areas of the brain are activated. This reasoning is in line with the deliberate versus habitual behavior dilemma. For example, the theory of repeated behavior (RONIS; YATES; KIRSCHT, 1989) argues that initial behavior is indeed regulated by intentions and deliberative cognition, however as it is performed repeatedly under stable conditions, it becomes habitual and is no longer reasoned (VERPLANKEN et al., 1998; VERPLANKEN; AARTS, 1999; WOOD; TAM; WITT, 2005), which is the case for daily commute and mode choice (THØGERSEN, 2006).

Empirical evidence seems to support this reasoning. Fujii and Kitamura (2003) suggested that a significant contextual change is required as to reduce the effects of habit and for new relevant information to be considered. For example, Eriksson, Garvill and Nordlund (2008) conducted an experiment instigating a group of participants to actively plan their travel. After the intervention, the results showed that mode choice became more deliberate, as the association between car habit and car use became insignificant and the relation between car use and personal norms turned significant. Likewise, studies not including intervention experiments often find a significant negative effect of habit on mode switching intentions, which is stronger than the individual effects of TPB variables (CHEN; CHAO, 2011). In this sense, habit is likely to reduce the influence of attitudes, social norms, and perceived behavioral control inhibiting the formation of a new behavior.

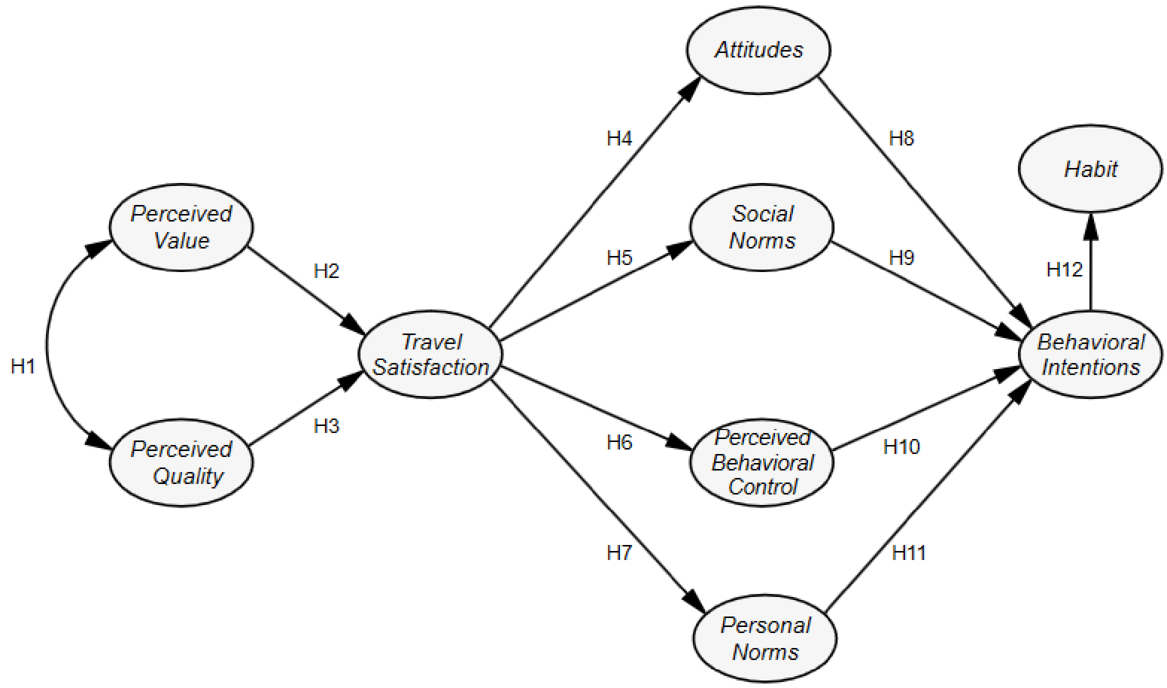
Moreover, Gardner (2009) tested habit as a moderator in the intention-behavior relationship for travel mode choice for commuting, in the UK, and for cycling usage, in The Netherlands. For both, behavior was found to be positively correlated to past behavior on stable conditions, intention to be a statistically significant predictor of behavior, and habit to moderate the effects of intention on behavior. Consequently, when habit is weak, intention predicts behavior, but when it is strong, intention has a negligible effect on it. This conclusion is supported by other studies, such as Verplanken et al. (1998), who showed that when habitual and intention tendencies diverge, behavior will often align with habit and not with intention. Consequently, the following hypothesis are presented:

H12 Behavioral intentions and user loyalty positively habit.

H13 The influence of behavioral intentions and user loyalty on habit will decrease as habit strength increases.

The first 12 hypotheses were modelled as a path diagram, as presented in Figure 1.

Figure 1 – Graphical representation of the hypothesis



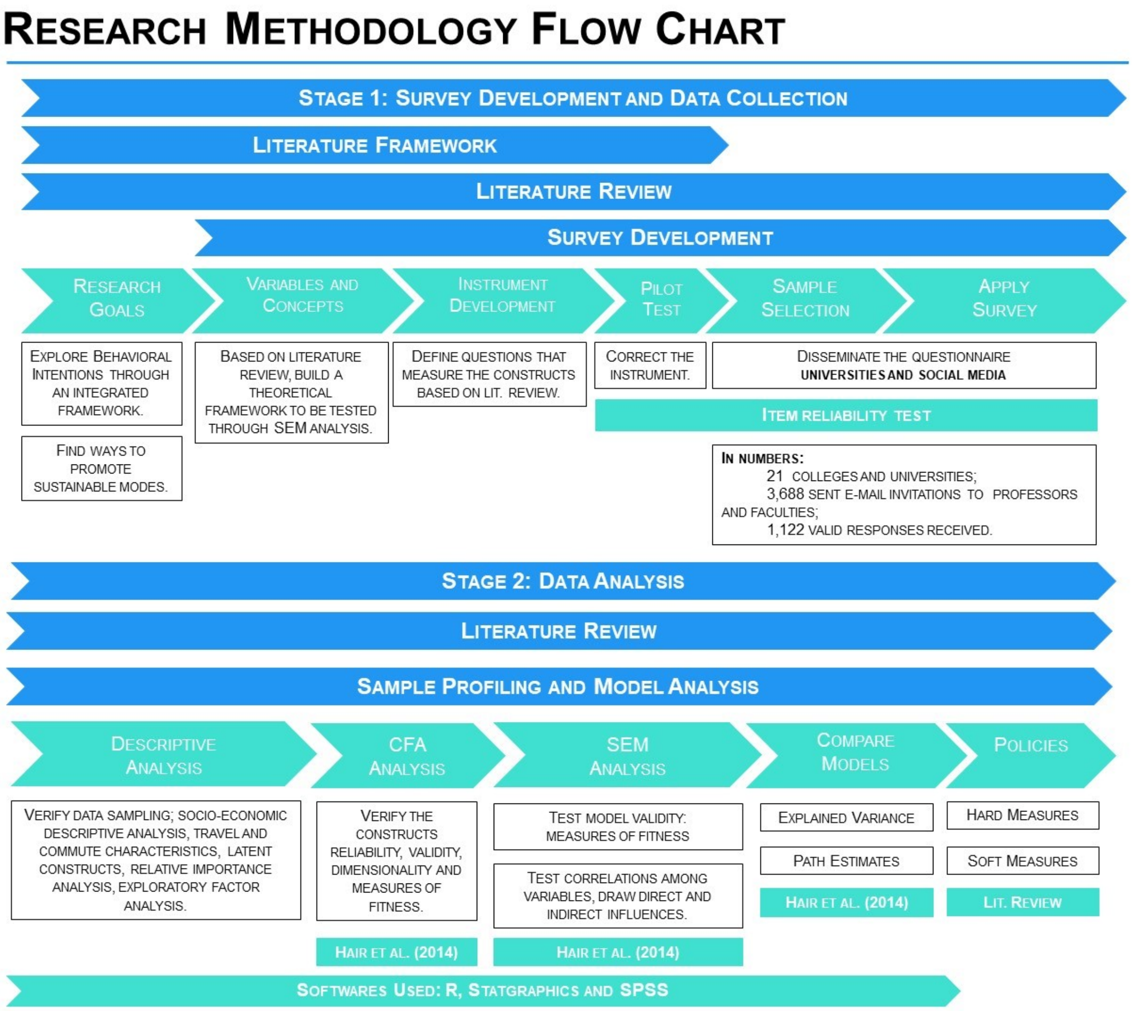
Source: Author (2020)

According to the guidelines discussed in Chapter 4, the validity of the proposed model will be tested for samples of respondents commuting by car and by public transport and the results will be compared. Additionally, for each commuting behavior, the results will be compared to the models developed from the customer-loyalty theory (MINSER; WEBB, 2010) and the theory of planned behavior (AJZEN, 1985, 1991).

4 METHODOLOGY

The primary purpose of this study is to investigate travel mode choice behavior based on an integrated framework of social psychology and marketing theory. Thus, this chapter concerns mostly with the steps to operationalize, test and validate the proposed model, which are discussed in Sections 4.1 and 4.2, respectively. The research process can be summarized by research methodology flow chart in Figure 2. Methodologically, as hypothesis were being tested following both mathematical procedures and statistical analysis, the data is required to be quantitative (HAIR et al., 2014). The data was collected through an online survey, which was applied in Curitiba, Brazil.

Figure 2 – Research methodology chart flow



Source: Author (2020)

Curitiba has about 1.75 million inhabitants, thus statistically classified as an infinite population. The population was partially accessed through local universities and social media, thus not characterizing random sampling. However, as the main goal of this research relates to achieving an analytical representation of the relationships among multiple variables and not a descriptive analysis of the population, it is more relevant to achieve a large and sufficiently diverse sample rather than a representative sample (BEATTY; GROVES, 2006). Nonetheless, the sample was tested for achieving true proportions of the descriptive variables, such as age, gender and monthly household income, according to the local census distribution. Finally, this study is also classified as cross-sectional, as the collected data represents a specific point in time; correlational, as the influence between two or more variables is being analysed, and non-experimental, as it does not involve the researcher intervention in the data collection process (CRESWELL, 2009).

4.1 SURVEY DEVELOPMENT

The process of developing a data collection instrument starts with laying the theoretical definitions for the analysed constructs. It works as a basis for designing the measurement scales for the constructs and the scale types, which have great impact on both the quality of the analysis and the data itself. As most concepts are naturally complex and composed of different dimensions often multiple measures are necessary. In this way, the research design should strive for unidimensionality, which means that a set of measured indicators explain only one construct. Achieving unidimensionality is extremely critical for the development of the theoretical model, since it has serious impacts on both construct and model validity. Additionally, ensuring sample internal consistency, or reliability, and construct validity should also be points of concern. Thus, it is recommended to pre-test the instrument as to ensure its suitability on measuring the analysed constructs in a valid and meaningful manner.

In this study, the first step on designing the survey was to perform a literature review as to theoretically define the concepts being analysed as well as their composing dimensions. From previous studies, attitudinal statements were selected as to operationalize the latent constructs. A 7-point Likert scale was used to measure the respondents' perceptions towards the items. A Likert scale is a scaled response mechanism, which ranges in a continuum from one extreme view to another passing through a neutral point. The extreme points were labeled as strongly disagree and strongly agree. Except for the travel satisfaction construct, which followed the satisfaction with travel scale, and habit, measured by a response-frequency tool. Then, the instrument was pre-tested through a pilot study, as shown in Section 4.1.

The final survey was designed specifically for the goals of this research and is reported in Appendix A. The instrument is comprised of 4 dimensions: socio-economic characteristics, commute and travel characteristics, marketing constructs attitudinal statements, and social psychology attitudinal statements. The first section collected descriptive data on the respondents, such as age, gender, occupation, education level, monthly household income, household size, and presence of children. Their main purpose is to describe the sample at both overall and group levels. The second section is concerned with commute behavior, including current travel mode, commute travel time, levels of car availability and bus pass ownership. In this set of questions, each measured indicator has a different goal. Current travel mode segregates the respondents into travel groups (car and public transport commuters) for the model analysis. Commute travel time is used for descriptive analysis and for discussions on policy implications. Levels of car availability and bus pass ownership serve as complementary measures of perceived behavioral control.

The third and fourth sections concerned with attitudinal statements toward marketing and social psychology constructs. As presented in Chapter 3, marketing theory is being studied through perceived value, perceived quality, travel satisfaction, and user loyalty. Likewise, social psychology theory is being analysed according to the theory of planned behavior (AJZEN, 1985, 1991), which is composed of attitudes, social norms, and perceived behavioral control, the concept of personal norms from the norm-activation theory (SCHWARTZ, 1977) and the value-belief-norm theory (STERN, 2003), and habit (AARTS; VERPLANKEN; VAN KNIPPENBERG, 1998; VERPLANKEN; AARTS, 1999; WOOD; TAM; WITT, 2005). Except for perceived behavioral control, defined as a single-dimension construct, and habit, measured by the response-frequency tool developed by Verplanken et al. (1994), all constructs were evaluated through at least three indicators, aiming to both represent their multiple-dimension nature and to achieve model identifiability for the structural equation model, as later discussed in Section 4.2. Additionally, both attitudes, social norms, and perceived behavioral control indicators were measured according to both behaviors, namely commuting by car and commuting by public transport.

The survey was operationalized using a Google Forms™ platform, as to allow easier and broader dissemination. This issue becomes relevant when a large amount of answers is necessary. According to the sample guidelines proposed by Bartlett, Kotrlik and Higgins (2001), for infinite populations, 385 responses would be required to ensure a level of confidence of 95% for a 5% margin of error. Nonetheless, Hair et al. (2014) argues a minimum sample size of 500 valid responses is required to ensure that a structural equation model works properly, given that it has more than seven constructs. As this study is analysing two different travel modes, it implies collecting at least 500 observations for each behavior as to test and validate the individual models. The instrument was promoted through the broadcast mailing system from Universidade Tecnológica Federal do Paraná (UTFPR) and through volunteer professors from 21 colleges and universities from Curitiba, such as the Universidade Federal do Paraná (UFPR) and the Pontifícia Universidade Católica do Paraná (PUC-PR), as well as social media from late May through June 2019.

4.1.1 Pilot Survey

Piloting a survey aims to ensure the instrument's suitability on measuring the analysed constructs in a valid and meaningful manner. In this study, a preliminary version was applied in Ponta Grossa, Brazil. This alternate location was selected among the cities in which UTFPR has a campus as to facilitate survey dissemination. The analysis focused on 39 factors, such as urban population, average income, vehicle/inhabitant ratio, urban fleet, public transport system characteristics, cycling infrastructure, among other variables, as to select a city with similar characteristics to Curitiba. During a period of three weeks, from late April to early June, the online survey was promoted by volunteer professors from two local universities, UTFPR and UEPG, and 326 valid observations were collected. According to Perneger et al. (2015), a sample size of 30 is sufficient to detect a problem occurring in at least 5% of the sample with high probability (80%). However, our goal was also to explore the structural relationships among the constructs, thus a larger sample was necessary. The procedure was composed of assessing reliability, discriminant and face validity, dimensionality and relative importance analysis for each latent construct, which are hypothesized, or unobservable concepts, measured by observable indicators.

Reliability is a measurement of the consistency between multiple measures of a dimension. It is measured by item-overall score correlation, item-item correlation and by a reliability coefficient (HAIR et al., 2014). First, correlation is an expression of the magnitude and direction of the relationship between two variables. Even though, there are several methods for measuring it, the most indicated for ordinal scaled items is the Spearman rank order correlation (PAGANO, 2010). As a rule, measured items and overall scores should be highly correlated (over 0.50). It indicates that the measurement is a good representative of the latent construct, thus yielding an adequate degree of internal consistency (AJZEN, 2005). In this study, the overall score was calculated as a median of the items composing each construct. Nevertheless, item-item correlations are not expected to correlate as strongly, since a construct should be measured by a heterogeneous set of dimensions. However, inter-correlations should at least exceed 0.30. A reliability coefficient estimates the consistency of the scale used. It is calculated by Cronbach's alpha, which is accepted when reaching at least 0.70.

Validity is the extent to which a set of measurements accurately represents a latent construct (HAIR et al., 2014), which was measured by discriminant validity and face validity. Discriminant validity is the degree to which two similar concepts are different. It is measured by correlating different latent construct overall scores, which are expected to yield low values. Face validity, however, is a subjective evaluation of whether the measured items have theoretical soundness, which was ensured by selecting measurements previously used in the literature and by collecting expert opinion. Another point of concern is the number of indicators per construct. In dealing with analysis such as confirmatory factor analysis and structural modeling equations, it is necessary to provide enough degrees of freedom as to be able to identify a solution. Therefore, each construct should have at least 3, but ideally 4 or more observable indicators as to achieve an overidentified model, which will enable testing model validity. A larger number of indicators is also necessary for reducing issues caused by not having enough degrees of freedom, which affects model validity. Additionally, we were able to measure convergent validity for two constructs, perceived quality and travel satisfaction. Convergent validity is the degree to which different measures of the same concept are correlated. Therefore, high values are expected.

Another expected requirement is that the measured items are unidimensional. Therefore, for each construct, all measured items should load highly on a single factor (over 0.50, but ideally over 0.70) through an exploratory factor analysis. Except when the construct is composed of multiple dimensions, then each dimension should reflect a separate factor. Additionally, total variance explained, item communality, Kaiser-Meyer-Olkin (KMO) test for sampling adequacy and Bartlett's test of sphericity were also evaluated. Total variance explained is the overall amount of variation accounted for the extracted factors. Item communality is the proportion of variance explained by the factor structure generated, which should be at least 0.5. KMO measures how suited the sample is for factor analysis by assessing the overall common variance shared by the assessed variables, acceptable values should be over 0.60. A Bartlett's test provides statistical evidence that the correlation matrix has significant correlation among some variables. Thus, its null hypothesis is the identity matrix, which should be refused. Finally, measured items were related to their correspondent overall scores through multiple linear regression analysis. Even though R^2 statistics were expected to be high, the focus was on evaluating the item significance for the overall model through a t-statistic measure and overall model validity through an ANOVA test. Furthermore, parameter estimates were analysed through relative importance.

In the next sub-sections, the results for the aforementioned analysis will be presented. However, since the focus is on construct properties as to explore ways to improve the final data collection instrument, descriptive statistics for the sample will not be reported.

4.1.1.1 Perceived value

As mentioned previously in Section 3.1, perceived value is a trade-off between perceived benefits and costs, where benefits relate to tastes, circumstances, and preferences and costs to monetary and non-monetary sacrifices. It is regarded as a multi-dimensional construct, even though its composition is not a consensus in the literature. Functional, experience, convenience, social and personal interpretations of value have all been conceptually studied (AULIA; SUKATI; SULAIMAN, 2016). For the pilot study, only the first three dimensions were assessed, as shown in Table 1. Convenience value (PV1) regards to how easily a product or service can be consumed (PURA, 2005), functional value is based on utility (PV2 and PV3), such as price and quality (ZEITHAML, 1988), and experience value (PV4) is related to the hedonic perspective (HOLBROOK; HIRSCHMAN, 1982).

The measured items yielded positive results on the performed reliability tests. First, all items correlated strongly to the calculated overall score. The lowest correlation was found for the statement measuring the convenience value dimension (PV1, $r = 0.76$, $p < 0.01$), way above the lower permitted limit (0.50). Next, all inter-correlations were above 0.30, thus passing the second reliability criterion. However, all items are were highly correlated, when only moderate correlations (0.30 to 0.50) were expected. It raised concerns on the lack of measurement heterogeneity prompting further investigations. The overall construct also correlates strongly to the overall perceived quality ($r = 0.75$, $p < 0.01$), overall travel satisfaction ($r = 0.68$, $p < 0.01$) and overall behavioral intentions/loyalty ($r = 0.72$, $p < 0.01$). Even though, it is a positive indication for nomological validity, it does not fare well for discriminant validity, since low to moderately correlations are required. Finally, the item reliability test returned a Cronbach's alpha of 0.887, indicating a good internal consistency.

Table 1 – Results of the individual exploratory factor analysis on attitudinal measurements for perceived value

Code	***Item***	***Loading***	***Cronbach's alpha (std.)***
PV1	I believe my current travel mode is convenient.	0.802	0.887
PV2	I believe the time/cost ratio for my current travel mode is appropriate	0.872	
PV3	I believe the quality/cost ratio for my current travel mode is appropriate.	0.910	
PV4	I believe the comfort/cost ratio for my current travel mode is appropriate.	0.873	

Variance Explained (74.9%); KMO (0.807);
Bartletts's Test of Sphericity ($\chi^2 = 772.12$, d.f. = 6, p-value = 0.000)

As reported in Table 1, the measured items loaded strongly into a single concept making it possible to assume unidimensionality. Additionally, all share more than 50% communality. Through multiple linear regression the items were also related to the overall score, which resulted in a 0.952 adjusted R^2 and both the model and the items were statistically significant. Utility measures (PV2 and PV3) resulted in higher coefficient estimates than experience (PV4) and convenience (PV1) measures. According to Anable and Gatersleben (2005), commuters tend to attach more importance to instrumental attributes than to affective ones. Therefore, it is a positive evidence for the construct face validity. However, since the construct lacked overall heterogeneity, between items and among other constructs, some modifications were made for the final version of the survey. Items representing personal and social dimensions of perceived value were added and PV2 was excluded, since it could be interpreted as a dual cost evaluation and replaced by a perceived value for money as proposed by Zeithaml (1988).

4.1.1.2 Perceived quality

This construct is conceptualized as a multi-dimensional cognitive judgement between expected and perceived performance. The measured items were designed to assess both availability and comfort and convenience dimensions of transport quality evaluation according to TRB's directives (TRB, 1999), as shown in Table 2. Availability attributes are related to the spatial-temporal conditions of availability of a given travel mode, which was measured by frequency and reliability (PQ1), and accessibility (PQ2). On the other hand, comfort and convenience attributes are linked to the likeness of a potential user to become a frequent one. It was measured by tangible infrastructure (PQ3), information provision (PQ4), safety and security (PQ5), and comfort (PQ6).

For this construct, both Cronbach's alpha (0.916) and item-overall score correlations were strong. However, even though inter-correlation results were over 0.30, a similar situation to perceived value occurred. Most items correlated moderately among themselves (0.50 to 0.60), except for PQ1 and PQ6 (over 0.60). Additionally, the overall perceived quality score correlated highly to other marketing constructs, such as overall perceived value ($r = 0.75$, $p < 0.01$), overall travel satisfaction ($r = 0.72$, $p < 0.01$) and overall behavioral intentions/loyalty ($r = 0.68$, $p < 0.01$). Based on the literature, high correlations between perceived quality and perceived value, travel satisfaction and loyalty are expected, since there are several studies laying evidence on these associations (*e.g.* DE OÑA et al., 2013; FU; JUAN, 2017a; FU; ZHANG; CHAN, 2018; LAI; CHEN, 2011), consequently it can be considered a positive indication of nomological validity. Nevertheless, this is a negative implication for discriminant validity, however the changes made within the perceived value construct are expected to aid producing better overall results.

Table 2 – Results of the individual exploratory factor analysis on attitudinal measurements for perceived quality

Code	Item	Loading	Cronbach's alpha (std.)
PQ1	My current travel mode enables me to get to my place of work/study on time.	0.876	0.916
PQ2	My current travel mode enables me to get to my place of work/study easily.	0.829	
PQ3	My current travel mode infrastructure suffices my needs.	0.828	
PQ4	My current travel mode provides me with enough information.	0.773	
PQ5	My current travel mode enables me to get to my place of work/study safely.	0.834	
PQ6	My current travel mode enables me to get to my place of work/study comfortably.	0.895	

Variance Explained (70.6%); KMO (0.906);
Bartletts's Test of Sphericity (χ^2 = 1289.79, d.f. = 15, p-value = 0.000)

The respondents were also asked to evaluate the overall quality of their current travel mode. It permitted to perform a mean equivalence analysis between both single and multi-dimensional scores. The test indicated that the means were equivalent at 95% confidence interval, thus indicating convergent validity for the proposed scale. Furthermore, the exploratory factor analysis results indicated unidimensionality (Table 2). The multiple linear regression analysis showed a 0.939 adjusted R^2. Also, both measured items and the overall model were found to be statistically significant. Finally, availability attributes resulted in significantly higher coefficient estimates than comfort and convenience attributes, as expected. According to Eboli and Mazzulla (2008), reliability, frequency and accessibility are deemed as basic service components, which are expected to deeply affect perceived quality when their level is low.

4.1.1.3 Travel satisfaction

Travel satisfaction was measured through the satisfaction with travel scale (STS) developed by Ettema et al. (2012). It is composed of nine items scoring on a 7 point-scale from -3 to 3, which are divided into two affective and one cognitive dimension. The first two sections are defined by valence and arousal emotions. The first three affective indicators range from negative activation to positive deactivation, such as very hurried to very relaxed, very worried to very confident, and very stressed to very calm. The next three, also affective, go from negative deactivation to positive activation, including very tired to very alert, very bored to very enthusiastic, and very fed up to very engaged. The last three are cognitive indicators of satisfaction regarding mode choice general quality and efficiency, such as the worst I can think of to the best I can think of, very low standard to very high standard, and worked very poorly to worked very well, as seen in Table 3. As the survey was applied in Portuguese, achieving an accurate translation was a point of concern, thus both psychologists and transport specialists were consulted. Additionally, the proposed scale was converted into a matching 7-point Likert scale.

Reliability evaluation was again performed through both item-overall score correlations, item-item correlations and item reliability analysis. The nine items correlated strongly to the calculated overall score, thus indicating high internal consistency. Inter-correlations were overall moderate (0.50 to 0.60), however among each of the three dimensions, the values were significantly higher (over 0.70). Cronbach's alpha results achieved a strong level of internal consistency (0.943). Overall travel satisfaction scores, as previously demonstrated, correlate highly to both overall perceived value ($r = 0.68$, $p < 0.01$) and overall perceived quality ($r = 0.72$, $p < 0.01$), however a more moderate correlation was found for overall behavioral intentions/loyalty ($r = 0.58$, $p < 0.01$). Convergent validity was evaluated through comparing both a single dimension satisfaction score to the overall travel satisfaction score. The mean equivalence analysis yielded positive results at a 95% confidence interval.

As shown in Table 3, the measured items formed a single construct with strong factor loadings, thus indicating unidimensionality. Finally, multiple linear regression analysis generated a 0.927 adjusted R^2 and a statistically significant model. However, TS7 did not perform well for the t-test, achieving 0.053 for its p-value, which is slightly over the threshold. Consequently, the item was reworded. Overall, arousal items (TS4 to TS6), measuring wakefulness and readiness to respond, had higher estimates than valence items (TS1 to TS3), related to the attractiveness/averseness of a prospective event, which fared higher than cognitive items (TS7 to TS9).

Table 3 - Results of the individual exploratory factor analysis on attitudinal measurements for travel satisfaction

Code	Item	Loading	Cronbach's alpha (std.)
TS1	I feel very hurried – very relaxed.	0.806	
TS2	I feel very worried – very confident.	0.803	
TS3	I feel very stressed – very calm.	0.830	
TS4	I feel very tired – very alert.	0.846	
TS5	I feel very bored – very enthusiastic.	0.840	0.943
TS6	I feel very fed-up – very engaged.	0.871	
TS7	I feel the trip is the worst I can think of – the best I can think of.	0.858	
TS8	I feel the trip is very low standard – very high standard.	0.834	
TS9	I feel the trip worked very poorly – worked very well.	0.783	

Variance Explained (69.0%); KMO (0.906);

Bartletts's Test of Sphericity (χ^2 = 2765.51, d.f. = 36, p-value = 0.000)

4.1.1.4 Behavioral intentions and user loyalty

Ajzen (1991) defined behavioral intention as "an indication of how hard people are willing to try, of how much of an effort they are planning to exert, in order to perform the behavior". In the context of this study, since respondents are already users of a given specific mode, behavioral intentions become conceptually similar to user loyalty. User loyalty is deemed as a sign of whether a customer will continue to user the service or switch to a different provider (ZEITHAML; BERRY; PARASURAMAN, 1996). Additionally, both constructs have been consistently evaluated through the same indicators in the literature: willingness to re-use (BI1) and willingness to recommend (BI2) (*e.g.* FU; JUAN, 2017b; FU; ZHANG; CHAN, 2018; MACHADO et al., 2018; MACHADO-LEÓN; DE OÑA; DE OÑA, 2016; WIDIANTI et al., 2015). Additionally, following Van Lierop, Badami and El-Geneidy's (2017) suggestion, the affective side to loyalty was also explored through social psychology constructs, such as involvement (BI3) and attitudes. Measured items are shown in the Table 4.

Table 4 – Results of the individual exploratory factor analysis on attitudinal measurements for behavioral intentions and user loyalty

Code	Item	Loading	Cronbach's alpha (std.)
BI1	I will probably keep using my current travel mode in the future.	0.797	
BI2	I would recommend my current travel mode to others.	0.838	0.815
BI3	I feel that my current travel mode is consistent with my lifestyle.	0.828	

Variance Explained (73.0%); KMO (0.714);
Bartletts's Test of Sphericity (χ^2 = 333.50, d.f. = 3, p-value = 0.000)

The observed variables correlated strongly to the calculated overall score and achieved a good level of internal consistency according to Cronbach's alpha results. Inter-correlations ranged from 0.61 to 0.64 ($p < 0.01$), which are considered strong but tend to be moderate. Nomological and discriminant analysis follow the same results and discussions presented for the previous latent constructs. As presented in Table 4, the items loaded highly on a single construct, thus indicating unidimensionality. Finally, multiple linear regression analysis yielded a 0.904 adjusted R^2 and both model and measured items were statistically significant. Model estimates were similar for all three measured items, however involvement (BI3), an affective indicator, had relative higher importance than cognitive measures (BI1 and BI2).

4.1.1.5 Attitudes toward the travel modes

Attitudes are a subjective measure of how positively or negatively a person evaluates the outcomes of a behavior. In this case, commuting by car and commuting by public transport. For each behavior, 6 different dimensions were assessed: positiveness, pleasantness, efficiency, comfort, sustainability, and safety. Even though, several other dimensions could be analysed, these were the ones appearing more consistently across studies. Reliability, validity, dimensionality, and multiple linear regression analysis were examined once again.

Attitudes toward cars were the first to be analysed. Items measuring positiveness (ATC1), pleasantness (ATC2), efficiency (ATC3), comfort (ATC4), and safety (ATC6) resulted in strong correlations to the calculated overall score, while sustainability (ATC5) correlated mildly (0.298). In the same sense, this measurement was the only one not able to meet the criteria for item-item correlation. Cronbach's alpha resulted in 0.792, indicating acceptable internal consistency. However, the value would increase to 0.804, if ATC5 were excluded. The overall attitudes toward cars score correlated moderately to both the overall social norms toward cars ($r = 0.35$, $p < 0.01$) and perceived behavioral control towards cars ($r = 0.40$, $p < 0.01$), which are positive markers for nomological validity, while also meeting discriminant validity criteria. Exploratory factor analysis showed further evidence that ATC5 should be excluded from the analysis, since it loaded under the lower-limit threshold of 0.50, as shown in Table 5, and had poor shared communality with other items (0.482). Nevertheless, unidimensionality was achieved.

Table 5 – Results of the individual exploratory factor analysis on attitudinal measurements for attitudes toward cars

Code	Item	Loading	Cronbach's alpha (std.)
ATC1	I believe that commuting by car is positive.	0.774	0.792
ATC2	I believe that commuting by car is pleasant.	0.808	
ATC3	I believe that commuting by car is efficient.	0.738	
ATC4	I believe that commuting by car is comfortable.	0.737	
ATC5	I believe that commuting by car is sustainable.	0.482	
ATC6	I believe that commuting by car is safe.	0.644	

Variance Explained (49.8%); KMO (0.812);
Bartletts's Test of Sphericity ($\chi^2 = 551.66$, d.f. = 15, p-value = 0.000)

Finally, multiple linear regression analysis resulted in 0.900 adjusted R^2 and a statistically significant model, however, ATC5 did not perform well for the t-test, achieving 0.114 for its p-value, which is over the threshold. Pleasantness resulted in the most relevant coefficient estimate (0.310), along with efficiency (0.251), positiveness (0.248), and safety (0.201), while comfort (0.067) and sustainability (-0.024) did not attain substantial relative importance. Comfort seems to be intrinsically attached to car use. It resulted in an overall sample mean of 6.5 (S.D. 0.9), at the top of the scale (7.0). On the other hand, a low sample mean of 2.6 (S.D. 1.5) allied with negligible model estimates and an overall sense of pleasantness, efficiency and positiveness toward the mode feeds evidence that sustainability does not raise strong concerns.

The second analysis focused on attitudes toward public transport (Table 6), which followed the same guidelines applied to attitudes toward cars. Similarly, the item measuring sustainability (ATP5) did not correlate strongly to the overall attitudes toward public transportation score and did not meet the criteria for item-item correlations. The item reliability test resulted in a Cronbach's alpha of 0.820, indicating good sample adequacy. This value can be increased to 0.833, if ATP5 was excluded. Thus, apart from sustainability, the overall construct meets the reliability criteria. The overall construct is also correlated to both overall social norms toward public transportation ($r = 0.54$, $p < 0.01$) and perceived behavioral control towards public transport ($r = 0.54$, $p < 0.01$). The correlation values are on the lower end of strongly correlated items, which is a positive sign for discriminant validity. This result is also an encouraging indicative for nomological validity, according to what is expected from the theory of planned behavior.

As expected from the item-overall score correlation results, ATP5 did not load strongly on the single factor. However, it was slightly above the lower acceptable limit (0.50). Nevertheless, the construct met the unidimensionality criteria. Lastly, the multiple linear regression analysis generated a statistically significant model with a 0.888 adjusted R^2. Safety resulted the highest model coefficient estimate (0.279), followed by efficiency (0.265), positiveness (0.212), pleasantness (0.143), comfort (0.141) and sustainability (0.090). This result follows previous literature findings. Safety and security are often found as the main point of concern for public transport users (ABENOZA; CATS; SUSILO, 2017) along with utility aspects (EBOLI; MAZZULLA, 2008). Nonetheless, the opposite from attitudes toward cars happened in relation to comfort and sustainability, while the sample was overall neutral towards public transport comfort (*Mdn* = 3.4, S.D. = 1.6), sustainability achieved close to top of the scale results. The mean of 5.1 (S.D. 1.7) along with low model estimates can be interpreted as sustainability being perceived as an inherently dimension of this mode.

Overall, the results did not favor keeping sustainability as a dimension within the survey, since it does not contribute to the overall consistency, validity or dimensionality of the constructs. Nevertheless, specially for the car-related attitudes, it showed a comparatively high standard deviation. Thus, it could be an interesting source of respondent heterogeneity and could be applied to analyse the existence of self-presentation bias among the sample. Nonetheless, depending on further analysis, it will probably have to be excluded from the structural equation model. Additionally, due to the high relative importance of efficiency, other utility dimensions will be explored on the final survey, such as flexibility and cost.

Table 6 – Results of the individual exploratory factor analysis on attitudinal measurements for attitudes toward public transport

Code	Item	Loading	Cronbach's alpha (std.)
ATP1	I believe that commuting by PT is positive.	0.739	0.820
ATP2	I believe that commuting by PT is pleasant.	0.819	
ATP3	I believe that commuting by PT is efficient.	0.744	
ATP4	I believe that commuting by PT is comfortable.	0.803	
ATP5	I believe that commuting by PT is sustainable.	0.507	
ATP6	I believe that commuting by PT is safe.	0.726	

Variance Explained (53.4%); KMO (0.826);

Bartletts's Test of Sphericity (χ^2 = 669.72, d.f. = 15, p-value = 0.000)

4.1.1.6 Social norms toward the travel modes

Social norms are characterized as perceived social pressure or subjective standards related to the degree to which family and peers would approve of a behavior. This concept was measured for the two analysed commute behaviors, which were operationalized by how well both close relationships and society and media would approve of commuting by each travel mode.

First, the reliability of social norms toward cars was analysed. The construct is composed of two items, which correlated strongly to the overall calculated score. However, the achieved inter-correlation was low ($r = 0.14$, $p < 0.01$) and the item-reliability result was unacceptable ($r = 0.20$, $p < 0.01$). On the same note, even though the exploratory factor analysis resulted in a single construct with high loadings, the overall sample adequacy was poor, as seen in Table 7.

The overall calculated score correlated moderately with overall attitudes toward cars ($r = 0.35$, $p < 0.01$) and its association to perceived behavioral control towards car was almost moderate ($r = 0.26$, $p < 0.01$), which is a positive indication to both discriminant and nomological validity. Furthermore, multiple linear regression generated a statistically significant model with a 0.963 adjusted R^2 and all items effectively contributed to it.

Table 7 – Results of the individual exploratory factor analysis on attitudinal measurements for social norms toward cars

Code	Item	Loading	Cronbach's alpha (std.)
SNC1	Most people who are important to me would support me commuting to work/school by car.	0.744	0.196
SNC2	Commuting by car is well seen by society and media.	0.744	

Variance Explained (55.4%); KMO (0.500);
Bartletts's Test of Sphericity (χ^2 = 3.823, d.f. = 1, p-value = 0.051)

The second construct focused on social norms toward public transport. The two measured items correlated strongly to the calculated overall score and had a significant inter-correlation ($r = 0.35$, $p < 0.01$). However, the sample internal consistency was poor (0.502). Thus, the reliability criteria were not met. Similarly, the construct did not achieve enough sample adequacy to ensure unidimensionality, as depicted in Table 8. The overall social norms toward public transport score was also able to correlate highly to both overall attitudes towards public transport ($r = 0.54$, $p < 0.01$) and perceived behavioral control towards public transport ($r = 0.35$, $p < 0.01$), which is a positive sign to both discriminant and nomological validity. Finally, multiple linear regression analysis resulted in a statistically significant model with a 0.968 adjusted R^2 and all items effectively contributing to it.

Table 8 – Results of the individual exploratory factor analysis on attitudinal measurements for social norms toward public transport

Code	Item	Loading	Cronbach's alpha (std.)
SNP1	Most people who are important to me would support me commuting to work/school by public transport.	0.817	0.502
SNP2	Commuting by public transport is well seen by society and media.	0.817	

Variance Explained (66.8%); KMO (0.500);
Bartletts's Test of Sphericity (χ^2 = 38.596, d.f. = 1, p-value = 0.000)

Overall, the constructs did not achieve reliability and unidimensionality. Subsequently, once both analyses are affected by the number of measures, it was increased from two to three in the final survey. The first item was excluded and divided into two dimensions: strong and weak ties. The former investigates close friends and family approval of the behavior and the latter, acquaintances and co-workers support to the behavior. Besides, this new configuration will aid the constructs to achieve identifiability on the structural model testing.

4.1.1.7 Perceived behavioral control toward the travel modes

Perceived behavioral control is characterized as the perception of easiness or difficulty to perform a behavior. In this study, it was measured as a single dimension construct, which stated "For me, to commute by (travel mode) would be easy". As only one was collected, only discriminant and nomological analyses were possible. For each travel mode, their respective item measuring perceived behavior control was tested for significant, moderate and positive correlations to both overall attitude scores and overall social norms scores. Largely, the results were adequate. Only for cars, these criteria were not completely met, since overall social norms toward cars fell short of a moderate correlation ($r = 0.26$, $p < 0.01$).

4.1.1.8 Personal norms

Personal norms are felt as a moral obligation to perform a behavior, which if not followed would lead to negative feelings, such as regret and guilt. This construct was measured by three indicators related to pro-environmental (PN1 and PN2) and pro-healthy (PN3) lifestyle, as depicted in Table 9. The measured items were able to correlate strongly to the overall calculated score. The lowest correlation was found for the statement measuring involvement (PN3), which was of 0.76 ($p < 0.01$), way above the minimum threshold (0.50). Moreover, the sample achieved good sample internal consistency (0.859). Even though, all inter-correlations were positive and significant, they were not moderate. PN2, which measured the intentions to switch travel mode if it would help the environment, was both strongly correlated to PN1 ($r = 0.73$, $p < 0.01$) and PN3 ($r = 0.69$, $p < 0.01$). In this sense, the reliability criteria were partially met.

Additionally, the overall personal norms score did not correlate significantly to any other variable.

Table 9 – Results of the individual exploratory factor analysis on attitudinal measurements for personal norms

Code	Item	Loading	Cronbach's alpha (std.)
PN1	I feel a personal obligation to protect the environment.	0.868	0.859
PN2	I would feel the need to switch travel mode if it would help the environment.	0.935	
PN3	I would feel the need to switch travel mode if it would help me achieve a healthier lifestyle.	0.846	

Variance Explained (78.2%); KMO (0.665);
Bartletts's Test of Sphericity (χ^2 = 503.80, d.f. = 3, p-value = 0.000)

A single factor with high loadings was extracted from the exploratory factor analysis, thus indicating unidimensionality. Finally, the multiple linear regression analysis generated a statistically significant model with 0.944 adjusted R^2 and all items effectively contributing to it. PN2 scored significant larger coefficient estimates than the other 2 (0.618). PN1, measuring feelings towards the environment, received 0.222 and PN3, related to healthy lifestyle, 0.189. For the final survey, it was found interesting to add a fourth item measuring feelings toward exercising.

4.1.1.9 Habit towards the travel modes

Habit was evaluated by the response-frequency tool developed by Verplanken et al. (1994), which consists of presenting the respondents with 12 different usual situations and asking them to choose a travel mode quickly, the more frequently the choice appears the stronger the habit is. Thus, for each travel mode, a score was calculated, which could range from 0 to 12. The selected situations were visiting a friend, go to the supermarket, go to the movies, go have lunch out, go out have dinner, go shopping downtown, go to the park, go home, commuting, go to a doctor's appointment, go out at night and go to a bakery (Table 10).

Table 10 – Results of the individual exploratory factor analysis on attitudinal measurements for habits

Factor	Code	Item	Loading	Cronbach's alpha (std.)
Leisure Activities	*HAB6*	Go shopping downtown	0.713	0.691
	HAB7	Going to the park	0.657	
	HAB3	Going to the movies	0.607	
	HAB12	Going to the bakery	0.557	
	HAB4	Going out to have lunch	0.511	
Routine Activities	*HAB9*	Commuting	0.863	0.747
	HAB8	Going home	0.848	
	HAB1	Visiting a friend.	0.549	
Night Activities	*HAB11*	Going out at night.	0.816	0.640
	HAB5	Going out to have dinner	0.747	

Variance Explained (54.6%); KMO (0.826);

Bartletts's Test of Sphericity (χ^2 = 1018.58, d.f. = 66, p-value = 0.000

As previously mentioned, Verplanken et al. (1998) showed evidence supporting that when habitual and intention tendencies diverge, behavior often aligns with habit. This premise served as basis for an exploratory analysis for nomological validity. Two linear regression models were built for each travel mode. The first model related the mode choice behavior to the overall habit measure toward the behavior. For example, "*commuting by car*", a dummy variable, and overall habit toward cars were regressed, which resulted in a 0.390 R^2 and a statistically significant model. Then, the same procedure was applied to "car use" and overall behavioral intentions, which yielded a 0.219 R^2 and a statistically significant model. Therefore, indeed the car habit measure was able to better explain car use behavior than behavioral intentions. The same procedure was replicated to "*commuting by public transport*" to similar results. This analysis indicated nomological validity according to previous literature findings and will be further explored with the data collected from the final survey.

The 12 item-scale was also tested for reliability. They were correlated to a summated overall score from which only HAB11 did not correlate strongly (0.269). Additionally, HAB7, HAB11 and HAB12 did not yield at least moderately item-item correlations with mostly all other measurements. However, the sample achieved a good level of internal consistency (0.821). Therefore, the reliability criteria were only partially met. The exploratory factor analysis, however, extracted three factors, which represented leisure activities, routine activities and night activities. As previously stated, it is acceptable when the construct is composed of multiple dimensions, as depicted in Table 14. The items "*going to the market*" (HAB2) and "*going to a doctor's appointment*" (HAB10) were not able to load highly in any factor.

Finally, the multiple linear regression resulted in a statistically significant model with a 0.780 adjusted R^2. Nonetheless, "commuting", "going out at night" and "going to the bakery" did not contribute to the model efficiency. Overall, the scale was not able to fully meet both reliability and model validity criteria, thus the literature was analysed further so that the situations could be switched.

4.2 MODEL TESTING AND VALIDATION

The first point of concern was dealt within the survey development process, which is ensuring model identification. Identification is weather there is enough information as to identify a unique model solution. In another words, if the model would have more unique indicator variances and covariances than parameters to be estimated, which would allow a unique solution to be found. Consequently, the researcher is expected to design a data collection instrument able to gather at least three items per latent construct, thus guaranteeing a just-identified, or saturated, model. However, the best solution is to have an over-identified setting, whenever possible (HAIR et al., 2014).

The process of validating the proposed theoretical model was based on a two-step confirmatory modelling strategy. First, the measurement model goodness-of-fit and construct validity were tested as to gain evidence on the suitability of the measurement items and scales for the analysed latent constructs. Then, once made sure that good and valid measures were selected, the proposed structural relationships among the latent constructs were tested. One key advantage of a two-step approach is the possibility of using the results from the measurement model as basis to assess the validity of the structural model, which enables stronger assurance on the results.

The collected observations were split according to the respondent's current commute travel mode, thus generating two smaller samples. The procedures presented in Sections 4.1 and 4.2 were applied for each sample. In this way, each behavior was modelled according to the customer-loyalty theory (MINSER; WEBB, 2010), the theory of planned behavior (AJZEN, 1985, 1991), and the proposed integrated theoretical model. The results were compared following the guidelines from Section 4.3.

4.2.1 Measurement Model

In proposing a theoretical model, the researcher develops a set of prespecified latent constructs. Latent constructs, also known as latent variables, are hypothesized and unobservable concepts, which are measured, or operationalized, by observable indicators. For example, perceived quality, conceived as a multi-dimensional cognitive judgement between expected and perceived performance, is evaluated by different statements regarding respondents' views on different aspects of their current mode choice. The collected measurements are characterized as observable indicators, which are expected to provide a global measure on perceived quality. The same is applied to perceived value, travel satisfaction, and so on. In this way, the group of latent constructs and respective observed measurements is called a measurement model. This set needs to be tested on how well the measured indicators and the preconceived theory represents the actual data. In this sense, confirmatory factor analysis (CFA) is a tool to gather statistical evidence as to confirm or reject the proposed measurement model.

CFA requires the researcher to specify both the number of latent constructs expected to exist within the data and the construct each measured indicator should be assigned to. Additionally, in each construct, one item loading needs to be set to 1 as to define the factor scale as well as the error terms for each indicator. This model is analysed through a path diagram, which provides a visual representation of the hypothesized constructs being tested, such as presented in Figure 1. Moreover, in this research, a standardized covariance matrix was favored, since it provides more flexibility for statistical analysis as it can hold more information.

As discussed, one of the primary objectives of a measurement model is to find empirical support for the validity, reliability and unidimensionality of the proposed constructs, thus several different measures are often used. Factor loadings are the primary output of a confirmatory factor analysis, which are measures of the strength of the relationship between collected indicators and their respective latent construct. As a rule of thumb, factor loadings should be at least 0.5, but ideally 0.7 or higher.

However, there are still other measures of construct validity that should be analysed. Overall, construct validity is divided into four components, each including several indicators:

- Convergent validity, the degree to which two measures of the same construct are correlated. It is measured by factor loadings; average variance explained, a summary measure of convergence calculated by the square sum of construct factor loadings divided by the number of indicators, which should be 0.5 or higher as to indicate that more explained variance than error remains in the items; and construct reliability, usually measured by coefficient alpha, which should be 0.7 or higher as to indicate internal consistency;
- Discriminant validity, the degree to which a construct is truly different from others. It is evaluated by the comparison between the average variance-extracted for any two constructs with the square of the correlation estimate between these two constructs. The correlation estimate should be the lower value, since more variance should be explained within the constructs themselves, than by what is shared with other constructs;
- Nomological validity, whether the correlations among constructs in the theoretical model are accurate, which is assessed by analysing the matrix of construct correlations;
- Face validity, the understanding of the content of each indicator and their measurements, which is subjective but still relevant.

Finally, the last step for the measurement model is to test whether it has acceptable levels of goodness-of-fit, which are measures of how well theory represents reality based on both the estimated covariance matrix, derived from the proposed model, and the observed covariance matrix, from collected data. Thus, if theory is perfect, both matrices should be equal. For this study, absolute fit indices and incremental fit indices were assessed. The later are direct measures of how well the specified model represents the observed data. The chi-square statistic is its most fundamental measure. It is a function of the sample size and the difference between the observed and estimated covariance matrices, thus small values combined with accepting the null hypothesis, which states that both matrices are equal, are supposed to indicate a good fit. However, once this measure is affected by sample size, even if the residuals remain constant, more observations will lead to higher chi-square values making it difficult to achieve model fitness with either large samples or a large number of parameters. As both are required for achieving model stability in SEM, it should not be used as a single measure of goodness-of-fit. Additionally, goodness-of-fit index (GFI), root mean square error of approximation (RMSEA), standardized root mean residual (SRMR), and normed chi-square were also computed.

Incremental fit indices compare the proposed model to a baseline null model, which assumes that all observed variables are uncorrelated. Thus, if true, no other model would be able to improve its fit. For a long while, the normed fit index (NFI), a ratio of the difference in the chi-square value for the fitted model and the null mode divided by the chi-square for the null mode, was used frequently. However, more complex models end up artificially inflating its results, which is a serious disadvantage. The comparative fit index (CFI) came as an improvement, since by being relative it has a degree of insensitivity to model complexity. Furthermore, it is also normed, meaning that results fall in a range from 0 to 1, and higher values indicate better fit. Once, both construct validity and model fit are met, the next step is to test the proposed relationships on structural model.

4.2.2 Structural Model

A second step on validating a theoretical model is to the test the proposed relationships among the latent constructs. Structural equation modelling (SEM) is the method most adequate tool for this end. It is a combination of interdependent and dependent techniques able to simultaneously examine a series of relationships, either correlational or dependent, through a series of multiple regression equations. As in the measurement model, a SEM model is usually represented by a path diagram, a visual scheme of the multiple hypothesis being tested.

The measurement model is transformed into a structural model by defining both free parameters, the relationships being tested, and fixed parameters, the ones set to zero. Moreover, the latent constructs are divided and specified as endogenous, the ones acting as outcomes, which receive error terms and a Y notation, or exogenous, the ones preceding all other constructs, which keep the X notation from CFA. Lastly, the model is estimated, including the factor loadings and error variance terms, which were both already estimated for the confirmatory factor analysis. The values should be compared, and small fluctuations should be expected, 0.05 or less, otherwise it would indicate interpretational confounding, which means that the proposed pattern of relationships are significantly affecting the measurement estimates, which should lead to model respecification. A form of ensuring that the transforming process was correctly handled is to perform a saturated theoretical model, when there are the same number of relationships as the possible number of correlations between the constructs. The same fit statistics from CFA should be obtained.

A significant difference from other multivariate techniques is that as it is not a single relationship being tested, measures of validity will evaluate the model acceptability as a whole. In this way, model fitness is determined by comparing both the observed covariance and the estimated covariance matrixes from the results from the proposed model, the closer they are the better. Therefore, the same guidelines applied to the measurement model apply for the structural model. Also, the results should be compared. A lower chi-square value is not expected or acceptable, since a fewer number of relationships are being tested at this step. However, the closer they are the better. Finally, the hypothesized dependence relationships are evaluated. This assessment is based on verifying that the parameter estimates are statically significant and in the predict direction, non-triviality or that not all standardized loading estimates are zero, and by analysing prediction accuracy (R^2 values).

4.2.3 Model Comparison

As previously discussed, the collected data was sub-divided into two smaller samples according to the travel mode used for commuting. For each sample, three models were created following the customer-loyalty theory (MINSER; WEBB, 2010), the theory of planned behavior (AJZEN, 1985, 1991), and the proposed integrated theoretical model. After validating both measurement and structural equation models for each theoretical approach, the results were compared through the overall model prediction accuracy (R^2 value) and the estimated parameter estimates.

5 RESULTS AND DISCUSSIONS

In this chapter, the results of the study are presented and discussed as to test and validate the proposed integrated theoretical framework based on marketing and social psychology theories for the two interest groups, namely car commuters and public transport commuters. As discussed in the methodology, the process is comprised of (a) validating the data collection instrument, and (b) a two-step confirmatory modelling strategy, which is divided into a confirmatory factor analysis and testing the proposed relationships among the latent constructs through structural equation modelling.

The first specific objective concerned with developing the integrated model framework based on both marketing and social psychology literatures, which was discussed in Chapter 3. Nonetheless, the remaining specific objectives will be reported and discussed in this chapter. In this sense, Section 5.1 displays both data sampling examinations and descriptive analyses for both descriptive variables and the latent constructs, which are related to the second specific objective. Section 5.2 illustrates the process of validating, analysing and comparing the integrated model framework results for the studied travel modes as required by the third specific objective. Then, the overall model prediction performance for each commuting behavior is compared to the results of the models from the two competing theories, which are the customer-loyalty (MINSER; WEBB, 2010) and the theory of planned behavior (AJZEN, 1985, 1991), as to answer whether the proposed integrated approach would increase significantly the variance explaining power on commuting behavior. Finally, research highlights and possible soft and hard policy implications are discussed.

5.1 DATA SAMPLING AND DESCRIPTIVE ANALYSIS

In this section, overall descriptive statistics will be presented in relation to data sampling, socio-economic and travel and commute characteristics variables as well as the latent constructs. First, data sampling guidelines are presented, and the collected sample is compared to the criteria for each of the proposed analysis. Then, both socio-economic and travel and commute characteristics variables are described in relation to (a) descriptive or frequency statistics, depending on whether the variable is continuous or categorial and (b) significant Spearman correlations to other descriptive variables, including the analysed travel modes as to try to understand how these indicators aid the comprehension of commute travel behavior within the sample. An infographic is provided in Appendix B.

Additionally, both descriptive and relative importance analyses for the measured attitudinal statements concerning marketing and social psychology constructs will be evaluated. As previously mentioned, marketing theory is being studied through perceived value, perceived quality, travel satisfaction, and user loyalty. On the other hand, social psychology theory is being analysed according to the theory of planned behavior, which is composed of attitudes, social norms, and perceived behavioral control, the concept of personal norms from both the norm-activation and the value-belief-norm theories, and habit.

5.1.1 Data Sampling

Curitiba has approximately 1,933,105 inhabitants (IBGE, 2019), thus classified as a statistically infinite population. Therefore, adopting a 5% margin of error (e), a 95% confidence interval ($\sigma = 1.96$), and a 50% response rate (p), the minimum sample required to achieve these conditions would be:

$$\mathrm{n} = \frac{\sigma^2 * \mathrm{p}^2}{\mathrm{e}^2} = \frac{(1.96)^2 * (50)^2}{(5)^2} = 384.16 \cong 384 \text{ answers} \tag{1}$$

The survey was applied in Curitiba, Brazil, from late May through June 2019. It was disseminated over 21 colleges and universities in the region as well as social media. 3,688 e-mail invitations were sent to professors and faculty departments asking their collaboration both participating and disseminating the survey to their students. Overall, 1,122 valid answers were collected, which were divided into two groups according to their current commute travel mode. In this sense, the studied sample is composed of 58.3% of car commuters and 41.7% of public transport commuters. Overall, both samples were able to achieve a 95% confidence level, as reported in Table 11. Curitiba has recently released its origin-destiny (OD) matrix (IPPUC, 2019). According to the data, the modal split in the city is of 44.7% car commuters, 26.2% public transport commuters, 23.6% walking commuters, 2.9% motorcycle commuters, 2.1% cycling commuters, and 0.5% that fall into other modes. Therefore, this study represents 70.9% of the mode share.

Table 11 – Response distribution, by travel mode group

Travel Mode	Sample	%	Confidence Level	Margin of Error	Measured Parameters	Observation/ Parameter
Car	654	58.3	95.0%	5.0%	40	16
Public Transport	468	41.7	95.0%	5.0%	40	12
Overall Sample	**1122**	**100.0**	**95.0%**	**5.0%**	**-**	**-**

Moreover, the samples are also required to fulfil the sampling guidelines for the performed analysis, such as exploratory and confirmatory factor analysis and structural equation modeling analysis. Regarding exploratory and confirmatory factor analysis, Hair et al. (2014) argues that the sample should be 100 or larger. Additionally, as to minimize the chances of over-fitting the data, the sample should have at least five times as many observations as the number of variables being analysed. Nevertheless, a 10:1 ratio would be desirable. In this sense, both car and public transport commuter groups fully meet the criteria. As shown in Table 15, the car commuter group is composed of 654 observations, which results in a 16:1 observation-parameter ratio. On the same note, there are 468 public transport commuter observations, amounting to a 12:1 observation-parameter ratio. Therefore, it implies that the data is not over-fitted, thus the results can be generalized.

On the same note, structural equation modeling algorythms are usually sensitive to sample size and are unreliable with small samples. Therefore, five topics should be taken into consideration:

- **Multivariate normality:** As data deviates from a multivariate normal distribution, the ratio of respondents to parameters should increase. As to minimize problems, a ratio of 15:1 is recommended.
- **Estimation technique:** Maximum likelihood estimation (MLE) is the most common estimation procedure in SEM analysis. Under ideal conditions, such as having strong measurements and no missing data, it provides valid and stable results with samples as small as 50, however as the measurement deviates from these conditions, sample size should increase. A 200-observation sample is the usual rule-of-thumb for a sound

estimation. Nonetheless, as samples increase, it becomes more sensitive to any variation, making goodness-of-fit suggest poor fit.

- **Model complexity:** The more complex a model is, the larger the required sample as more observations are required to decrease variability and increase stability in the solutions.
- **Missing data:** The researcher should plan for an increase in the data sample as to offset any problems with missing data, which will reduce the sample size and ask for remedies that might influence the stability and validity of the response.
- **Average error variance of indicators:** Communalities are a relevant issue for sample size. They represent the common share of variance between the measured indicators in the model. As models contain either low communalities (< 0.5) between indicators or constructs, large samples are required as to ensure model stability and convergence.

In the interest groups, the car sample was able to fully meet all the sampling guidelines required for structural equation modelling. For instance, the car commuter group has a 16:1 observation-parameter ratio, thus complying with the minimum required. Moreover, the sample is greater than 200 observations, thus suggesting that a valid and stable solution will be achieved. However, goodness-of-fit might result in poor fit due to the sample size. On the other hand, even though the public transport commuter group meets the sample size criteria, it shows a smaller observation-parameter ratio (12:1) than required. Therefore, as the proposed integrated model shows high complexity, the resulted stability and validity are likely to suffer. However, model respecification procedures will be tested as to improve validity according to both the exploratory and the confirmatory factor analysis results.

5.1.2 Socio-Economic Descriptive Analysis

Table 12 reports socio-economic frequency statistics for gender, occupation, education level, monthly household income, household size and presence of children for the overall sample as well as by travel mode group. The following sub-sections elaborate on the reported frequency data as well as on significant correlations to other socio-economic and travel and commute variables, specially in relation to current commute travel mode.

Table 12 – Frequency table for socioeconomic descriptive variables, by travel mode group

	Overall Sample N = 1,122			Car Group N = 654			PT Group N = 468		
	Freq.	%	Cum. Freq. (%)	Freq.	%	Cum. Freq. (%)	Freq.	%	Cum. Freq. (%)
Gender									
Female	699	62.3	62.3	392	59.9	59.9	307	65.6	65.6
Male	423	37.7	100.0	262	40.1	100.0	161	34.4	100.0
Occupation									
Unemployed	17	1.5	1.5	6	0.9	0.9	11	2.4	2.4
Student	488	43.5	45.0	198	30.3	31.2	290	62.0	64.3
Employee	263	23.4	68.4	169	25.8	57.0	94	20.1	84.4
Entrepreneur	70	6.2	74.7	57	8.7	65.7	13	2.8	87.2
Public Server	275	24.5	99.2	217	33.2	98.9	58	12.4	99.6
Retired	9	0.8	100.0	7	1.1	100.0	2	0.4	100.0
Education Level									
Elementary School	1	0.1	0.1	1	0.2	0.2	0	0.0	0.0
High School Studies	4	0.4	0.4	1	0.2	0.3	3	0.6	0.6
High School Degree	41	3.7	4.1	13	2.0	2.3	28	6.0	6.6
Undergraduate Studies	362	32.3	36.4	135	20.6	22.9	227	48.5	55.1
Bachelor's Degree	184	16.4	52.8	98	15.0	37.9	86	18.4	73.5
Specialist	136	12.1	64.9	102	15.6	53.5	34	7.3	80.8
Master	212	18.9	83.8	145	22.2	75.7	67	14.3	95.1
PhD	182	16.2	100.0	159	24.3	100.0	23	4.9	100.0
Household Income									
Up to US$ 506.00	87	7.8	7.8	24	3.7	3.7	63	13.5	13.5
US$ 506.01 to US$ 1,012.00	246	21.9	29.7	82	12.5	16.2	164	35.0	48.5
US$ 1,012.01 to US$ 2.530.00	437	38.9	68.6	260	39.8	56.0	177	37.8	86.3
US$ 2,530.01 to US$ 5,060.00	261	23.3	91.9	210	32.1	88.1	51	10.9	97.2
Over US$ 5,060.00	91	8.1	100.0	78	11.9	100.0	13	2.8	100.0
Household Size									
1	98	8.7	8.7	55	8.4	8.4	43	9.2	9.2
2	334	29.8	38.5	220	33.6	42.0	114	24.4	33.5
3	298	26.6	65.1	177	27.1	69.1	121	25.9	59.4
4	283	25.2	90.3	158	24.2	93.3	125	26.7	86.1
5 or more	109	9.7	100.0	44	6.7	100.0	65	13.9	100.0
Presence of Children									
No children	901	80.3	80.3	510	78.0	78.0	391	83.5	83.5
Children under 6 years old	89	7.9	88.2	58	8.9	86.9	31	6.6	90.2
Children from 7 to 12 years old	132	11.8	100.0	86	13.1	100.0	46	9.8	100.0

5.1.2.1 Age

In the overall sample, the respondents' age distribution ranges from 17 to 79 years old, from which 75% are under 41 years old (Table 13). The sample mean is of 32.7 (s.d. 12.4) years old and the median, 29 years old. These results reflect the composition of the sample. For instance, as the survey was disseminated mostly in academic environments, it drew a large share of undergraduate students (30.7%), from which 75% are under 25 years old. In fact, education level shows a strong positive correlation to age ($r = 0.73$, $p < 0.01$). Moreover, according to IBGE (2019), 70.6% of the population of Curitiba is under 44 years old. Therefore, the sample was expected to be positively skewed, as it was found (0.92). Finally, the resulted kurtosis was of 0.04. Since it is lower than 3, the sample has fewer and less extreme outliers than a normal distribution.

Table 13 – Descriptive statistics for age, by travel mode group

	N	Mean	S.D.	Min	Q1	Median	Q3	Max	Skewness	Kurtosis
Car	654	36.1	12.7	17.0	26.0	33.0	46.0	79.0	0.7	-0.4
Public Transport	468	28.0	10.3	17.0	21.0	25.0	31.0	67.0	1.5	1.6
Overall	**1,122**	**32.7**	**12.4**	**17.0**	**23.0**	**29.0**	**41.0**	**79.0**	**0.9**	**0.0**

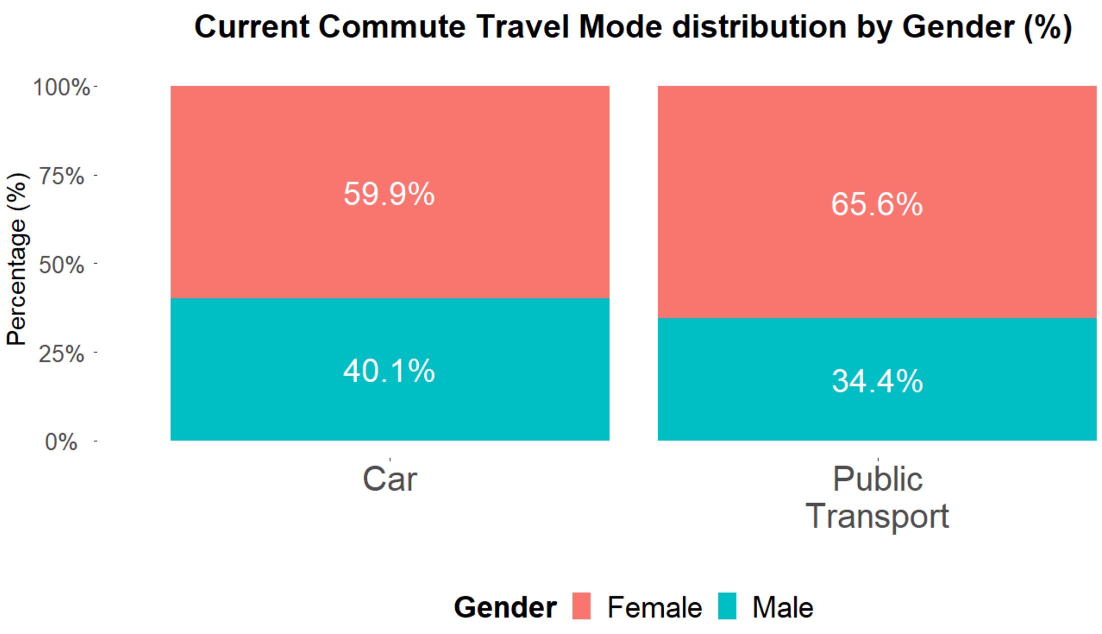
In relation to the interest groups, a Kruskal-Wallis Test was conducted to examine the age differences according to the commute travel modes used, which showed a significant mean difference between the two groups (Chi-square = 143.86, p-value < 0.01, df = 1). The car group age distribution also ranges from 17 to 79 years old, from which 75% are under 46 years old. The group's mean is 36.1 (s.d. 12.7) years old and the median, 33 years old. In comparison, the car group is 11% older than the overall sample in average. The car group has a large share of participants who had as the highest completed level of education a specialization (15.6%), a masters degree (22.2%), or a doctoral degree (24.3%), which are categories with a higher age mean than the overall sample, respectively 37.0 (s.d. 9.3) years old, 35.4 (s.d. 10.3) years old, and 47.1 (s.d. 10.1) years old.

The public transport group distribution ranged from 17 to 67 years-old, from which 75% are under 31 years old. The mean age is of 28 (s.d. 10.3) years old and the median, 25 years old. This group is 13.8% younger than the overall sample, which is due to the group's composition. In the sample, 6% have as higher completed education level a high school degree, 48.5% are undergraduate students, and 18.4% have a bachelor's degree. These categories have a lower mean age than the overall sample, respectively 23.3 (s.d. 9.3) years old, 23.7 (s.d. 6.9) years old, and 29.6 (s.d. 7.9) years old.

5.1.2.2 Gender

The overall sample is composed of 62.3% female respondents and 37.7% male respondents (Table 14). This gender split deviates from the expected, as the census data (IBGE, 2019) shows that the population of Curitiba is constituted of 52.3% female and 47.7% male inhabitants. Therefore, the analysis should take into consideration that women are over-represented in the sample. Moreover, gender did not exhibit any significant correlation to any other descriptive variable.

Figure 3 – Current commute travel model distribution split by gender



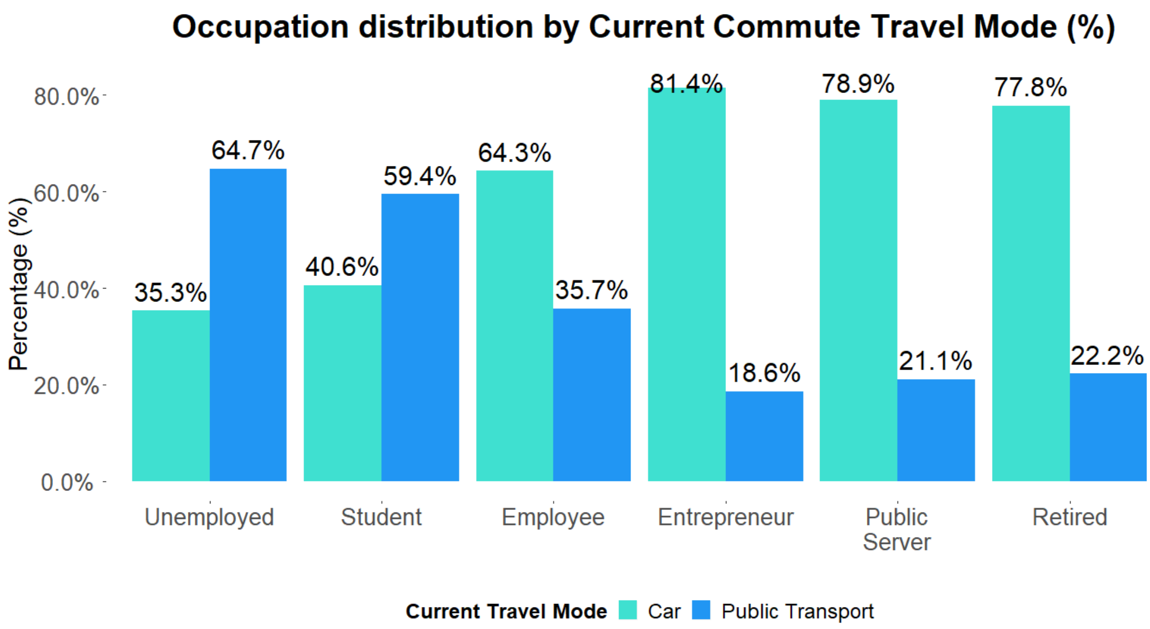
Source: Author (2020)

For the interest groups, the gender split is shown in Figure 3. According to the OD matrix (IPPUC, 2019), car commuters have a gender split of 42.6% female and 57.4% male and public transport commuters, 57.9% female and 42.1% male. In the sample, both commuter groups skew more female than stated in the OD matrix, respectively 59.9% and 65.6% of the participants are women. Nevertheless, the car group has the biggest departure from the reported data as it was expected be predominantly male.

5.1.2.3 Occupation

The occupation frequency distribution found for the overall sample was of 1.5% unemployed, 43.5% student, 23.4% employee, 6.2% entrepreneur, 24.5% public server, and 0.8% retired respondents (Table 12). As previously stated, due to being disseminated mostly in academic environments, the survey attracted a large share of students. This group is composed mainly of undergraduate (57.8%) and master (17.2%) students, which mostly commute by public transport (59.4%). In this sense, student and unemployed categories are the only groups in which commuting by car does not account for the largest share of respondents (Figure 4).

Figure 4 – Occupation distribution by current commute travel mode



Source: Author (2020)

One possible explanation is related to monthly household income. 58.8% of unemployed and 44.0% of student respondents reported an overall monthly household income of up to 4 minimum wages or about US$ 12,000/year. On the other hand, only 27.0%, 22.8%, 7.6%, and 0.0% of employee, entrepreneur, public server, and retired respondents, respectively, live under the same conditions. Moreover, monthly household income shows a moderate negative correlation to current commute travel mode ($r = -0.39$, $p < 0.01$) and a moderate positive correlation to car availability ($r = 0.43$, $p < 0.01$).

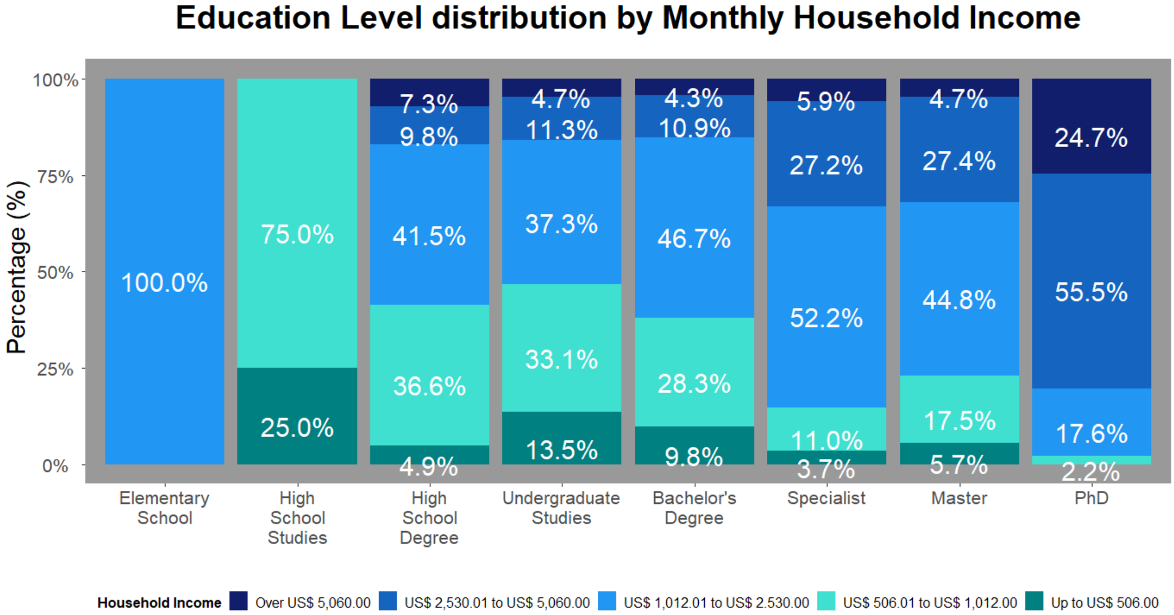
As shown in Table 12, the car group is mainly composed of public servers (33.2%), students (30.3%), and employees (25.8%) and the public transport group by students (64.3%) and employees (20.1%). Analysing the travel mode groups by monthly household income, it is shown once more that car users, in average, have higher incomes. Only 16.2% of car users have an overall monthly household income up to 4 minimum wages, while this share represents 48.5% of public transport commuters. Even when comparing only the student group among the different travel commute samples, it is possible to perceive this trend. For the car group, 27.3% of the student group live with up to 4 minimum wages by month per household, while 55.5% of students from the public transport commuter group live under the same conditions.

This trend raises the question on whether public transport commuters would keep commuting with their current travel mode if their monthly income increased. In the public transport group, only 21.2% selected public transport as their preferred travel mode, while commuting by car is seen as a better option by 46.2% and commuting by cycling is favored by 22.1%. Overall, Curitiba's public authorities should be concerned on how to improve public transport perceived quality as to try to retain current users, which would otherwise become car users.

5.1.2.4 Education level

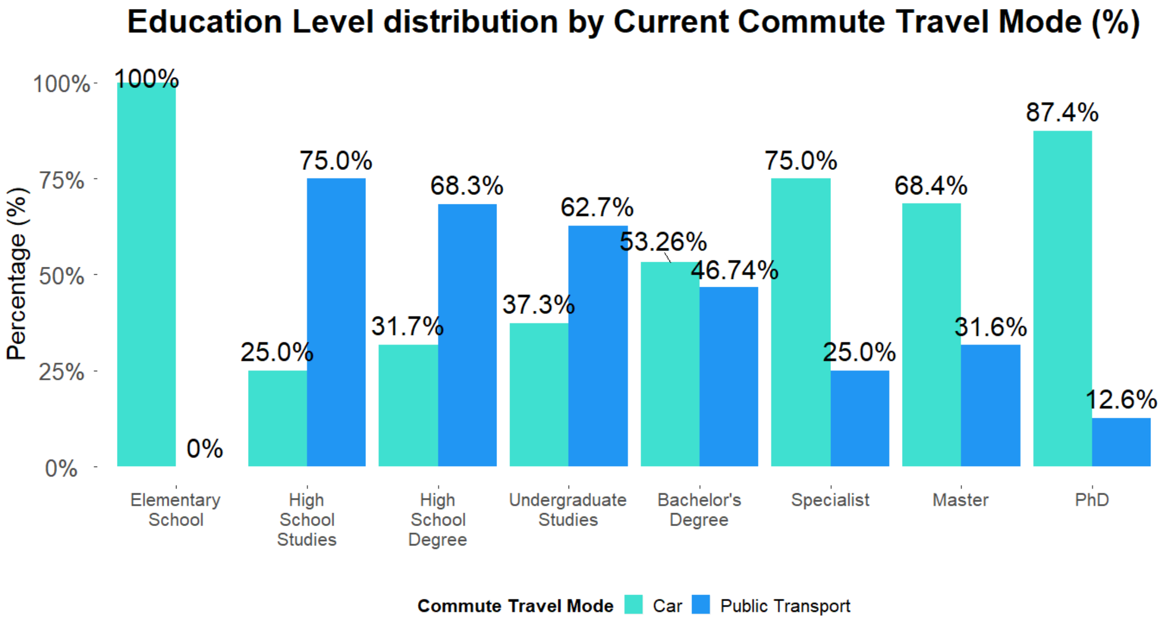
The overall sample can be segmented into 8 different categories according to the highest completed education level, which, as seen in Table 12, are elementary school (0.1%), high school studies (0.4%), high school degree (3.7%), undergraduate studies (32.3%), bachelor's degree (16.4%), specialist degree (12.1%), master's studies or degree (18.9%), and PhD studies or degree (16.2%). Moreover, education level is moderately correlated to monthly household income ($r = 0.41$, $p < 0.01$). In the sample, while 46.6% of undergraduate students have a household monthly income of up to 4 minimum wages, only 2.2% of PhD's live under the same conditions (Figure 5).

Figure 5 – Education level distribution by monthly household income



Source: Author (2020)

Figure 6 – Education level distribution by current commute travel mode



Source: Author (2020)

Therefore, as income is likely to increase with education level and, as shown in Section 5.1.2.3, income is correlated to both current commute travel mode and car availability, it could be expected that the higher the income, the more likely the respondent will be to commute by car. Likewise, running a discriminant analysis, using only education level and monthly household income to predict car use, it was possible to correctly classify 65.4% of car users. In the overall sample, 87.4% of respondents with PhD studies or a PhD degree commute by car, while only 37.3% of undergraduate students commute by the same mode (Figure 6). The same experiment was replicated to public transport usage, in which only 37.0% of public transport users were correctly guessed. Public transport usage is moderately and negatively correlated to education level ($r = -0.38$, $p < 0.01$). Only 12.6% of PhD respondents commute by public transport, while 62.7% of undergraduate students do the same (Figure 6).

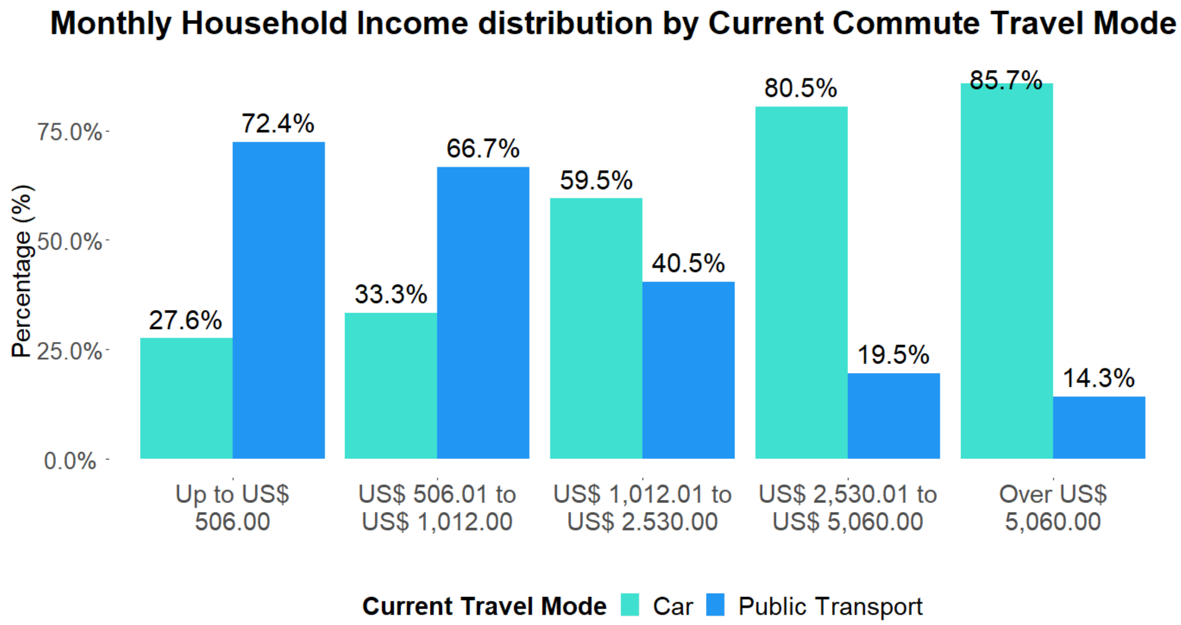
For the interest groups, as presented in Table 12, the car group is mainly composed of participants who have PhD studies or degree (24.3%), master's studies or degree (22.2%), and undergraduate studies (20.6%) and the public transport group by undergraduate students (48.5%) and bachelor's degree (18.4%). As expected, the most predominant categories within the car group have higher education levels than the ones for the public transport group.

5.1.2.5 Monthly household income

The monthly household income categories were defined based on the Brazilian census guidelines. Therefore, there are 5 categories, which are defined according to the quantity of minimum wages a household earns per month. In 2019, the Brazilian minimum wage was of R$ 998.00, which amounts to about US$ 253.00. The adopted conversion rate was of 3.94 (29/04/2019). The categories are low-income households, which earn up to 2 minimum wages (US$ 506.00); lower-middle income households, 2 to 4 minimum wages (US$ 506.01 to US$ 1,012.00); middle income households, 4 to 10 minimum wages (US$ 1,012.01 to US$ 2,530.00); upper-middle income households, 10 to 20 minimum wages (US$ 2,530.01 to US$ 5,060.00); and upper income households, over 20 minimum wages (US$ 5,060.00).

In the overall sample, the obtained respondent distribution was of 7.8% low-income households, 21.9% lower-middle income households, 38.9% middle income households, 23.3% upper-middle income households, and 8.1% upper income households. The found income distribution deviates from the census data, specially for low income households. In Curitiba, according to IBGE (2019), there are 16.8% low-income households, 32.4% lower-middle income households, 26.9% middle income households, 15.0% upper-middle income households, and 8.9% upper income households. Consequently, the collected sample is mostly overrepresenting middle income respondents (+12.0%), while underrepresenting lower-middle income participants (-10.5%).

Figure 7 – Monthly household income distribution by current commute travel mode



Source: Author (2020)

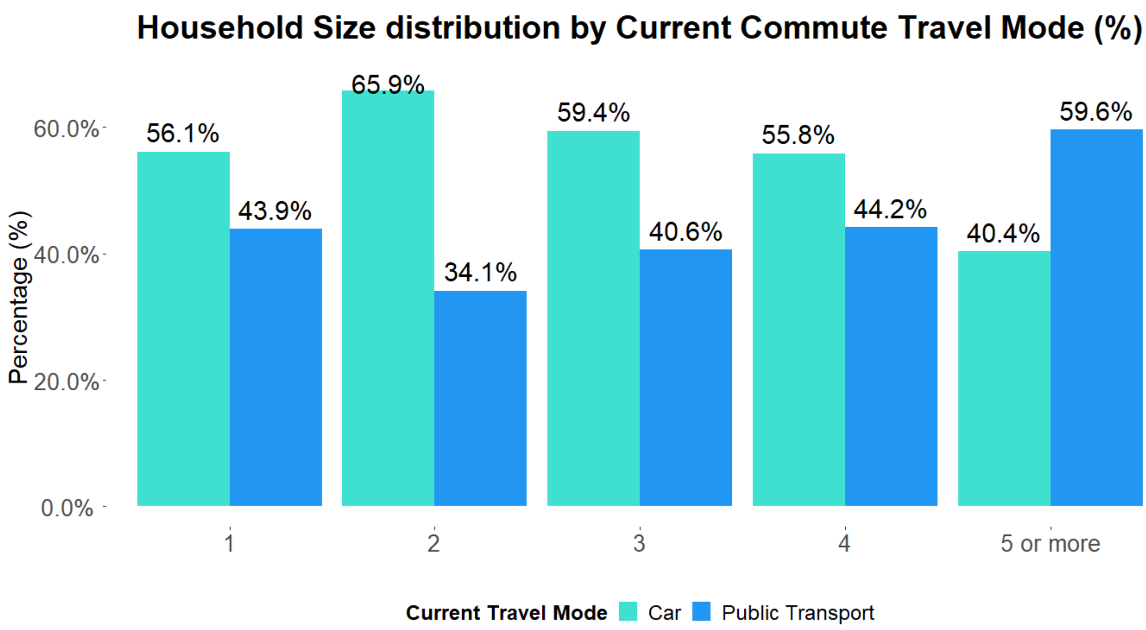
As previously mentioned in Sections 5.1.2.4 and 5.1.2.5, monthly household income is moderately correlated to current commute travel mode ($r = -0.39$, $p < 0.01$), car availability ($r = 0.43$, $p < 0.01$), and education level ($r = 0.41$, $p < 0.01$). In this sense, monthly household income is moderately correlated to car use ($r = 0.39$, $p < 0.01$), thus the higher the income, the more likely the respondent will commute by car. On the other hand, the opposite is expected from public transport usage, which is negatively correlated to monthly household income ($r = -0.39$, $p < 0.01$). For example, among low-income households, 72.4% commute by public transport and 27.6% commute by car, while among upper income households only 14.3% commute by public transport and 85.7% commute by car (Figure 7).

Among the studied groups, the car sample has the largest share of respondents in the two upper brackets accounting for 44% of respondents. In comparison, the public transport group holds only 13.7% in these categories, while 48.5% of the public transport group are within the two lower brackets. In this sense, the car group skews middle to upper income, while the public transport group skews middle to low income as was expected from the previous findings for the overall sample. As shown in Table 12, the car group is mostly composed of middle (39.8%) and upper (32.1%) income respondents and the public transport group by lower-middle (35.0%) and middle (37.8%) income respondents.

5.1.2.6 Household size

In the overall sample, 8.7% of households are occupied by only one person, 29.8% by two people, 26.6% by three people, 25.2% by four people, and 9.7% by five people or more (Table 12). As expected, household size shows a moderate correlation to presence of children ($r = 0.35$, $p < 0.01$). For example, only 58.7% of household with 5 or more people have no children, while that is true for 96.1% of households with two people. Moreover, it was not found a significant correlation between household size and current commute travel mode. However, the proportion of public transport commuters increased with household size. 59.6% of respondents who live in households with 5 or more people commute by public transport, while only 34.1% do the same in two-people households (Figure 8). Nonetheless, the correlation ($r = 0.12$, $p < 0.01$) between household size and public transport use is too weak to be accounted.

Figure 8 – Household size distribution by current commute travel mode



Source: Author (2020)

As shown in Table 12, the car group is mostly comprised of respondents who live in households with 2 (33.6%), 3 (27.1%) or 4 (24.2%) people. Likewise, the public transport group is also composed mostly by respondents who live in households with 2 (24.4%), 3 (25.9%) or 4 (26.7%) people, however the category's "5 or more people" share is significantly larger (13.9%) than what is found in the car sample. In comparison, only 6.7% of car commuters are in this category.

5.1.2.7 Presence of children

In the overall sample, the frequency distribution found for presence of children was of 80.3% of households have no children, 7.9% of households have children under 6 years old, and 11.8% of households have children between 7 and 12 years old (Table 12). As stated in Section 5.1.2.6, presence of children has a moderate and positive correlation to household size ($r = 0.35$, $p < 0.01$). Additionally, it was not found a significant correlation between presence of children and current commute travel mode. On the same note, both travel mode groups are mainly no children households.

5.1.3 Travel and Commute Characteristics Descriptive Analysis

Table 14 reports travel and commute characteristics frequency statistics for preferred commute travel mode, current commute travel time, car availability, bus card ownership, and ridesharing or carpooling usage for the overall sample as well as by travel mode group. The following sub-sections elaborate on the reported frequency data as well as on significant correlations to other socio-economic and other travel and commute variables, specially in relation to current commute travel mode.

Table 14 – Frequency table for travel and commute characteristics descriptive variables, by travel mode group

	Overall Group N = 1,122			Car Group N = 654			PT Group N = 468		
	Freq.	**%**	**Cum. Freq. (%)**	**Freq.**	**%**	**Cum. Freq. (%)**	**Freq.**	**%**	**Cum. Freq. (%)**
Preferred Travel Mode									
Car	542	52.0	52.0	344	56.1	56.1	198	46.2	46.2
Public Transport	197	18.9	70.9	106	17.3	73.4	91	21.2	67.4
Cycling	185	17.8	88.7	90	14.7	88.1	95	22.1	89.5
Walking	105	10.1	98.8	62	10.1	98.2	43	10.0	99.5
Other	13	1.2	100.0	11	1.8	100.0	2	0.5	100.0
Current Travel Time									
Less than 10 min	89	7.9	87.7	84	12.8	12.8	5	1.1	1.1
11 to 20 min	290	25.8	25.8	236	36.1	48.9	54	11.5	12.6
21 to 30 min	226	20.1	46.0	161	24.6	73.5	65	13.9	26.5
31 to 45 min	229	20.4	66.4	122	18.7	92.2	107	22.9	49.4
46 to 60 min	150	13.4	79.8	42	6.4	98.6	108	23.1	72.4
Over 60 min	138	12.3	100.0	9	1.4	100.0	129	27.6	100.0
Car Availability									
Car always available	570	50.8	50.8	539	82.4	82.4	31	6.6	6.6
Car eventually available	143	12.7	63.5	62	9.5	91.9	81	17.3	23.9
Car in the household, but not available	175	15.6	79.1	19	2.9	94.8	156	33.3	57.3
No car available	234	20.9	100.0	34	5.2	100.0	200	42.7	100.0
Bus Card Ownership									
No	457	40.7	40.7	367	56.1	56.1	90	19.2	19.2
Yes	665	59.3	100.0	287	43.9	100.0	378	80.8	100.0
Car Sharing Use									
No	192	18.9	18.9	131	22.2	22.2	61	14.3	14.3
Yes	825	81.1	90.6	460	77.8	100.0	365	85.7	100.0

5.1.3.1 Preferred commute travel mode

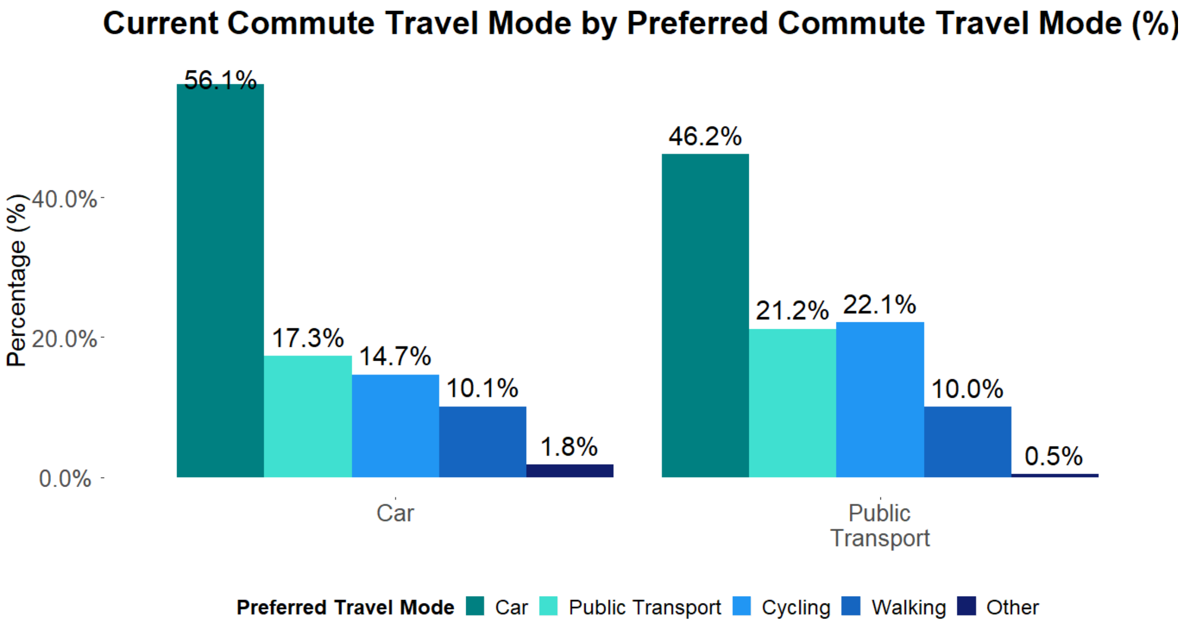
In the survey, participants were asked which would be their preferred travel mode for commuting, which serves as an additional indicator of loyalty to their current commute travel mode. As reported in Table 14, commuting by car was favored by 52.0% of the sample followed by public transport (18.9%), cycling (17.8%), walking (10.1%), and other (1.2%). The large preference for car use might be attributed to the sense of freedom, status, and independency attached to it (STEG, 2005). Nonetheless, a large interest is found for active and more sustainable forms of transportation, such as cycling and walking, accounting for 27.9% of responses. However, the relative low interest for public transport is concerning. In Curitiba, ridership has been constantly decreasing at a rate of 6% per year (URBS, 2019) due to factors such as fare, safety and overcrowding (SILVEIRA, 2018). This scenario has been affecting the system's financial stability as well as its capacity to renew the fleet and to invest in infrastructural improvements.

The respondents who selected car as their preferred travel mode could be characterized as, in average, 31.9 (s.d. 12.5) years old, largely female (71%), mainly undergraduate students (37.5%), middle class (40.0%), living in households with 2 (27.1%), 3 (27.1%) or 4 (26.8%) people, and with no children (78%). In comparison, car commuters are, in average, 36.1 (s.d. 12.7) years old, largely female (59.9%), mainly public servers (33.2%), holding a master's degree or studies (22.2%) or a PhD degree or studies (24.3%), middle (39.8%) and upper-middle (32.1%) class, living in households with 2 (33.6%), 3 (27.1%) or 4 (24.2%) people, and with no children (78%). Overall, participants who prefer to commute by car are younger, more female, and with lower higher completed education levels and household incomes than the car commuter group. Therefore, as seen in Section 5.1.2.5, it should be expected that if their monthly household income increase, they are likely to become car users given their travel mode attitudes do not change.

Participants who selected public transport as their preferred travel mode could be characterized as, in average, 36.0 (s.d. 12.8) years old, with an almost even male (46.7%) and female (53.3%) distribution, mainly public servers (38.6%), holding a bachelor's degree (20.3%), master's degree or studies (20.3%) or a PhD degree or studies (28.4%), middle (31.5%) and upper-middle class (29.4%), living in households with 2 (37.6%) or 3 (24.9%) people, and with no children (81.7%). On the other hand, public transport commuters are, in average, 28 (s.d. 10.3) years old, largely female (65.6%), mainly undergraduate students (48.5%), lower-middle (35.0%) and middle class (37.8%), living in households with 2 (24.4%), 3 (25.9%) or 4 (26.7%) people, and with no children (83.5%). Overall, participants who prefer to commute by public transport are older, more evenly distributed gender wise, more educated, and with higher household incomes than the public transport commuter group. The description of participants who selected public transport as their preferred travel mode fairly matches the car group. In fact, 53.8% of them are car users. In this sense, 17.3% of car users would be willing to use public transportation to commute.

Additionally, as mentioned, 17.8% of respondents selected cycling as their preferred commute travel mode. This group could be characterized as, in average, 31.1 (s.d. 11.1) years old, with and even male (46.5%) and female distribution (53.5%), mainly undergraduate students (40.0%), lower-middle (23.2%) or middle (37.8%) income households, living in households with 2 (28.1%), 3 (25.9%) or 4 (30.8%) people, and with no children (82.2%). Moreover, it is evenly composed of car commuters (48.6%) and public transport commuters (51.4%). Finally, respondents who selected walking as their preferred travel mode could be characterized as, in average, 32.8 (s.d. 12.1) years old, largely female (64.8%), undergraduate students (23.8%) or holding a master's degree or studies (21.0%), middle (40.0%%) class, living in households with 2 (35.2%), 3 (22.9%) or 4 (23.8%) people, and with no children (85.7%) which are mostly car commuters (59.0%).

Figure 9 – Current commute travel mode by preferred commute travel mode



Source: Author (2020)

Preferred commute travel mode does not correlate significantly to any other descriptive variable, including current commute travel mode. On the other hand, within the car group, 56.1% chose commuting by car as their preferred travel mode. Thus, suggesting the existence of loyalty bonds in relation to their current commute travel mode. However, it did not hold true for the public transport group. In the group, only 21.2% marked public transport as their preferred option, while 46.2% would rather commute by car (Figure 9). Even so, it is interesting to notice a sizable number of respondents who would rather commute with active transportation options within both motorized groups. 24.8% of car users and 32.1% of public transport users would prefer commuting with active transportation modes, such as walking and cycling.

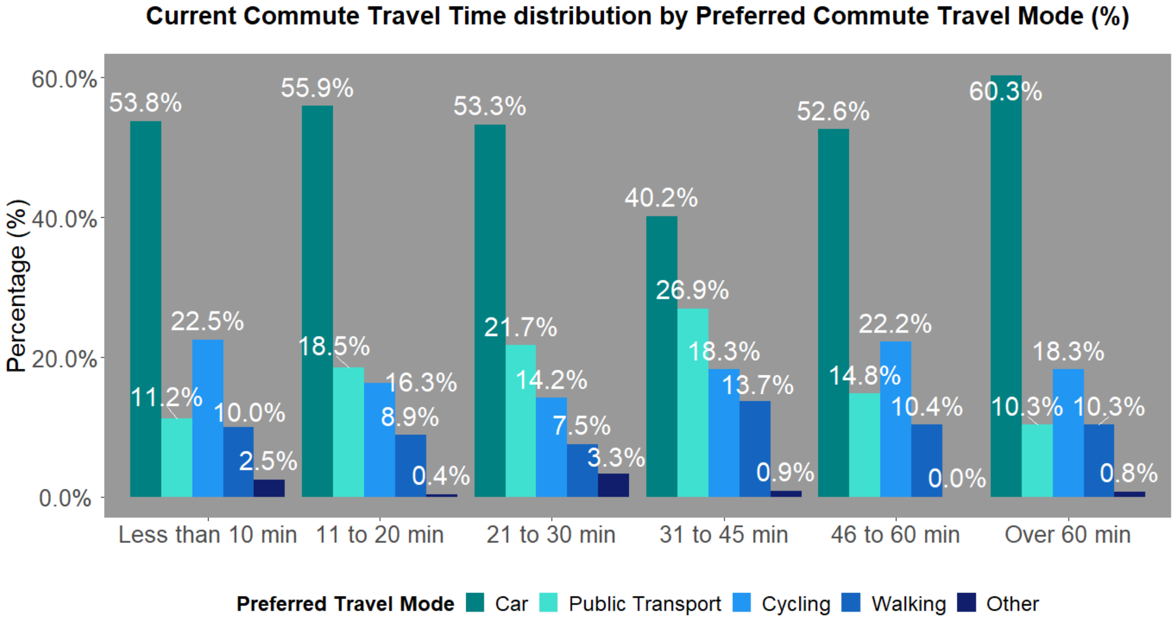
5.1.3.2 Current commute travel time

The overall sample was segmented into 6 different categories according to current commute travel time. 7.9% of respondents take less than 10 minutes to commute, 25.8% between 11 to 20 minutes, 20.1% between 21 to 30 minutes, 20.4% between 31 to 45 minutes, 13.4% between 46 to 60 minutes, and 12.3% over 60 minutes (Table 14). Current commute travel time is moderately correlated to both current commute travel mode ($r = 0.53$, $p < 0.01$), commuting by car ($r = - 0.53$, $p < 0.01$), and commuting by public transport ($r = 0.53$, $p < 0.01$). Therefore, the car group has, in general, shorter commutes. In this sense, 73.5% of the reported car commutes take less than 30 minutes. On the other hand, 73.6% of public transport commuters take over 30 minutes.

Moreover, there are some interesting trends in the data in relation to the age distribution. For instance, the average age per category tends to decrease as travel time increases. In this sense, a Kruskal-Wallis Test was performed, and a significant difference could be found among the travel time categories (Chi-square = 86.64, p-value < $2.2e^{-16}$, df = 5). However, the pairwise comparisons shows that significant mean differences only hold true between the "46 to 60 minutes" and "over 60 minutes" categories to other groups. The found means were of 36.5 (s.d. 12.0) for respondents with commutes taking less than 10 minutes, 35.1 (s.d. 12.8) for 11 to 20 minutes, 34.1 (s.d. 12.5) for 21 to 30 minutes, 32.9 (s.d. 12.5) for 31 to 45 minutes, 29.3 (s.d. 11.5) for 46 to 60 minutes, and 26.6 (s.d. 9.4) for over 60 minutes. This is mostly explained by a combination of the travel mode used by age group and travel model composition by commute travel time category. As seen from last section, car commuters, in average, are the oldest group, while public transport users are the youngest. In this sense, car use tends to decrease with travel time ($r = -0.53$, $p < 0.01$) as public transport goes in the opposite direction ($r = 0.53$, $p < 0.01$). For example, within commutes taking less than 10 minutes, 94.4% are made by car, while only 5.6% are by public transport. However, for those taking over 60 minutes, 93.5% are made by public transport while 6.5% are made by car.

From the previous findings, it could be expected that as public transport usage shows a moderate to low negative correlation to education level ($r = -0.38$, $p < 0.01$), the proportion of undergraduate students would increase with current commute travel time as well as the number of respondents holding a PhD degree or studies would decrease. For instance, for commutes taking less than 10 minutes, 18.0% are undergraduates while 24.7% are on the PhD category. On the other hand, for the commutes taking over 60 minutes, 60.9% are undergraduate students and 2.9% have PhD studies. Following the same rationale, as car use has a moderate positive Pearson correlation to household income ($r = 0.39$, $p < 0.01$), the proportion of middle to low income respondents tends to increase as commute travel time increases. For example, for commutes taking less than 10 minutes, 61.8% are within middle to low income households, while 87.7% are in the same categories for commutes taking over 60 minutes.

Figure 10 – Current commute travel time distribution by preferred commute travel mode



Source: Author (2020)

Commuting by car is the favorite travel mode across all commute travel time categories, specially among the longer ones (Figure 10). Moreover, the preference for public transport increases up until commutes taking 31 to 45 minutes and then decreases. It can be explained by the mean auto/public transport travel time found in Curitiba, which is of 1.3 (SILVEIRA, 2018). According to the TRB (2003), it is the limit tolerable ratio from the user perspective, where a 20-minute trip by car would take around 40 minutes by bus. On the same note, the preference for cycling is rather constant among all categories, while for walking, it decreases with travel time, which is likely due to distance constraints.

For the interest groups, the distribution by commute travel time is reported on Table 14. The car group is mainly composed of 11 to 20 minutes (36.1%), 21 to 30 minutes (24.6%), and 31 to 45 minutes (18.7%) commutes and the public transport group by 31 to 45 minutes (22.9%), 46 to 60 minutes (23.1%), and over 60 minutes (27.6%) commutes. As expect, car commutes center on short to medium travel times, while public transport on longer travel times.

5.1.3.3 Car availability

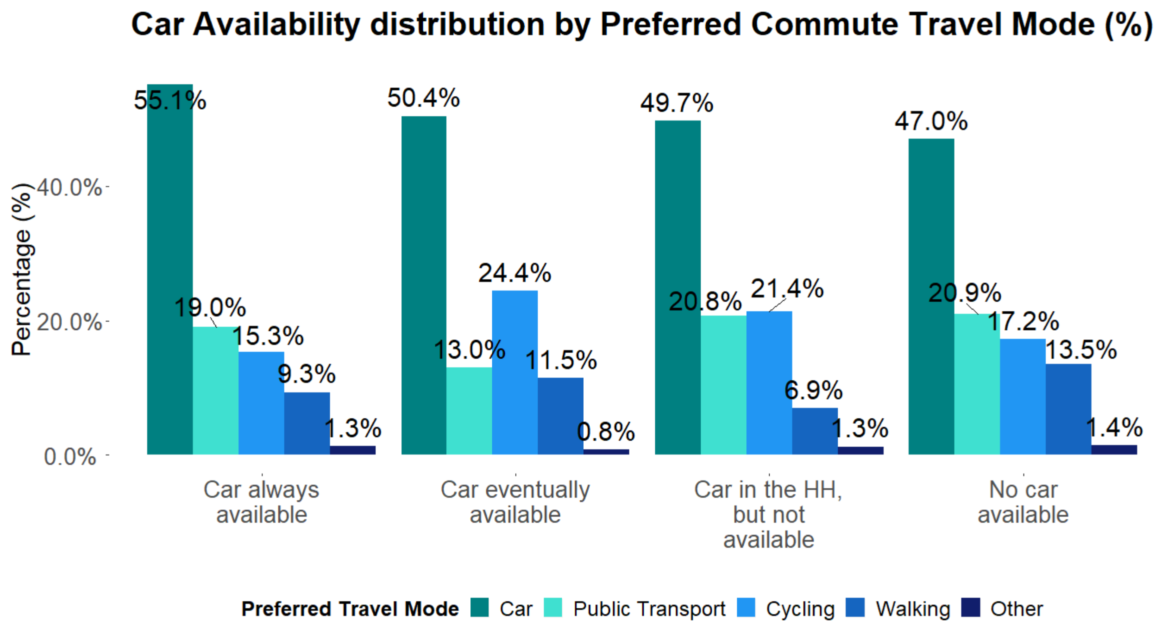
Respondents were also asked about their car availability, as to further illustrates their behavioral control. As seen in Table 14, the sample was classified according to four different categories: car always available (50.8%); car eventually available (12.7%); car in the household, but not available (15.6%); and no car available (20.9%). This variable yielded a positive moderate correlation to age ($r = 0.39$, $p < 0.01$) and monthly household income ($r = 0.43$, $p < 0.01$) and a negative strong correlation to current commute travel mode ($r = -0.75$, $p < 0.01$).

The mean age for respondents who have a car always available was of 36.9 (s.d. 12.5) years old, which is similar to the one found for the car group. It is an expected result as this category is mainly composed of car commuters (94.6%). The following categories are majorly comprised of public transport commuters to varying degrees. As the public transport group is younger when compared to the car sample, the higher its percentage in the group composition, the younger the group is. Likewise, the "car eventually available" category has a mean age of 29.4 (s.d. 11.5) years old and is composed of 56.6% of public transport commuters. Those who have a car in the household, but that is not available to them have a mean age of 27.4 (s.d. 11.1) years old and 89.1% are public transport commuters. Finally, the "no car available" category has a mean age of 28.5 (10.0) years old and are also mainly composed of public transport commuters (85.5%).

The positive moderate correlation found between monthly household income and car availability works as an extension from the association between monthly household income and current commute travel mode ($r = -0.39$, $p < 0.01$). Therefore, as mentioned, car usage increases with household income while public transport goes in the opposite direction. In the overall sample, 86.1% of those who have a car always available range from middle to upper classes, while 90.6% of those who have no car available range from low to middle classes.

As mentioned, car availability shows a negative strong correlation to current commute travel mode ($r = -0.75$, $p < 0.01$). Unraveling this association by correlating car availability to the two evaluated behaviors, it is seen a strong positive correlation to car usage ($r = 0.75$, $p < 0.01$) and a negative strong correlation to public transportation usage ($r = -0.75$, $p < 0.01$). Therefore, the more available the car is, the more likely the respondent is a car user. Similarly, car availability is a moderately good indicator of perceived behavioral car control ($r = 0.34$, $p < 0.01$). Examining car availability based on perceived behavioral car control (PBCC), it is noticeable that those who have a car always available have a significantly different and higher mean than those who do not, which was verified by a Kruskal-Wallis Test (Chi-square = 136.07, p-value < 0.01, df = 3). In a 7-point Likert scale, the later resulted a median of 6, while the former a median of 5.

Figure 11 – Car availability distribution by preferred commute travel mode



Source: Author (2020)

Finally, the car commuter group is mostly composed of those who have a car always available (82.4%). On the other hand, the public transport group is mainly comprised of those who have no car available (42.7%). On the same note, when car availability is analysed in relation to preferred commute travel mode, for those who have a car always available, 55.1% would rather keep commuting by car, which is an indicative of strong habit measures. For instance, the median car habit strength for this group is of 9 (out of 12). Contrarily, for those with no car available, it is only 3. The "no car available" category also shows a strong preference for commuting by car. In this group, 47.0% have commuting by car as their favored mode followed by public transport (20.9%), cycling (17.2%) and by walking (13.5%), as seen in Figure 11.

5.1.3.4 Bus card ownership

In the sample, 59.3% of respondents who own a bus card and 40.7% who do not (Table 14). Overall, this variable is moderately and positively correlated to current commute travel mode ($r = 0.38$, $p < 0.01$) and commuting by public transport ($r = 0.38$, $p < 0.01$) and negatively to commuting by car ($r = -0.38$, $p < 0.01$). In this sense, 80.8% of public transport commuters own a bus card, while that is true for only 43.9% of car commuters in the sample.

As it was measured as a complementary indicator of perceived behavioral control towards public transport, the mean difference between categories was tested through a Kruskal-Wallis Test. A significant difference (Chi-square = 50.03, p-value < 0.01, df = 1) was found between-groups. In this way, the found perceived behavioral control towards public transport median for those who own a bus card (*Mdn* = 4.0) was 25.0% higher than for those who did not (*Mdn* = 3.0). However, only a weak statistically significant Pearson correlation was found between perceived behavioral control towards public transport and bus card ownership ($r = 0.21$, $p < 0.01$).

5.1.3.5 Ridesharing or carpooling usage

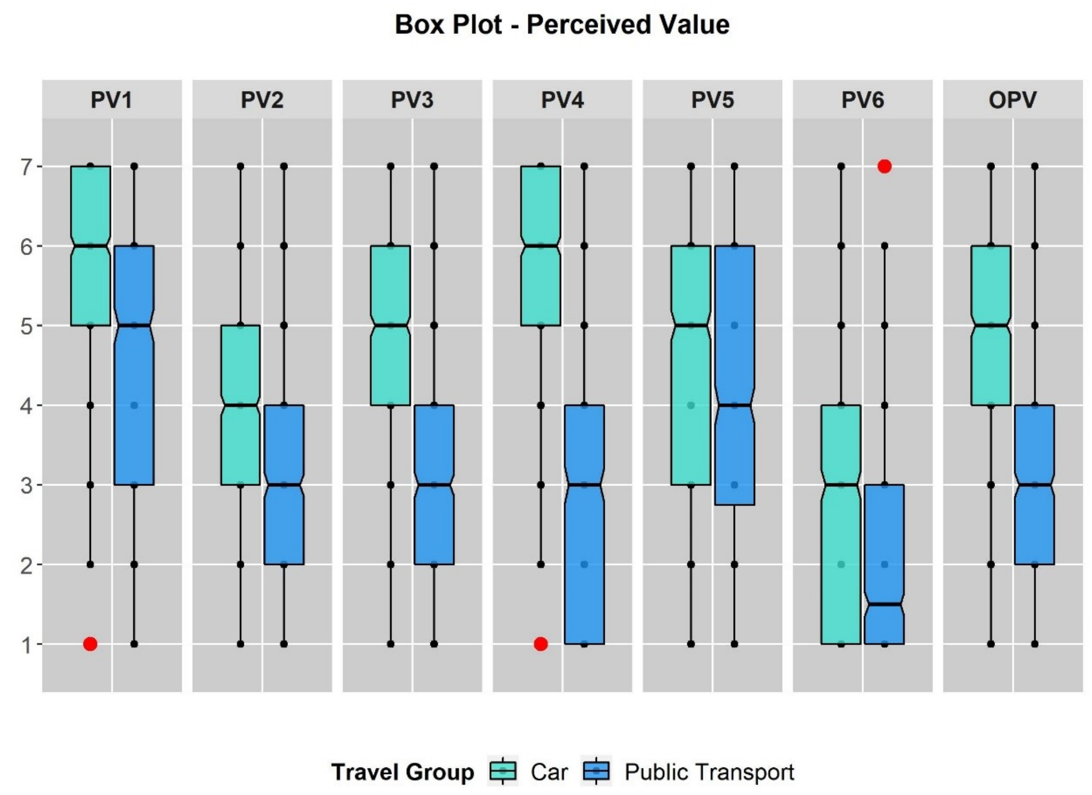
In the overall sample, 81.1% said to use ridesharing or carpooling services, while 18.9% do not (Table 14). This variable did not correlate strongly to any other descriptive variable or to any of the studied travel modes. On the same note, it did not correlate strongly to any perceived behavioral control measures. For the interest groups, respectively, 77.8% and 85.7% of the car and public transport commuter groups have said to use ridesharing or carpooling services.

5.1.4 Latent Construct Descriptive Analysis

Results regarding measured indicators and latent constructs descriptive statistics will be presented and discussed in this sub-section. Overall, it aims to answer how the interest variables are distributed according to their frequency tables (Appendix C), whether they have any significant correlations to any descriptive variables, specially in relation to commute travel behavior, and understanding the role played by each measured indicator in the overall latent construct composition through relative importance analysis.

5.1.4.1 Perceived value

Figure 12 – Box plot of perceived value variables, by travel mode group



Source: Author (2020)

Conceptually, perceived value can be characterized as a trade-off between perceived benefits and costs, which are influenced by tastes, circumstances, preferences as well as monetary and non-monetary sacrifices. As a multi-dimensional construct, it can be analysed from different perspectives. For this study, data was collected on both convenience, utility, experience, personal and social aspects of value, as depicted in Figure 12.

Convenience is interpreted as how easily a product or service can be acquired or consumed. This dimension was measured by the attitudinal statement "I believe my current travel mode is convenient (practical, easy to use)", which was coded as PV1. In the overall sample, 73.4% agreed, at some level, with the statement, while 12.6% were neutral and 14.1% disagreed (*Mdn* = 6.0). Moreover, it correlates negatively to both current commute travel mode ($r = -0.40$, $p < 0.01$), public transport usage ($r = -0.40$, $p < 0.01$) and current commute travel time ($r = -0.39$, $p < 0.01$). In this sense, convenience levels decreased with travel time and public transport usage, which are already moderately correlated ($r = 0.53$, $p < 0.01$). The public transport commuter group median falls into respondents' somewhat agreeing with the statement (*Mdn* = 5.0), while the car sample skewed toward higher scores. In this sense, convenience results were positively correlated to both commuting by car ($r = 0.40$, $p < 0.01$) and car availability ($r = 0.32$, $p < 0.01$). For instance, the car commuter group median was 6 (agree). There is a significant mean difference across both travel mode groups (Chi-square = 187.08, p-value < 0.01, df = 1).

Utility value is associated to the functional aspects of a service, such as the perception of value according to the amount spent and as a trade-off between quality and cost. Therefore, this dimension was measured by two attitudinal statements: "I believe the amount I spend with my current travel mode is adequate" (PV2) and "I believe the quality/cost ratio of my current travel mode is appropriate" (PV3). In the overall sample, 50.2% of respondents disagreed at some level with PV2 (*Mdn* = 3.0), while 44.7% agreed at some level with PV3 (*Mdn* = 4.0).

PV2 is not significantly correlated to any descriptive variables. However, according to the Kruskal-Wallis Test, there is a significant mean difference among the travel mode groups (Chi-square = 82.71, p-value < 0.01, df = 1). Public transport commuters displayed a lower median value for this statement (*Mdn* = 3.0), than car commuters (*Mdn* = 4.0). In this sense, if a person uses public transport twice a day 5 times a week, the fares would account for about 17% of a minimum wage per person in Curitiba, which is a high monthly expense as 48.5% of the sample live mostly under 4 minimum wages in households with 2 to 4 people. The third statement is negatively correlated to both public transport usage ($r = -0.49$, $p < 0.01$), commute travel time ($r = -0.40$, $p < 0.01$) and current commute travel mode ($r = -0.49$, $p < 0.01$) while positively correlated to commuting by car ($r = 0.49$, $p < 0.01$) and car availability ($r = 0.35$, $p < 0.01$). Therefore, it is expected that public transport users to find the amount paid for the service too high for the quality received. In this sense, once more, within the public transport group (*Mdn* = 3.0), the found median values were lower than in the car commuter group (*Mdn* = 5.0). Additionally, the mean difference among travel mode groups is significant (Chi-square = 272.87, p-value < 0.01, df = 1).

Experience value is related to the hedonic aspects of the service or product being consumed, such as the enjoyment or comfort felt. This dimension was evaluated by the attitudinal statement "I believe the comfort/cost ratio of my current travel mode is appropriate", which was coded as PV4. In the overall sample, 52.5% of respondents agreed at some level with the statement, while 13.3% were neutral and 34.2% disagreed. The overall sample median falls into respondents somewhat agreeing with the statement (*Mdn* = 5.0). This variable is moderately correlated to current commute travel mode ($r = -0.65$, $p < 0.01$), car usage ($r = 0.65$, $p < 0.01$), public transport usage ($r = -0.65$, $p < 0.01$), car availability ($r = 0.50$, $p < 0.01$), and current commute travel time ($r = -0.46$, $p < 0.01$). As car availability is expected to increase with car usage ($r = 0.75$, $p < 0.01$) and commute travel time with public transport usage ($r = 0.53$, $p < 0.01$), it is possible to analyse these correlations only in terms of car and public transport commuting. In this sense, public transport commuters (*Mdn* = 4.0) were expected to be less satisfied with the comfort received for the amount paid than car commuters (*Mdn* = 5.0). Overall, the Kruskal-Wallis Test found that the mean scores are significantly different (Chi-square = 471.91, p-value < 0.01, df = 1).

Personal value depends on individual beliefs, goals, and principles, which may be affected by contemporary social norms and culture in society. It was measured by the attitudinal statement "I believe my current travel mode is in accordance with my personal values and interests", which was coded as PV5. In the overall sample, 48.5% of respondents agreed at some level with the statement (*Mdn* = 4.0), while 20.0% were neutral and 31.6% disagreed. Still, this variable is not significantly correlated to any descriptive variable. Overall, public transport commuters (*Mdn* = 4.0) did not believe to have as much accordance between their current travel mode and personal values as car commuters (*Mdn* = 5.0). Finally, a Kruskal-Wallis Test was conducted. It returned the existence of a significant mean difference among the travel mode groups (Chi-square = 16.98, p-value < 0.01, df = 1).

The last evaluated dimension was social value, which is associated with status, esteem or recognition obtained from society when using a determined product or service. It was evaluated based on the following attitudinal statement: "I believe my current travel mode adds me social value (acceptance, prestige, and status)" (PV6). In the overall sample, 65.9% of respondents disagreed at some level with the statement (*Mdn* = 2.0), while 19.6% were neutral and 30.9% agreed. Overall, social value scores did not correlate significantly to any descriptive variables. Nonetheless, public transport commuters (*Mdn* = 1.5) exhibited a lower median score to the car sample (*Mdn* = 3.0). However, both results skew toward the negative side of the scale. Finally, a significant mean difference among the travel mode groups was found according to a conducted Kruskal-Wallis Test (Chi-square = 67.07, p-value < 0.01, df = 1).

Across all evaluated dimensions, public transport commuters exhibited lower perceived value scores. As previously mentioned in Section 5.1.2.3, in this group, only 21.2% have public transport as their preferred travel mode, while commuting by car is favored by 46.2% followed by cycling (22.1%). These findings reinforce the need for analyzing possible service improvements as to raise perceived service value and retain ridership, which is already declining in Curitiba. Nonetheless, car commuters showed high scores only for convenience and experience dimensions, while all median scores for the other variables were mostly on neutral zones of the scale.

In this sense, a relative importance analysis was conducted as to identify which are the most significant indicators for each sample. For each travel mode group, a multiple linear regression analysis was conducted. An overall perceived value score was calculated according to the median of the 6 analysed variables and used as the dependent variable. The main goal was to understand the role played by each measured indicator in the overall score composition based on the calculated multiple regression standardized coefficients.

In the car sample, using the enter method it was found that the measured indicators explained a significant amount of the variance in the overall perceived value score ($F(6, 647) = 980.64$, $p < 0.01$, $R^2 = 0.95$, $R^2_{Adjusted} = 0.90$). Additionally, the analysis showed that all measured indicators significantly predict the overall score. Consequently, the measured standardized coefficients were ranked from largest to smallest as to asses their relative importance, as displayed in Table 15. The perceived trade-off between quality and cost (PV3) was found to be the most relevant indicator for the car sample. The regression coefficient associated with this variable suggests that each unit increase in PV3 would lead to a 0.32 unit increase in the overall perceived value score. This indicator was followed in the rank by the measures of comfort (PV4), accordance to personal values (PV5), perception of price adequacy (PV2), convenience (PV1), and added social value (PV6). In this sense, utility, experienced, and personal dimensions of value are the most relevant within the car sample.

Table 15 – Results of the overall perceived value score relative importance analysis for the car commuter group

Code	Dimension	Measure	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
			B	Std. Error	Beta		
Constant	-	-	-0.516	0.088	-	-5.877	0.000
PV3	Utility	Quality/Cost	0.292	0.018	0.320	16.156	0.000
PV4	Experience	Comfort	0.247	0.018	0.249	13.613	0.000
PV5	Personal	Accordance to Personal Values	0.193	0.012	0.244	16.001	0.000
PV2	Utility	Price	0.153	0.014	0.193	11.229	0.000
PV1	Convenience	Convenience	0.165	0.015	0.161	11.016	0.000
PV6	Social	Added Social Value	0.102	0.009	0.139	10.782	0.000

The procedure was repeated for the public transport sample. Once more, it was found that the measured indicators explained a significant amount of the variance in the overall perceived value score ($F(6, 461) = 976.91$, $p < 0.01$, $R^2 = 0.96$, $R^2_{Adjusted} = 0.93$). All obtained standardized coefficients were significant, therefore they were ranked from largest to smallest, as depicted in Table 16. Utility (PV2 and PV3) and experience (PV4) measures were ranked among top positions and followed by the perception of accordance to personal values (PV5), added social value (PV6), and convenience (PV1).

Table 16 – Results of the overall perceived value score relative importance analysis for the public transport commuter group

Code	Dimension	Measure	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
			B	Std. Error	Beta		
Constant	-	-	-0.129	0.060	-	-2.171	0.030
PV3	Utility	Quality/Cost	0.307	0.022	0.331	13.835	0.000
PV4	Experience	Comfort	0.261	0.021	0.274	12.376	0.000
PV2	Utility	Price	0.195	0.016	0.212	11.923	0.000
PV5	Personal	Accordance to Personal Values	0.127	0.013	0.160	9.509	0.000
PV6	Social	Added Social Value	0.141	0.015	0.134	9.499	0.000
PV1	Convenience	Convenience	0.082	0.015	0.089	5.446	0.000

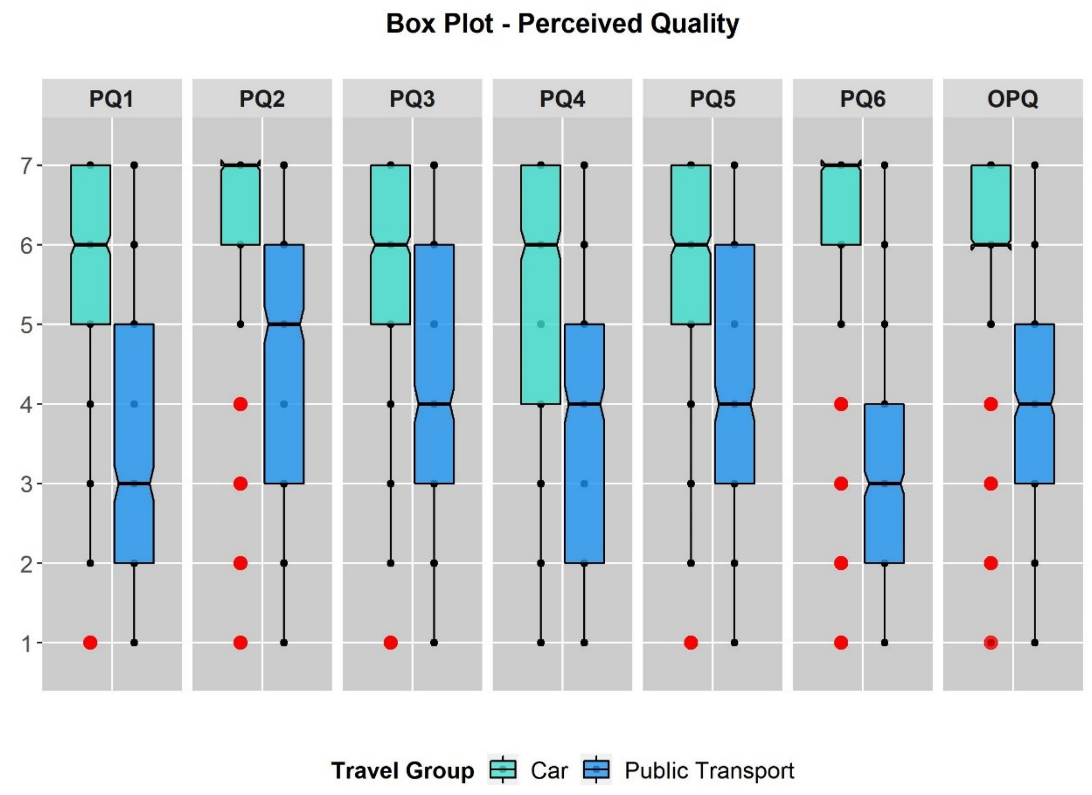
Overall, utility and experience measures resulted in high model standardized coefficients for both travel mode groups. Therefore, providing statistical evidence on the importance of functional and comfort aspects of service on the formation of perceived value. However, it can be highlighted the relative high contribution of personal value on overall perceived value for the car commuter group. For instance, 53.1% of car commuters agree on some way that their travel mode is according with their personal values and interests. On the other hand, social value and convenience indicators did not contribute largely to any travel mode group overall scores.

5.1.4.2 Perceived quality

Perceived quality can be defined as a multi-dimensional cognitive assessment of expected and perceived performance. As a complex and abstract concept, its evaluation involves subjective measures, which are based on the different attribute dimensions composing the object of interest. In this study, the attitudinal statements were selected as to cover the directives proposed by the Transportation Research Board (TRB, 1999). Therefore, both availability and comfort and convenience dimensions of transport quality were examined. Availability attributes describe the spatiotemporal conditions provided by a given transportation mode, such as reliability (PQ1) and accessibility (PQ2). Meanwhile, comfort and convenience attributes are related to the likeness of a potential user to become a frequent one. This dimension was measured by tangible infrastructure (PQ3), problem experiences (PQ4), safety

(PQ5), and experience of comfort (PQ6). The distribution of responses for the measured indicators are presented in Figure 13.

Figure 13 – Box plot of perceived quality variables, by travel mode group



Source: Author (2020)

The first service quality dimension measured the respondents' perception of their current travel mode reliability. It relates to both keeping a consistent commute duration and arrival time as to meet personal scheduling criteria. This attribute was evaluated through the following attitudinal statement: "my current travel mode enables me to get to my place of work/study on time", which was coded as PQ1. In the overall sample, 64.3% of the respondents agree with the statement in some way (*Mdn* = 5.0). Moreover, PQ1 is positively correlated to both car usage ($r = 0.60$, $p < 0.01$) and car availability ($r = 0.51$, $p < 0.01$). On the other hand, it is negatively correlated to public transport ($r = -0.60$, $p < 0.01$) and commute travel time ($r = -0.46$, $p < 0.01$). Therefore, 86.4% agree, in varying levels, with the analysed statement (*Mdn* = 6.0) in the car group. On the other hand, 52.6% of public transport commuters disagree in some way with the statement (*Mdn* = 3.0). One possible explanation could be associated with commute travel time. As previously mentioned, both public transport usage and commute travel time are moderately correlated ($r = 0.53$, $p < 0.01$). For instance, this group has the largest share of commutes taking over 60 minutes (27.6%), thus indicating longer commute distances and living further from central areas or great economic activity and university poles, which are usually linked to the city's structural axes. In this scenario, commuters are likely to depend on feeder and conventional lines, which have reduced frequency of service, and undergoing multiple bus transfers. For instance, in Curitiba, while the average waiting time for biarticulated express lines is 5 minutes, feeder and conventional lines range from 14 to 23 minutes.

Accessibility was the second measured perceived quality indicator, which relates to how easily the respondent can access their destination through their current travel mode. The selected attitudinal statement was "my current travel mode enables me to get to my place of work/study easily" (PQ2). In the overall sample, 77.7% agree is some way with the presented statement (*Mdn* = 6.0). This variable is negatively correlated with public transport usage ($r = -0.43$, $p < 0.01$) and commute travel time ($r = -0.44$, $p < 0.01$). For instance, 30.1% of the public transport sample disagree at some level with the statement (*Mdn* = 5.0), while only 3.7% (*Mdn* = 7.0) of the car commuter group responded in the same way. Nevertheless, the overall median scores fell under the positive side of the scale for all travel mode groups.

The third measured indicator relates to tangible infrastructure, which was evaluated through the following statement: "my current travel mode infrastructure suffices my needs" (PQ3). In the overall sample, 65.2% of respondents agree in some way with the statement (*Mdn* = 5.0). This variable is moderately correlated with car usage ($r = 0.36$, $p < 0.01$). In this sense, 77.1% of the car sample agree, in different levels, with the statement (*Mdn* = 6.0). Therefore, the car group shows mostly a positive perspective on the available infrastructure for its travel mode. Still, the public transport sample distribution was less skewed towards the positive side of the scale. In the sample, a smaller share agreed, at some level, with the statement (48.5%, *Mdn* = 4.0), while 32.7% disagreed and 18.8% were neutral.

Problem experience was measured by the following statement: "usually, I do NOT face inconveniences while using my current travel mode to get to my place of work/study", which was coded as PQ4. Overall, 58.6% agreed with the statement (*Mdn* = 5.0). However, this variable is negatively correlated to both public transport usage ($r = -0.39$, $p < 0.01$) and commute travel time ($r = -0.41$, $p < 0.01$). In this sense, public transport commuters displayed a lower overall median score (*Mdn* = 4.0). On the other hand, car commuters seem to experience less inconveniences during their commutes (*Mdn* = 6.0).

The fifth indicator measured the respondents' perception of safety related to their current travel mode. The selected attitudinal statement was "my current travel mode enables me to get to my place of work study safely" (PQ5). Overall, the sample has a positive perspective in this subject. 70.1% of respondents believe to be able to safely commute (*Mdn* = 6.0). In this sense, as found for the reliability measure (PQ1), the measure of perception of safety is negatively correlated to public transport usage ($r = -0.52$, $p < 0.01$) and commute travel time ($r = -0.43$, $p < 0.01$), while positively correlated to both car use ($r = 0.52$, $p < 0.01$) and car availability ($r = 0.41$, $p < 0.01$). Car commuters have a more positive view (*Mdn* = 6.0) when compared to public transport commuters (*Mdn* = 4.0). For instance, 88.1% of the group agree, in some level, with the affirmation. In the public transport sample, 36.3% of respondents do not feel safe while using their current commute travel model. Moreover, the longer the commute travel time, the worst the perception on safety. For example, among those who have commutes over 60 minutes (*Mdn* = 3.0) the median is significant smaller than among those who have commutes lasting less than 10 minutes (*Mdn* = 7.0). On the same note, the former group is mostly composed of public transport commuters (93.5%), while the later by car commuters (94.4%).

Finally, perception of comfort was measured by "my current travel mode enables me to get to my place of work/study comfortably", which was coded as PQ6. In the overall sample, 64.4% of respondents believe, to varying degrees, to able to commute comfortably (*Mdn* = 6.0). This variable correlates positively to monthly household income ($r = 0.36$, $p < 0.01$), car usage ($r = 0.76$, $p < 0.01$), and car availability ($r = 0.61$, $p < 0.01$) and negatively to public transport usage ($r = -0.76$, $p < 0.01$) and commute travel time ($r = -0.52$, $p < 0.01$). As previously mentioned, car users are found to have larger household incomes, as evidenced by the positive correlation between household income and car usage ($r = 0.39$, $p < 0.01$). In this sense, 93.4% of car commuters believe that this mode is comfortable (*Mdn* = 7.0). However, public transport commuters' responses mostly fall in the negative side of the scale (*Mdn* = 3.0), which might be related to waiting times, not enough sits available, overcrowding in peak hours, among other factors. In this sense, 59.8% of respondents disagreed, to varying degrees, with the statement.

Furthermore, perceived quality is one of the possible "get" components in the "give-get" perceived value trade-off, therefore it is likely that the measured perceived quality indicators will affect the overall perceived value of the analysed travel mode, and vice-versa, as hypothesized. For example, the overall negative perceived quality among public transport commuters might have influenced perceived quality results. In this sense, one evidence is the strong Spearman correlation found between both overall perceived value and overall perceived quality among all travel groups ($r = 0.69$, $p < 0.01$). Nevertheless, car commuters displayed a more positive view on all evaluated indicators, specially reliability and comfort.

A relative importance analysis was conducted as to identify the contribution of each measured indicator in the composition of the overall perceived quality score for each travel mode. Therefore, based on the median of the 6 measured indicators, an overall perceived quality score was calculated for each sample. Then, a multiple regression analysis was conducted as to obtain the standardized coefficients for each of the measured indicators.

First, in the car sample, it was found that the measured indicators explained a significant amount of the variance in the overall perceived value score ($F(6, 647) = 875.12$, $p < 0.01$, $R^2 = 0.94$, $R^2_{Adjusted} = 0.89$). Additionally, all measured indicators reached statistical significance in the multiple regression model. Then, the measured standardized coefficients were ranked from largest to smallest as to asses their relative importance.

Table 17 – Results of the overall perceived quality score relative importance analysis for the car commuter group

Code	Dimension	Measure	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
			B	Std. Error	Beta		
Constant	-	-	-0.101	0.093	-	-1.088	0.277
PQ5	Comfort and Convenience	Safety	0.250	0.017	0.286	14.884	0.000
PQ2	Availability	Accessibility	0.256	0.017	0.281	15.035	0.000
PQ3	Comfort and Convenience	Tangible Infrastructure	0.149	0.014	0.204	10.604	0.000
PQ6	Comfort and Convenience	Comfort	0.197	0.019	0.200	10.599	0.000
PQ1	Availability	Reliability	0.126	0.014	0.154	9.202	0.000
PQ4	Comfort and Convenience	Problem Experiences	0.064	0.012	0.098	5.324	0.000

As shown in Table 17, safety (PQ5), accessibility (PQ2), tangible infrastructure (PQ3), and comfort (PQ6) are among the most relevant attributes for car commuters. In this sense, it is likely that this group feels that their availability needs are being satisfied, as comfort and convenience measures are a second level analysis (TRB, 1999).

The procedure was repeated for the public transport sample. First, it was tested whether the measured indicators could explain a significant amount of the variance in the overall perceived value score, which was confirmed ($F(6, 461) = 1063.53$, $p < 0.01$, $R^2 = 0.97$, $R^2_{Adjusted} = 0.93$). In the same fashion, all measured indicators are statistically significant predictors of the overall score as shown in Table 18. Problem experiencing (PQ4) was the most relevant for the overall score composition (Beta = .24, $t(461) = 13.10$, $p < 0.01$), which was followed by tangible infrastructure (PQ3), safety (PQ5), and reliability (PQ1). Therefore, these are points of interest for increasing overall perceived service quality within this target group. Overall, most measured items in top positions are comfort and convenience measures as found for the car sample. However, comfort (PQ6) is the indicator that contributes the least in the overall score composition (Beta = .13, $t(461) = 7.30$, $p < 0.01$).

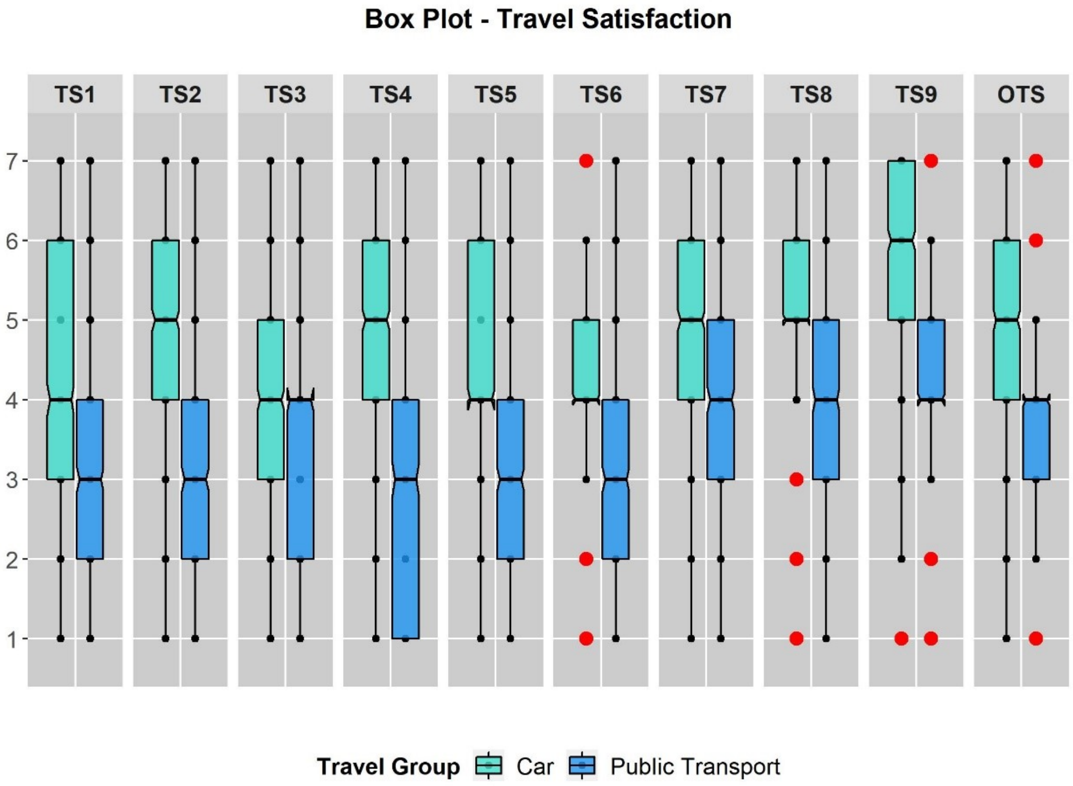
Table 18 – Results of the overall perceived quality score relative importance analysis for the public transport commuter group

Code	Dimension	Measure	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
			B	Std. Error	Beta		
Constant	-	-	-0.332	0.062	-	-5.360	0.000
PQ4	Comfort and Convenience	Problem Experiences	0.205	0.016	0.237	13.098	0.000
PQ3	Comfort and Convenience	Tangible Infrastructure	0.216	0.017	0.228	12.871	0.000
PQ5	Comfort and Convenience	Safety	0.217	0.016	0.227	13.544	0.000
PQ1	Availability	Reliability	0.184	0.015	0.208	12.418	0.000
PQ2	Availability	Accessibility	0.165	0.015	0.190	11.282	0.000
PQ6	Comfort and Convenience	Comfort	0.125	0.017	0.125	7.304	0.000

Overall, comfort and convenience measures were the most relevant across all travel modes. Problem experiencing (PQ4) was the most relevant attribute for the public transport sample, while the least significant for car commuters. In this sense, the car sample is mostly concerned with safety, which is also extremely relevant for public transport users. Tangible infrastructure was also found to be relevant for both motorized travel modes, while standardized coefficients related to comfort were not as preeminent. Finally, accessibility was also more significant in the car sample.

5.1.4.3 Travel satisfaction

Figure 14 – Box plot of travel satisfaction variables, by travel mode group



Source: Author (2020)

In marketing theory, satisfaction is believed to be an affective counterpart to perceived quality. Therefore, conceptually, it is an affective judgement of expected and perceived performance. In this study, it was measured by the satisfaction with travel scale (STS) developed by Ettema et al. (2012). Typically, the evaluated items are measured in a 7-point scale ranging from -3 to 3, however it was adapted into a 7-point Likert Scale as to ensure consistency with the other assessed indicators. The scale is composed of nine indicators measuring how the respondent usually feels during their commute. They are divided into two affective dimensions, valence and arousal emotions, and one cognitive dimension. Valence indicators vary between negative activation and positive deactivation, which are very hurried to very relaxed, very worried to very confident, and very stressed to very calm. Arousal indicators are defined by negative deactivation to positive activation, including very tired to very alert, very bored to very enthusiastic, and very fed up to very engaged. Finally, cognitive indicators measure travel in terms of quality and efficiency, such as the worst I can think of – the best I can think of, very low standard – very high standard, and worked very poorly to worked very well, as depicted in Figure 14.

The first three indicators measured valence emotions. Among them, the first item ranged from very hurried to very relaxed (TS1). In the overall sample, there is a relative balance in the distribution between those who feel hurried (39.9%) and those who feel relaxed (36.1%) (*Mdn* = 4.0). This measure is moderate negatively correlated to commute travel time ($r = -0.30$, $p < 0.01$). Therefore, public transport commuters, that, on average, have longer travel commutes, are the ones feeling the most hurried (54.3%, *Mdn* = 3.0). The Kruskal-Wallis Test confirmed a significant difference among the analysed groups (Chi-square = 82.00, p-value < 0.01, df = 1). In this sense, most car users reported to be in the relaxed spectrum (44.7%), while 26.1% were neutral and 29.7% feel hurried at some level (29.7%) (*Mdn* = 4.0).

The second measure ranged from very worried to very confident (TS2). Overall, the sample overall median fell into a neutral spot (*Mdn* = 4.0), however the distribution skews more toward feeling confident (41.0%) than worried (34.0%). This variable is moderate negatively correlated to both public transport usage ($r = -0.38$, $p < 0.01$) and commute travel time ($r = -0.35$, $p < 0.01$). In this sense, public transport users (*Mdn* = 3.0) displayed a more negative reaction than the car sample (*Mdn* = 5.0). Therefore, showing a higher concentration of passengers experiencing anxious feelings while commuting (51.1%), while car commuters are mostly confident (54.9%). This finding was confirmed by the Kruskal-Wallis Test, which found a significant difference within the groups (Chi-square = 163.54, p-value < 0.01, df = 1).

The third measured indicator varied between very stressed and very calm (TS3). In the overall sample, a similar share of participants reported feeling, in some way, calm (36.7%) and stressed (36.2%) during the commute. Additionally, as there is a large amount of neutral responses (27.1%), the overall median score was neutral (*Mdn* = 4.0). The variable was found to be moderate negatively correlated to commute travel time ($r = -0.33$, $p < 0.01$), which are largely public transport commuters. In this sense, 47.6% of the public transport sample experience some form of stress during their commute, 27.8% are neutral, and 24.6% feel somewhat calm (*Mdn* = 4.0). The

Kruskal-Wallis Test supported a statistically significant mean difference among the analysed travel groups (Chi-square = 75.25, p-value < 0.01, df = 1). Contrarily, most of the car sample fall into the calm spectrum of the scale (45.4%), followed by 26.6% who feel neutral and 28% who feel stressed in some way (*Mdn* = 4.0).

The next three indicators measure arousal emotions, thus ranging from negative deactivation to positive activation. The first indicator varied from very tired to very alert (TS4). Overall, the sample response distribution can be segmented into 39.1% feeling somewhat alert, 21.1% neutral and 39.8% tired during their travel commutes. Thus, resulting in a neutral median (*Mdn* = 4.0). This item is moderate negatively correlated to both public transport usage (r = -0.45, p < 0.01) and commute travel time (r = -0.42, p < 0.01). Therefore, once again, public transport commuters fell mostly into the negative side of the scale. 64.3% of the sample feel, in some way, tired during the commute (*Mdn* = 3.0). The Kruskal-Wallis Test revealed that the interest groups have significantly different means (Chi-square = 222.24, p-value < 0.01, df = 1). In this sense, car commuters' distribution skews in the opposite direction. For instance, most car commuters feel alert during their commutes, while 24.0% are neutral and only 22.2% reported to feel tired (*Mdn* = 5.0). This finding can be related to driving requiring more concentration and alertness for its execution, while public transport commuters are possibly standing during their commute.

The second measured indicator for the arousal dimension ranged from very bored to very enthusiastic (TS6). In the overall sample, 35.1% of participants reported feeling some level of enthusiasm during their commute, followed by 31.5% who felt neutral and 33.4% who experienced some level of boredom, which resulted in a neutral median (*Mdn* = 4.0). Following the trend, this variable is moderate negatively correlated to both public transport usage (r = -0.44, p < 0.01) and commute travel time (r = -0.36, p < 0.01). For instance, 56.8% declared feeling some level of boredom during their commute (*Mdn* = 3.0). Moreover, the Kruskal-Wallis Test showed that both groups have significantly different means (Chi-square = 214.43, p-value < 0.01, df = 3). The car sample displayed a larger share of respondents experiencing some level of enthusiasm. 48.6% of car commuters were within this response spectrum, while 34.7% were neutral and only 16.7% were bored (*Mdn* = 4.0).

The last measured indicator for the arousal dimension varied from very fed up to very engaged (TS6). Overall, similar shares of respondents within the fed up (36.2%) and the engaged (35.8%) spectrum were found. Additionally, 28.0% of responses were neutral (*Mdn* = 4.0). This item also has a moderate negative correlation to public transport usage (r = -0.43, p < 0.01) and commute travel time (r = -0.38, p < 0.01). Therefore, 59.2% of the public transport sample declared being fed up at some level while commuting (*Mdn* = 3.0). Like the previous two arousal measurements, the Kruskal-Wallis Test resulted in a significant mean difference across both evaluated travel groups (Chi-square = 203.88, p-value < 0.01, df =13). In this sense, a larger share of respondents feeling a positive activation was found within the car sample (49.4%, *Mdn* = 4.0).

The following three indicators measured the cognitive dimension. The first indicator ranged from evaluating the usual commute as the worst I can think of to the best I can think of. In the overall sample, most respondents reported experiencing a positive experience to varying degrees (53.1%, *Mdn* = 5.0). This variable also correlates moderately and negatively to both public transport usage (r = -0.50, p < 0.01) and commute travel time (r = -0.42, p < 0.01). Consequently, 39.5% of public transport declared having, at varying levels, a bad experience, which was followed by 31.4% neutral responses and 29.1% in the positive range of the scale. Thus, resulting in a neutral median (*Mdn* = 4.0). Furthermore, both interest groups were found to have significantly different means according to the conducted Kruskal-Wallis Test (Chi-square = 272.54, p-value < 0.01, df =1). For instance, a larger share of car users declared experiencing positive experiences while commuting. For instance, 70.3% (*Mdn* = 5.0) of the sample fell into the positive side of the spectrum, while 21.9% were neutral and only 7.8% reported to have a bad experience at some level.

The second measure for the cognitive perspective measured the perceived quality of the usual commute, which ranged from very low standard to very high standard. Overall, 58.0% of participants recognized their current travel mode as having some good level of quality, which was followed by 22.1% neutral responses and 19.9% who feel negatively. Thus, resulting in a largely positive overall median (*Mdn* = 5.0). This indicator is moderately positive correlated to car usage (r = 0.58, p < 0.01) and car availability (r = 0.44, p < 0.01) and moderate negatively correlated to both public transport usage (r = -0.58, p < 0.01) and commute travel time (r = -0.42, p < 0.01). In this sense, 40.2% of the public transport sample stated felling in some level negatively toward the quality received, while 78.1% of the car sample felt positive in some way. Therefore, indicating opposites reaction between both groups regarding service quality experience. The Kruskal-Wallis Test confirmed a significant mean difference across the analysed groups (Chi-square = 342.90, p-value < 0.01, df = 1).

The last measured indicator for travel satisfaction measured the perceived efficiency of the respondents' usual commute, varying from worked very poorly to worked very well. In the overall sample, participants mostly declared their commute as being in some level efficient (68.1%). Consequently, resulting in a positive median (*Mdn* = 6.0). As occurred for most travel satisfaction measures, the variable is moderate negatively correlated to both public transport usage (r = -0.44, p < 0.01) and commute travel time (r = -0.36, p < 0.01). Therefore, the public transport sample (*Mdn* = 4.0) resulted in a lower median than the one found for the car sample (*Mdn* = 6.0). In this sense, 48.7% of public transport commuters thought their commute to be efficient at some level, while 82.0% of car commuters are within the same response range. The Kruskal-Wallis Test confirmed a significant mean difference across the analysed groups (Chi-square = 205.58, p-value < 0.01, df = 1).

Finally, based on the median of the 9 measured indicators, an overall travel satisfaction score was calculated for each sample, which were then analysed. As expected, public transport usage is negatively correlated to travel satisfaction across all evaluated dimensions (r = -0.47, p < 0.01). Therefore, resulting in a lower overall median score when compared to the car sample. Almost half of the sample (49.4%) showed a negative view on their satisfaction with public transport and 30.6% were neutral (*Mdn* = 4.0). As previously stated, this group do not show strong loyalty bonds to their travel mode. For instance, only 21.2% of the sample selected public transport as their preferred travel mode, while 46.2% would rather commute by car. On the same note, given the group's current socio-economic characteristics, it could be expected that as their conditions improve they are likely to switch to car use, once commuting by car is moderate positively correlated to both household income (r = 0.39, p < 0.01) and education level (r = 0.30, p < 0.01). Therefore, these findings highlight the need for infrastructural system improvements as to reduce problem experiences and increase both safety and reliability. As a result, perceived value, perceived quality, and travel satisfaction are likely to increase, thus creating stronger loyalty bonds and behavioral intentions over time. On the other hand, the car sample demonstrated more positive levels of travel satisfaction. For instance, 60.4% of the car sample evaluated their travel satisfaction on the positive side of the scale (*Mdn* = 5.0). A multiple regression was conducted as to identify the relative importance of each measured indicator in the composition of the overall travel satisfaction score for each travel mode.

Table 19 – Results of the overall travel satisfaction score relative importance analysis for the car commuter group

Code	Dimension	Measure	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
			B	Std. Error	Beta		
Constant	-	-	-0.204	0.099	-	-2.074	0.038
TS5	Arousal	Very bored Very enthusiastic	0.204	0.021	0.221	9.555	0.000
TS2	Valence	Very worried Very confident	0.165	0.018	0.204	9.238	0.000
TS4	Arousal	Very tired Very alert	0.147	0.018	0.182	8.285	0.000
TS1	Valence	Very hurried Very relaxed	0.113	0.018	0.147	6.472	0.000
TS3	Valence	Very stressed Very calm	0.109	0.020	0.131	5.347	0.000
TS7	Cognitive	Worst I can think of Best I can think of	0.120	0.020	0.126	5.936	0.000
TS8	Cognitive	Very low standard Very high standard	0.107	0.020	0.102	5.236	0.000
TS6	Arousal	Very fed-up Very engaged	0.084	0.022	0.094	3.721	0.000
TS9	Cognitive	Worked very poorly Worked very well	0.017	0.018	0.017	0.934	0.350

In the car sample, the measured indicators were found to explain a significant amount of the variance in the overall travel satisfaction score ($F(9, 647) = 480.56$, $p < 0.01$, $R^2 = 0.93$, $R^2_{Adjusted} = 0.87$). Moreover, the third cognitive indicator (TS9), which measured the perceived efficiency of travel mode, was not statistically significant in the multiple regression model (Beta = .02, $t(647) = 0.93$, ns), as shown in Table 19. Overall, arousal and valence emotions, such as boredom/enthusiasm (TS5), worriedness/confidence (TS2), tiredness/alertness (TS4), hurriedness/being relaxed (TS1), and being stressed/calmness (TS3), are the most relevant for the travel satisfaction overall score composition in the car sample.

The same procedure was replicated for the public transport sample. Likewise, it was found that the measured indicators were able to explain a significant amount of variance in the overall travel satisfaction score ($F(9, 458) = 475.37$, $p < 0.01$, $R^2 = 0.95$, $R^2_{Adjusted} = 0.90$). However, as shown in Table 20, the third cognitive item was also not statistically significant in the multiple regression model for the public transport sample as well (Beta = .03, $t(458) = 1.19$, ns). Valence emotions were the most relevant within this sample, such as being stressed/calmness (TS3), worriedness/confidence (TS2), and hurriedness/being relaxed (TS1).

Table 20 – Results of the overall travel satisfaction score relative importance analysis for the public transport commuter group

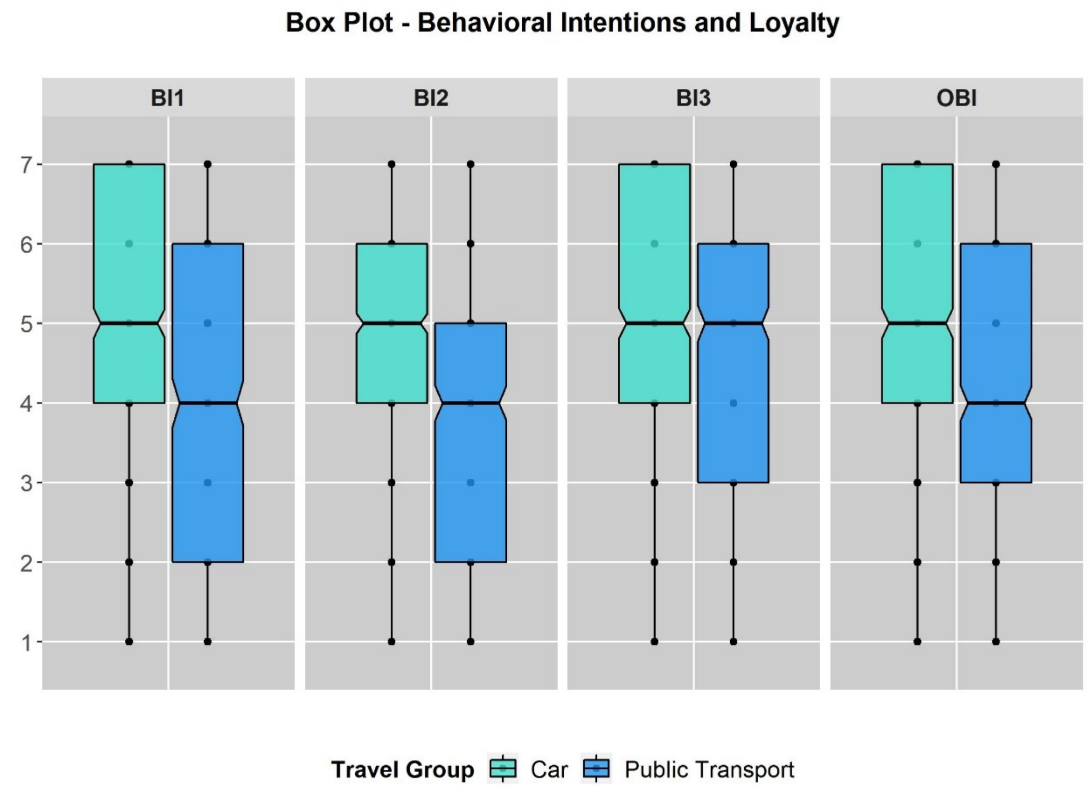
Code	Dimension	Measure	Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
Constant	-	-	-0.197	0.068		-2.890	0.004
TS3	Valence	Very stressed Very calm	0.173	0.022	0.201	7.791	0.000
TS2	Valence	Very worried Very confident	0.167	0.021	0.183	7.886	0.000
TS1	Valence	Very hurried Very relaxed	0.130	0.020	0.158	6.548	0.000
TS8	Cognitive	Very low standard Very high standard	0.147	0.026	0.146	5.572	0.000
TS4	Arousal	Very tired Very alert	0.103	0.020	0.125	5.209	0.000
TS5	Arousal	Very bored Very enthusiastic	0.109	0.020	0.114	5.435	0.000
TS7	Cognitive	Worst I can think of Best I can think of	0.116	0.029	0.112	3.952	0.000
TS6	Arousal	Very fed-up Very engaged	0.094	0.024	0.105	3.969	0.000
TS9	Cognitive	Worked very poorly Worked very well	0.025	0.021	0.028	1.191	0.234

Finally, when comparing the relative importance of the measured indicators across the travel modes, it is noticeable that valence and arousal dimensions are the most preeminent. For instance, feelings of worriedness/confidence appeared among the two top positions for both car and public transport samples; while being stressed/calm was among the three top positions for the public transport sample and tiredness/alertness was among the three top positions for the car sample. However, while in the car group, commuters mostly skew toward positive emotions, public transport commuters tend to go in the opposite direction. Considering previous results, worriedness and the sense of being stressed might be reduced among public transport commuters, if system managers work on reducing problem experiences and increasing both safety and reliability, which are among the most relevant indicators of service quality for this group. Additionally, it would also aid enhancing perceived value.

5.1.4.4 Behavioral intentions and loyalty

As mentioned in Section 3.3, in the context of this study both behavioral intentions and customer loyalty are conceptually similar as respondents are going to be analysed according to their current travel mode. In this sense, behavioral intentions are a measure of how much effort a person is planning to exert and how willing a person is to try or to keep performing a behavior. On the same note, customer loyalty is an indicator of whether a customer will keep using a product or service. Moreover, both constructs are consistently evaluated through the same measures in the literature: willingness to re-use (BI1) and willingness to recommend (BI2). Additionally, involvement (BI3), defined as sense of care, concern, importance, personal relevance, and significance toward an attitude, object or activity, will be evaluated as an affective dimension of loyalty as proposed by van Lierop, Badami and El-Geneidy (2017). The results for the travel groups are depicted in the Figure 15.

Figure 15 – Box plot of behavioral intentions and loyalty variables, by travel mode group



Source: Author (2020)

The first behavioral intentions and loyalty indicator measured the willingness to reuse the respondent's current travel mode. It was operationalized through the following statement: "I will keep commuting with my current travel mode in the future", which was coded as BI1. In the overall sample, 53.5% agree, in some way, that they will keep using their current travel mode in the future (*Mdn* = 5.0). This variable is moderate negatively correlated to current commute travel mode ($r = -0.33$, $p < 0.01$), public transport usage ($r = -0.33$, $p < 0.01$) and positively correlated to both car usage ($r = 0.33$, $p < 0.01$) and car availability ($r = -0.31$, $p < 0.01$). In this sense, public transport overall median score is expected to be lower than the car overall median score. In the public transport sample, the opinions on this topic are balanced (*Mdn* = 4.0). For instance, 46.4% disagree, at some level, with the statement, while 40.4% are in the opposite side of the spectrum. On the other hand, car commuters have an overall positive view on to keep commuting with their current travel mode as 62.8% (*Mdn* = 5.0) agree in some way with the statement. Finally, the Kruskal-Wallis Test confirmed a significant mean difference among the analysed travel groups (Chi-square = 105.33, p-value < 0.01, df = 1).

The second measured indicator relates to the willingness to recommend, which was evaluated by "I would recommend my current travel mode to others" (BI2). Overall, most respondents agree in some way with the statement (48.8%, *Mdn* = 4.0). However, this measure is both negatively correlated to current commute travel mode ($r = -0.31$, $p < 0.01$), public transport usage ($r = -0.31$, $p < 0.01$) and commute travel time ($r = -0.30$, $p < 0.01$) and positively correlated to car usage ($r = 0.31$, $p < 0.01$). In this sense, 58.9% (*Mdn* = 5.0) of car commuters agree, at some level, with the statement. However, within public transport commuters, 42.3% disagreed, in some way, while 22.9% were neutral and 34.8% agreed with the statement (*Mdn* = 4.0). Additionally, the group means were confirmed to be significantly different according to the conducted Kruskal-Wallis Test (Chi-square = 95.53, p-value < $2.2e^{-16}$, df = 1).

The last measured indicator examined the participants' level of involvement to their current travel modes, which was assessed by "I feel my current travel mode is consistent with my lifestyle" (BI3). In the overall sample, 60.2% agree, in some way, with the statement, while only 21.0% disagreed (*Mdn* = 5.0). This variable does not correlate significantly to any descriptive variable. Moreover, both interest groups are significantly different according to the conducted Kruskal-Wallis Test (Chi-square = 14.80, p-value < 0.01, df = 1). In this sense, 56.8% (*Mdn* = 5.0) and 62.7% (*Mdn* = 5.0) of public transport and car commuters, respectively, agree, at some level with the statement. On the other hand, the public transport sample displays the largest share of people disagreeing with it (25.4%). Thus, it provides further evidence on the desire of a significant share of the sample to commute with a different travel mode.

Finally, based on the median of the 3 measured indicators, an overall behavioral intentions and loyalty score was calculated for each sample. This measure did not correlate significantly to any other descriptive variable. Across both analysed travel modes, public transport commuters showed weaker loyalty bonds toward their commute travel mode. In the sample, 35.9% fell into the lower side of the scale and 21.8% are neutral (*Mdn* = 4.0). As previously mentioned, only 21.2% of public transport commuters marked it as their preferred option. On the other hand, most car commuter responses fell into the upper values of the scale (62.4%, *Mdn* = 5.0). Therefore, car commuters showed stronger behavioral intentions and loyalty bonds toward their current travel modes than public transport commuters. This finding is supported by the participants' reported preferred travel modes. As mentioned in Section 5.1.3.1, car commuters are positively inclined toward their current travel mode. In the sample, 56.1% selected car as their favored choice. As to analyse the relative importance of each measured indicator in the overall behavioral intentions and loyalty score composition, a multiple regression was conducted for each analysed travel mode.

In the car sample, using the enter method it was found that the measured indicators explained a significant amount of the variance in the overall score ($F(3, 647) = 1958.13$, $p < 0.01$, $R^2 = 0.95$, $R^2_{Adjusted} = 0.90$). Moreover, all measured indicators were statistically significant in the multiple regression, as shown in Table 21. Willingness to re-use (BI1) was the most relevant indicator for the overall score composition in this sample (Beta = .39, $t(647) = 24.62$, $p < 0.01$), which was followed by willingness to recommend (BI2, Beta = .38, $t(647) = 23.88$, $p < 0.01$) and, lastly, by involvement (BI3, Beta = .36, $t(647) = 22.70$, $p < 0.01$). However, the percentual difference between the standardized coefficients was small. For instance, the difference between BI1 and BI3 coefficients was of only 5%. Thus, indicating a similar importance of both cognitive and affective components in the overall behavioral intentions and loyalty score composition.

Table 21 – Results of the overall behavioral intentions and loyalty score relative importance analysis for the car commuter group

Code	Dimension	Measure	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
			B	Std. Error	Beta		
Constant	-	-	-0.291	0.073	-	-3.992	0.000
BI1	Cognitive	Willingness to re-use	0.368	0.015	0.392	24.616	0.000
BI2	Cognitive	Willingness to recommend	0.355	0.015	0.380	23.883	0.000
BI3	Affective	Involvement	0.348	0.015	0.361	22.704	0.000

The same analysis was conducted for the public transport sample. Once more, it was found that the measured indicators explained a significant amount of the variance in the overall score ($F(3, 464) = 1647.14$, $p < 0.01$, $R^2 = 0.95$, $R^2_{Adjusted} = 0.90$). Also, all measured items were statistically significant in the multiple regression, as shown in Table 22. Willingness to recommend (BI2) was the most relevant indicator in the overall score composition (Beta = .44, $t(464) = 23.26$, $p < 0.01$). It was followed by willingness to re-use (BI1, Beta = .37, $t(464) = 21.35$, $p < 0.01$) and, then, by involvement (BI3, Beta = .31, $t(464) = 17.11$, $p < 0.01$). In comparison to BI2, the coefficient of BI1 was 20% less relevant and the coefficient of BI3 was 45% less relevant. In this sense, as overall behavioral intentions and loyalty were poor across public transport commuters, it is necessary to find ways to increase them. Specially, their willingness to recommend the service as to retain ridership.

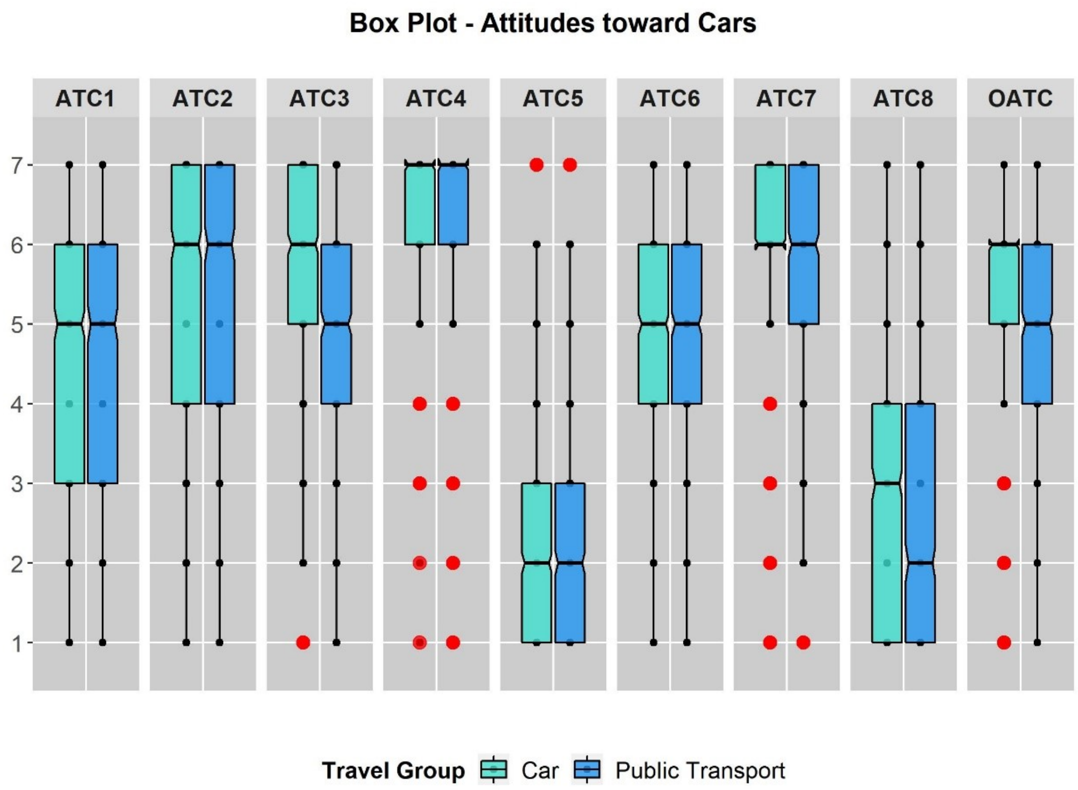
Table 22 – Results of the overall behavioral intentions and loyalty score relative importance analysis for the public transport commuter group

Code	Dimension	Measure	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
			B	Std. Error	Beta		
Constant	-	-	-0.292	0.071	-	-4.088	0.000
BI2	Cognitive	Willingness to recommend	0.444	0.019	0.444	23.255	0.000
BI1	Cognitive	Willingness to re-use	0.322	0.015	0.371	21.346	0.000
BI3	Affective	Involvement	0.318	0.019	0.307	17.115	0.000

Overall, the cognitive dimension was the most relevant in the car and public transport samples. In this sense, willingness to recommend (BI2) was the indicator that contributed the most for the overall behavioral intentions and loyalty score for the public transport group, while willingness to re-use (BI1) was the most relevant in the car group. However, in both motorized samples, involvement (BI3) was found to have similar standardized coefficients to the top positions. Therefore, it suggests the importance of their travel modes having personal relevance and being in accordance with their lifestyles. For instance, for both motorized samples the overall median values were found to be positive (*Mdn* = 5). However, it only indicates somewhat agreeing with the statement. Therefore, some dissonance might be found between the respondents' attitudes and behavior in the samples.

5.1.4.5 Attitudes toward cars

Figure 16 – Box plot of attitudes toward cars variables, by travel mode group



Source: Author (2020)

Attitude is a social psychology construct derived from salient beliefs held by a person, which are drawn from personal experience as well as external sources. In this sense, attitudes are a natural and quick judgment on how positive or negative the possible outcomes of a behavior are perceived. Moreover, beliefs and, by consequence, attitudes are expected to fall into a state of balance and consistency. Otherwise, it would create a sense of dissonance and discomfort, which would lead to tension and change. In this sub-section, descriptive statistics on attitudes toward commuting by car variables will be presented for the interest groups. The results cover 8 different dimensions, namely positiveness, pleasantness, effectiveness, comfort, sustainability, safety, flexibility, and cost (Figure 16).

The first attitudinal measure concerned the perception of positiveness on the evaluated behavior ("I believe that commuting by car is positive", ATC1). Overall, 56.2% of the sample strongly agreed, agreed, or somewhat agreed that commuting by car is positive (*Mdn* = 5.0), while 16.2% were neutral and 27.5% strongly disagreed, disagreed, or somewhat disagreed. The Kruskal-Wallis Test confirmed a significant mean difference among the analysed travel groups (Chi-square = 4.65, p-value = 0.03, df = 1). However, as the p-value is close to 0.05, which would reject the hypothesis, some similarities between the samples could be expected. Consequently, the public transport and the car groups resulted in similar overall median scores (*Mdn* = 5.0). For instance, 53.2% (*Mdn* = 5.0) of public transport commuters and 58.4% (*Mdn* = 5.0) of car commuters reported, at some level, agreeing with the statement. Moreover, this variable is negative moderate correlated to preferred travel mode ($r = -0.42$, $p < 0.01$). In this sense, as expected, those who prefer commuting by car showed higher median scores (*Mdn* = 6.0) than those who do not (*Mdn* = 4.0). The group of those who prefer commuting by car is composed of 63.5% car commuters and 36.5% public transport commuters.

Pleasantness was the second attitudinal statement evaluated for commuting by car ("I believe that commuting by car is pleasant", ATC2). In the overall sample, 72.9% agreed, at some level, that commuting by car is pleasant, while only 13.8% disagreed (*Mdn* = 6.0). The Kruskal-Wallis Test did not indicate the existence of a significant mean difference across the analysed groups (Chi-square = 0.7, ns, df = 1). Consequently, both car and public transport samples displayed similar distributions. 73.2% (*Mdn* = 6.0) of the car sample and 72.4% (*Mdn* = 6.0) of the public transport sample agreed, to varying degrees, that commuting by car is pleasant, while 12.8% and 15.2%, respectively, disagreed. Moreover, this variable is also negatively moderate correlated to preferred travel mode ($r = -0.35$, $p < 0.01$). Therefore, once more, those who prefer commuting by car showed higher median scores (*Mdn* = 6.0) than those who do not (*Mdn* = 5.0).

The third measured attitudinal statement referred to the perception of effectiveness of the behavior of interest ("I believe that commuting by car is effective", ATC3). Overall, the sample had a positive response to the statement (*Mdn* = 6.0). In this sense, 73.4% agreed, at some level, that commuting by car is effective, while only 13.5% disagreed. The Kruskal-Wallis Test showed a significant mean difference across the interest groups (Chi-square = 16.64, p-value < 0.01, df = 1). In this sense, the car sample exhibited a more skewed reaction to the statement. 77.2% of car commuters agreed with the statement (*Mdn* = 6.0), while 11.2% were neutral and only 11.6% disagreed. On a similar note, 68.2% of the public transport commuters agreed, to varying degrees, with the statement, however the shares of neutral (15.8%) and unfavorable (16.0%) responses were larger. Therefore, resulting in a lower, but still positive overall median score (*Mdn* = 5.0). Furthermore, this variable is also negative moderately correlated to preferred travel mode (r = -0.34, p < 0.01). Consequently, as expected, those who favor commuting by car showed higher median scores (*Mdn* = 6.0) than those who do not (*Mdn* = 5.0).

Comfort was the fourth measured attitudinal statement concerning commuting by car ("I believe that commuting by car is comfortable", ATC4). The responses for this variable skewed negatively (-1.90), thus the result of an overall positive perception of this dimension across the sample. In this sense, 93.3% agreed, to varying degrees, that commuting by car is comfortable (*Mdn* = 7.0). Moreover, according to the Kruskal-Wallis Test, a significant mean difference across the interest groups could not be found (Chi-square = 0.04, ns, df = 1). Consequently, both commuter samples have similar distributions. Respectively, 94.2% (*Mdn* = 7.0) and 92.1% (*Mdn* = 7.0), 88.3% (*Mdn* = 7.0), and 84.7% (*Mdn* = 6.0) of the car and the public transport samples agree, at some level, with statement. Additionally, this indicator does not correlate significantly to any other descriptive variable.

The fifth measured attitudinal statement regarded the perception of sustainability of commuting by car ("I believe that commuting by car is sustainable", ATC5). Differently from the previous variable, the responses for this indicator skewed positively (1.13), thus indicating an overall negative perception of this dimension across the sample. Overall, 80.2% disagree, at some level, that commuting by car is sustainable (*Mdn* = 2.0). The Kruskal-Wallis Test suggested a significant mean difference across the interest groups (Chi-square = 17.11, p-value < 0.01, df = 1). In this sense, 87.0% (*Mdn* = 2.0) of the public transport commuters disagreed, at some level, with the statement. Contrarily, the response for the car sample is slightly more positive. In the group, 75.4% of the sample disagreed, to varying degrees, that commuting by car is sustainable (*Mdn* = 2.0). Moreover, this indicator does not correlate significantly to any other descriptive variable.

Safety was the sixth measured attitudinal dimension for commuting by car, which was evaluated by "I believe that commuting by car is safe" (ATC6). In the overall sample, 67.8% of the sample agree, to varying degrees, that commuting by car is safe (*Mdn* = 5.0). According to the Kruskal-Wallis Test, there is a significant mean difference across the analysed travel mode groups (Chi-square = 10.41, p-value = 0.01, df = 1). Consequently, 64.3% of the public transport sample agreed, at some level, that commuting by car is safe (*Mdn* = 5.0). On the same note, a larger share of the car sample (70.3%) reported to feel in the same way (*Mdn* = 5.0). Additionally, this indicator also did not correlate significantly to any descriptive variable.

The seventh measured indicator regarded flexibility towards commuting by car ("I believe that commuting by car enables me flexible routine", ATC7). Overall, 86.0% of the sample believes, to varying degrees, that commuting by car enables them a flexible routine (*Mdn* = 6.0). The Kruskal-Wallis Test showed a significant mean difference across all interest travel mode groups (Chi-square = 27.75, p-value < 0.01, df = 1). In the car sample, 89.3% agreed, in some way, with the statement, while only 4.0% disagreed (*Mdn* = 6.0). Therefore, a more skewed response distribution than the one found for the public transport sample. In this sense, 81.4% (*Mdn* = 6.0) of the public transport commuters were also positive about the topic, while 8.3% disagreed. This variable is negative moderate correlated to preferred travel mode ($r = -0.32$, $p < 0.01$). Consequently, those who prefer commuting by car showed higher median scores (*Mdn* = 7.0) than those who do not (*Mdn* = 6.0). However, both medians fell into the positive side of the spectrum.

The last measured attitudinal statement was related to cost ("I believe that commuting by car is cheap", ATC8). In the overall sample, 70.6% disagreed, to varying degrees, with the statement (*Mdn* = 2.0). Therefore, showing a negative reaction towards the cost of commuting by car. According to the Kruskal-Wallis Test, a significant mean difference was found across all interest groups (Chi-square = 15.94, p-value < 0.01, df = 1). The car sample displayed a more positive response towards the topic than the public transport sample. Among car commuters, 15.4% agreed, at some level, with the statement, while 67.7% disagreed (*Mdn* = 3.0). On the other hand, 74.6% (*Mdn* = 2.0) of public transport commuters disagreed, to varying degrees, with the statement. Moreover, this indicator did not correlate significantly to any descriptive variable, however it showed a positive moderate correlation to perceived behavioral control towards cars (PBCC, $r = 0.31$, $p < 0.01$). Therefore, the more positive the perception of cost of commuting by car, the highest the perceived behavioral control. For instance, those who strongly agree display a higher overall PBCC median score (*Mdn* = 7.0) than those who were neutral (*Mdn* = 6.0) or those who strongly disagreed (*Mdn* = 5.0) with the statement.

Finally, based on the median of the 8 measured indicators, an overall score was calculated for each sample and the results are here reported. First, a significant mean difference was found across both travel mode groups in the Kruskal-Wallis Test (Chi-square = 11.76, p-value < 0.01, df = 1). Overall, car commuters exhibited positive attitudinal responses towards positiveness, pleasantness, effectiveness, comfort, safety, and flexibility. Consequently, the calculated mean score of 77.2% of the sample fell into the positive side of the spectrum (*Mdn* = 6.0). On the same note, the public transport (*Mdn* = 5.0) also showed a positive attitude towards commuting by car. In this sense, the public transport sample had positive results for positiveness, pleasantness, effectiveness, comfort, safety, and flexibility. Generally, both travel modes displayed a strong positive view of comfort and a strong negative perception of sustainability and cost. However, even for these cases, the car commuters' response was slightly more positive when compared to the public transport commuters' response. Consequently, overall, the results do not indicate a dissonance between attitudes and behavioral intentions for the car sample. Moreover, the overall score is negative moderate correlated to preferred travel mode ($r = -0.44$, $p < 0.01$). Consequently, those who favor commuting by car showed higher median scores (*Mdn* = 6.0), than those who do not (*Mdn* = 5.0). As to analyse the relative importance of each measured indicator in the overall attitudes toward cars score composition, a multiple regression was conducted for each analysed travel mode.

In the car sample, using the enter method it was found that the measured indicators explained a significant amount of the variance in the overall score ($F(8, 645) = 689.13$, $p < 0.01$, $R^2 = 0.95$, $R^2_{Adjusted} = 0.89$). Moreover, all measured indicators were statistically significant in the multiple regression, as shown in Table 23. Pleasantness (ATC2) and effectiveness (ATC3) were found to be the most relevant indicators for the overall sample score composition. They were followed by positiveness (ATC1), safety (ATC6), and flexibility (ATC7), which were all positively evaluated by the sample. On the other hand, indicators, such as sustainability (ATC5) and cost (ATC8), which were negatively evaluated, were less significant. Thus, the results suggest that the most relevant needs of car commuters are being satisfied. Consequently, car commuters are not expected to display dissonance or discomfort towards commuting by car.

Table 23 – Results of the overall attitudes toward cars score relative importance analysis for the car commuter group

Code	Dimension	Measure	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
			B	Std. Error	Beta		
Constant	-	-	-0.740	0.120	-	-6.156	0.000
ATC2	Experience	Pleasantness	0.257	0.015	0.303	17.228	0.000
ATC3	Utility	Effectiveness	0.257	0.014	0.299	18.331	0.000
ATC1	Experience	Positiveness	0.202	0.013	0.280	15.262	0.000
ATC6	Utility	Safety	0.196	0.014	0.208	13.792	0.000
ATC7	Utility	Flexibility	0.149	0.016	0.138	9.115	0.000
ATC8	Utility	Cost	0.061	0.012	0.073	5.067	0.000
ATC4	Experience	Comfort	0.060	0.023	0.043	2.634	0.009
ATC5	Utility	Sustainability	-0.036	0.014	-0.042	-2.634	0.009

The same analysis was conducted for the public transport sample. Once again, it was found that the measured indicators explained a significant amount of the variance in the overall score ($F(8, 459) = 475.10$, $p < 0.01$, $R^2 = 0.94$, $R^2_{Adjusted} = 0.89$). However, comfort (ATC4, Beta = .04, t(459) = 1.77, ns), sustainability (ATC5, Beta = .02, t(459) = 1.18, ns), and cost (ATC8, Beta = .01, t(459) = 0.57, ns) were not found to be statistically significant in the multiple regression, as show in Table 24. Pleasantness (ATC2) was the most relevant indicator for the overall score composition, which was followed by positiveness (ATC1), effectiveness (ATC3), safety (ATC6), and flexibility (ATC7). Moreover, it can be highlighted that the relative importance rank distribution is similar between both the car and the public transport samples. Therefore, giving evidence that, besides evaluating the attitudinal statements similarly, both car and public transport commuters value analogous aspects of commuting by car. However, even though the standardized coefficient for cost (ATC8) is non-significant, it aids hindering this sample from commuting by car as this behavior is positively correlated to household income (r = 0.39, $p < 0.01$) and public transport commuters are largely low and lower-middle households (48.5%).

Table 24 – Results of the overall attitudes toward cars score relative importance analysis for the public transport commuter group

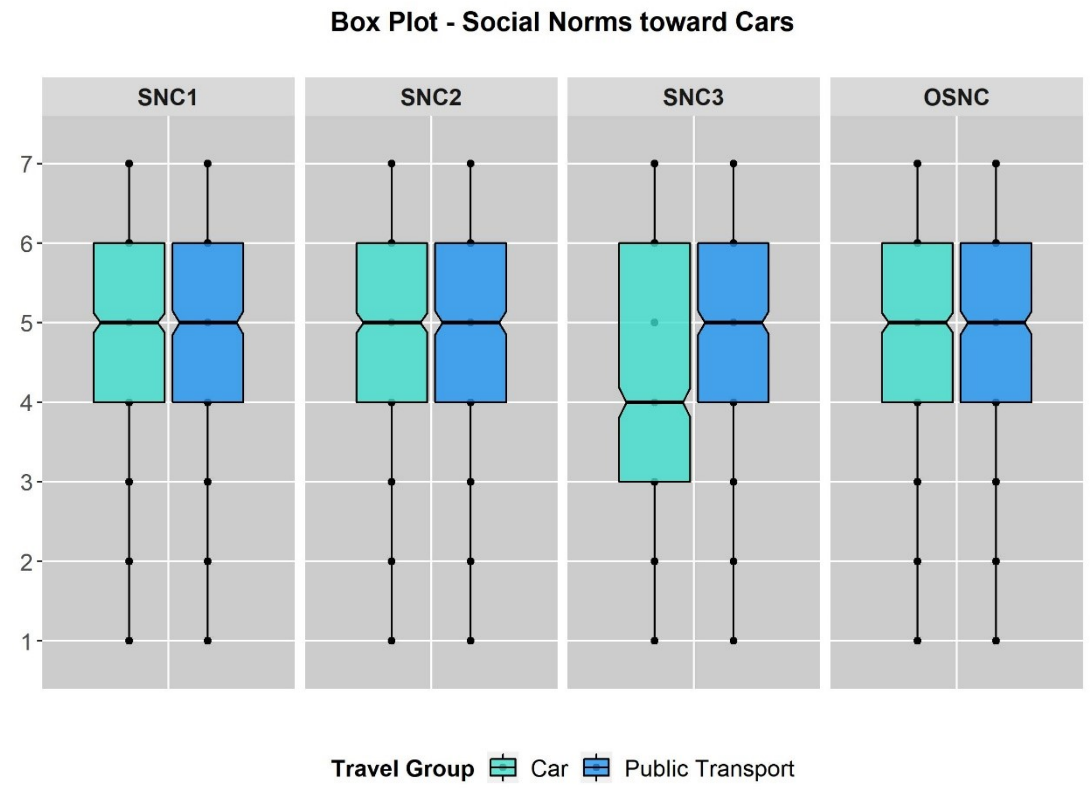
Code	Dimension	Measure	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
			B	Std. Error	Beta		
Constant	-	-	-0.667	0.127	-	-5.268	0.000
ATC2	Experience	Pleasantness	0.263	0.018	0.317	14.426	0.000
ATC1	Experience	Positiveness	0.214	0.016	0.275	13.657	0.000
ATC3	Utility	Effectiveness	0.219	0.016	0.262	13.871	0.000
ATC6	Utility	Safety	0.196	0.017	0.203	11.384	0.000
ATC7	Utility	Flexibility	0.175	0.018	0.182	9.673	0.000
ATC4	Experience	Comfort	0.044	0.025	0.037	1.770	0.077
ATC5	Utility	Sustainability	0.025	0.021	0.022	1.182	0.238
ATC8	Utility	Cost	0.010	0.017	0.010	0.568	0.570

Overall, experience measures were found to be the most significant for both travel groups. For instance, pleasantness (ATC2) was the most relevant in both the car and public transport samples. Effectiveness (ATC3) was the second most relevant in the car sample and the third, in the public transport sample. Additionally, positiveness (ATC1), flexibility (ATC7), and safety (ATC6) appeared among the top five indicators for both interest groups. On the other hand, comfort (ATC4) and sustainability (ATC5), which were, respectively, very positively perceived and very negatively perceived were not statistically significant in the multiple regression. As both variables were highly skewed, it was tried to apply a logarithmic transformation, however they remained non-significant.

5.1.4.6 Social norms toward cars

Social norms are a social psychology construct characterized as a perceived social pressure or subjective norm based on the degree to which family and peers would approve of the performance of the behavior. It was measured based on three dimensions: perceived social pressure originating from strong personal relationships or ties, such as family and close friends; perceived social pressure related to weak personal relationships or ties, such as acquaintances and co-workers; and perceived social pressure related to cultural norms, such as the view of society and media on the behavior of interest, as depicted in Figure 17. Moreover, none of the analysed variables correlated significantly to any descriptive variables.

Figure 17 – Box plot of social norms toward cars variables, by travel mode group



Source: Author (2020)

The first measured attitudinal statement for social norms toward cars was related to the perceived social pressure from strong relationships, such as family and close friends. It was operationalized by "I believe that family and close friends would support me commuting to work/school by car", which was coded as SNC1. In the overall sample, 60.2% agree, in some way, that their strong relationships would support them commuting by car, while 23.4% were neutral and 16.4% disagreed (*Mdn* = 5.0). According to the Kruskal-Wallis Test, a significant mean difference could not be found between the analysed interest groups (Chi-square = 2.44, ns, df = 1). Therefore, indicating a similar view on social norms from close relationships towards commuting by car among both travel mode groups. In this sense, 61.2% (*Mdn* = 5.0) of car commuters and 58.8% (*Mdn* = 5.0) of public transport commuters agreed, at some level, that their family and close friends would support them commuting by car. On the other hand, respectively, 16.4% of car commuters and 17.7% of public transport commuters disagreed.

Perceived social pressure related to weak relationships was the second indicator assessed. It was measured by "I believe that acquaintances and co-workers would support me commuting to work/school by car" (SNC2). Overall, 53.6% of the sample agreed, at some level with the statement, while 29.5% were neutral and 16.9% disagreed (*Mdn* = 5.0). As SNC1, the Kruskal-Wallis Test did not find a significant mean difference among the analysed groups (Chi-square = 0.00, ns, df = 1). Therefore, 53.2% (*Mdn* = 5.0) of the car group and 54.1% (*Mdn* = 5.0) of the public transport group agreed, at some level, that their weak relationships would approve them commuting by car. On the other hand, 16.4% of the car sample and 17.7% of the public transport sample did not agree with the statement. In this sense, car and public transport commuters are likely to perceive a positive culture around commuting by car from both strong and weak relationships.

The third measure concerned cultural norms, which was measured by "I believe that commuting by car is well seen by society and media" (SNC3). In the overall sample, 49.3% believed, to varying degrees, that commuting by car is well seen by society and the media (*Mdn* = 4.0), while 23.9% were neutral and 26.8% disagreed. The Kruskal-Wallis Test found a significant mean difference among the analysed travel groups (Chi-square = 35.63, p-value < 0.01, df = 1). In this sense, 59.4% (*Mdn* = 5.0) of public transport commuters believe that commuting by car is well seen by society, while car commuters displayed an overall neutral response (*Mdn* = 4.0). In this sense, car commuters were found to have a more negative perception of the way society views commuting by car than public transport commuters do.

Based on the median of the 3 measured indicators, an overall social norm toward cars score was calculated for each sample. Overall, 55.9% of the sample fell into the positive side of the score (*Mdn* = 5.0). The Kruskal-Wallis Test did not find a significant mean difference among the analysed travel groups (Chi-square = 0.44, ns, df = 1). Consequently, car commuters and public transport commuters were found to exhibit a similar positive perception of social norms in relation to strong and weak relationships. Yet, they differ in their view of how society perceives commuting by car. For instance, car commuters have a more neutral to negative view on the way society perceives commuting by car than public transport commuters. In this sense, respectively, 54.3% (*Mdn* = 5.0) and 58.1% (*Mdn* = 5.0) of car and public transport commuters' scores fell into the positive side of the spectrum. As to analyse the relative importance of each measured indicator in the overall social norm toward cars score composition, a multiple regression was conducted for each analysed travel mode.

In the car sample, using the enter method it was found that the measured indicators explained a significant amount of the variance in the overall score ($F(3, 650) = 3{,}320.31$, $p < 0.01$, $R^2 = 0.97$, $R^2_{Adjusted} = 0.94$). Moreover, all measured indicators were statistically significant in the multiple regression, as shown in Table 25. Perceived social pressure related to weak ties (SNC2), such as acquaintances and co-workers was the most relevant indicator in the composition of the overall score. It was followed by strong ties (SNC1) and cultural norms (SNC3). In comparison, SNC1 and SNC3 were, respectively, 196% and 468% less relevant than SNC2. Therefore, the findings indicate that weak relationships have a greater impact on the perception of commuting by car than strong relationships and cultural norms.

Table 25 – Results of the overall social norm toward cars score relative importance analysis for the car commuter group

Code	Dimension	Measure	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
			B	Std. Error	Beta		
Constant	-	-	-0.107	0.054	-	-1.987	0.047
SNC2	Relationships	Weak Ties	0.693	0.016	0.710	44.330	0.000
SNC1	Relationships	Strong Ties	0.230	0.015	0.239	15.794	0.000
SNC3	Society	Cultural Norms	0.107	0.009	0.125	11.455	0.000

The same analysis was conducted for the public transport sample. Once again, it was found that the measured indicators explained a significant amount of the variance in the overall score ($F(3, 464) = 1{,}620.99$, $p < 0.01$, $R^2 = 0.95$, $R^2_{Adjusted} = 0.91$). Moreover, all measured indicators aided significantly in the multiple regression, as shown in Table 26. As found for the car sample, perceived social pressure related to weak ties (SNC2) was found to be the most relevant indicator for the overall score composition. Likewise, it was followed by strong ties (SNC1) and cultural norms (SNC3). In comparison, SNC1 and SNC3 were, respectively, 27% and 214% less relevant than SNC2. Therefore, for public transport commuters, strong relationships have a somewhat similar weight to weak relationships.

Table 26 – Results of the overall social norm toward cars score relative importance analysis for the public transport commuter group

Code	Dimension	Measure	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
			B	Std. Error	Beta		
Constant	-	-	-0.257	0.080	-	-3.198	0.001
SNC2	Relationships	Weak Ties	0.520	0.020	0.528	25.547	0.000
SNC1	Relationships	Strong Ties	0.394	0.019	0.416	20.436	0.000
SNC3	Society	Cultural Norms	0.147	0.013	0.168	11.417	0.000

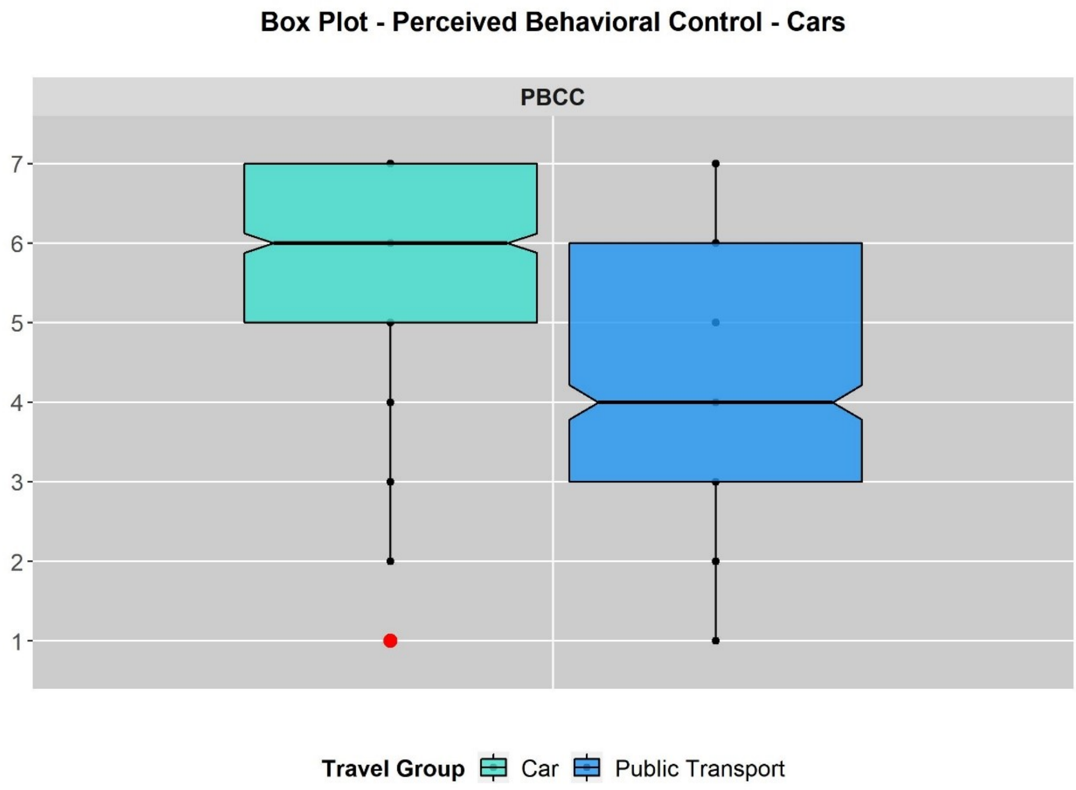
Overall, perceived social pressure related to weak personal relationships or ties was found to be the most relevant indicator on the social norms overall score composition across both travel modes. Moreover, the cultural norms standardized coefficient was significantly less relevant. On the other hand, strong relationships were found to be more relevant among public transport commuters than in the car sample. These findings indicate that understanding the perception of acquaintances and co-workers might be more important on understanding social norms than family and close friends.

5.1.4.7 Perceived behavioral control toward commuting by car

Perceived behavioral control is related to the perceived ease or difficulty of performing a determined behavioral, therefore it is regulated by the amount of resources and opportunities available at a given moment. It was operationalized by a single attitudinal statement: "for me, to commute to work/school by car would be easy", which was coded as PBCC (Figure 18). In the overall sample, 67.9% agreed, at some level, with the statement (*Mdn* = 6.0). Therefore, there are 230 respondents or about 20% of the sample which are not car commutes, but who believe that they could be. The indicator measuring perceived behavioral control toward cars is both positive moderate correlated to car usage ($r = 0.38$, $p < 0.01$) and car availability ($r = 0.34$, $p < 0.01$), while negative moderate correlated to commute travel mode ($r = -0.38$, $p < 0.01$) and commuting by public transport ($r = -0.38$, $p < 0.01$). Consequently, it suggests that those who commute by car have a strong sense of easiness toward commuting by car (*Mdn* = 6.0) than those who do not (*Mdn* = 4.0). Moreover, as proposed by Thogersen

(2006), perceived behavioral control was found to be a good indicator of car availability as evidenced by the mentioned correlation. For instance, in this sample, PBCC was able to correctly classify 91.4% of those who have a car always available through a discriminant analysis.

Figure 18 – Box plot of perceived behavioral control towards cars, by travel mode group

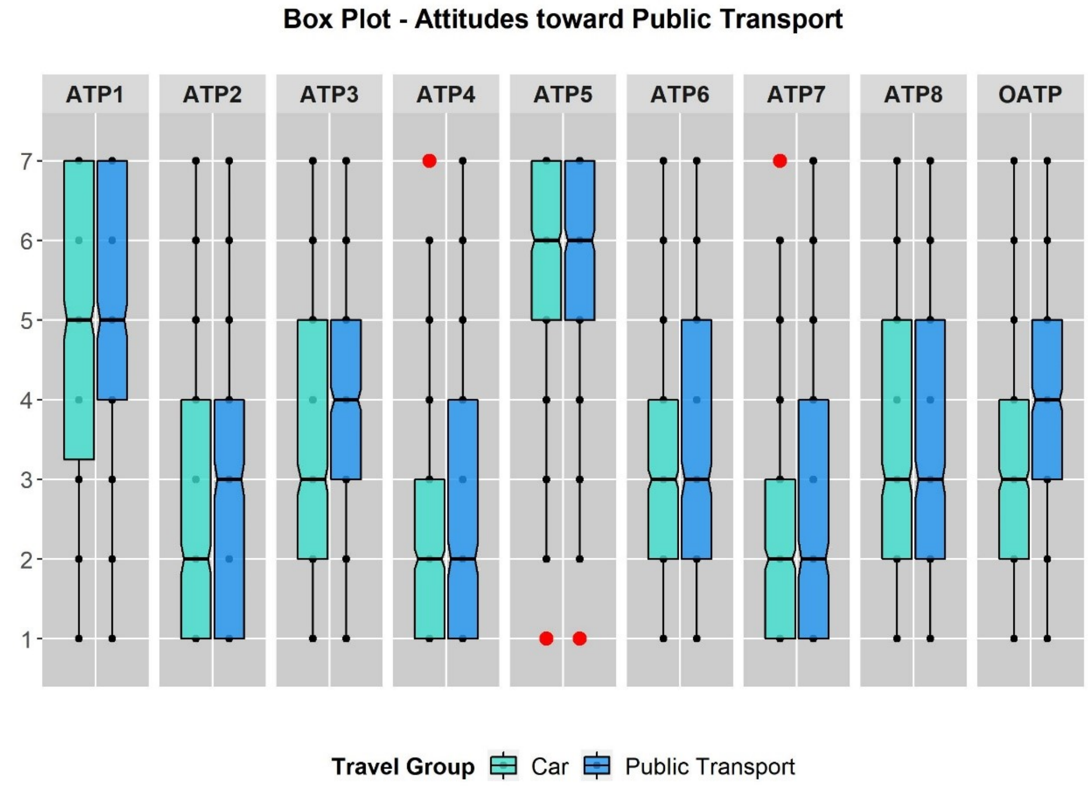


Source: Author (2020)

5.1.4.8 Attitudes toward public transport

The same 8 dimensions of attitudes previously evaluated for commuting by car were also assessed for commuting by public transport. Namely, positiveness, pleasantness, effectiveness, comfort, sustainability, safety, flexibility, and cost, as depicted in Figure 19. Moreover, none of the attitudinal variables in this section were found to correlate significantly to any descriptive variable.

Figure 19 – Box plot of attitudes toward public transport variables, by travel mode group



Source: Author (2020)

The first attitudinal statement measured the perception of positiveness of commuting by public transport ("I believe that commuting by public transport is positive", ATP1). In the overall sample, 64.3% believe, to some degree, that this behavior is positive, while 12.7% are neutral and 22.9% disagree (*Mdn* = 5.0). According to the Kruskal-Wallis Test, a significant mean difference could not be found among the analysed travel groups (Chi-square = 0.74, ns, df = 1). Consequently, the response distribution across both commute travel modes was expected to be similar. For instance, 64.2% (*Mdn* = 5.0) of car commuters and 64.5% (*Mdn* = 5.0) of public transport commuters agreed, to varying degrees, that commuting by public transport is positive, while 25.1% and 19.9% of the car and public transport samples disagreed.

Pleasantness was the second measured dimension, which was operationalized by "I believe that commuting by public transport is pleasant" (ATP2). Overall, 66.7% of respondents disagreed, at some level, with the statement, while 16.5% were neutral and only 16.8% agreed (*Mdn* = 3.0). Therefore, indicating an overall negative perception of the experience of commuting by public transport. Moreover, the Kruskal-Wallis Test displayed a significant mean difference across the evaluated travel groups (Chi-square = 7.78, $p < 0.01$, df = 1). In this sense, 63.2% (*Mdn* = 3.0) of public transport commuters disagree, at some level, that commuting by public transport is pleasant. On the same note, car commuters showed a slight worse overall response to the statement as 69.1% disagreed (*Mdn* = 2.0).

The third measured attitudinal statement concerned the perception of effectiveness of this travel mode ("I believe that commuting by public transport is effective", ATP3). Overall, a balance between those who disagree and those who agree was found in the sample. For instance, 44.3% disagreed, at some level, that commuting by public transport is effective, while 19.7% were neutral and 36.0% agreed (*Mdn* = 4.0). The Kruskal-Wallis Test also showed a significant mean difference across the analysed groups (Chi-square = 56.48, $p < 0.01$, df = 1). The public transport sample displayed a similar response distribution to the overall sample (*Mdn* = 4.0), while car commuters exhibited a more negative reaction (*Mdn* = 3.0). For instance, in the car sample, 51.7% disagreed, at some level, with the statement, while, in the public transport sample, 46.6% agreed with the statement.

The perception of comfort in commuting by public transport was the fourth measured dimension. It was assessed by "I believe that commuting by public transport is comfortable", which was coded as ATP4. Overall, the response towards this indicator was negative. For instance, 75.7% of respondents disagreed, at some level, with the statement, while 13.2% were neutral and only 11.1% agreed (*Mdn* = 2.0). Moreover, the Kruskal-Wallis Test showed a significant mean difference across the analysed groups (Chi-square = 7.22, $p < 0.01$, df = 1). In the public transport sample, 71.6% do not believe, to varying degrees, that commuting by public transport is comfortable (*Mdn* = 2.0). In the car sample, this perception is slightly worse. 78.6% of respondents disagree, at some level, with the statement (*Mdn* = 2.0).

The fifth measured attitudinal statement regarded the perception of sustainability of this travel mode ("I believe that commuting by public transport is sustainable", ATP5). In the overall sample, 77.5% believe, at some level, that commuting by public transport is sustainable, while 11.4% are neutral and 11.1% disagree (*Mdn* = 6.0). The Kruskal-Wallis Test was not able to find a significant mean difference across the analysed travel groups (Chi-square = 0.00, ns, df = 1). Consequently, both interest groups were expected to exhibit a similar pattern of responses. For instance, 76.0% (*Mdn* = 6.0) of car commuters and 79.5% (*Mdn* = 6.0) of public transport commuters agree, at some level, that commuting by public transport is sustainable. Thus, it suggests that public transport is generally perceived as a sustainable travel mode.

Safety was the sixth measured indicator related to commuting by public transport. It was assessed by "I believe that commuting by public transport is safe", which was coded as ATP6. Overall, 59.8% of the sample disagree, at some level, with this statement, while 18.4% are neutral and 21.8% agree (*Mdn* = 3.0). The Kruskal-Wallis Test displayed a significant mean difference across the analysed travel groups (Chi-square = 10.50, $p < 0.01$, df = 1). The car sample responses were found to skew more towards the negative side of the scale. For instance, 62.2% (*Mdn* = 3.0) disagreed, at some level, with the statement. Similarly, 56.4% (*Mdn* = 3.0) of car commuters are within the same response range. Therefore, most respondents showed a disbelief that commuting by public transport is safe.

The seventh measured attitudinal statement concerned flexibility ("I believe that commuting by public transport enables me a flexible routine", ATP7). In the overall sample, 75.6% do not believe, to varying degrees, that commuting by public transport enables a flexible routine (*Mdn* = 2.0). Moreover, 12.6% responded neutrally and 11.9% agreed. According to the Kruskal-Wallis Test, a significant mean difference can be found among the analysed travel groups (Chi-square = 9.79, $p < 0.01$, df = 1). Nonetheless, both samples skewed toward not believing that commuting by public transport enables flexibility in their daily routines. In the public transport sample, 70.3% (*Mdn* = 2.0) disagreed, at some level, with the statement. Similarly, 79.4% (*Mdn* = 2.0) of car commuters are within the same response range.

The last measured attitudinal indicator regarded the perception of cost of commuting by public transport. It was operationalized by "I believe that commuting by public transport is cheap", which was coded as ATP8. In the overall sample, 54.5% disagree, at some level, that commuting with this travel mode is cheap, while 18.3% are neutral and 27.3% agreed (*Mdn* = 3.0). The Kruskal-Wallis Test was not able to find a significant mean difference among the analysed travel groups (Chi-square = 1.98, ns, df = 1). In this sense, both travel mode groups showed a similar negative reaction towards this indicator. For instance, 52.9% (*Mdn* = 3.0) of car commuters and 56.6% (*Mdn* = 3.0) of public transport commuters disagreed, at some level, with the statement.

Finally, based on the 8 measured indicators, an overall median score was calculated for each travel mode. In the overall sample, 49.8% of respondents' overall scores fell into the negative side of the scale, while 26.4% were neutral and 23.8% were positive (*Mdn* = 4.0). The Kruskal-Wallis Test showed a significant mean difference among the analysed travel groups (Chi-square = 20.79, $p < 0.01$, df = 1). The public transport (*Mdn* = 4.0) showed a negative reaction toward pleasantness, effectiveness, comfort, safety, flexibility, and cost dimensions of commuting by public transport. In comparison, the car sample perceived commuting by public transport the worst (*Mdn* = 3.0), specially, regarding pleasantness and effectiveness dimensions. On the other hand, positiveness and sustainability were the only attitudinal statements positively evaluated among both groups. Consequently, the overall reaction towards commuting by public transport was negative. As to analyse the relative importance of each measured indicator in the overall attitudes toward public transport score composition, a multiple regression was conducted for each analysed travel mode.

In the car sample, using the enter method it was found that the measured indicators explained a significant amount of the variance in the overall score ($F(8, 645) = 572.42$, $p < 0.01$, $R^2 = 0.94$, $R^2_{Adjusted} = 0.87$). Moreover, all measured indicators were statistically significant in the multiple regression, as shown in Table 27.

Table 27 – Results of the overall attitudes toward public transport score relative importance analysis for the car commuter group

Code	Dimension	Measure	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
			B	Std. Error	Beta		
Constant	-	-	-0.739	0.082	-	-8.994	0.000
ATP3	Utility	Effectiveness	0.252	0.014	0.308	17.371	0.000
ATP2	Experience	Pleasantness	0.197	0.019	0.218	10.094	0.000
ATP6	Utility	Safety	0.183	0.015	0.204	12.322	0.000
ATP8	Utility	Cost	0.144	0.012	0.174	11.737	0.000
ATP1	Experience	Positiveness	0.112	0.013	0.151	8.927	0.000
ATP7	Utility	Flexibility	0.145	0.017	0.144	8.410	0.000
ATP4	Experience	Comfort	0.129	0.024	0.122	5.270	0.000
ATP5	Utility	Sustainability	0.071	0.015	0.075	4.829	0.000

Effectiveness (ATP3) was the most relevant indicator in the sample for the overall score composition, which was followed by pleasantness (ATP2), safety (ATP6), cost (ATP8), positiveness (ATP1), flexibility (ATP7), comfort (ATP4), and sustainability (ATP5). As found for the attitudes toward cars, comfort (ATP4) and sustainability (ATP5) were extremely less important than the remaining indicators. On the other hand, effectiveness (ATP3) and pleasantness (ATP2) remain among the most relevant. Additionally, as the most relevant indicators in the rank are not well seen by car commuters, it is unlikely that they would consider switching to public transport.

The same procedure was repeated for the public transport sample. Once more, the measured indicators were found to explain a significant amount of variance in the overall score ($F(8, 459) = 489.61$, $p < 0.01$, $R^2 = 0.95$, $R^2_{Adjusted} = 0.89$). Additionally, all measured indicators were statistically significant in the multiple regression, as shown in Table 28. As found in Silveira et al. (2018), safety (ATP6) was the most relevant indicator in the overall score composition for the public transport group. It was followed by pleasantness (ATP2), effectiveness (ATP3), cost (ATP8), flexibility (ATP7), comfort (ATP4), positiveness (ATP1), and sustainability (ATP5). In this sense, all relevant indicators were negatively evaluated by the sample, thus suggesting that their needs are not being fulfilled. In comparison, experience indicators were among the most relevant for the respondents when evaluating attitudes toward public transport, while, in the present context, utility measures are predominant.

Table 28 – Results of the overall attitudes toward public transport score relative importance analysis for the public transport commuter group

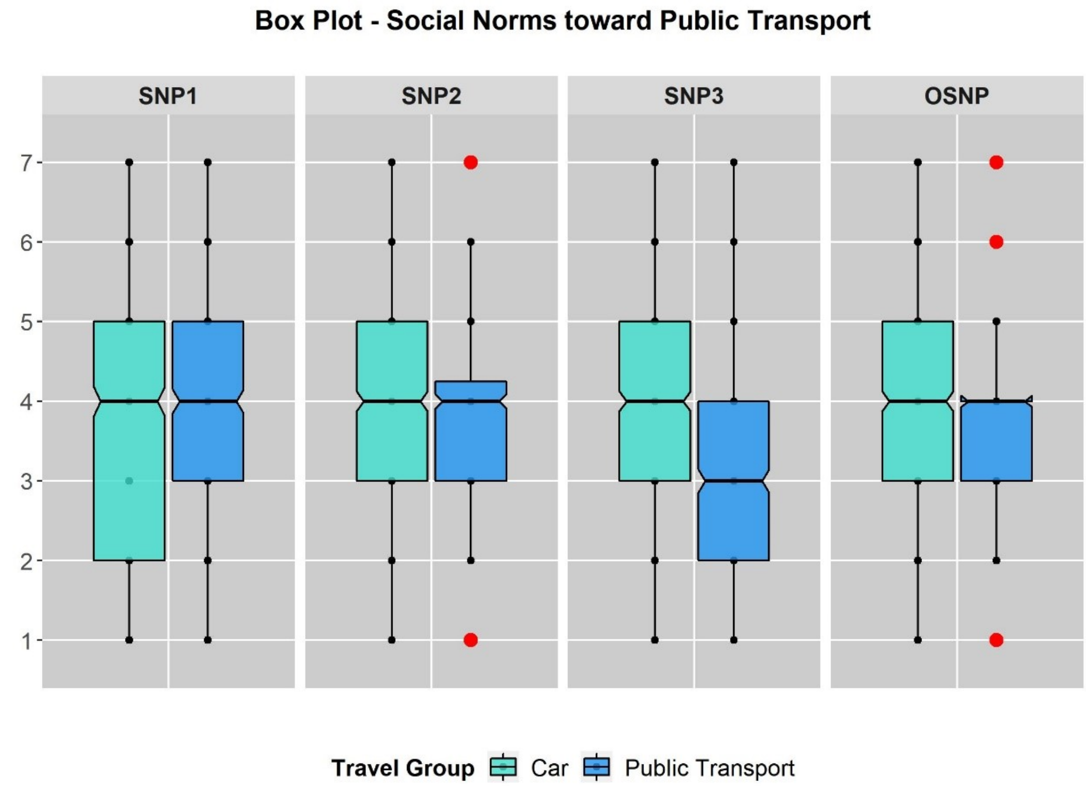
Code	Dimension	Measure	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
			B	Std. Error	Beta		
Constant	-	-	-0.445	0.094	-	-4.731	0.000
ATP6	Utility	Safety	0.192	0.018	0.210	10.398	0.000
ATP2	Experience	Pleasantness	0.176	0.025	0.199	7.066	0.000
ATP3	Utility	Effectiveness	0.174	0.020	0.190	8.912	0.000
ATP8	Utility	Cost	0.163	0.015	0.185	10.602	0.000
ATP7	Utility	Flexibility	0.164	0.018	0.172	8.887	0.000
ATP4	Experience	Comfort	0.139	0.027	0.144	5.165	0.000
ATP1	Experience	Positiveness	0.094	0.017	0.113	5.551	0.000
ATP5	Utility	Sustainability	0.075	0.017	0.076	4.334	0.000

Overall, utility measures were the most relevant for the overall score composition across all measured indicators. For instance, effectiveness (ATP3) in the car sample and safety in the public transport sample. Moreover, pleasantness (ATP2) was the second most significant indicator for both interest samples. In this sense, all top 3 ranked indicators for both travel groups were negatively viewed by the sample, thus suggesting (a) an overall negative perception of commuting by public transport and (b) that their needs are not or would not be fulfilled by commuting by public transport.

5.1.4.9 Social norms toward public transport

The same three dimensions of social norms evaluated for commuting by car were also assessed for commuting by public transport, which are perceived social pressure originating from strong personal relationships or ties, such as family and close friends; perceived social pressure related to weak personal relationships or ties, such as acquaintances and co-workers; and perceived social pressure related to cultural norms. The results are depicted in the Figure 20. Moreover, none of the attitudinal variables in this section were found to correlate significantly to any descriptive variable.

Figure 20 – Box plot of social norms toward public transport variables, by travel mode group



Source: Author (2020)

The first measured dimension regarded the perceived social pressure from strong personal relationships or ties, such as family and close friends in relation to commuting by public transport. It was operationalized by "I believe that family and close friends would support me commuting to work/school by public transport", which was coded as SNP1. In the overall sample, the responses were mostly neutral (34.4%, *Mdn* = 4.0). The Kruskal-Wallis Test found a significant mean difference across the interest groups (Chi-square = 5.73, p = 0.01, df = 1). Nonetheless, both groups displayed a similar distribution to the overall sample. For instance, 33.9% of car commuters (*Mdn* = 4.0) and 35.0% of public transport commuters (*Mdn* = 4.0) selected the neutral option. Moreover, 40.8% and 36.5%, respectively, agreed with the statement in both the car and the public transport samples, while 25.2% and 28.4% disagreed.

Perceived social pressure related to weak personal relationships or ties, such as acquaintances and co-workers, was the second measured indicator. It was assessed by "I believe that acquaintances and co-workers would support me commuting to work/school by public transport" (SNP2). Overall, 41.5% of the respondents selected a neutral option (*Mdn* = 4.0), which was followed by 33.1% who disagreed, at some level, and 25.4% who agreed with the statement. The Kruskal-Wallis Test was not able to find a significant mean difference across the interest groups (Chi-square = 0.02, ns, df = 1). In this sense, both travel mode groups showed a similar response pattern distribution. For instance, 41.4% of car commuters (*Mdn* = 4.0) and 41.7% of public transport commuters (*Mdn* = 4.0) selected the neutral alternative. The second most significant share was of those who disagreed. Respectively, 32.9% and 33.3% of the car and public transport samples were within this response range.

The third indicator concerned cultural norms, which was measured by "I believe that commuting by public transport is well seen by society and media" (SNP3). In the overall sample, 44.4% disagreed, at some level, with the statement, while 30.9% were neutral and 24.7% agreed (*Mdn* = 4.0). Moreover, the Kruskal-Wallis Test found a significant mean difference between the analysed travel mode groups (Chi-square = 32.59, $p < 0.01$, df = 1). For instance, 54.5% of public transport commuters (*Mdn* = 3.0) do not believe, at some level, that commuting by public transport is well seen by society and media. On the other hand, the perception of the car commuters is more positive (*Mdn* = 4.0). 37.2% of them disagree, at some level, with the statement, while 33.6% were neutral and 29.2% agreed.

Based on the three measured attitudinal indicators, an overall median score was calculated for each sample. In the sample, 39.1% of respondents' score fell into the neutral spot, while 36.1% are in the negative side of the scale and 25.1% are in the positive side. Moreover, the Kruskal-Wallis Test did not find a significant mean difference across the interest groups (Chi-square = 0.01, ns, df = 1). Consequently, both travel mode groups displayed similar response distributions. For instance, 39.4% of car commuters (*Mdn* = 4.0) and 37.8% of public transport commuters (*Mdn* = 4.0) scores fell into the neutral zone. Therefore, this finding suggests that society, in general, has a more dispassionate view of commuting by public transport. As to analyse the relative importance of each measured indicator in the overall social norm toward public transport score composition, a multiple regression was conducted for each analysed travel mode.

In the car sample, using the enter method it was found that the measured indicators explained a significant amount of the variance in the overall score ($F(3, 650) = 3{,}678.32$, $p < 0.01$, $R^2 = 0.97$, $R^2_{Adjusted} = 0.94$). Moreover, all measured indicators were statistically significant in the multiple regression, as shown in Table 29. The indicator measuring the perception of weak ties (SNP2) was the most relevant indicator for composition of the overall score as happened in the analysis for social norms toward cars. It was followed by strong ties (SNP1) and cultural norms (SNP3). In comparison, SNP1 and SNP3 were, respectively, 64% and 348% less relevant than SNP2. Thus, once more, suggesting that weak ties are more relevant in the composition of social norms perception than strong ties and cultural norms.

Table 29 – Results of the overall social norm toward public transport score relative importance analysis for the car commuter group

Code	Dimension	Measure	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
			B	Std. Error	Beta		
Constant	-	-	-0.138	0.042	-	-3.280	0.001
SNP2	Relationships	Weak Ties	0.579	0.016	0.587	36.684	0.000
SNP1	Relationships	Strong Ties	0.334	0.015	0.359	23.044	0.000
SNP3	Society	Cultural Norms	0.124	0.010	0.131	12.277	0.000

The same procedure was replicated for the public transport sample. Once again, the measured indicators were found to explain a significant amount of the variance in the overall score ($F(3, 464) = 2{,}333.93$, $p < 0.01$, $R^2 = 0.97$, $R^2_{Adjusted} = 0.94$). Additionally, all measured indicators were statistically significant in the multiple regression, as shown in Table 30. Perception of weak ties (SNP2) was also the most relevant indicator for the composition of the overall score, which was followed by strong ties (SNP1) and cultural norms (SNP3). In comparison, SNP1 and SNP3 were, respectively, 35% and 302% less relevant than SNP2. Therefore, it indicates that the relationship dimension is the most relevant for the development of social norm perception towards commuting by public transport in this sample. Moreover, the rank order is the same to the one found for the analysis for social norms toward cars.

Table 30 – Results of the overall social norm toward public transport score relative importance analysis for the public transport commuter group

Code	Dimension	Measure	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
			B	Std. Error	Beta		
Constant	-	-	-0.187	0.051	-	-3.696	0.000
SNP2	Relationships	Weak Ties	0.537	0.020	0.541	27.349	0.000
SNP1	Relationships	Strong Ties	0.381	0.018	0.401	20.942	0.000
SNP3	Society	Cultural Norms	0.126	0.013	0.135	9.952	0.000

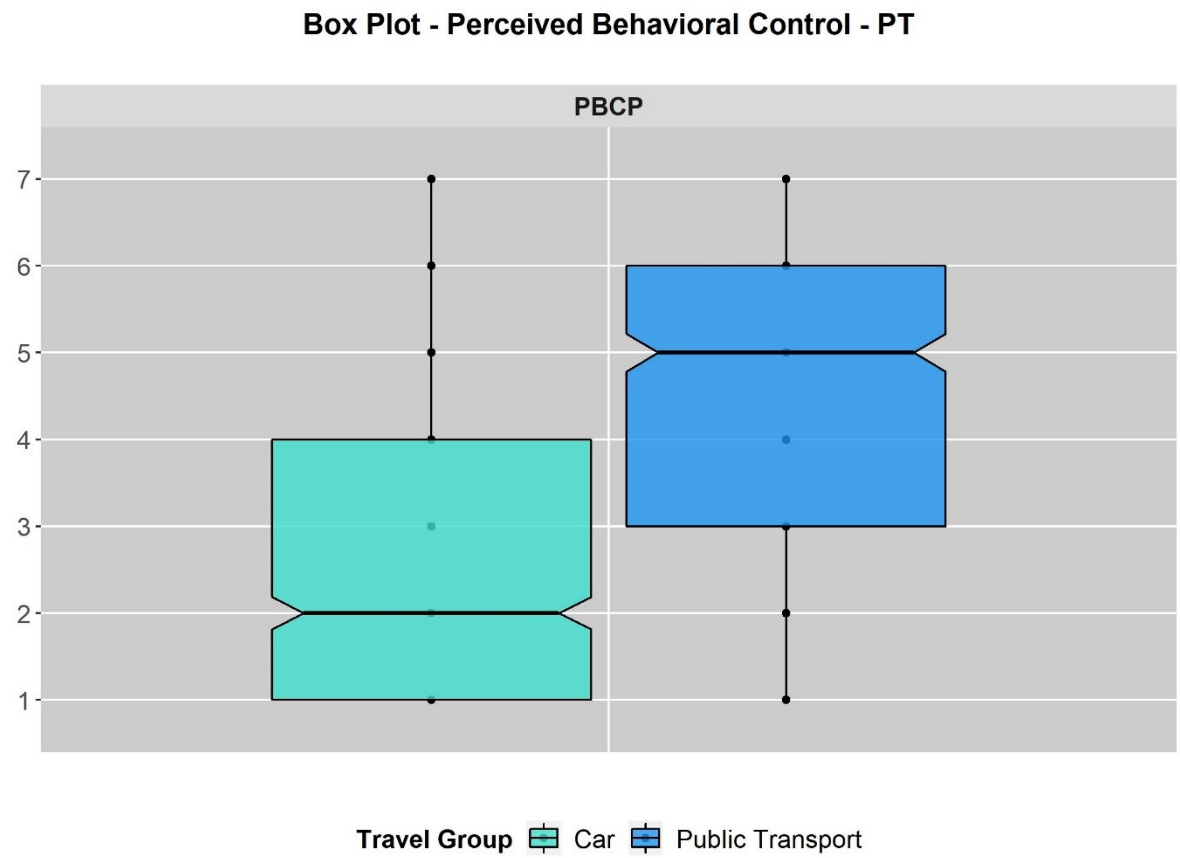
Overall, perceived social pressure related to weak personal relationships or ties was found to be more relevant on the overall score composition for both car and public transport commuters. On the other hand, cultural norms standardized coefficients were significantly less relevant. These findings corroborate the evidence shown for the analysis of social norms toward cars. In this sense, understanding the perception of acquaintances and co-workers might be more important on explaining social norms than the perception of family and close friends.

5.1.4.10 Perceived behavioral control toward commuting by public transport

Perceived behavioral control toward commuting by public transport was measured by "for me, to commute to work/school by public transport would be easy", which was coded as PBCP (Figure 21). In the overall sample, 50.6% do not believe, to varying degrees, that commuting by public transport would be easy (*Mdn* = 4.0). It was followed by 13.8% neutral responses and 35.6% who agreed. However, this result was mostly skewed by the car sample (*Mdn* = 2.0). For instance, 65.3% of car commuters do not agree, at some level, with the statement, while 13.5% were neutral and 21.3% agree. On the other hand, 55.6% of public transport commuters agree, at some level, with the statement, while 14.3% were neutral and 30.1% disagreed (*Mdn*

= 5.0). Consequently, the Kruskal-Wallis Test found a significant mean difference among the analysed travel groups (Chi-square = 185.62, $p < 0.01$, df = 1). Moreover, this variable is both positive moderate correlated to public transport usage ($r = 0.40$, $p < 0.01$) and current commute travel mode ($r = 0.40$, $p < 0.01$) and negative moderate correlated to car usage ($r = -0.40$, $p < 0.01$) and car availability ($r = -0.37$, $p < 0.01$). Therefore, the perception of ease of those who commute by public transport (*Mdn* = 5.0) is significantly higher than those who do not (*Mdn* = 3.0).

Figure 21 – Box plot of perceived behavioral control towards public transport, by travel mode group

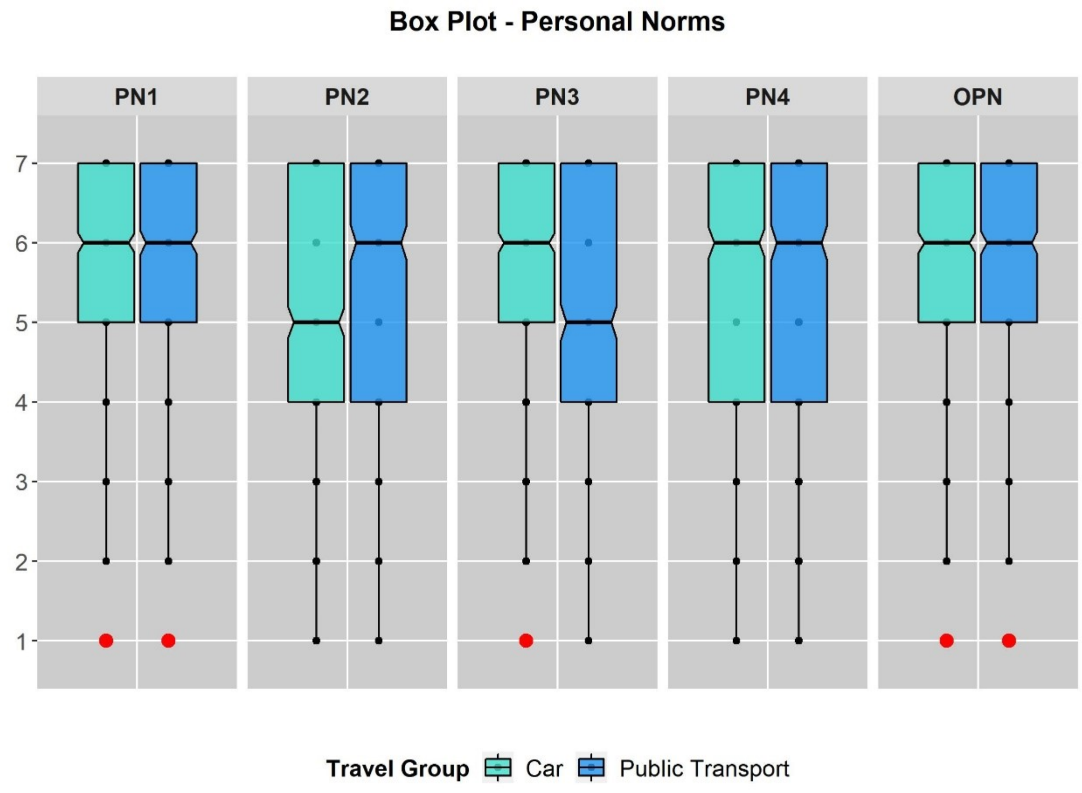


Source: Author (2020)

5.1.4.11 Personal norms

Personal norms are defined as a moral obligation to perform a determined behavior or action, which would lead to negative feelings, such as regret and guilt, if not followed. In this study, this latent construct was operationalized by four indicators related to pro-environment (PN1 and PN2) and pro-health attitudes (PN3 and PN4), as depicted in Figure 22.

Figure 22 – Box plot of social norms toward cars variables, by travel mode group



Source: Author (2020)

The first attitudinal statement measured the respondent's perceived personal obligation to protect the environment ("I feel a personal obligation to protect the environment", PN1). The responses for this variable skewed negatively (-1.30), thus the result of an overall agreement with the statement across both groups. In this sense, 84.7% of participants declared to feel, at some level, an obligation to protect the environment, while 11.1% were neutral and 4.2% disagreed (*Mdn* = 6.0). According to the Kruskal-Wallis Test, a significant mean difference across the analysed travel groups could not be found (Chi-square = 1.30, ns, df = 1). Consequently, both travel groups display a similar negatively skewed distribution. For instance, respectively, 84.3% (*Mdn* = 6.0) and 85.3% (*Mdn* = 6.0) of car and public transport commuters agree at some level with the statement.

The second indicator evaluated weather the respondent would want to switch their current travel mode if it would help the environment ("I would feel the need to switch travel mode if it would help the environment", PN2). Overall, 68.0% of respondents agreed, to varying degrees, with statement, while 16.1% were neutral and 15.9% disagreed (*Mdn* = 5.0). The Kruskal-Wallis Test did not reveal a significant mean difference among the analysed groups (Chi-square = 2.31, ns, df = 1). In this sense, both travel modes showed the same overall positive response. For instance, respectively, 67.3% (*Mdn* = 5.0) and 69.0% (*Mdn* = 6.0) of car and public transport commuters agree at some level with the statement. However, the results might be affected by self-presentation biases as the sample is composed mostly of car commuters (58.3%) from which 75.4% do not believe that commuting by car is sustainable.

The third indicator evaluated the respondents' pro-health choices ("I feel a personal obligation to live healthily – food, exercises, etc.", PN3). Overall, 74.2% of the sample agree, at some level, with the statement, while 12.5% were neutral and only 13.3% disagreed (*Mdn* = 6.0). The Kruskal-Wallis Test found a significant mean difference across the analysed travel mode groups (Chi-square = 15.08, p-value < 0.01, df = 1). Nonetheless, both samples show similar views on the topic. In this sense, 77.5% (*Mdn* = 6.0) of car commuters and 69.7% (*Mdn* = 5.0) of public transport commuters were found to agree, to varying degrees, with the statement. On the other hand, respectively, 10.9% and 16.7% of car and public transport commuters disagreed.

The fourth indicator evaluated weather the respondent would want to switch their current travel mode if it would help them be healthier ("I would feel the need to switch travel mode if it would help me achieve a healthier life", PN4). Overall, 70.9% of respondents agree, at some level, with the statement (*Mdn* = 6.0). The Kruskal-Wallis Test did not find a significant mean difference across the analysed travel mode groups (Chi-square = 0.00, ns, df = 1). In this sense, both travel groups showed an overall positive response towards the statement. For instance, 71.4% of car commuters (*Mdn* = 6.0) and 70.3% of public transport commuters (*Mdn* = 6.0) agreed, at some level, with the statement.

Based on the median of the 4 measured indicators, an overall personal norm score was calculated for each sample. Overall, 79.5% of respondents fell into the positive side of the response scale, while 13.1% are neutral and only 7.4% are within the negative side. According to the Kruskal-Wallis Test, a significant mean difference could not be found across the analysed travel mode groups (Chi-square = 0.21, ns, df = 1). Consequently, both interest samples showed an overall positive response pattern.

Therefore, 80.4% (*Mdn* = 6.0) of car commuters and 78.2% (*Mdn* = 6.0) of public transport commuters fell into the positive side of the scale. The large share of positive responses raises the question on the existence of self-presentation biases in the responses, consequently, additional studies should try to evaluate this latent construct with different indicators. Additionally, as to analyse the relative importance of each measured indicator in the overall personal norm score composition, a multiple regression was conducted for each analysed travel mode.

In the car sample, using the enter method it was found that the measured indicators explained a significant amount of the variance in the overall score ($F(4, 649) = 1,709.84$, $p < 0.01$, $R^2 = 0.96$, $R^2_{Adjusted} = 0.91$). Moreover, all measured indicators were statistically significant in the multiple regression, as shown in Table 31. Pro-health lifestyle choices (PN3) was the most relevant indicator for the overall score composition, which was followed by pro-health commitment (PN4), environment commitment (PN2), and environment protection (PN1). In comparison, PN1, PN2, and PN4 were, respectively, 32%, 8%, and 6% less relevant than PN3. Therefore, a similar level of relevance across the measured indicators is found for the overall score composition in the car group.

Table 31 – Results of the overall personal norm score relative importance analysis for the car commuter group

Code	Dimension	Measure	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
			B	Std. Error	Beta		
Constant	-	-	0.076	0.077	-	0.987	0.324
PN3	Pro-Health	Lifestyle	0.286	0.013	0.333	22.303	0.000
PN4	Pro-Health	Commitment	0.250	0.013	0.314	18.897	0.000
PN2	Pro-Environment	Commitment	0.245	0.014	0.308	17.636	0.000
PN1	Pro-Environment	Protection	0.239	0.016	0.233	15.229	0.000

The same procedure was conducted for the public transport sample. Once again, the measured indicators were found to explain a significant amount of the variance in the overall score ($F(4, 463) = 1,271.97$, $p < 0.01$, $R^2 = 0.96$, $R^2_{Adjusted} = 0.92$). Moreover, all measured indicators were statistically significant in the multiple regression, as shown in Table 32. In this sample, environmental commitment (PN2) was found to be the most relevant for the overall score composition, which was followed by pro-health commitment (PN4), pro-health lifestyle choices (PN3), and environmental protection (PN1). In comparison, PN1, PN3, and PN4 were, respectively, 50%, 45% and 6% less relevant than PN2.

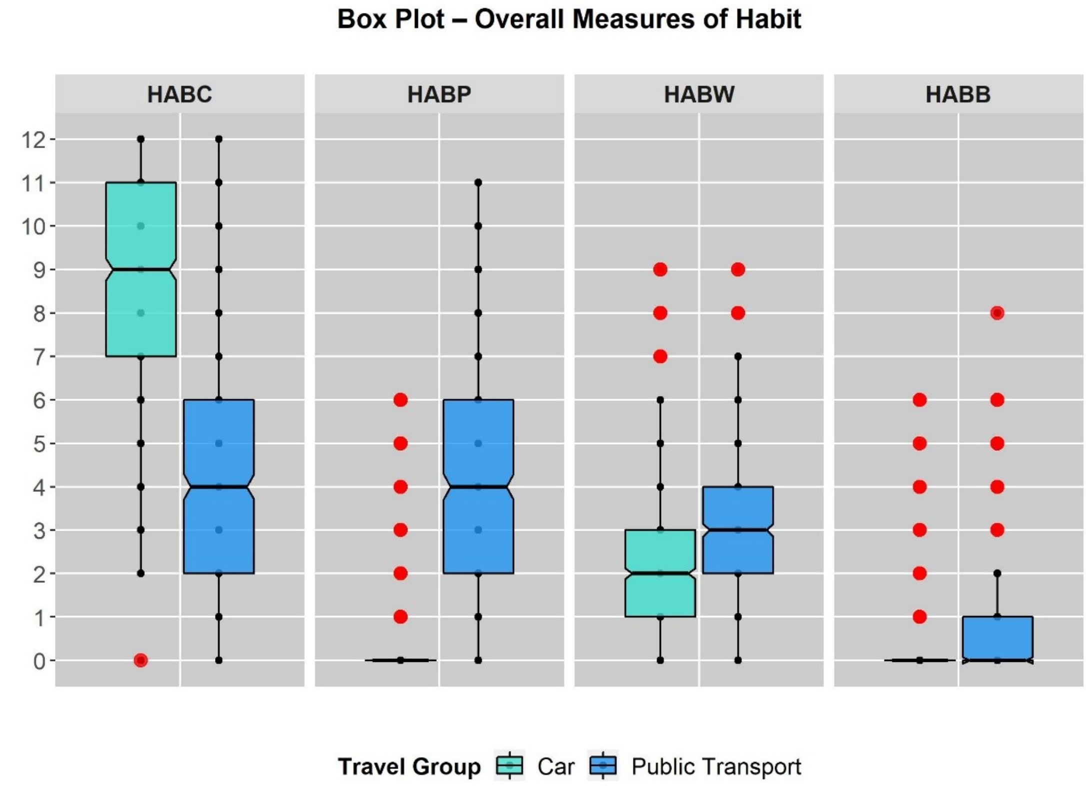
Table 32 – Results of the overall personal norm score relative importance analysis for the public transport commuter group

Code	Dimension	Measure	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
			B	Std. Error	Beta		
Constant	-	-	-0.107	0.093	-	-1.151	0.250
PN2	Pro-Environment	Commitment	0.295	0.016	0.363	18.467	0.000
PN4	Pro-Health	Commitment	0.290	0.016	0.341	18.014	0.000
PN3	Pro-Health	Lifestyle	0.211	0.014	0.251	14.606	0.000
PN1	Pro-Environment	Protection	0.254	0.018	0.241	13.883	0.000

5.1.4.12 Habit towards travel modes

As to offer an alternative to the use of past behavior as a measure of habit, Verplanken et al. (1994) proposed a frequency-response tool consisting of presenting a set of 12 recurring situations and asking respondents to quickly choose a travel mode. Consequently, the more frequent a travel mode is selected, the more habitual it is. In this study, the selected situations were visiting a friend (HAB1), go grocery shopping (HAB2), going to the movies (HAB3), going to the park (HAB4), going to a concert or a play (HAB5), going out to have lunch (HAB6), going to a drugstore (HAB7), going out at night (HAB8), going to a bakery (HAB9), going home (HAB10), commuting to work/school (HAB11), and going to a doctor's appointment (HAB12). For each activity, the respondents were asked to select the first travel mode that came to their mind among 4 options: car, public transport, walking, and cycling. Then, a summated overall score was calculated for each possible choice, which could range from 0 to 12 as shown in Figure 23. In this sense, an overall score of 0 means that the respondent did not select the analysed travel mode for any situation and an overall score of 12 indicates that the participant selected the travel mode for all situations. The frequency descriptive tables for both the overall scores and the measured indicators are shown in the Appendix B.

Figure 23 – Box plot of overall measures of habit strength, by travel mode group



Source: Author (2020)

The first calculated measure was the overall score of car habit (HABC). In the overall sample, the scores range from 0 to 12 situations, from which 75.0% are under 10. Additionally, the mean score is of 7 (SD = 3) situations as well as the median. The sample was divided into 3 groups, namely weak car habit strength (0 to 4), moderate car habit strength (5 to 8), and strong car habit strength (9 to 12). In this sense, 27.5% selected the car for 0 to 4 situations, consequently skewing towards a weak car habit strength. It was followed by 36.6% who chose this option from 5 to 8 times, thus a moderate habit strength, and 35.9% who marked it from 9 to 12, which signals a strong car habit. Moreover, this measure is positively correlated to both commuting by car ($r = 0.67$, $p < 0.01$), car availability ($r = 0.64$, $p < 0.01$), and household income ($r = 0.38$, $p < 0.01$) and negatively correlated to current commute travel mode ($r = -0.67$, $p < 0.01$) and commuting by public transport ($r = -0.67$, $p < 0.01$). Consequently, car commuters (M = 9, SD = 2) have a higher mean score than public transport commuters (M = 94, SD = 3). For instance, HABC was able to correctly classify 82.7% of car commuters and 82.8% of non-car commuters in a discriminant analysis. It also could properly categorize 59.0% of public transport commuters and 79.3% of non-public transport commuters. Likewise, as commuting by car and car availability ($r = 0.75$, $p < 0.01$) and commuting by car and household income ($r = 0.39$, $p < 0.01$) are positively correlated, those who have a car always available ($M = 9$, $SD = 3$) and/or are from upper income households ($M = 9$, $SD = 3$) display higher mean scores than those who have no car available ($M = 4$, $SD = 3$) and/or are from lower income households ($M = 4$, $SD = 3$).

According to the Kruskal-Wallis Test, a significant mean difference is found among the analysed travel groups for this measure (Chi-square = 512.68, p-value < 0.01, df = 1). In the public transport sample, the scores range from 0 to 12, from which 75.0% are under 6. The mean score is of 4 ($SD = 3$) situations as well as the median. In this sense, 59.0% are under thee weak car habit strength category, 34.2% showed moderate car habit strength, and only 6.8% indicated strong car habit strength. The situations in which public transport commuters most selected the car were going out at night (HAB8, 91.7%) and going to a concert or a play (HAB5, 73.9%). In contrast, the car sample shows the strongest overall car habit measure as expected. In the sample, the mean score is 9 ($SD = 2$) as well as the median. In this sense, only 4.9% are within the weak car habit category, while 38.4% are in the moderate category and 56.7% are in the strong car habit category. The situations in which car commuters most selected the car option were also going out at night (96.8%) and going to a concert or a play (HAB8, 91.3%) as well as commuting to work or school (HAB5, 90.5%).

The overall score of public transport habit (HABP) was calculated next. In the overall sample, the scores ranged from 0 to 11 situations, from which 75.0% were under 3. Additionally, the mean score is 2 ($SD = 2$), while the median is 1. Thus, showing an overall weaker habit strength toward using public transport across all travel mode samples. In this sense, 83.0% marked public transport from 0 to 4 times, while 16.3% selected it from 5 to 8 times and only 0.7% chose it from 9 to 11 times. Moreover, the score is positively correlated to current commute travel mode ($r = 0.77$, $p < 0.01$), commuting by public transport ($r = 0.77$, $p < 0.01$), commute travel time ($r = 0.44$, $p < 0.01$) and bus card ownership ($r = 0.41$, $p < 0.01$), while negatively correlated to age ($r = -0.36$, $p < 0.01$), education level ($r = -0.35$, $p < 0.01$), household income ($r = -0.40$, $p < 0.01$), commuting by car ($r = -0.77$, $p < 0.01$) and car availability ($r = -0.67$, $p < 0.01$). In this sense, public transport commuters ($M = 4$, $SD = 2$) have a higher mean score than the car commuter group ($M = 0$, $SD = 1$). However, the habit measure was weak in both instances. On the same note, HABP was able to correctly classify 74.1% of public transport commuters and 90.9% of non-public transport commuters in a discriminant analysis. It also could properly categorize 87.2% of car commuters and 67.0% of non-car commuters. These results are on par with the ones found for HABC.

The Kruskal-Wallis Test revealed a significant mean difference across the analysed travel groups (Chi-square = 657.06, p-value < 0.01, df = 1). As expected from the found correlations, car commuters showed the lowest public transport habit measure across both groups. The scores ranged from 0 to 6, from which 75.0% were null scores. On the same note, the mean was found to be 0 (SD = 1) as well as the median. 98.5% showed weak public transport habit strength, while only 1.5% were categorized as moderate habit strength. The situations in which car commuters most selected public transport were going to a doctor's appointment (HAB12, 9.5%), going to the movies (HAB3, 9.8%) and going to a concert or a play (HAB5, 6.1%). In contrast, public transport commuters showed the highest measures of habit towards public transport. The scores ranged from 0 to 11, from which 75.0% were under 6.0. The mean was 4 (SD = 2) as well as the median. In the sample, 61.3% were in the weak habit category, followed by 37.0% in the moderate category and only 1.7% in the strong category. The situations in which public transport commuters most selected their commute mode were commuting to work or school (85.9%), going home (73.3%) and going to a doctor's appointment (53.4%).

The third calculated overall score concerned the walking habit strength (HABW). In the overall sample, the scores ranged from 0 to 9, from which 75.0% were under 4. The mean was found to be 3 (SD = 2) as well as the median. Therefore, it suggests an overall weak habit strength across the sample. 83.7% of respondents selected walking on 0 to 4 situations, while 16.0% chose it on 5 to 8 and 0.4% on 9 to 12. Moreover, this indicator is negatively correlated to car availability (r = -0.34, p < 0.01). Therefore, those who have a car always available (M = 2, SD = 2) showed lower mean scores than those who do not own a car (M = 4, SD = 2). Consequently, the less the car is available to the respondent, the higher the walking habit strength.

The Kruskal-Wallis Test found a significant mean difference across the analysed travel groups (Chi-square = 82.84, p-value < 0.01, df = 1). In the car sample, the scores range from 0 to 9, from which 75.0% are under 3. The mean was found to be 3 (SD = 2) as well as the median. 88.4% of respondents selected walking from 0 to 4 times, while 11.3% from 5 to 8 times and 0.3%, 9 times. The situations in which car commuters most selected walking were going to a bakery (HAB9, 79.7%), going to a drugstore (HAB7, 68.5%) and going grocery shopping (HAB2, 43.2%). Nonetheless, the public transport sample exhibited similar results. The scores ranged from 0 to 9, from which 75.0% were under 4.0. The mean was found to be 3 (SD = 2) as well as the median. In the sample, 77.1% of respondents selected walking from 0 to 4 times, while 22.4% from 5 to 8 times and 0.4%, 9 times. The situations in which public transport commuters most selected walking were going to a bakery (HAB9, 90.6%), going to a drugstore (HAB7, 79.3%) and going grocery shopping (HAB2, 60.0%).

The last calculated measure was the overall score of cycling habit (HABB). In the overall sample, the scores ranged from 0 to 8, from which 75.0% did not select cycling for any situation. The mean was found to be 0 (SD = 1), as well as the median. In this sense, 98.7% of the sample showed a weak cycling habit strength, while 1.3% displayed moderate habit tendencies. Moreover, this indicator is not significantly correlated to any descriptive variable.

The Kruskal-Wallis Test did not reveal a significant mean difference among the analysed travel groups (Chi-square = 1.73, ns, df = 1). Consequently, both car and public transport samples were expected to show similar response patterns. In the car sample, the scores ranged from 0 to 6, from which 76.6% were null scores. The mean was found to be 0 (SD = 1) as well as the median. In this way, 99.1% of respondents selected cycling from 0 to 4 times, while 0.9% from 5 to 6 times. The situation in which car commuters most selected cycling was going to the park (HAB4, 20.5%). Likewise, in the public transport sample, the scores ranged from 0 to 8, from which 75% were under 1. The mean was of 0 (SD = 1) as well as the median. In the sample, 98.1% chose cycling from 0 to 4 times, while 1.9% from 5 to 8 times. The situation in which public transport commuters most selected cycling was also going to the park (HAB4, 20.5%).

5.2 INTEGRATED FRAMEWORK MODEL

As previously mentioned, the process of validating the proposed theoretical model was based on a two-step confirmatory modelling strategy. The procedure is composed of both confirmatory factor analysis (CFA) and structural equation modelling analysis (SEM). In this sense, CFA measures how well the measured indicators and the preconceived theory represent the data as well as to provide parameters to evaluate the validity of the structural model. Then, SEM analysis involves testing the proposed relationships among the constructs.

In this study, this approach was used to validate the proposed integrated theoretical framework, which is composed of constructs from both marketing and social psychology theories, for the analysed travel modes. The models were also compared in relation to the analysed structural paths between the travel modes of interest. Nonetheless, first the results of an exploratory factor analysis and a reliability analysis are reported as to ensure the suitability of the data collection instrument in reflecting the non-observable or latent constructs as well as its validity for applying the structural equation modelling techniques.

5.2.1 Exploratory Factor Analysis

The exploratory factor analysis (EFA) aims to investigate whether each set of measured indicators is unidimensional, meaning that they can be used only to explain one latent construct and are strongly correlated to each other. Therefore, by forming a single concept, which is represented by a factor in the factor analysis, it provides empirical evidence signaling theoretical soundness for the tested model. In this sense, each observable indicator is expected to load over 0.50, ideally over 0.70, in the factor representing their respective latent construct. For this analysis, the overall sample was divided into the two, previously stated, interest groups: car commuter group and public transport commuter group.

For the car commuter group, the process started by analysing the factorability of the 39-observed indicator variables. First, it was confirmed that all measured indicators correlate over 0.30 with at least one other variable, therefore indicating reasonable factorability. Moreover, the Kaiser-Meyer-Olkin (KMO) measure of sample adequacy was of 0.914, which is above the acceptable value of 0.60. The KMO uses the common variance across the assessed variables as to indicate the sample's adequacy for factor analysis.

Table 33 – Integrated framework exploratory factor analysis results for the car commuter group

Code	Statement	Loading	Cronbach's alpha (std.)
Factor 1: Perceived Value			
PV2	I believe the amount I spend with my current travel mode is adequate	0.849	0.850
PV3	I believe my current travel mode's quality/cost ratio is appropriate	0.820	
PV4	I believe my current travel mode's comfort/cost ratio is appropriate	0.768	
Factor 2: Perceived Quality			
PQ2	My current travel mode enables me to get to my place of work/study easily	0.722	0.823
PQ3	My current travel mode infrastructure suffices my needs	0.786	
PQ4	Usually, I do NOT face inconveniences while using my current travel mode to get to my place of work/study	0.782	
PQ5	My current travel mode enables me to get to my place of work/study safely	0.691	
Factor 3: Travel Satisfaction			
TS1	I feel very hurried – very relaxed	0.777	0.898
TS2	I feel very worried – very confident	0.769	
TS3	I feel very stressed – very calm	0.848	
TS4	I feel very tired – very alert	0.812	
TS5	I feel very bored – very enthusiastic	0.708	
TS6	I feel very fed-up – very engaged	0.770	
Factor 4: Behavioral Intentions and Loyalty			
BI1	I will keep commuting with my current travel mode in the future	0.664	0.788
BI2	I would recommend my current travel mode to others	0.569	
BI3	I feel that my current travel mode is consistent with my lifestyle	0.663	
Factor 5: Attitudes toward Cars			
ATC1	I believe that commuting by car is positive	0.669	0.784
ATC2	I believe that commuting by car is pleasant	0.683	
ATC3	I believe that commuting by car is effective	0.647	
ATC4	I believe that commuting by car is comfortable	0.592	
Factor 6: Social Norms toward Cars			
SNC1	I believe that family and close friends would support me commuting to work/school by car	0.884	0.869
SNC2	I believe that acquaintances and co-workers would support me commuting to work/school by car	0.910	
Factor 7: Personal Norms			
PN1	I feel a personal obligation to protect the environment	0.790	0.814
PN2	I would feel the need to switch travel mode if it would help the environment	0.822	
PN3	I feel a personal obligation to live healthily (food, exercising, etc.)	0.779	
PN4	I would feel the need to switch travel mode if it would help me achieve a healthier lifestyle	0.781	

Variance Explained (69.9%); KMO (0.875);

Bartletts's Test of Sphericity (χ^2 = 18,496.0, d.f. = 325, p-value = 0.000)

Finally, the Bartlett's test of sphericity provided statistical evidence that the analysed correlation matrix is not the identity matrix (χ^2 = 28,652.10, d.f. = 741, p-value = 0.000). Therefore, there is enough evidence to consider a factor analysis. Nevertheless, 13 observed indicators had to be excluded from the analysis as they failed the criteria of having a primary factor loading or a communality of over 0.50. Communality is an estimation of shared variance among the indicators according to the current factor structure. In this sense, a communality lower than 0.50 is not adequate as the variable do not aid variance explaining.

As the main objective of the analysis was to summarize the original information into a smaller number of factors as to validate the studied concepts, principal component analysis was chosen as the factoring method. Additionally, VARIMAX rotation was used as it was expected to provide a simpler and clearer separation of the data structure. After the necessary respecification procedyures, the remaining 26 items resulted in a 7-factor structure representing perceived value, perceived quality, travel satisfaction, behavioral intentions and loyalty, attitudes toward cars, social norms toward cars, and perceived norms (Table 33). Moreover, all observed variables achieved a communality of over 0.50 and no cross-loadings were detected. Overall, the factor structure explained 69.9% of variance, which is a satisfactory result for social sciences. The internal consistency for each factor were examined using Cronbach's alpha. In this sense, all factors resulted in acceptable or good consistency levels. The found results for the exploratory factor analysis suggest that the measured observable indicators represent the studied latent constructs, therefore providing empirical evidence that the data collection instrument offers a valid representation of the theoretical framework for car commuters' group.

Dimensionality was tested for public transport commuters' group through a similar process. First, the factorability of the 39-variable data set was evaluated by examining three measures, namely item-item correlation, the Kaiser-Meyer-Olkin (KMO) measure of sample adequacy and the results of a Bartlett's test of sphericity. Overall, the results indicate that factor analysis can be explored within this sample as all variables showed at least one case of item-item correlation over 0.30, the KMO measure suggests great sampling adequacy (0.945), and the null hypothesis from the Bartlett's Test of Sphericity was refused (χ^2 = 35,917.80, d.f. = 741, p-value = 0.000). Still, 13 observed indicators were excluded from the analysis as they failed to meet the minimum criteria. In other words, having either a primary factor loading or a communality of over 0.50.

Table 34 – Integrated framework exploratory factor analysis results for the public transport group

Code	Statement	Loading	Cronbach's alpha (std.)
Factor 1: Perceived Value			
PV2	I believe the amount I spend with my current travel mode is adequate	0.842	0.873
PV3	I believe my current travel mode's quality/cost ratio is appropriate	0.814	
PV4	I believe my current travel mode's comfort/cost ratio is appropriate	0.708	
Factor 2: Perceived Quality			
PQ3	My current travel mode infrastructure suffices my needs	0.660	0.849
PQ4	Usually, I do NOT face inconveniences while using my current travel mode to get to my place of work/study	0.691	
PQ5	My current travel mode enables me to get to my place of work/study safely	0.719	
PQ6	My current travel mode enables me to get to my place of work/study comfortably	0.536	
Factor 3: Travel Satisfaction			
TS1	I feel very hurried – very relaxed	0.725	0.913
TS2	I feel very worried – very confident	0.724	
TS3	I feel very stressed – very calm	0.812	
TS4	I feel very tired – very alert	0.780	
TS5	I feel very bored – very enthusiastic	0.718	
TS6	I feel very fed-up – very engaged	0.801	
Factor 4: Behavioral Intentions and Loyalty			
BI1	I will keep commuting with my current travel mode in the future	0.764	0.805
BI2	I would recommend my current travel mode to others	0.537	
BI3	I feel that my current travel mode is consistent with my lifestyle	0.709	
Factor 5: Attitudes toward Public Transport			
ATP1	I believe that commuting by public transport is positive	0.559	0.856
ATP2	I believe that commuting by public transport is pleasant	0.775	
ATP3	I believe that commuting by public transport is effective	0.526	
ATP4	I believe that commuting by public transport is comfortable	0.767	
Factor 6: Social Norms toward Public Transport			
SNP1	I believe that family and close friends would support me commuting to work/school by public transport	0.893	0.885
SNP2	I believe that acquaintances and co-workers would support me commuting to work/school by public transport	0.889	
Factor 7: Personal Norms			
PN1	I feel a personal obligation to protect the environment	0.704	0.803
PN2	I would feel the need to switch travel mode if it would help the environment	0.820	
PN3	I feel a personal obligation to live healthily (food, exercising, etc.)	0.782	
PN4	I would feel the need to switch travel mode if it would help me achieve a healthier lifestyle	0.836	

Variance Explained (73.3%); KMO (0.915);

Bartletts's Test of Sphericity (χ^2 = 22,838.7, d.f. = 325, p-value = 0.000)

After the respecification, a principal component factor analysis of the remaining 26 observed indicators was conducted. A 7-factor structure was found, which explained 73.3% of variance. The factors were labelled perceived value, perceived quality, travel satisfaction, behavioral intentions and loyalty, attitudes toward public transport, social norms toward public transport, and personal norms (Table 34). Consequently, it corroborates the notion that the measured observed indicators represent the theoretical framework being analysed for the public transport commuters' group. Moreover, all extracted factors resulted in either good or excellent levels of internal consistency.

Overall, the exploratory factor analysis aimed to investigate the unidimensionality of the sets of measured observable indicators for each sample of interest. Therefore, both the car commuters' group and the public transport commuters' group data resulted in a clearly defined 7-factor structure with, generally, good levels of internal consistency. Thus, providing empirical evidence suggesting that the measured observed indicators represent the studied latent constructs and that the data collection instrument returned a valid representation of the theoretical framework.

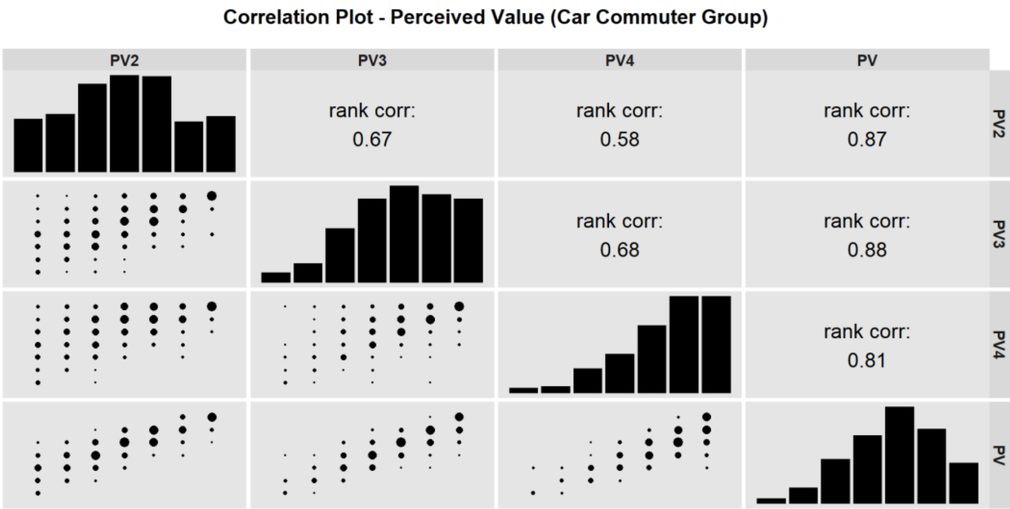
5.2.2 Reliability Analysis

Reliability is the degree to which a set of observed indicators are consistent with the theoretical concepts being measured. Therefore, it indicates internal consistency, meaning that the chosen indicators represent a single construct. It was measured by three different indicators: item-to-total correlation, inter-item correlation, and a reliability coefficient. Summated scale scores were calculated by combining the individual variables representing a construct into a single composite measure. In this sense, item-to-total correlations are expected to exceed 0.50, while inter-item correlations should be at least 0.30 (HAIR et al., 2014). Additionally, the Cronbach's alpha was selected as the reliability coefficient, since it is the most widely used in the literature. As a rule of thumb, it should be greater than 0.70 to be acceptable. In this study, construct reliability was examined according to the exploratory factor analysis results for each interest travel mode group.

5.2.2.1 Car Commuter Group

In the car sample, the exploratory factor analysis extracted a 7-factor structure representing perceived value, perceived quality, travel satisfaction, behavioral intentions and loyalty, attitudes toward cars, social norms toward cars, and perceived norms. The perceived value factor retained the utility and experienced dimensions of the construct, which are namely the perception of value according to the amount spent (PV2), the trade-off between perceived quality and cost (PV3) and the trade-off between comfort and cost (PV4). Additionally, for these variables, a new overall median score was calculated (PV). Then, the reliability analyses were conducted. First, all measured indicators were found to correlate strongly to the overall median score (Figure 24). Therefore, none of the evaluated indicators displayed an inconsistent behavior to the other measures of perceived value. However, the found inter-item correlations were moderate (0.50 to 0.69), while moderate-to-low correlations were expected (0.30 to 0.49). Thus, indicating that a degree of redundancy can be found among the items. Nonetheless, the main criteria, which is to exceed 0.30, was complied. Finally, the item reliability test returned a Cronbach's alpha of 0.850, indicating a good level of internal consistency. In this sense, the indicators are expected to measure a single unidimensional latent construct.

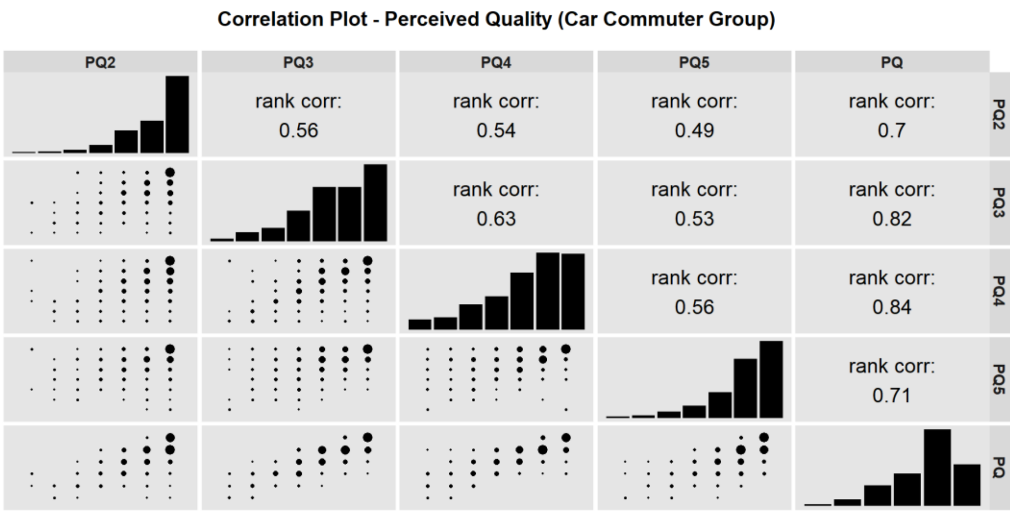
Figure 24 – Correlation plot of perceived value for the car commuter group



Source: Author (2020)

The perceived quality factor is composed of four dimensions: accessibility (PQ2), tangible infrastructure (PQ3), problem experience (PQ4), and safety (PQ5). Moreover, an overall median score was calculated for these measured indicators (PQ). In this sense, all measured items correlated strongly to the overall median score (Figure 25). Once more, no item showed an inconsistent behavior to the other measures of the latent construct. Additionally, as found for perceived value, the inter-item correlations were also found to be mostly moderate (0.50 to 0.69). Thus, suggesting the existence of some redundancy among the indicators. Finally, Cronbach's alpha for the 4 measured items was 0.823. Therefore, indicating a good level of internal consistency and that the items are likely to measure a single unidimensional latent construct.

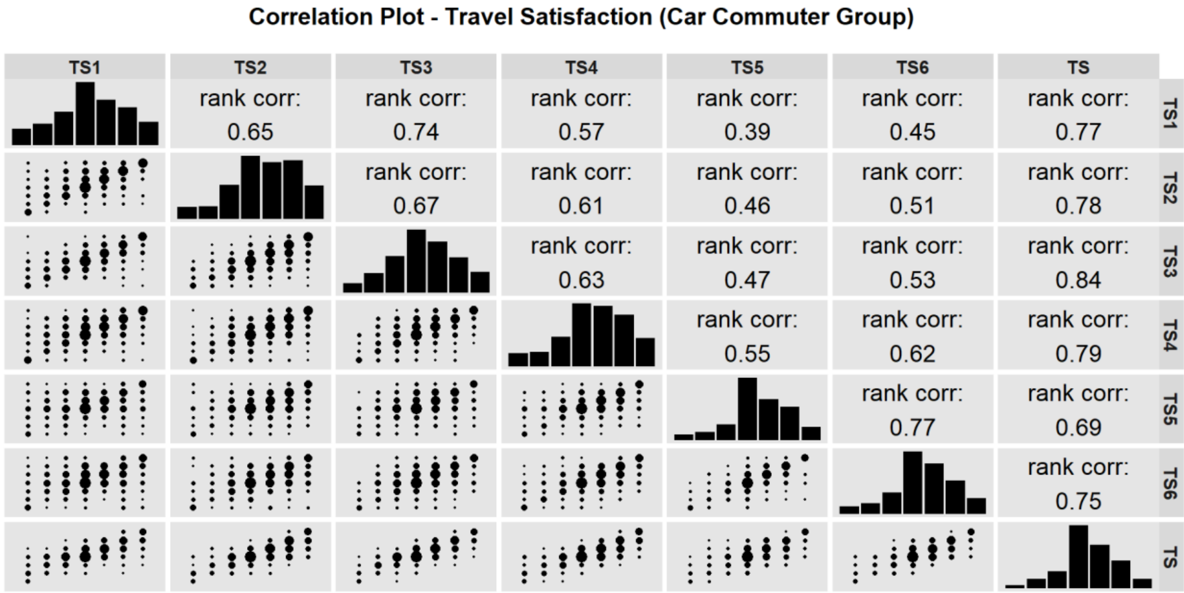
Figure 25 – Correlation plot of perceived quality for the car commuter group



Source: Author (2020)

The travel satisfaction factor extracted only the items representing affective dimensions, which are valence and arousal emotions. Valence indicators vary between negative activation and positive deactivation, which are very hurried to very relaxed (TS1), very worried to very confident (TS2), and very stressed to very calm (TS3). Arousal indicators are defined by negative deactivation to positive activation, including very tired to very alert (TS4), very bored to very enthusiastic (TS5), and very fed up to very engaged (TS6). For the reliability analysis, an overall median score was calculated for the 6 measured indicators (TS). In this sense, all items correlated strongly to it, as seen in Figure 26. Therefore, none of the items diverged from the average behavior exhibited by the other variables measuring travel satisfaction. Once more, most inter-correlations were found to be moderate (0.50 to 0.69). Nonetheless, a strong correlation was found between TS1 and TS3 ($r = 0.74$, $p < 0.01$) and TS5 and TS6 ($r = 0.77$, $p < 0.01$). Therefore, these items are likely to have measured very similar ideas. On the other hand, the item reliability test returned a Cronbach's alpha of 0.898, indicating a good level of internal consistency. Consequently, the items are expected to consistently represent a single unidimensional latent construct.

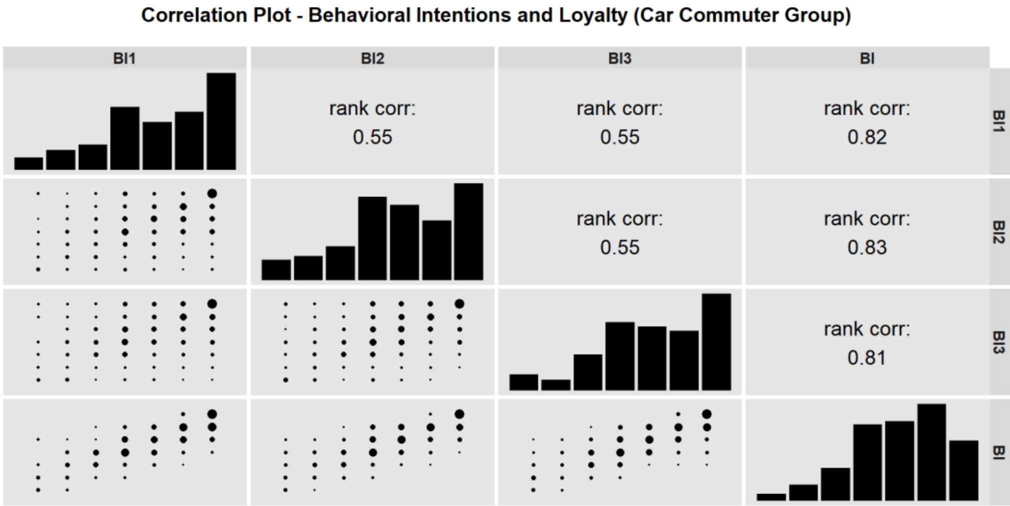
Figure 26 – Correlation plot of travel satisfaction for the car commuter group



Source: Author (2020)

The fourth factor represented behavioral intentions and loyalty, which is composed of three dimensions: willingness to re-use (BI1), willingness to recommend (BI2), and involvement (BI3). As the factor extracted all the original measured indicators, it was not needed to calculate a new overall median score. In this sense, all measured indicators correlated strongly to it (Figure 27). In this sense, no item showed an inconsistent behavior to the other measures of the latent construct. However, once more, the inter-correlations were found to have moderate strength ($r = 0.55$, $p < 0.01$). It implies the existence of some redundancy among the variables. Moreover, the Cronbach's alpha was found to be 0.788, thus indicating acceptable levels of internal consistency. Therefore, it can be expected that the indicators are consistently measuring a single unidimensional latent construct.

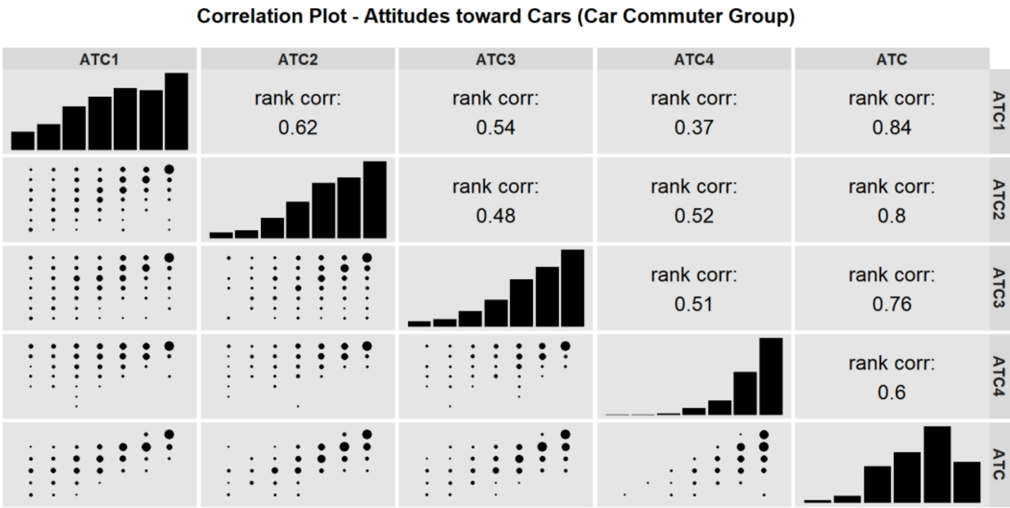
Figure 27 – Correlation plot of behavioral intentions and loyalty for the car commuter group



Source: Author (2020)

The fifth extracted factor represented attitudes toward cars, which was composed by four dimensions: positiveness (ATC1), pleasantness (ATC2), effectiveness (ATC3), and comfort (ATC4). For the reliability analysis, an overall median score was calculated (ATC) to which all measured indicators correlated over the minimum threshold of 0.50 (Figure 28).

Figure 28 – Correlation plot of attitudes toward cars for the car commuter group

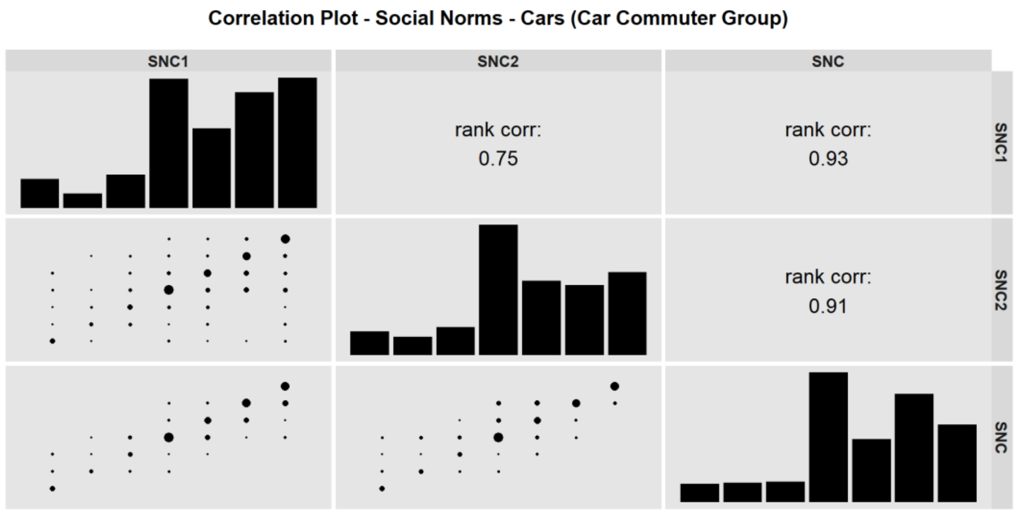


Source: Author (2020)

Therefore, none of the items diverged from the average behavior exhibited by the other variables measuring attitudes toward cars. Moreover, the inter-correlations were mostly moderate (0.50 to 0.69). Once more, suggesting the existence of some redundancy among the indicators. Finally, the Cronbach's alpha was found to be 0.784, indicating an adequate level of internal consistency. Consequently, the items are expected to consistently measure a single unidimensional latent construct.

The sixth measured factor concerned social norms toward cars, which was composed of two dimensions: perceived social pressure originating from strong personal relationships or ties, such as family and close friends (SNC1) and perceived social pressure related to weak personal relationships or ties, such as acquaintances and co-workers (SNC2). For the reliability analysis, an overall median score was also calculated (SNC) to which all measured indicators correlated strongly (Figure 29). Thus, no item showed an inconsistent behavior to the other measures of the latent construct. Nonetheless, a strong correlation was found between SNC1 and SNC2 ($r = 0.75$, $p < 0.01$), which indicates that statistically both measures are likely to represent similar ideas. Moreover, the Cronbach's alpha was found to be 0.869, indicating a good level of internal consistency. Therefore, the items are expected to consistently measure a single unidimensional latent construct.

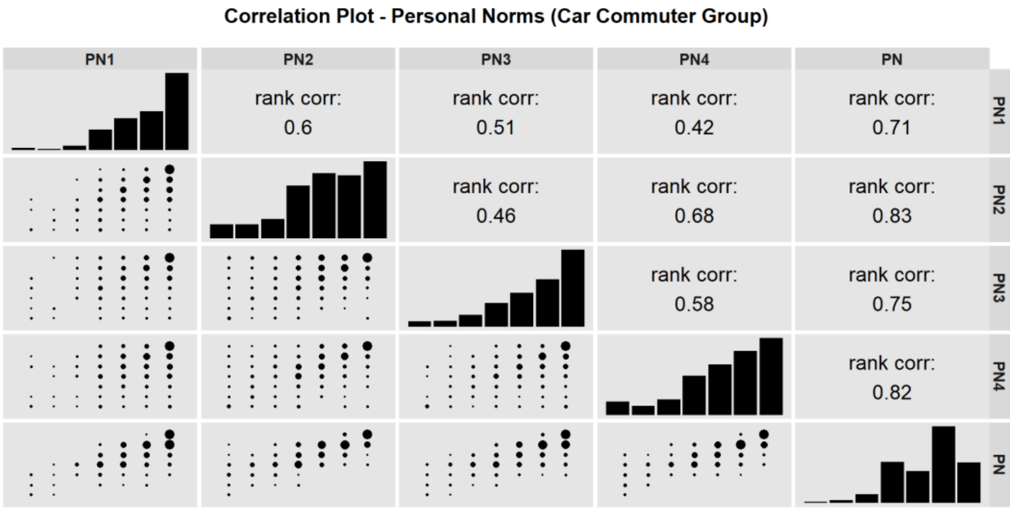
Figure 29 – Correlation plot of social norms toward cars for the car commuter group



Source: Author (2020)

The seventh, and final, extracted factor represented personal norms, which was composed of two dimensions: pro-environment (PN1 and PN2) and pro-health (PN3 and PN4) attitudes. As all measured indicators loaded highly on the factor, it was not needed to calculate a new overall median score. All item-to-total correlations were strong (Figure 30). Thus, it can be implied that none of the items diverged from the average behavior exhibited by the other variables measuring personal norms. Moreover, the inter-correlations were found to have moderate strength (0.50 to 0.69). Thus, indicating that a degree of redundancy can be found among the items. Finally, the Cronbach's alpha was found to be 0.814, which suggests a good level of internal consistency. Consequently, the items are expected to consistently measure a single unidimensional latent construct.

Figure 30 – Correlation plot of personal norms for the car commuter group



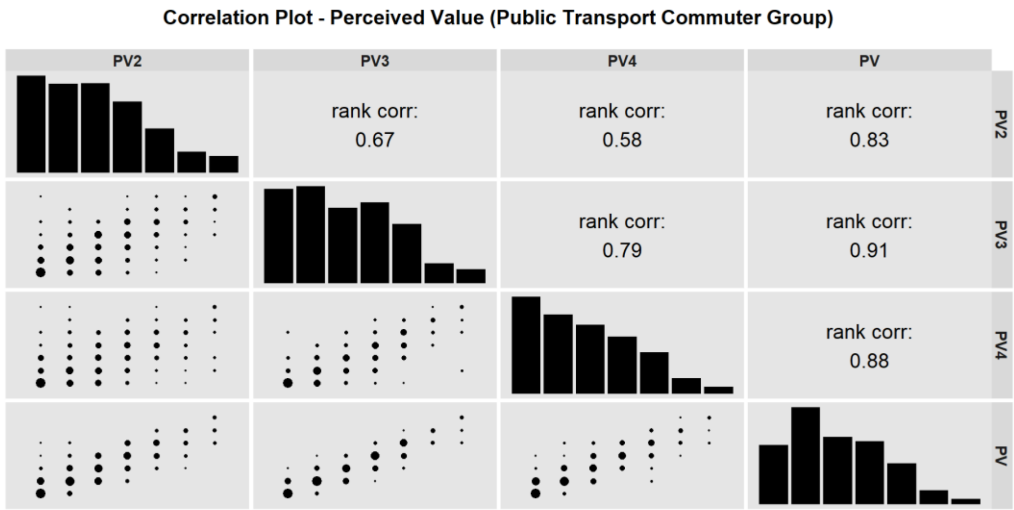
Source: Author (2020)

5.2.2.2 Public Transport Commuter Group

In the public transport group, the 7 factor-structure was labelled as perceived value, perceived quality, travel satisfaction, behavioral intentions and loyalty, attitudes toward public transport, social norms toward public transport, and personal norms. The same three reliability tests conducted for the car group were replicated to this sample.

The first factor represented perceived value, which was composed of three measured indicators related to the perception of value according to the amount spent (PV2), the trade-off between perceived quality and cost (PV3) and the trade-off between comfort and cost (PV4). In this sense, it covered both utility (PV2 and PV3) and experienced (PV4) dimensions of perceived value. For the reliability analysis, a new overall median score was calculated as to perform the item-to-total test. The three items correlated strongly to it, as seen in Figure 31. Therefore, no item showed an inconsistent behavior to the other measures of the latent construct. On the other hand, the inter-item results were not as appropriate to attest no-item redundancy. For instance, a strong correlation was found between PV3 and PV4 (r = 0.79, $p < 0.01$), thus indicating that the two items could have been interpreted similarly by the sample. Moreover, the Cronbach's alpha was found to be 0.873. It suggests a good level of internal consistency, which is further evidence that the items measure a single unidimensional latent construct.

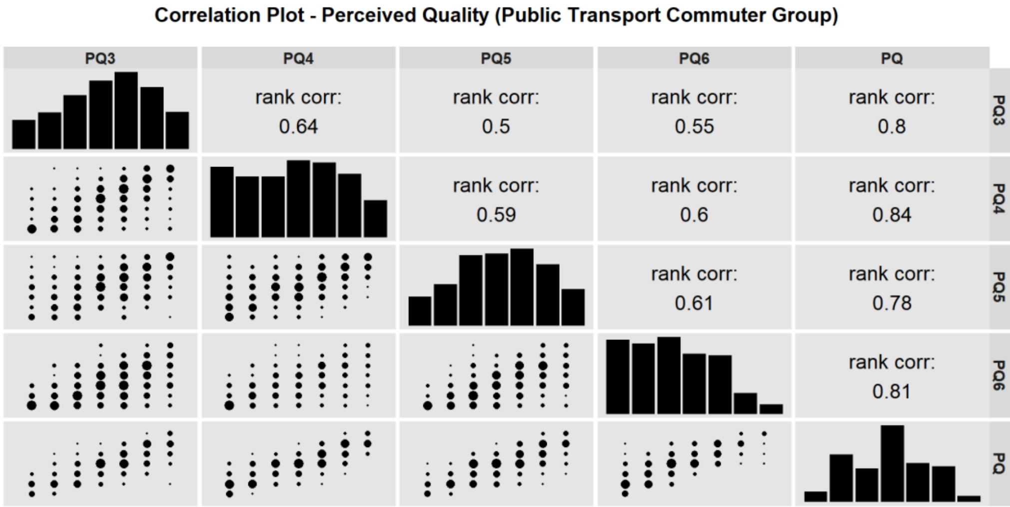
Figure 31 – Correlation plot of perceived value for the public transport commuter group



Source: Author (2020)

The second extracted factor was labelled as perceived quality, which contained indicators measuring tangible infrastructure (PQ3), problem experiencing (PQ4), safety (PQ5) and comfort (PQ6) aspects of the latent construct. For the reliability analysis, a new overall median score was calculated to which all items correlated strongly (Figure 32). Consequently, none of the items deviated from the average behavior shown by the other variables measuring perceived quality. However, all inter-item correlations were found to have moderate strength (0.50 to 0.69). Therefore, the finding suggests that there is a degree of redundancy among the collected variables. Finally, the Cronbach's alpha was of 0.849, indicating a good level of internal consistency. In this sense, it gives further evidence that the measured items represent a single unidimensional latent construct.

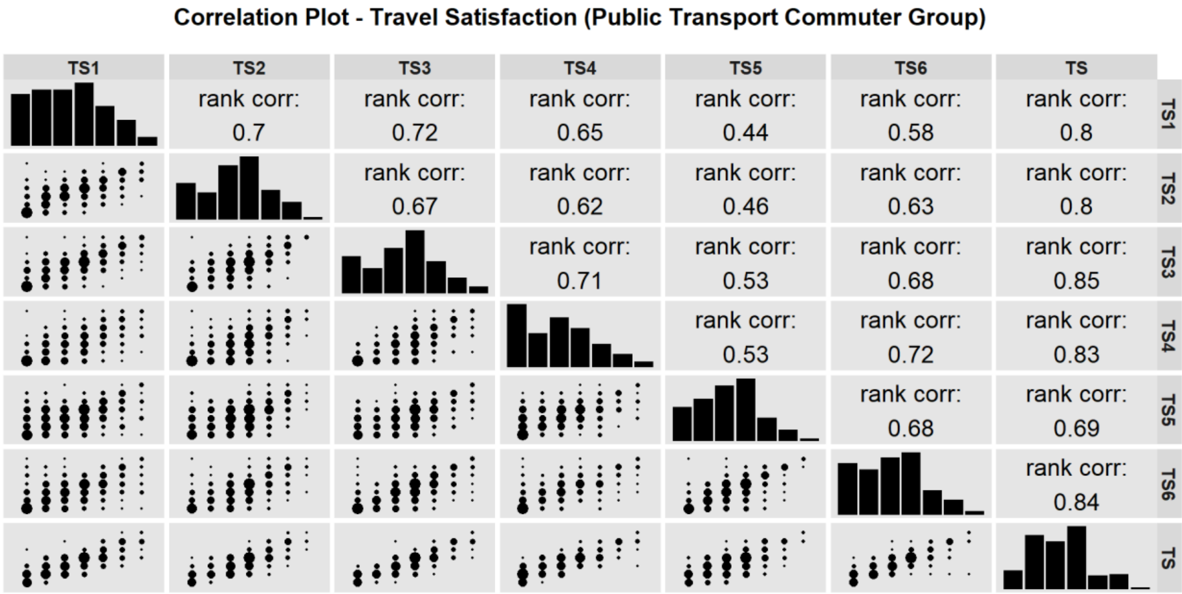
Figure 32 – Correlation plot of perceived quality for the public transport commuter group



Source: Author (2020)

The third factor concerned travel satisfaction. It was composed of items representing affective dimensions, namely valence and arousal emotions. Valence measures were very hurried to very relaxed (TS1), very worried to very confident (TS2), and very stressed to very calm (TS3), thus ranging from negative activation to positive deactivation. Arousal indicators included very tired to very alert (TS4), very bored to very enthusiastic (TS5), and very fed up to very engaged (TS6), consequently varying between negative deactivation to positive activation. For the item-to-total test, a new overall median score was calculated to which all variables correlated moderately to strongly, thus complying with the lower-limit threshold of 0.50 (Figure 33). On the other hand, moderate-to-low (0.30 to 0.49), moderate (0.50 to 0.69), and strong (0.70 to 0.89) inter-item correlations were found. In this sense, the latter two categories suggest some item redundancy in the scale. Moreover, the Cronbach's alpha was of 0.913, which suggests an excellent level of internal consistency. Once more, it indicates that the items measure a single unidimensional latent construct.

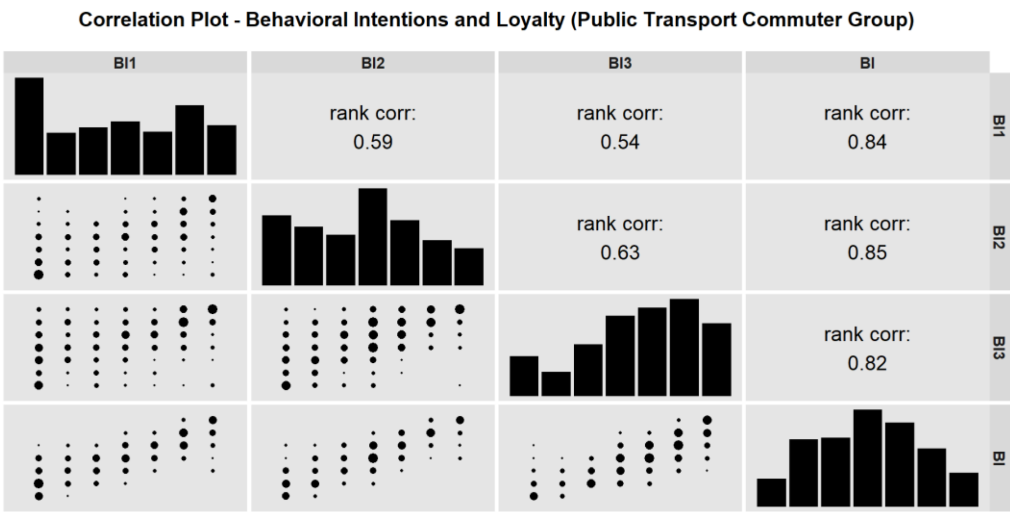
Figure 33 – Correlation plot of travel satisfaction for the public transport commuter group



Source: Author (2020)

The fourth factor concerned behavioral intentions and loyalty, which was composed of items measuring willingness to re-use (BI1), willingness to recommend (BI2), and involvement (BI3). For the reliability analyses, all variables correlated strongly to the overall median score (Figure 34).

Figure 34 – Correlation plot of behavioral intentions and loyalty for the public transport commuter group

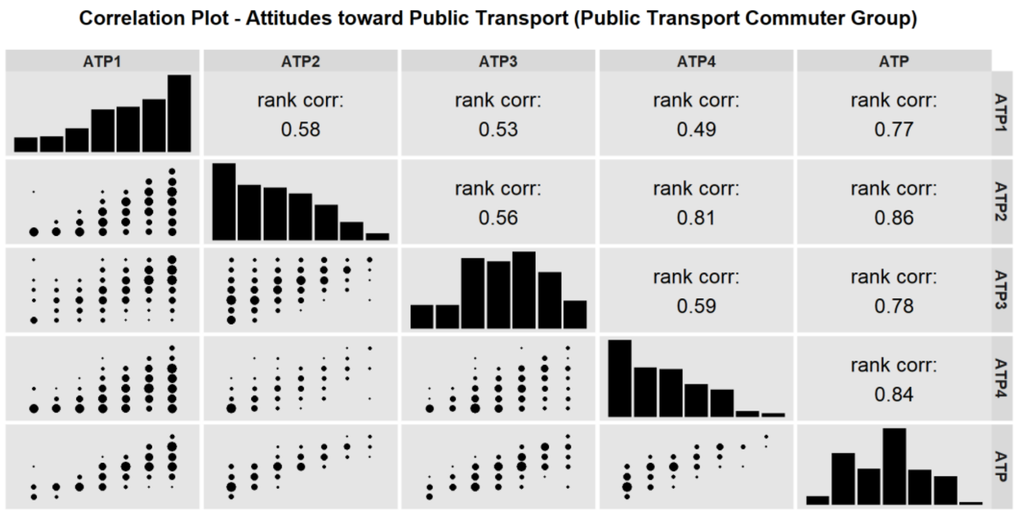


Source: Author (2020)

Therefore, indicating that no item presented an inconsistent behavior to the other measures of the latent construct. Nonetheless, the inter-item correlations were found to be moderate (0.50 to 0.69). In this sense, it suggests at least some redundancy in the measures. The Cronbach's alpha was found to be 0.805, which indicates a good level of internal consistency. As found for the previous latent constructs, the measured items are likely to represent a single unidimensional latent construct.

The fifth extracted factor represented attitudes towards public transport. In this sense, the factor comprised measures concerning positiveness (ATP1), pleasantness (ATP2), effectiveness (ATP3), and comfort (ATP4). As to perform the item-to-total test, a new overall median score was calculated. Therefore, all variables correlated strongly to it, as seen in Figure 35. Therefore, no item showed an inconsistent behavior to the other measures of the latent construct. Nonetheless, the inter-item correlations were mostly moderate (0.50 to 0.69), thus suggesting some level of redundancy among the measured indicators. For instance, the correlation between pleasantness (ATP2) and comfort (ATP4) was found to be the most critical as it was strong ($r = 0.81$, $p < 0.01$). Finally, the Cronbach's alpha was of 0.856, thus a good level of internal consistency. Consequently, it indicates that the variables measure a single unidimensional latent construct.

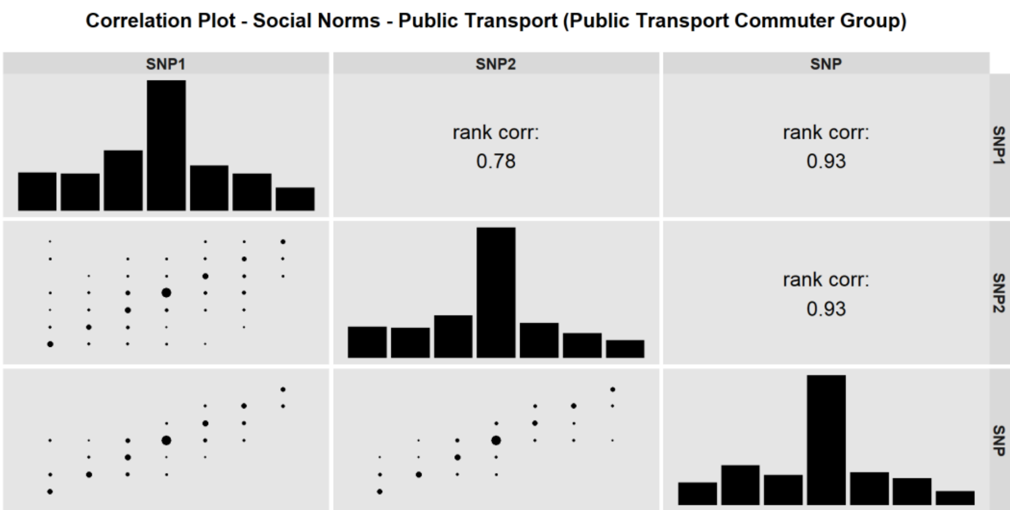
Figure 35 – Correlation plot of attitudes toward public transport for the public transport commuter group



Source: Author (2020)

The sixth factor was labelled social norms toward public transport. It was composed of indicators measuring perceived social pressure originating from strong personal relationships or ties, such as family and close friends (SNP1) and perceived social pressure related to weak personal relationships or ties, such as acquaintances and co-workers (SNP2). For the item-to-total test, a new overall median score was calculated to which all variables correlated strongly, as seen in Figure 36. Therefore, no variable showed an inconsistent behavior in relation to the other measures of the latent construct. On the other hand, the inter-item correlation was found to be strong ($r = 0.78$, $p < 0.01$). It implies that there is some redundancy among the collected indicators. Moreover, the Cronbach's alpha was found to be 0.885, which reflects a good level of internal consistency and that the variables are likely to measure a single unidimensional latent construct.

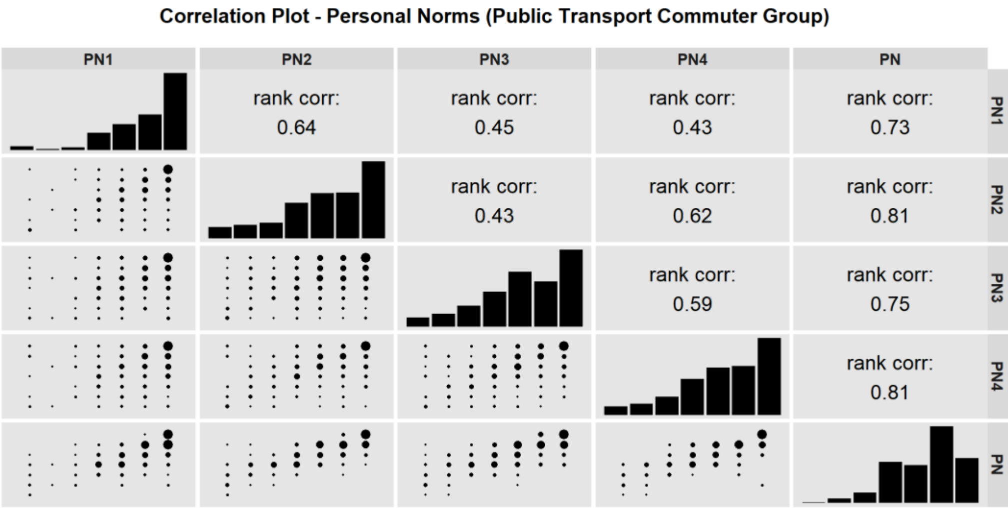
Figure 36 – Correlation plot of social norms toward public transport for the public transport commuter group



Source: Author (2020)

The seventh and final extracted factor concerned personal norms, which was measured by pro-environmental (PN1 and PN2) and pro-health (PN3 and PN4) attitudes. For the item-to-total test, all variables correlated strongly to the overall median correlation analysis (Figure 37), implying that no item showed an inconsistent behavior to the other measures of the latent construct. Moreover, inter-item correlations were found to be both moderate to low (0.30 to 0.49) and moderate (0.50 to 0.69). Therefore, it suggests that at least some redundancy can be found among the indicators. Finally, the Cronbach's alpha was 0.803, which translates into a good level of internal consistency. Consequently, it indicates that the items are measuring a single unidimensional latent construct.

Figure 37 – Correlation plot of personal norms for the public transport commuter group



Source: Author (2020)

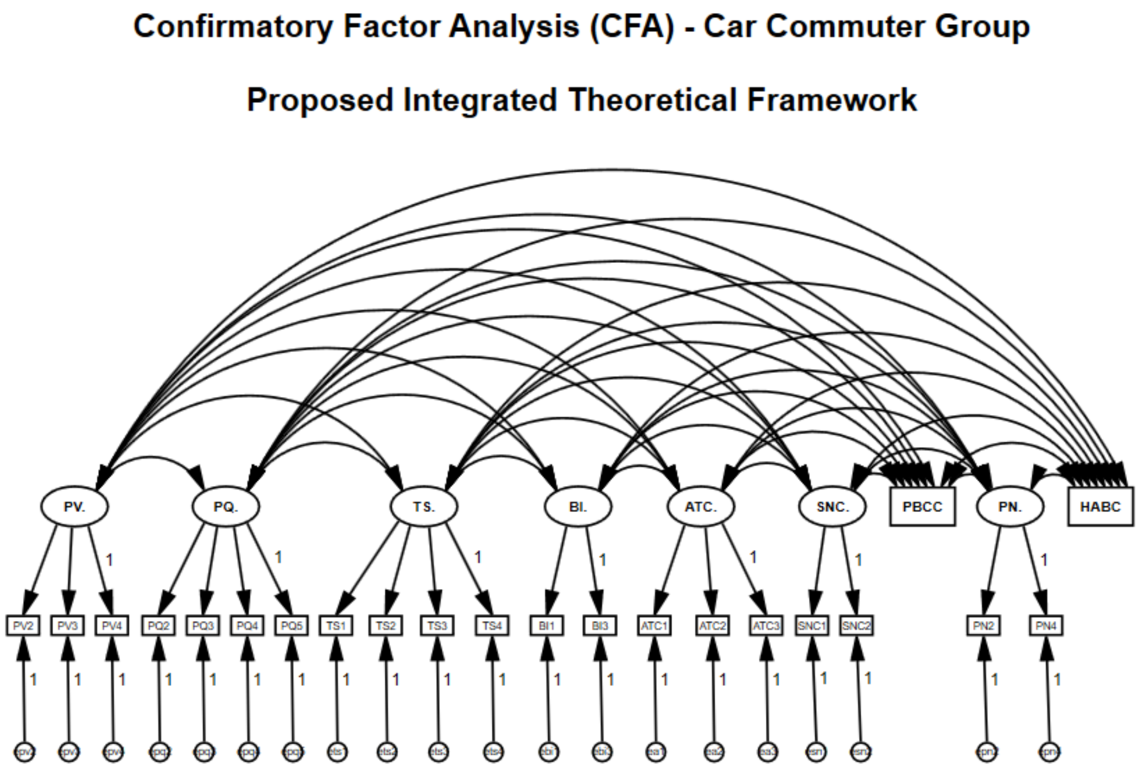
5.2.3 Confirmatory Factor Analysis

Building upon the previously reported descriptive analysis, exploratory factor analysis, relative importance analysis and reliability analysis, a confirmatory factor analysis was conducted for each travel mode group in relation to the proposed integrated theoretical framework. The main purpose of the analysis was to validate the measurement model by testing how well the proposed observed variables represent the latent constructs and by gathering statistical evidence as to confirm or reject it.

5.2.3.1 Car Commuter Group

In the car group, a path diagram was built in IBM SPSS AMOS 24 to test the measurement model of the proposed integrated theoretical framework. It was initially designed based on the previously reported exploratory factor analysis, however it was respecified as to achieve better model fit. A path diagram is a visual representation of the measurement theory, which is composed of the latent constructs, the observed variables, the item loadings on specific constructs, the relationships among the constructs, and the error terms for each indicator. As shown in Figure 38, latent constructs are drawn as ellipses and the observed variables as rectangles to which error terms are attached. Error terms are a measure of how much of the observed variables the latent factors are not explaining. The factor loadings are represented by arrows going from the latent construct to the observed variable, while correlational relationships are illustrated by two-headed curved arrows. Also, as to set the scale of the measurement one of the factor loadings in each construct is set to 1. Additionally, the path diagram was designed to be congeneric, therefore all within or between construct error variances were fixed at zero. Prior to running the analysis the identification of the latent constructs and of the measurement model was reviewed.

Figure 38 – Car commuter group confirmatory factor analysis path diagram for the proposed integrated theoretical framework



Source: Author (2020)

Identification refers to weather the model has enough information to find a solution both at the latent construct and model levels. This condition depends on the number of distinct sample moments being higher than the number of parameters to be estimated, which can be assessed by the degrees of freedom. In this sense, there are three levels of identification: underidentified (no degrees of freedom), just-identified (df

= 0), and overidentified (df > 0). In general, an overidentified model composed of overidentified and just-identified latent constructs should be the goal. The final car group model was found to be overidentified (df = 175), while perceived quality and travel satisfaction are overidentified, perceived value and attitudes toward cars are just-identified, and behavioral intentions and loyalty, social norms toward cars and personal norms are underidentified.

Table 35 – Integrated framework confirmatory factor analysis results for the car commuter group

Factor	Variable	Dimension	Measure	Factor Loading
Perceived Value	PV2	Utility	Amount Spent	0.734
	PV3		Quality/Cost Ratio	0.892
	PV4	Experience	Comfort/Cost Ratio	0.803
Perceived Quality	PQ2	Availability	Accessibility	0.707
	PQ3	Comfort and Convenience	Tangible Infrastructure	0.825
	PQ4		Problem Experiences	0.820
	PQ5		Safety	0.679
Travel Satisfaction	TS1	Valence Emotions	Very hurried - Very relaxed	0.854
	TS2		Very worried - Very confident	0.801
	TS3		Very stressed - Very calm	0.880
	TS4	Arousal Emotions	Very tired - Very alert	0.744
Behavioral Intentions and Loyalty	BI1	Cognitive	Willingness to re-use	0.726
	BI3	Affective	Involvement	0.784
Attitudes toward Cars	ATC1	Experience	Positiveness	0.787
	ATC2	Experience	Pleasantness	0.750
	ATC3	Utility	Effectiveness	0.663
Social Norms - Cars	SNC1	Relationships	Strong Ties	0.967
	SNC2	Relationships	Weak Ties	0.822
Personal Norms	PN2	Pro-Environment	Commitment	0.831
	PN4	Pro-Health	Commitment	0.769

The sample was tested for outliers by examining the Mahalanobis distance and the associated p-values, which were compared to the threshold value of 0.001. In this sense, p-values lower than 0.001 are an indicative of an outlier distribution and, therefore, the observations were excluded from the analysis. The remaining 630 observations are enough to fulfill the minimum sample size guideline proposed by Hair et al. (2014). Additionally, it results in a 31:1 observation-parameter ratio, which is over the desired value of 15:1 as to reduce problems originating from deviations from multivariate normality. As there is no missing data in the sample, the confirmatory factor analysis was conducted using a variance-covariance matrix with maximum likelihood estimation (MLE).

As displayed in Table 35, all factor loadings are at least over 0.50, while 90% of the variables showed a loading over the ideal threshold of 0.70. Thus, it confirms that the observed variables are strongly related to their assigned latent construct. Moreover, no illogical standardized parameters or Heywood cases (negative error variance) were found. The next step was to examine construct validity as to determine the extent to which the set of observed variables represent the latent constructs they are intended to measure. It was measured by convergent and discriminant validity. Convergent validity is the degree to which measures intending to measure the same construct are related. It can be demonstrated when the average extracted variance (AVE) is at least 0.50 and when the composite reliability (CR) is over 0.70 (FORNELL; LARCKER, 1981). In this sense, the criteria was complied by all latent constructs in car group. Discriminant validity captures the extent to which each construct is unique. It is calculated by comparing the AVE values for any two constructs to the correlation found between them (ENDERS; BANDALOS, 2001). In the sample, discriminant validity for behavioral intentions and loyalty and attitudes toward cars could not be attested as shown in Table 36.

Table 36 – Integrated framework convergent and discriminant validity results for the car commuter group

	CR	AVE	MSV	MaxR(H)	SNC	PV	PQ	TS	BI	ATC	PN
SNC	0.892	0.805	0.287	0.943	**0.897**	-	-	-	-	-	-
PV	0.853	0.660	0.308	0.873	0.229	**0.812**	-	-	-	-	-
PQ	0.845	0.578	0.323	0.858	0.281	0.555	**0.761**	-	-	-	-
TS	0.892	0.675	0.197	0.902	0.165	0.345	0.444	**0.821**	-	-	-
BI	0.727	0.571	0.602	0.730	0.471	0.529	0.530	0.317	**0.756**	-	-
ATC	0.778	0.540	0.602	0.787	0.536	0.441	0.568	0.415	0.776	**0.735**	-
PN	0.781	0.641	0.160	0.786	-0.223	-0.241	-0.098	-0.110	-0.400	-0.396	**0.801**

Notes: CR = Composite Reliability; AVE = Average Variance Extracted; MSV = Maximum Shared Variance; MaxR(H) = McDonald Construct Reliability. The square root of AVE is shown on the diagonal in bold faces.

Finally, the measurement model validity was evaluated by absolute fit indices, incremental fit indices and parsimony fit indices as reported in Table 37. In this sense, the chi-square statistic was the only indicator to not meet the desired threshold.

However, as it is influenced by sample size and tends to penalize model complexity (HAIR et al., 2014), it makes it harder to achieve a statistically insignificant goodness-of-fit. However, as the other indices complied with the guidelines, the results for the chi-square statistic are not expected to be detrimental to the overall validity of the measurement model. Therefore, as the model shows sufficient validity, the structural model analysis (SEM) can be performed.

Table 37 – Integrated framework measurement model validity analysis for the car commuter group

Model-Fit Indices	Indicators	Source	Threshold Value	CFA Model
Absolute Fit Indices				
Chi-Square Statistic	CMIN	HAIR et al. (2014)	*	393.96**
Goodness-of-Fit Index	GFI	Hu and Bentler (1999)	≥ 0.90	0.946
Root Mean Square Error of Approximation	RMSEA	Hair et al. (2014)	≤ 0.08	0.045
Standardized Root Mean Square Residual	SRMR	Hair et al. (2014)	≤ 0.08	0.038
Normed Chi-Square	CMIN/DF	Byrne (2013)	< 5.0	2.251
Incremental Fit Indices				
Normed Fit Index	NFI	Awang (2015)	≥ 0.90	0.942
Tucker-Lewis Index	TLI	Hair et al. (2014)	≥ 0.90	0.956
Comparative Fit Index	CFI	Hu and Bentler (1999)	≥ 0.90	0.967
Parsimony Fit Indices				
Adjusted Goodness-of-Fit Index	AGFI	Chau (1997)	≥ 0.80	0.922

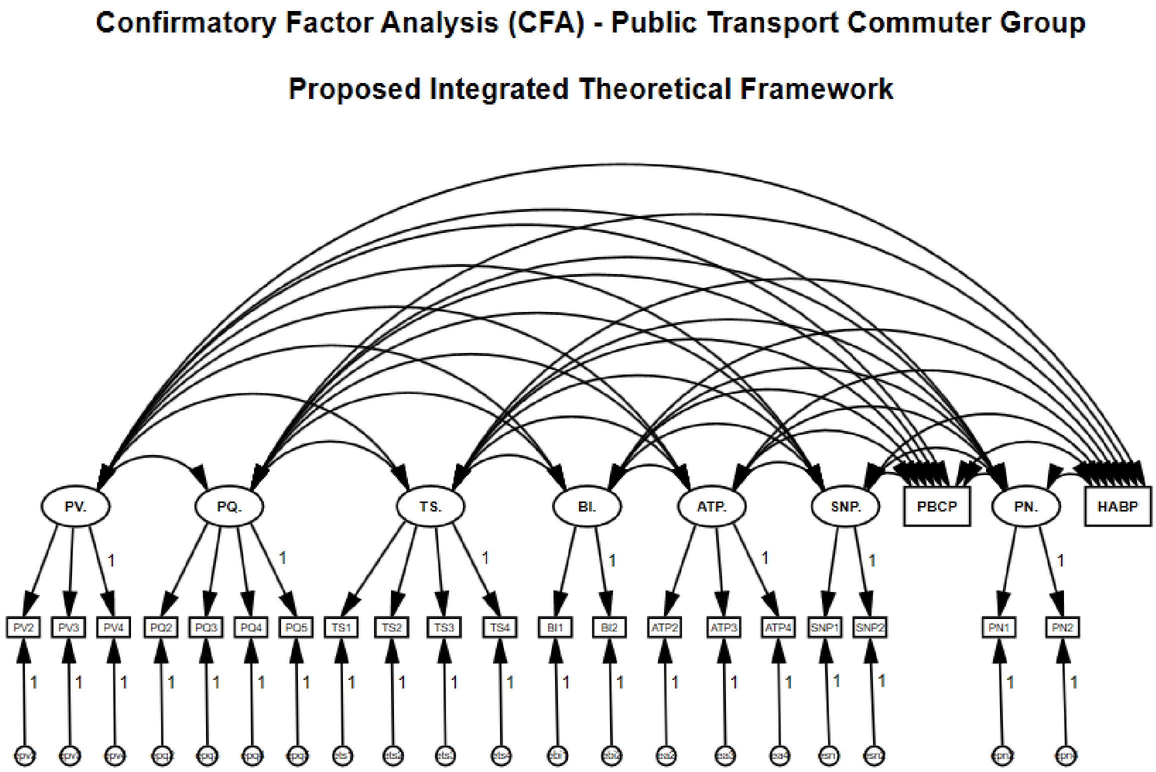
Notes: * p-value should be statistically insignificant (p-value ≥ 0.05); ** p-value < 0.01.

5.2.3.2 Public Transport Commuter Group

As for the car sample, a confirmatory factor analysis was conducted to test and validate the measurement model of the proposed integrated theoretical framework for the public transport sample. Therefore, a congeneric path diagram, initially based on the previous exploratory factor analysis and then respecified as to increase model fitness, was built in IBM SPSS AMOS 24, as shown in Figure 39. In relation to identification, perceived quality and travel satisfaction are also overidentified, perceive value and attitudes toward public transport are just-identified, and behavioral intentions and loyalty, social norms toward public transport and personal norms are underidentified. Overall, the model is overidentified (df = 175).

The sample was also tested for multivariate outliers by investigating the Mahalanobis distance and the associated p-values, which were compared to a threshold of 0.001. P-values lower than this threshold are indicative of an outlier distribution and were excluded from the analysis. Nevertheless, the remaining 436 observations were enough to fulfill the minimum sample guidelines proposed by Hair et al. (2014). Moreover, the observation- parameter ratio was calculated, which was found to be 22:1. Thus, higher than the desired value of 15:1 as to reduce problems originating from deviations from multivariate normality. As there is no missing data, the confirmatory factor analysis was conducted using a variance-covariance matrix with maximum likelihood estimation (MLE).

Figure 39 – Public transport commuter group confirmatory factor analysis path diagram for the proposed integrated theoretical framework



Source: Author (2020)

As shown in Table 38, all factor loadings were over the threshold value of 0.50 indicating that the observed variables are strongly related to their respective latent constructs. For instance, 95% of the variables resulted in a loading over the ideal threshold of 0.70. Moreover, no illogical standardized parameters or Heywood cases (negative error variance) were found.

Table 38 – Integrated framework confirmatory factor analysis results for the public transport commuter group

Factor	Variable	Dimension	Measure	Factor Loading
Perceived Value	PV2	Utility	Amount Spent	0.734
	PV3		Quality/Cost Ratio	0.912
	PV4	Experience	Comfort/Cost Ratio	0.884
Perceived Quality	PQ2	Availability	Accessibility	0.738
	PQ3	Comfort and Convenience	Tangible Infrastructure	0.780
	PQ4		Problem Experiences	0.802
	PQ5		Safety	0.711
Travel Satisfaction	TS1	Valence Emotions	Very hurried - Very relaxed	0.847
	TS2		Very worried - Very confident	0.821
	TS3		Very stressed - Very calm	0.865
	TS4	Arousal Emotions	Very tired - Very alert	0.819
Behavioral Intentions and Loyalty	BI1	Cognitive	Willingness to re-use	0.643
	BI2		Willingness to recommend	0.965
Attitudes toward Cars	ATP2	Experience	Pleasantness	0.880
	ATP3	Utility	Effectiveness	0.714
	ATP4	Experience	Comfort	0.889
Social Norms - Cars	SNP1	Relationships	Strong Ties	0.930
	SNP2	Relationships	Weak Ties	0.908
Personal Norms	PN1	Pro-Environment	Environment Protection	0.804
	PN2		Commitment	0.777

Convergent validity was examined by assessing the average extracted variance (AVE) and the composite reliability (CR) of the analysed latent constructs. As a rule-of-thumb, the AVE should be at least over 0.50 and the CR over 0.70 (FORNELL; LARCKER, 1981). In this sense, both criteria were complied, thus suggesting that the observed indicators converge into single unidimensional constructs. Discriminant validity was examined by comparing the AVE results of any two latent constructs to the correlation found between them (ENDERS; BANDALOS, 2001). As shown in Table 39, only the discriminant validity for perceived quality could not be attested.

Absolute fit indices, incremental fit indices and parsimony fit indices were examined to measure the measurement model validity as reported in Table 40. In this sense, only the chi-square statistic did not meet its respective threshold criteria. As previously mentioned, the chi-square statistic is negatively influenced by sample size and tends to penalize model complexity (HAIR et al., 2014), thus making it harder to achieve model fit. Therefore, as the other fit indices complied with the proposed guidelines, these results are not expected to be detrimental to the overall validity of the measurement model. Finally, as the model shows sufficient validity, the structural model analysis (SEM) can be performed.

Table 39 – Integrated framework convergent and discriminant validity results for the public transport commuter group

	CR	AVE	MSV	MaxR(H)	SNP	PV	PQ	TS	BI	ATP	PN
SNP	0.916	0.845	0.269	0.917	**0.919**	-	-	-	-	-	-
PV	0.883	0.717	0.510	0.906	0.356	**0.847**	-	-	-	-	-
PQ	0.844	0.575	0.585	0.848	0.474	0.714	**0.759**	-	-	-	-
TS	0.904	0.703	0.537	0.906	0.371	0.604	0.707	**0.838**	-	-	-
BI	0.798	0.672	0.585	0.934	0.465	0.712	0.765	0.656	**0.820**	-	-
ATP	0.869	0.692	0.567	0.892	0.519	0.650	0.713	0.733	0.753	**0.832**	-
PN	0.769	0.625	0.054	0.770	0.103	0.053	-0.023	0.136	0.227	0.232	**0.791**

Notes: CR = Composite Reliability; AVE = Average Variance Extracted; MSV = Maximum Shared Variance; MaxR(H) = McDonald Construct Reliability. The square root of AVE is shown on the diagonal in bold faces

Table 40 – Integrated framework measurement model validity analysis for the public transport commuter group

Model-Fit Indices	Indicators	Source	Threshold Value	CFA Model
Absolute Fit Indices				
Chi-Square Statistic	CMIN	Hair et al. (2014)	*	362.67*
Goodness-of-Fit Index	GFI	Hu and Bentler (1999)	≥ 0.90	0.931
Root Mean Square Error of Approximation	RMSEA	Hair et al. (2014)	≤ 0.08	0.049
Standardized Root Mean Square Residual	SRMR	Hair et al. (2014)	≤ 0.08	0.037
Normed Chi-Square	CMIN/DF	Byrne (2013)	< 5.0	2.072
Incremental Fit Indices				
Normed Fit Index	NFI	Awang (2015)	≥ 0.90	0.943
Tucker-Lewis Index	TLI	Hair et al. (2014)	≥ 0.90	0.960
Comparative Fit Index	CFI	Hu and Bentler (1999)	≥ 0.90	0.969
Parsimony Fit Indices				
Adjusted Goodness-of-Fit Index	AGFI	Chau (1997)	≥ 0.80	0.901

Notes: * p-value should be statistically insignificant (p-value ≥ 0.05); ** p-value < 0.01.

5.2.4 Structural Equation Model (SEM)

As the validity of the measurement models were confirmed, the next step is to examine the structural models. In this sense, both the model goodness-of-fit as well as the theorized relationships between the latent constructs are assessed for both interest travel groups. The models were designed as to be recursive, consequently it does not contain feedback loops and only predictor-outcome paths are evaluated.

5.2.4.1 Car Commuter Group

The measurement model reported in Section 5.3.1.1 for the car sample was transformed into a recursive structural model with the addition of perceived behavioral control and habit as unidimensional constructs. Therefore, fixed and free parameters were defined based on the hypothesis discussed in Section 3.3. In this sense, based on model modification indices, three paths coefficients were added, namely direct relationships between perceived quality and attitudes toward cars, perceived quality and perceived behavioral control, and attitudes toward cars and social norms toward cars. Additionally, an error term was assigned to all endogenous variables. The model identification was verified, which remained overidentified (df = 196). As there is no missing data in the sample and outliers had been already excluded in the previous step, the structural equation model analysis was conducted using a variance-covariance matrix with maximum likelihood estimation (MLE).

Table 41 – Integrated framework SEM validity analysis for the car commuter group

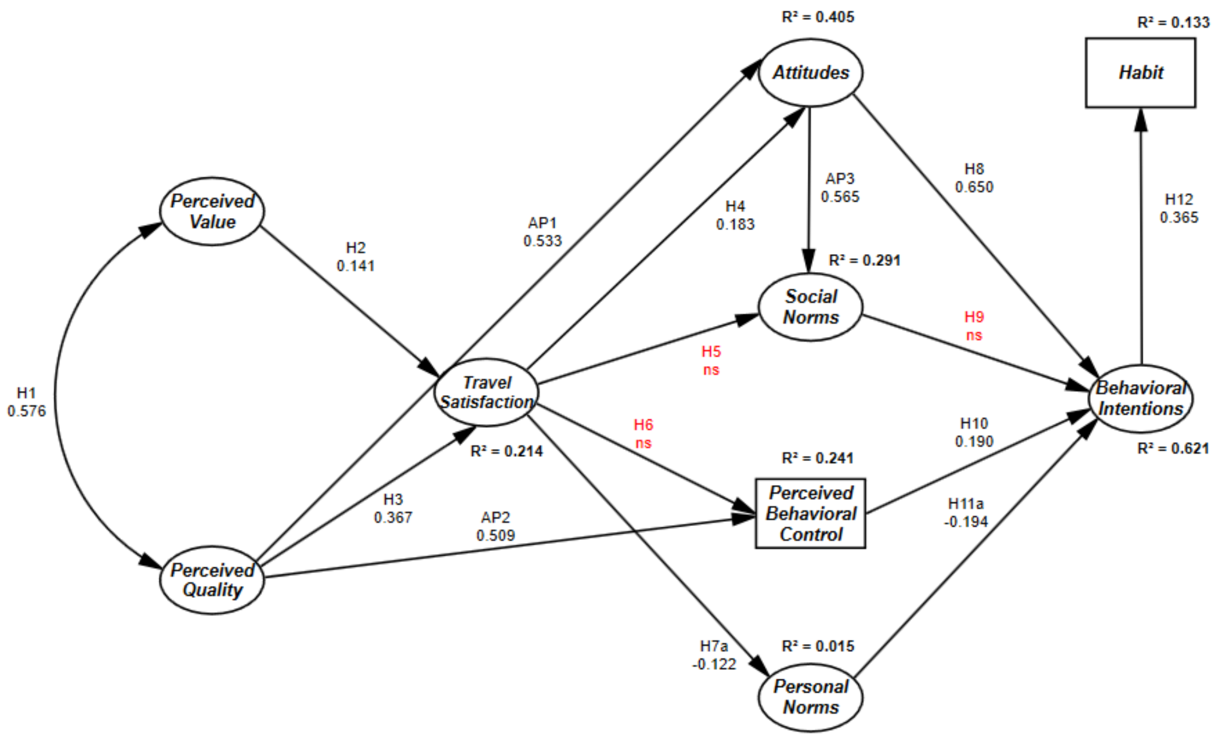
Model-Fit Indices	Indicators	Source	Threshold Value	SEM Model
Absolute Fit Indices				
Chi-Square Statistic	CMIN	Hair et al. (2014)	*	572.86**
Goodness-of-Fit Index	GFI	Hu and Bentler (1999)	≥ 0.90	0.922
Root Mean Square Error of Approximation	RMSEA	Hair et al. (2014)	≤ 0.08	0.055
Standardized Root Mean Square Residual	SRMR	Hair et al. (2014)	≤ 0.08	0.068
Normed Chi-Square	CMIN/DF	Byrne (2013)	< 5.0	2.923
Incremental Fit Indices				
Normed Fit Index	NFI	Awang (2015)	≥ 0.90	0.916
Tucker-Lewis Index	TLI	Hair et al. (2014)	≥ 0.90	0.932
Comparative Fit Index	CFI	Hu and Bentler (1999)	≥ 0.90	0.943
Parsimony Fit Indices				
Adjusted Goodness-of-Fit Index	AGFI	Chau (1997)	≥ 0.80	0.899

Note: * p-value should be statistically insignificant (p-value ≥ 0.05); ** p-value < 0.01.

As the loading estimates and the error variance terms were allowed to be estimated, the first verification concerned interpretational cofounding. This phenomenon refers to the measurement estimates for one construct being significantly affected by the defined relationship patterns, which should not be allowed. In this sense, as only fluctuations under 0.05 were found, there is no evidence of interpretational cofounding in the model results. Then, the model validity was assessed. As the model is recursive, thus having fewer relationships to estimate than in the measurement model, the found chi-square statistic (Chi-square = 572.86, p-value < 0.01, df = 196) was higher than the value previously found as expected (Chi-square = 393.96, p-value < 0.01, df = 175). Moreover, the multiple measures reported in Table 45 indicate that the model fits the data well.

Finally, the hypothesized dependence relationships could be evaluated. As reported in Figure 40, 9 out of the 12 hypotheses were found to be statistically significant and in the predicted direction, thus confirming most of the hypotheses laid out for the car sample. Additionally, Table 42 summarizes the outcomes for the 12 hypotheses and the three added paths.

Figure 40 – Car commuter group structural model analysis results for the proposed integrated theoretical framework



Source: Author (2020)

Table 42 – Summarization of the outcomes for the hypotheses for the integrated framework in the car sample

No.	Hypothesis	Estimate	p-value	Outcome
H1	Perceived Value ↔ Perceived Quality	0.576	< 0.01	Confirmed
H2	Perceived Value → Travel Satisfaction	0.141	0.01	Confirmed
H3	Perceived Quality → Travel Satisfaction	0.367	< 0.01	Confirmed
H4	Travel Satisfaction → Attitudes toward Cars	0.183	< 0.01	Confirmed
H5	Travel Satisfaction → Social Norms toward Cars	-0.072	0.108	Not Confirmed
H6	Travel Satisfaction → Perceived Behavioral Control	-0.046	0.296	Not Confirmed
H7a	Travel Satisfaction → Personal Norms	-0.122	0.01	Confirmed
H8	Attitudes toward Cars → Behavioral Intentions*	0.650	< 0.01	Confirmed
H9	Social Norms toward Cars → Behavioral Intentions*	0.045	0.359	Not Confirmed
H10	Perceived Behavioral Control → Behavioral Intentions*	0.190	< 0.01	Confirmed
H11a	Personal Norms → Behavioral Intentions*	-0.194	< 0.01	Confirmed
H12	Behavioral Intentions* → Habit	0.365	< 0.01	Confirmed
AP1	Perceived Quality → Attitudes toward Cars	0.533	< 0.01	Confirmed
AP2	Perceived Quality → Perceived Behavioral Control	0.509	< 0.01	Confirmed
AP3	Attitudes toward Cars → Social Norms toward Cars	0.565	< 0.01	Confirmed

Note: The behavioral intentions construct includes loyalty.

For the car sample, as hypothesized, both perceived value and perceived quality were found to directly influence travel satisfaction and to have a positive correlational relationship. However, the effects of perceived value on travel satisfaction were not as strong as the influence of perceived quality. Nonetheless, Hypotheses 1, 2 and 3 were supported by the model results. Perceived quality was also found to have an important indirect effect on behavioral intentions. It resulted in the second strongest total effect on it only behind to attitudes toward cars, as shown in Table 43. Thus, highlighting the importance of availability and comfort and convenience attributes, such as accessibility, tangible infrastructure, problem experiences, and safety on the formation of behavioral intentions and loyalty towards commuting by car.

Table 43 – Direct, indirect and total effects on behavioral intentions and loyalty for the integrated framework in the car sample

Relationship			Direct Effect	Indirect Effect	Total Effect
Perceived Value	→	Behavioral Intentions	0.000	0.019	0.019
Perceived Quality	→	Behavioral Intentions	0.000	0.507	0.507
Travel Satisfaction	→	Behavioral Intentions	0.000	0.135	0.135
Attitudes toward Cars	→	Behavioral Intentions	0.650	0.025	0.675
Perceived Behavioral Control	→	Behavioral Intentions	0.190	0.000	0.190
Personal Norms	→	Behavioral Intentions	-0.194	0.000	-0.194

Travel satisfaction is often found to mediate the influence of service quality on the formation of loyalty behavior (CHIOU; CHEN, 2012; DE OÑA et al., 2016; SHIFTAN; SHEFER, 2015). For the car sample, this mediating effect of travel satisfaction on the relationship between perceived quality and behavioral intentions and loyalty could also be verified. Nonetheless, the integrated framework has shown evidence that perceived quality also influences behavioral intentions and loyalty through attitudes toward cars and perceived behavioral control in the car sample. Moreover, perceived quality was found to have a stronger direct effect on attitudes toward cars and perceived behavioral control than on travel satisfaction. In this sense, as reasoned in Section 3.3, attitudes were found to be influenced by both cognitive and affective aspects of their current travel mode. The found relationship between travel satisfaction and attitudes is in line with current findings from the literature (DIANA, 2012; FU; JUAN, 2017b). Therefore, as proposed by De Vos and Witlox (2017), travel satisfaction can be considered a key factor in forming travel-related attitudes in the long-term scenario. However, the influence of perceived quality on this process should also be accounted for. The findings suggest that evaluating both constructs would be necessary as to change behavioral intentions and direct a mode switch.

The results for the car sample did not support the assumption that travel satisfaction would significantly influence both attitudes, social norms, perceived behavioral control, and personal norms. This reasoning was derived from the idea that as people's beliefs are expected to lean towards a state of balance or consistency (HEIDER, 1944), travel satisfaction as a product of experienced utility influenced by cognitive utility that has been shown to influence attitudes would also affect the remaining social psychology constructs. Nonetheless, besides attitudes, only personal norms were significantly influenced by travel satisfaction. Only Hypotheses 4 and 7a were confirmed, while Hypotheses 5 and 6 were rejected. On the other hand, perceived quality was found to influence both attitudes (0.601), social norms (0.313), perceived behavioral control (0.493), and personal norms (-0.045). Therefore, suggesting that the common set of beliefs towards commuting by car was probably being derived from perceived quality and not from travel satisfaction.

The hypotheses concerning the theory of planned behavior reason that the decision to perform a behavior is moderated by behavioral intentions, which in turn are influenced by attitudes, social norms, perceived behavioral control, and personal norms. In this sense, attitudes were shown to have the most important total effects on the formation of behavioral intentions and loyalty, thus confirming Hypothesis 8. On the other hand, social norms were not found to significantly influence behavioral intentions (Hypothesis 9 not confirmed). This conclusion is consistent with the findings of Thogersen (2006), who did not find an influence of social norms on behavioral intentions for studies performed in a stable context. In the car sample, 72.5% of respondents exhibited moderate to strong car habit tendencies. Therefore, as argued by Fujii, Gärling and Kitamura (2001), significant contextual changes would be required as to break habit patterns and enable the processing of new and relevant information (GÄRLING; AXHAUSEN, 2003).

Perceived behavioral control, however, was also found to influence behavioral intentions, thus confirming Hypothesis 10. As previously mentioned, perceived behavioral control is moderately correlated to car availability ($r = 0.34$, $p < 0.01$), which was able to correctly classify 91.9% of car commuters in the sample. Personal norms negatively affected behavioral intentions and loyalty in the car sample (Hypothesis 11a confirmed). Personal norms are defined as a moral obligation to perform a given action or behavior, which, if not followed, would lead to negative emotions, such as regret and guilt. In this sense, the dissonance between attitudes and personals norms was found in the sample as theorized. For instance, among car commuters, 75.4% did not believe that commuting by car is sustainable, but 84.3% believe that they feel a personal obligation to the environment and 69.0% that they would feel the need to switch their current travel mode if it would help the environment.

As previously discussed, habit is linked to a neural connection formed when behavior is performed frequently under a stable context between behavioral cues and outcomes. In this sense, commute behavior derives from a recurring and steady goal, *e.g.* get to work/place of study, that is often achieved by the same transportation mode, thus enabling the formation of habit. Therefore, after some time, the behavior would no longer be reasoned (AARTS; VERPLANKEN; VAN KNIPPENBERG, 1998; VERPLANKEN; AARTS, 1999) and significant contextual change would be required to reduce the effects of habit and for new relevant information to be considered (FUJII; KITAMURA, 2003). In the model, habit was found to be mostly influenced by behavioral intentions (0.365), attitudes (0.247) and perceived quality (0.185), as reported in Table 44. This result conforms with previous findings from the literature as the effects of social norms (THØGERSEN, 2006) has been shown to be hindered by habit. Moreover, it is reasonable that a stable and enduring construct, such as attitudes, would have a greater effect on the development of habit than a more transient and situation specific construct, such as travel satisfaction. Therefore, this finding supports the theory proposed by De Vos and Witlox (2017), which argues that experiencing intermediate to high levels of travel satisfaction over time would positively influence travel-related attitudes leading to the formation of a habit towards the chosen commute travel mode. Additionally, behavioral intentions were found to significantly influence habit, thus confirming Hypothesis 12.

Table 44 – Direct, indirect and total effects on habit for the integrated framework in the car sample

Relationship			Direct Effect	Indirect Effect	Total Effect
Perceived Value	→	Habit	0.000	0.007	0.007
Perceived Quality	→	Habit	0.000	0.185	0.185
Travel Satisfaction	→	Habit	0.000	0.049	0.049
Attitudes	→	Habit	0.000	0.247	0.247
Social Norms	→	Habit	0.000	0.016	0.016
Perceived Behavioral Control	→	Habit	0.000	0.069	0.069
Personal Norms	→	Habit	0.000	-0.071	-0.071
Behavioral Intentions	→	Habit	0.365	0.000	0.365

Finally, the data was split into three categories, namely weak car habit strength, moderate car habit strength, and strong car habit strength according to the parameters defined in Section 5.1.4.12. The model was re-tested for each group as to assess the effects of behavioral intentions according to habit strength. In this sense, the model for the weak car habit strength was not tested due to a small sample size (n = 31). However, the remaining two models showed a significant reduction in the coefficient estimates from the moderate to the strong car habit categories (Table 45), thus the model results provide further evidence that the stronger the habit strength, the less new relevant information would be processed. Therefore, significant contextual changes, in the form of soft and hard policies, would be required as to break car habit patterns in the sample and enable a mode switch towards more sustainable options.

Table 45 – Total effects on habit, by car habit strength group for the integrated framework in the car sample

Relationship			Habit Strength		
			Moderate	Strong	Reduction
Perceived Value	→	Habit	0.120	0.020	-500%
Perceived Quality	→	Habit	0.129	0.080	-61%
Travel Satisfaction	→	Habit	0.052	0.022	-136%
Attitudes	→	Habit	0.172	0.112	-54%
Social Norms	→	Habit	-0.007	0.015	147%
Perceived Behavioral Control	→	Habit	0.052	0.030	-73%
Personal Norms	→	Habit	-0.054	-0.021	-157%
Behavioral Intentions	→	Habit	0.262	0.158	-66%

5.2.4.2 Public Transport Commuter Group

In a similar process to the car sample, the measurement model reported in Section 5.3.1.2 for the public transport commuter group was modified into a recursive structural model including perceived behavioral control and habit as unidimensional constructs. Therefore, fixed and free parameters were defined based on the hypothesis discussed in Section 3.3. Then, error terms were assigned to all endogenous variables. Moreover, based on model modification indices, a direct relationship between perceived value and behavioral intentions and loyalty was added. Finally, the model identification was verified, which remained overidentified (df = 198). As there is no missing data in the sample and outliers had been already excluded in the previous step, the structural equation model analysis was conducted using a variance-covariance matrix with maximum likelihood estimation (MLE).

The model results were verified for interpretational cofounding. As previously explained, this phenomenon is related to the measurement estimates being significantly affected by the new pattern of relationships, which is not desired. In this sense, as only fluctuations under 0.05 were found, there is no evidence of interpretational cofounding in the model results. Then, model validity was examined according to the indicators reported in Table 46. As the model is recursive, it has a lower number of parameters to estimate than in the confirmatory factor analysis, consequently, the new chi-square value (Chi-square = 618.85, p-value < 0.01, df = 198) should be higher than the previous one (Chi-square = 362.67, p-value < 0.01, df = 175). Moreover, the goodness-of fit index (GFI) is smaller than 0.90, however, greater than 0.80, which is acceptable. Therefore, it might be inferred that the multiple measures fit the data well.

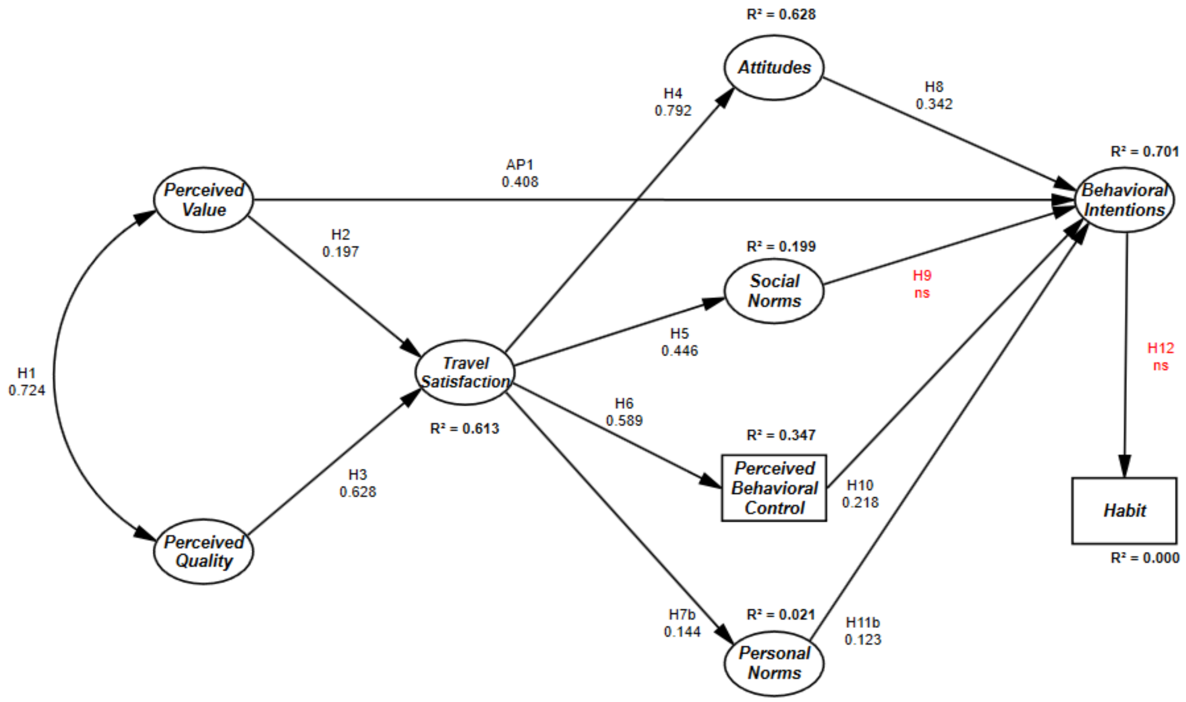
Table 46 – Integrated framework SEM validity analysis for the public transport commuter group

Model-Fit Indices	Indicators	Source	Threshold Value	SEM Model
Absolute Fit Indices				
Chi-Square Statistic	CMIN	Hair et al. (2014)	*	618.85**
Goodness-of-Fit Index	GFI	Hu and Bentler (1999)	≥ 0.90	0.882
Root Mean Square Error of Approximation	RMSEA	Hair et al. (2014)	≤ 0.08	0.069
Standardized Root Mean Square Residual	SRMR	Hair et al. (2014)	≤ 0.08	0.069
Normed Chi-Square	CMIN/DF	Byrne (2013)	< 5.0	3.126
Incremental Fit Indices				
Normed Fit Index	NFI	Awang (2015)	≥ 0.90	0.903
Tucker-Lewis Index	TLI	Hair et al. (2014)	≥ 0.90	0.920
Comparative Fit Index	CFI	Hu and Bentler (1999)	≥ 0.90	0.931
Parsimony Fit Indices				
Adjusted Goodness-of-Fit Index	AGFI	Chau (1997)	≥ 0.80	0.849

Note: * p-value should be statistically insignificant (p-value ≥ 0.05); ** p-value < 0.01.

The hypothesized dependence relationships were then evaluated. As reported in Figure 41, 10 out of the 12 hypotheses were found to be statistically significant and in the predicted direction. Additionally, Table 47 summarizes the outcomes for the 12 hypotheses and the added path.

Figure 41 – Public transport commuter group structural model analysis results for the proposed integrated theoretical framework



Source: Author (2020)

Table 47 – Summarization of the outcomes for the hypotheses for the integrated framework in the public transport sample

No.	Hypothesis - Public Transport Sample	Estimate	p-value	Outcome
H1	Perceived Value ↔ Perceived Quality	0.724	< 0.01	Confirmed
H2	Perceived Value → Travel Satisfaction	0.197	< 0.01	Confirmed
H3	Perceived Quality → Travel Satisfaction	0.628	< 0.01	Confirmed
H4	Travel Satisfaction → Attitudes	0.792	< 0.01	Confirmed
H5	Travel Satisfaction → Social Norms	0.446	< 0.01	Confirmed
H6	Travel Satisfaction → Perceived Behavioral Control	0.589	< 0.01	Confirmed
H7b	Travel Satisfaction → Personal Norms	0.144	0.01	Confirmed
H8	Attitudes → Behavioral Intentions*	0.342	< 0.01	Confirmed
H9	Social Norms → Behavioral Intentions*	0.073	0.05	Not Confirmed
H10	Perceived Behavioral Control → Behavioral Intentions*	0.218	< 0.01	Confirmed
H11b	Personal Norms → Behavioral Intentions*	0.123	< 0.01	Confirmed
H12	Behavioral Intentions* → Habit	-0.016	0.731	Not Confirmed
AP1	Perceived Value → Behavioral Intentions*	0.408	< 0.01	Confirmed

Note: The behavioral intentions construct includes loyalty

As found in the model developed for the car sample, both perceived value and perceived quality directly influence travel satisfaction, while displaying a positive correlational relationship. Thus, confirming Hypotheses 1, 2 and 3. Moreover, even though perceived quality was found to have a stronger direct effect on travel satisfaction than perceived value, perceived value showed a significant direct effect on behavioral intentions and loyalty, which accounted for the largest total effect on the construct (0.497) followed by travel satisfaction (0.449). Nonetheless, perceived quality also displayed a significant total effect on behavioral intentions and loyalty (0.282), as reported in Table 48. In this sense, suggesting the importance of both utility and experience dimensions of perceived value as well as availability and comfort and convenience attributes on the formation of behavioral intentions and loyalty towards commuting by public transport. Therefore, based on Lai and Chen (2011), it can be argued that improvements in service quality that do not result in an increase in perceived value are not expected to lead to travel satisfaction, but most importantly behavioral intentions. Additionally, the mediating role of travel satisfaction on the relationship between perceived quality and behavioral intentions and loyalty could also be verified.

Table 48 – Direct, indirect and total effects on behavioral intentions and loyalty for the integrated framework in the public transport sample

Relationship			**Direct Effect**	**Indirect Effect**	**Total Effect**
Perceived Value	→	Behavioral Intentions*	0.408	0.089	0.497
Perceived Quality	→	Behavioral Intentions*	0.000	0.282	0.282
Travel Satisfaction	→	Behavioral Intentions*	0.000	0.449	0.449
Attitudes	→	Behavioral Intentions*	0.342	0.000	0.342
Social Norms	→	Behavioral Intentions*	0.073	0.000	0.073
Perceived Behavioral Control	→	Behavioral Intentions*	0.218	0.000	0.218
Personal Norms	→	Behavioral Intentions*	0.123	0.000	0.123

Note: The behavioral intentions construct includes loyalty

Moreover, both perceived value (0.156) and perceived quality (0.498) were found to indirectly affect attitudes, which were mediated by travel satisfaction as hypothesised. Therefore, attitudes were found to be influenced by both cognitive and affective aspects of their current travel mode. In this sense, the findings from both models provide further evidence on the role of travel satisfaction as a driver of positive attitudes. On the same note, both social norms, perceived behavioral control, and personal norms were found to be directly affected by travel satisfaction as theorized. For the public transport sample, it indicates that the salient beliefs directed towards this commute travel mode were being derived from travel satisfaction, while having indirect effects from both perceived value and perceived quality. Thus, confirming Hypotheses 4, 5, 6 and 7b.

As proposed by De Vos and Witlox (2017), the negative perception of travel satisfaction in the public transport sample is likely to have a long-term negative impact on attitudes and the remaining social psychology constructs, thus leading to passengers felling compelled to perform a mode switch. Moreover, the effects of behavioral intentions on habit were found to be non-significant, therefore, suggesting that habit is not likely to be formed by behavioral intentions. Also, as most of the sample (61.3%) reported weak measures of habit towards commuting by public transport, it is likely that behavior would be predicted mostly by behavioral intentions as shown by Gardner (2009). In this sense, an increase in satisfaction depends on transit agencies and public administrators understanding travelers' heterogeneous needs and priorities, using appropriate measures and assessing the data to re-evaluate service parameters to define service improvements through soft and hard policies (TYRINOPOULOS; ANTONIOU, 2008).

From the hypotheses concerning the theory of planned behavior, only Hypothesis 9 was not supported by the data. It postulated that social norms would positively influence behavioral intentions and user loyalty, however, as found in the car sample, the finding is consistent with what was reported in Thogersen (2006), who did not find an influence of social norms on behavioral intentions for studies performed in a stable context. It is important to highlight that the hypothesis was almost confirmed as the p-value was only slightly above the threshold ($p\text{-value} < 0.05$). Nonetheless, it could be related to the sample having a smaller share of moderate to strong public transport habit tendencies than the car sample. On the other hand, attitudes were found to significantly affect behavioral intentions and loyalty (Hypothesis 8). As reported in Table 50, it has the third most important total effect on the construct. Moreover, perceived behavioral control was also found to significantly influence behavioral intentions as well as personal norms. In this context, personal norms were found to have a positive effect on the main construct, which can be attributed to a reduced dissonance between attitudes pro-environment and the perception of sustainability of commuting by public transport. For instance, 85.3% of public transport commuters believe that they feel a personal obligation to the environment, while 79.5% believe that commuting by public transport is sustainable.

5.2.5 Model Comparison

According to the results from the previous section, it is noticeable that the formation of behavioral intentions and loyalty bonds across both samples was different. In both models, perceived value was found to have a positive correlational relationship to perceived quality and to directly influence travel satisfaction. However, even though, the effects of perceived value on behavioral intentions and loyalty were negligible in the car sample, it accounted for the largest total effect on the main construct for the public transport sample. On the other hand, perceived quality was shown to have a significant effect on travel satisfaction and on behavioral intentions and loyalty in both contexts. Therefore, the mediating role of travel satisfaction between perceived quality and behavioral intentions and loyalty could be attested in both models.

Overall, the findings indicate that actions targeting perceived quality, such as improvements in accessibility, tangible infrastructure, problem experiences, and safety would have a greater effect on car commuters' intentions than focusing on the perceived value. Contrarily, for public transport commuters, it can be argued that improvements in service quality that do not lead to an increase in perceived value are not likely to significantly increase travel satisfaction or behavioral intentions. Thus, suggesting that car commuters are less sensitive to the costs of their commute travel mode than public transport commuters, as perceived value is defined as a trade-off between perceived benefits and costs, including both monetary and non-monetary dimensions.

Perceived quality was also found to directly and/or indirectly influence attitudes, social norms and perceived behavioral control in both samples, while perceived value was shown to only affect attitudes and perceived behavioral control in the public transport sample. In the car sample, perceived quality exhibited a stronger direct effect on attitudes (0.533) and perceived behavioral control (0.509) than on travel satisfaction (0.367). Additionally, the total effects of travel satisfaction on attitudes (0.183) were smaller than the ones of perceived quality (0.601). Thus, providing further evidence of the importance of perceived quality for the car sample both on the formation of behavioral intentions and attitudes. Moreover, travel satisfaction was not found to significantly influence social norms or perceived behavioral control for the car sample . On the other hand, in the public transport sample, travel satisfaction was found to have the largest total effects on attitudes (0.792), social norms (0.446), perceived behavioral control (0.589), and personal norms (0.144), while perceived quality and perceived value displayed only indirect effects. Moreover, travel satisfaction resulted in the second largest total effect on behavioral intentions. In this sense, Hypotheses 4, 5, 6, and 7 could only be confirmed for the public transport sample. Hypotheses 5 and 6 concerning the influence of travel satisfaction on social norms and perceived behavioral control were rejected for the car sample. Consequently, it can be reasoned that the common set of salient beliefs towards commuting by car and by public transport are likely to be derived from different constructs. For instance, perceived quality for the car sample and travel satisfaction for the public transport sample.

Furthermore, the association between travel satisfaction and attitudes has been found for both samples. Therefore, to different extents, it provides evidence that satisfaction is a driver of attitudes as suggested by Diana (2012), which were found to significantly influence behavioral intentions. As previously mentioned, according to De Vox and Witlox (2017), the perception of travel satisfaction towards a travel model is likely to over time account for a long-term impact on travel-related attitudes, which leads to the formation, or not, of a habitual commute travel mode. On the other hand, the assumption that social norms would positively influence behavioral intentions and loyalty was rejected in both models. The finding is consistent with Thogersen (2006), who did not find an influence of social norms on behavioral intentions for studies performed under stable conditions. However, it is important to highlight that in the public transport sample, which shows weaker habit tendencies, the hypothesis was closer to being accepted. Moreover, perceived behavioral control was found to positively influence behavioral intentions and loyalty in both samples, while personal norms negatively affected intentions towards commuting by car and positively influenced intentions towards commuting by public transport. Therefore, the theorized dissonance between the perception of sustainability of their current travel model and attitudes towards sustainability was greater among car commuters than within public transport commuters. Hypotheses 8, 10, and 11 were confirmed, while Hypothesis 9 was rejected for both samples.

Behavioral intentions and loyalty were found to significantly influence habit only in the car sample. In the car sample, attitudes and perceived quality were the only constructs to have non-negligible effects on the formation of habit. Re-testing the model according to car habit strength, showed a significant reduction of coefficient path estimates across all latent constructs from moderate to strong categories. Thus, suggesting that the stronger the habit, the less new relevant information would be processed. On the other hand, even though behavioral intentions were not found to influence habit for the overall public transport sample, a significant path estimate was found for the weak public transport habit strength category (0.174). The coefficient estimates for the other two groups could not be assessed due to low sample sizes. Additionally, no other construct was found to have a non-negligible or a positive effect on the formation of habit within the sample. Therefore, the results indicate that the overall negative perception of commuting by public transport could be hindering habit formation.

Overall, the most important effects on the formation of behavioral intentions and loyalty differed among both travel groups. Attitudes (0.675), perceived quality (0.507), personal norms (-0.194), perceived behavioral control (0.190), and travel satisfaction (0.135) were found to be the most significant for the car sample. On the other hand, perceived value (0.497), travel satisfaction (0.449), attitudes (0.342), perceived quality (0.282), perceived behavioral control (0.218), and personal norms (0.123) for the public transport sample. Therefore, public policies should assess car and public transport commuters differently as to achieve the best results toward a more sustainable urban environment.

5.3 COMPETING THEORIES

In this section, models representing two well stablished theories, namely the customer-loyalty theory (MINSER; WEBB, 2010) and the theory of planned behavior (AJZEN, 1985, 1991), were built based on the same two-step approach used to validate the integrated theory model for both travel mode groups. The results were then compared to the findings from the previous section.

5.3.1 Customer-Loyalty Theory

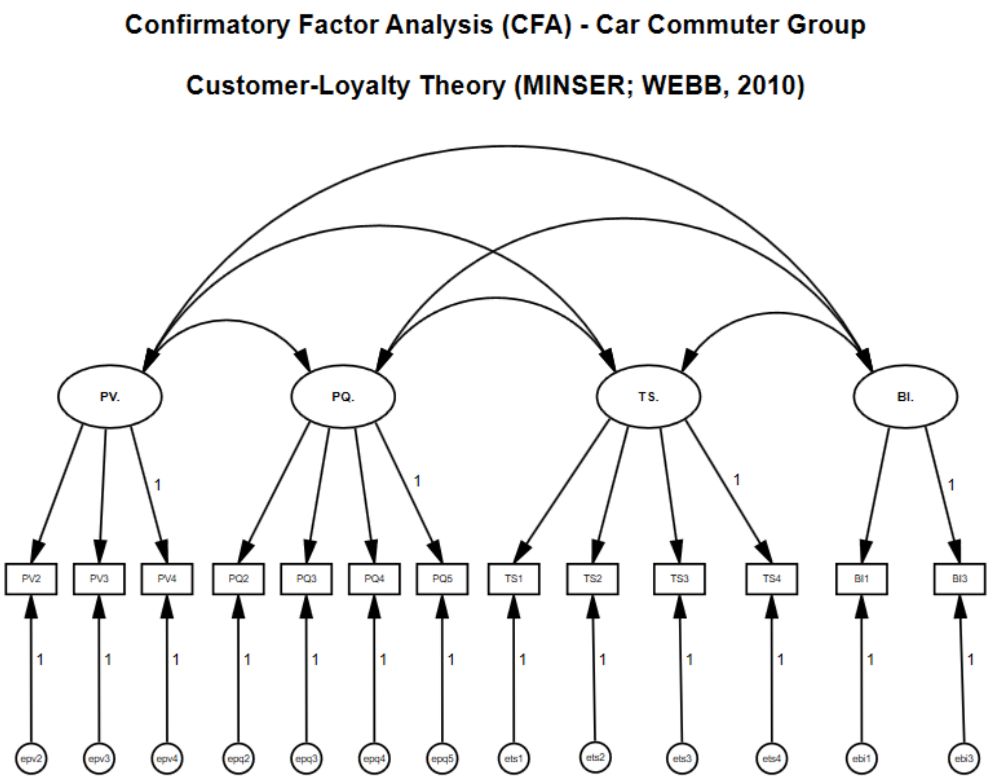
The Customer-Loyalty theory developed by Minser and Webb (2010) attempted to understand the relationship between motivating factors and loyalty. They developed a model that assessed the influence of problem experience, public image, perceived quality, travel satisfaction, and perceived value on customer loyalty in the public transportation context. It was found that public image has an important influence on perceived quality, travel satisfaction and perceived value, indicating that poor relationships with stakeholders and preconceived notions can greatly influence perception of delivered service, which was also found to have an indirect impact on service loyalty. Problem experience also showed a great negative effect on perceived quality and travel satisfaction. Moreover, perceived quality and perceived value were found to affect travel satisfaction, while both perceived quality and travel satisfaction significantly influenced the formation of loyalty bonds. Nonetheless, in the current study, problem experience was evaluated as dimension of perceived quality and public image was not assessed. Therefore, only the relationships between perceived quality, perceived value, travel satisfaction, and customer loyalty were evaluated. In this sense, the following hypotheses were tested:

H_1 Perceived value and perceived quality have a positive correlational relationship.
H_2 Perceived value positively influences travel satisfaction.
H_3 Perceived quality positively influences travel satisfaction.
H_4 Travel satisfaction positively influences behavioral intentions and user loyalty.
H_5 Perceived value positively influences behavioral intentions and user loyalty.
H_6 Perceived quality positively influences behavioral intentions and user loyalty.

5.3.1.1 Car Commuter Group

In the car sample, the methodology was applied by first testing the measurement model through confirmatory factor analysis. Therefore, a congeneric path diagram was built in IBM SPSS AMOS 24 to test the Customer-Loyalty Theory as shown in Figure 42. In relation to identification, the model was shown to be overidentified (df = 59). For instance, perceived quality and travel satisfaction constructs were also overidentified, while perceived value was just-identified and behavioral intentions and loyalty, underidentified. Additionally, the same data set employed to validate the model reported for the integrated framework was used to analyse this model. The data set is comprised of 630 observations, which are enough to fulfill the minimum sample size guidelines proposed by Hair et al. (2014). In this sense, it results in a 48:1 observation-parameter ratio, thus over the ideal value of 15:1 as to reduce problems originating from deviations from multivariate normality. As there is no missing data in the sample, the confirmatory factor analysis was conducted using a variance-covariance matrix with maximum likelihood estimation (MLE).

Figure 42 – Car commuter group confirmatory factor analysis path diagram for the customer-loyalty theory (MINSER; WEBB, 2010)



Source: Author (2020)

As reported in Table 49, all factor loadings are at least over 0.50, while 92.3% of the measured indicators displayed a loading over the ideal threshold of 0.70. Therefore, the finding suggests that the variables are strongly related to their assigned latent construct. Moreover, no illogical standardized parameters or Heywood cases (negative error variance) were found.

Table 49 – Customer-loyalty theory confirmatory factor analysis results for the car commuter group

Factor	Variable	Dimension	Measure	Factor Loading
Perceived Value	PV2	Utility	Amount Spent	0.736
	PV3		Quality/Cost Ratio	0.889
	PV4	Experience	Comfort/Cost Ratio	0.806
Perceived Quality	PQ2	Availability	Accessibility	0.701
	PQ3	Comfort and Convenience	Tangible Infrastructure	0.823
	PQ4		Problem Experiences	0.827
	PQ5		Safety	0.678
Travel Satisfaction	TS1	Valence Emotions	Very hurried - Very relaxed	0.852
	TS2		Very worried - Very confident	0.801
	TS3		Very stressed - Very calm	0.880
	TS4	Arousal Emotions	Very tired - Very alert	0.745
Behavioral Intentions and Loyalty	BI1	Cognitive	Willingness to re-use	0.705
	BI3	Affective	Involvement	0.808

As the latent constructs displayed both average extracted variance (AVE) and composite reliability (CR) values over the desired thresholds, it can be implied that the observed indicators converge into single unidimensional constructs. Therefore, showing an indication of convergent validity. Additionally, as the AVE results of any two constructs were smaller than the correlation found between them, it can be assumed discriminant validity in the sample, as show in Table 50.

Table 50 – Customer-loyalty theory convergent and discriminant validity results for the car commuter group

	CR	AVE	MSV	MaxR(H)	TS	PV	PQ	BI
TS	0.892	0.674	0.199	0.901	**0.821**	-	-	-
PV	0.853	0.661	0.309	0.872	0.346	**0.813**	-	-
PQ	0.845	0.578	0.309	0.859	0.446	0.556	**0.760**	-
BI	0.729	0.575	0.278	0.742	0.312	0.527	0.526	**0.758**

Notes: CR = Composite Reliability; AVE = Average Variance Extracted; MSV = Maximum Shared Variance; MaxR(H) = McDonald Construct Reliability. The square root of AVE is shown on the diagonal in bold faces.

The measurement model validity was assessed by a combination of absolute fit indices, incremental fit indices and parsimony fit indices, as reported in Table 51.

Except for the chi-square statistic, which is negatively influenced by sample size and tends to penalize model complexity (HAIR et al., 2014), all fit indices complied with the proposed guidelines. Consequently, as the model demonstrates sufficient validity, the structural model analysis (SEM) can be performed.

Table 51 – Customer-loyalty theory measurement model validity analysis for the car commuter group

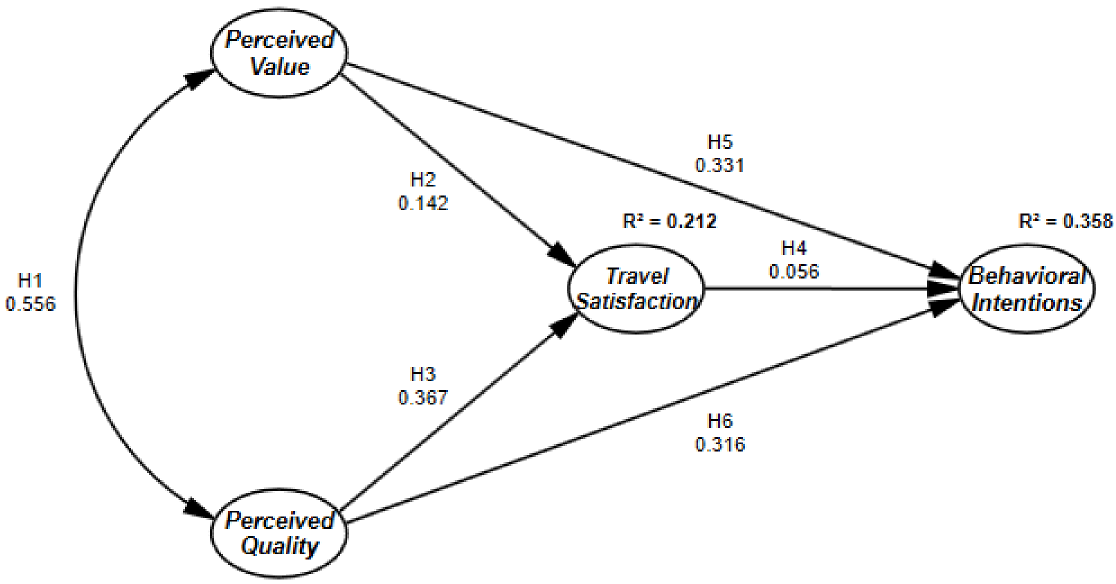
Model-Fit Indices	Indicators	Source	Threshold Value	CFA Model
Absolute Fit Indices				
Chi-Square Statistic	CMIN	Hair et al. (2014)	*	144.82**
Goodness-of-Fit Index	GFI	Hu and Bentler (1999)	≥ 0.90	0.964
Root Mean Square Error of Approximation	RMSEA	Hair et al. (2014)	≤ 0.08	0.048
Standardized Root Mean Square Residual	SRMR	Hair et al. (2014)	≤ 0.08	0.036
Normed Chi-Square	CMIN/DF	Byrne (2013)	< 5.0	2.455
Incremental Fit Indices				
Normed Fit Index	NFI	Awang (2015)	≥ 0.90	0.965
Tucker-Lewis Index	TLI	Hair et al. (2014)	≥ 0.90	0.972
Comparative Fit Index	CFI	Hu and Bentler (1999)	≥ 0.90	0.979
Parsimony Fit Indices				
Adjusted Goodness-of-Fit Index	AGFI	Chau (1997)	≥ 0.80	0.945

Note: * p-value should be statistically insignificant (p-value ≤ 0.05); ** p-value < 0.01.

The measurement model was transformed into a recursive model according to the paths proposed by Minser and Webb (2010). The structural equation model analysis was conducted using a variance-covariance matrix with maximum likelihood estimation (MLE). As the model was saturated, thus reproducing all the variances, covariances and means of the observed variables as in the measurement model, the results of the absolute fit indices, incremental fit indices and parsimony fit indices remained the same (Table 51). On the same note, as the factor coefficient estimates remained the same between both analyses, no evidence of interpretational cofounding was found.

As reported in Figure 43 and summarized in Table 52, out of the six hypothesised paths, five were shown to be statistically significant and in the predicted direction. In this sense, both perceived value and perceived quality were found to positively influence travel satisfaction, while displaying a positive correlational relationship. Moreover, both perceived value (0.339) and perceived quality (0.337) exhibited significant total effects on behavioral intentions and loyalty, while travel satisfaction did not. This result differs from the findings of Minser and Webb (2010), as they did not find a significant effect of perceived value on the formation of behavioral intentions and loyalty, while both perceived quality and travel satisfaction were found to positively affect it. However, the study was conducted based on a public transport context.

Figure 43 – Car commuter group structural model analysis results for the customer-loyalty theory (MINSER; WEBB, 2010)



Source: Author (2020)

Table 52 – Summarization of the outcomes for the hypotheses for the customer-loyalty theory in the car sample

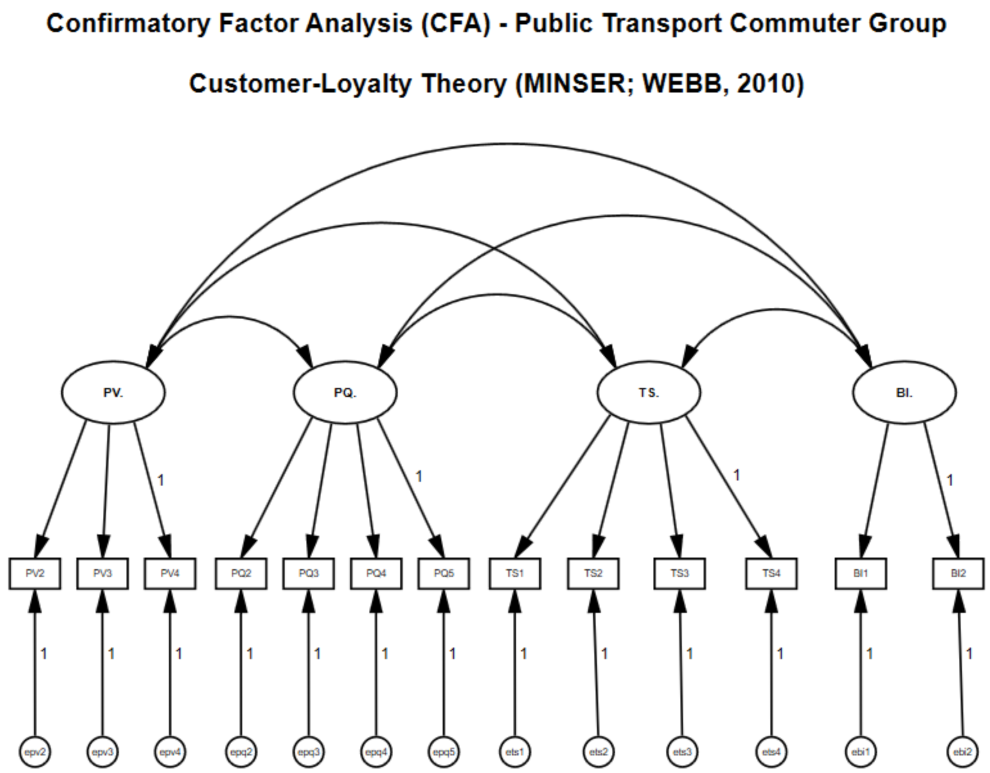
No.	Hypothesis	Estimate	p-value	Outcome
H1	Perceived Value ↔ Perceived Quality	0.556	< 0.01	Confirmed
H2	Perceived Value → Travel Satisfaction	0.142	< 0.01	Confirmed
H3	Perceived Quality → Travel Satisfaction	0.367	< 0.01	Confirmed
H4	Travel Satisfaction → Behavioral Intentions*	0.056	0.254	Not Confirmed
H5	Perceived Value → Behavioral Intentions*	0.331	< 0.01	Confirmed
H6	Perceived Quality → Behavioral Intentions*	0.316	< 0.01	Confirmed

Note: The behavioral intentions construct includes loyalty

As found in the integrated framework, the model results highlight the importance of perceived quality on behavioral intentions and loyalty, while displaying reduced effects of travel satisfaction on it. However, the influence of perceived value on behavioral intentions and loyalty was largely reduced by the integration of marketing and social psychology theories. Overall, the Customer-Loyalty Theory (R^2 = 0.358) accounted for a smaller share of the variance explained on behavioral intentions and loyalty than the integrated framework (R^2 = 0.621) for the car sample.

5.3.1.2 Public Transport Commuter Group

Figure 44 – Public transport commuter group confirmatory factor analysis path diagram for the customer-loyalty theory (MINSER; WEBB, 2010)



Source: Author (2020)

Consistent with the previous models, the same two-step procedure was applied to the public transport sample. In this sense, a congeneric path diagram representing the measurement model for the Customer-Loyalty Theory was built in IBM SPSS AMOS 24 and tested through confirmatory factor analysis (Figure 44). As for the car sample, the model was found to be overidentified (df = 59). Perceived quality and travel satisfaction constructs were also overidentified, while perceived value was just-identified and behavioral intentions and loyalty, underidentified.

Additionally, the same data set employed to validate the model reported for the integrated framework was used to analyse this model. The data set contains 449 observations, which is enough to fulfill the minimum sample size guideline proposed by Hair et al. (2014). It results in a 34:1 observation-parameter ratio, thus over the ideal value of 15:1 as to reduce problems originating from deviations from multivariate normality. As there is no missing data in the sample, the confirmatory factor analysis was conducted using a variance-covariance matrix with maximum likelihood estimation (MLE). The factor loadings were all found to be over the minimum value of 0.50. For instance, 92.3% of the observed parameters exhibited a loading over the ideal threshold of 0.70, as reported in Table 53. Consequently, the finding suggests that the variables are strongly related to their assigned latent construct. Moreover, no illogical standardized parameters or Heywood cases (negative error variance) were found.

Table 53 – Customer-loyalty theory confirmatory factor analysis results for the public transport commuter group

Factor	Variable	Dimension	Measure	Factor Loading
Perceived Value	PV2	Utility	Amount Spent	0.734
	PV3		Quality/Cost Ratio	0.915
	PV4	Experience	Comfort/Cost Ratio	0.882
Perceived Quality	PQ2	Availability	Accessibility	0.717
	PQ3	Comfort and Convenience	Tangible Infrastructure	0.788
	PQ4		Problem Experiences	0.812
	PQ5		Safety	0.712
Travel Satisfaction	TS1	Valence Emotions	Very hurried - Very relaxed	0.845
	TS2		Very worried - Very confident	0.826
	TS3		Very stressed - Very calm	0.864
	TS4	Arousal Emotions	Very tired - Very alert	0.817
Behavioral Intentions and Loyalty	BI1	Cognitive	Willingness to re-use	0.625
	BI2		Willingness to recommend	0.992

Convergent validity was examined by both average extracted variance (AVE) and composite reliability (CR). In this sense, all latent constructs resulted in values over the desired thresholds for both measures. Therefore, it can be implied that the observed indicators converge into single unidimensional constructs. Additionally, the AVE results of any two constructs were found to be smaller than the correlation found between them, thus it can be assumed discriminant validity within the latent constructs, as reported in Table 54.

Table 54 – Customer-loyalty theory convergent and discriminant validity results for the public transport commuter group

	CR	AVE	MSV	MaxR(H)	TS	PV	PQ	BI
TS	0.904	0.703	0.500	0.906	**0.838**	-	-	-
PV	0.883	0.718	0.508	0.908	0.602	**0.847**	-	-
PQ	0.844	0.575	0.554	0.850	0.707	0.713	**0.759**	-
BI	0.807	0.687	0.554	0.984	0.638	0.693	0.744	**0.829**

Notes: CR = Composite Reliability; AVE = Average Variance Extracted; MSV = Maximum Shared Variance; MaxR(H) = McDonald Construct Reliability. The square root of AVE is shown on the diagonal in bold faces

The measurement model was validated by a combination of absolute fit indices, incremental fit indices and parsimony fit indices (Table 55). In this sense, except for the chi-square statistic, which is negatively influenced by sample size and tends to penalize model complexity (HAIR et al., 2014), all fit indices complied with the proposed guidelines. As the model demonstrates sufficient validity, the structural model analysis (SEM) can be performed.

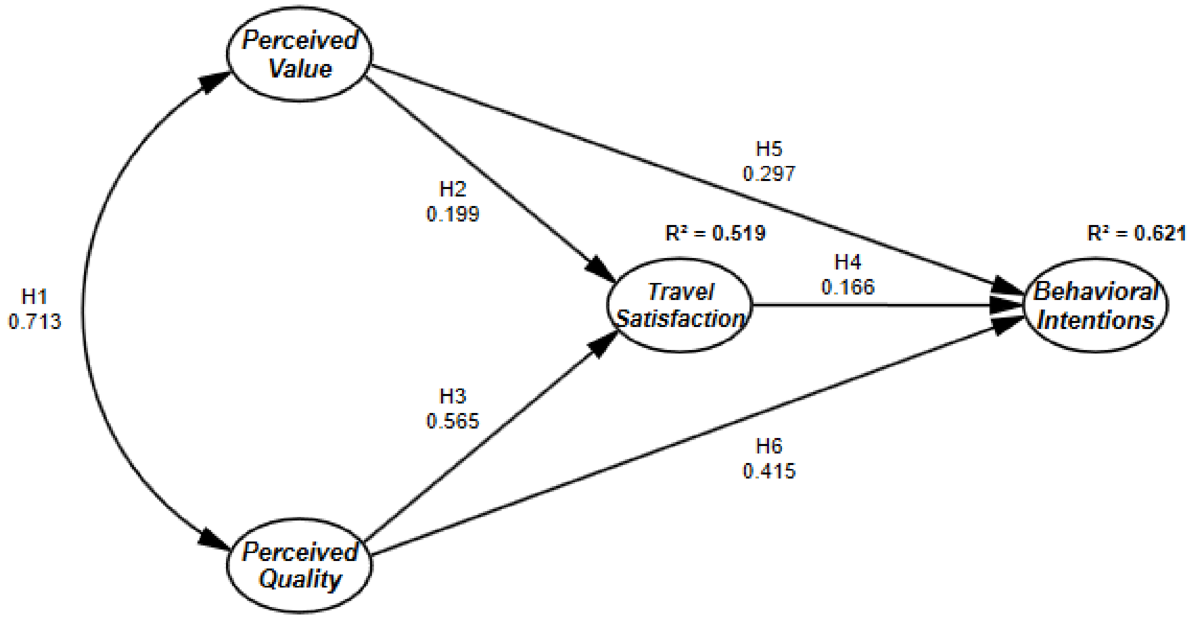
Table 55 – Customer-loyalty theory measurement model validity analysis for the public transport commuter group

Model-Fit Indices	Indicators	Source	Threshold Value	CFA Model
Absolute Fit Indices				
Chi-Square Statistic	CMIN	Hair et al. (2014)	*	143.01*
Goodness-of-Fit Index	GFI	Hu and Bentler (1999)	≥ 0.90	0.953
Root Mean Square Error of Approximation	RMSEA	Hair et al. (2014)	≤ 0.08	0.056
Standardized Root Mean Square Residual	SRMR	Hair et al. (2014)	≤ 0.08	0.034
Normed Chi-Square	CMIN/DF	Byrne (2013)	< 5.0	2.424
Incremental Fit Indices				
Normed Fit Index	NFI	Awang (2015)	≥ 0.90	0.963
Tucker-Lewis Index	TLI	Hair et al. (2014)	≥ 0.90	0.970
Comparative Fit Index	CFI	Hu and Bentler (1999)	≥ 0.90	0.978
Parsimony Fit Indices				
Adjusted Goodness-of-Fit Index	AGFI	Chau (1997)	≥ 0.80	0.927

Note: * p-value should be statistically insignificant (p-value ≤ 0.05); ** p-value < 0.01.

The measurement model was transformed into a recursive model according to the paths proposed by Minser and Webb (2010). Then, the structural equation model analysis was conducted using a variance-covariance matrix with maximum likelihood estimation (MLE). As for the car commuter group, the model was saturated, therefore the fit indices are the same as the ones found for the measurement model (Table 55). Additionally, as the factor loading estimates remained the same between both analyses, no evidence of interpretational cofounding was found. All six hypothesised paths were shown to be statistically significant and in the predicted direction. They are reported in Figure 45 and summarized in Table 56.

Figure 45 – Public transport commuter group structural model analysis results for the customer-loyalty theory (MINSER; WEBB, 2010)



Source: Author (2020)

Table 56 – Summarization of the outcomes for the hypotheses for the customer-loyalty theory in the public transport sample

No.	Hypothesis	Estimate	p-value	Outcome
H1	Perceived Value ↔ Perceived Quality	0.713	< 0.01	Confirmed
H2	Perceived Value → Travel Satisfaction	0.199	< 0.01	Confirmed
H3	Perceived Quality → Travel Satisfaction	0.565	< 0.01	Confirmed
H4	Travel Satisfaction → Behavioral Intentions*	0.166	< 0.01	Confirmed
H5	Perceived Value → Behavioral Intentions*	0.297	< 0.01	Confirmed
H6	Perceived Quality → Behavioral Intentions*	0.415	< 0.01	Confirmed

Note: The behavioral intentions construct includes loyalty

For the public transport sample, both perceived value (0.199) and perceived quality (0.565) were found to positively influence travel satisfaction, while displaying a positive correlational relationship (0.713). Moreover, the coefficient path estimates strength was similar to the ones found in the integrated framework. For instance, perceived value on travel satisfaction (0.197), perceived quality on travel satisfaction (0.628), and the correlational relationship (0.724). On the other hand, in the Customer-Loyalty Theory, perceived quality (0.509) was found to be more influential on the formation of behavioral intentions and loyalty than perceived value (0.330) and travel satisfaction (0.166). In the integrated framework, the effects of perceived quality on behavioral intentions and loyalty were less significant than the influence of perceived value and travel satisfaction. Nonetheless, even though Minser and Webb (2010) found an important effect of perceived quality and travel satisfaction on behavioral intentions, the influence of perceived value was found to be non-significant on their model. Overall, the Customer-Loyalty Theory (R^2 = 0.621) accounted for a smaller share of the variance explained on behavioral intentions and loyalty than the integrated framework (R^2 = 0.701).

5.3.2 Theory of Planned Behavior

As previously mentioned, the theory of planned behavior developed by Ajzen (1985, 1991) postulates that, when under volitional control, behavior is reasoned, deliberate and motivated by the strength of intentions, which are influenced by attitudes, social norms, and perceived behavioral control. Additionally, as personal norms have been found to increase explained variance on behavior (BECK; AJZEN, 1991) and habit is a main source of criticism to the theory, since as behavior is repeated, it stops being reasoned and is largely influenced by habit (RONIS; YATES; KIRSCHT, 1989), both constructs have been added to the model. In this sense, the following hypotheses were tested:

H_1 Attitudes positively influence behavioral intentions and user loyalty.
H_2 Social norms positively influence behavioral intentions and user loyalty.
H_3 Perceived behavioral control positively influence behavioral intentions and user loyalty.
H_{4a} Personal norms negatively influence behavioral intentions and user loyalty (car sample).

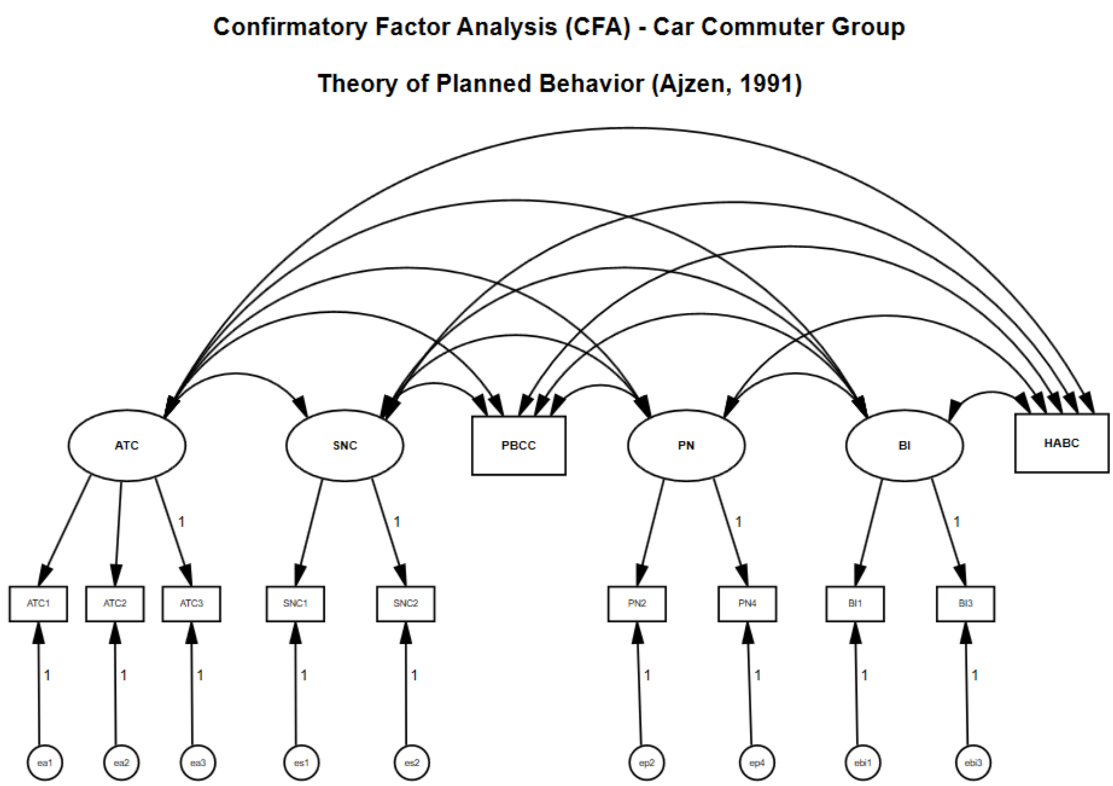
H$_{4b}$ Personal norms positively influence behavioral intentions and user loyalty (public transport sample).

H$_5$ Behavioral intentions and user loyalty influence positively habit.

5.3.2.1 Car Commuter Group

Following the same methodology applied to both the integrated framework and the customer-loyalty theory, the congeneric path diagram built in IBM SPSS AMOS 24 was used to asses the measurement model of the theory of planned behavior, as shown in Figure 46. In this sense, the model was found to be overidentified (df = 31). In relation to the latent constructs, attitudes is just-identified, while social norms, personal norms and behavioral intentions and loyalty are underidentified. Perceived behavioral control and habit were added as single dimensional constructs.

Figure 46 – Car commuter group confirmatory factor analysis path diagram for the theory of planned behavior (AJZEN, 1991)



Source: Author (2020)

The analysis was based on the same data set employed to validate the model reported for the integrated framework. The data set, which contains 630 observations, is enough to fulfill the minimum sample size guidelines proposed by Hair et al. (2014). Additionally, it results in a 57:1 observation-parameter ratio, thus over the ideal value of 15:1 as to reduce problems originating from deviations from multivariate normality. As there is no missing data in the sample, the confirmatory factor analysis was conducted using a variance-covariance matrix with maximum likelihood estimation (MLE). As reported in Table 57, all factor loadings are at least over 0.50, while 88.9% of the measured indicators displayed a loading over the ideal threshold of 0.70. Therefore, the finding suggests that the variables are strongly related to their assigned latent construct. Moreover, no illogical standardized parameters or Heywood cases (negative error variance) were found.

Table 57 – Theory of planned behavior confirmatory factor analysis results for the car commuter group

Factor	Variable	Dimension	Measure	Factor Loading
Attitudes toward Cars	ATC1	Experience	Positiveness	0.823
	ATC2	Experience	Pleasantness	0.723
	ATC3	Utility	Effectiveness	0.654
Social Norms - Cars	SNC1	Relationships	Strong Ties	0.966
	SNC2	Relationships	Weak Ties	0.822
Personal Norms	PN2	Pro-Environment	Commitment	0.843
	PN4	Pro-Health	Commitment	0.758
Behavioral Intentions and Loyalty	BI1	Cognitive	Willingness to re-use	0.732
	BI3	Affective	Involvement	0.778

Convergent validity was examined by assessing both the average extracted variance (AVE) and the composite reliability (CR). As the latent constructs displayed both average extracted variance (AVE) and composite reliability (CR) values over the desired thresholds, it can be implied that the observed indicators converge into single unidimensional constructs. Additionally, discriminant validity was measured by comparing the AVE values for any two constructs to the correlation found between them. In the sample, discriminant validity for behavioral intentions and loyalty and attitudes toward cars could not be attested as shown in Table 58. The same combination of absolute fit indices, incremental fit indices and parsimony fit indices was used to validate the measurement model (Table 59). Once more, the chi-square statistic was not found to comply with guidelines and was significant. However, as the other indices complied with the guidelines, the results for the chi-square statistic are not expected to be detrimental to the overall validity of the measurement model. Therefore, as the model shows sufficient validity, the structural model analysis (SEM) can be performed.

Table 58 – Theory of planned behavior convergent and discriminant validity results for the car commuter group

	CR	AVE	MSV	MaxR(H)	BI	ATC	SNC	PN
BI	0.726	0.571	0.599	0.729	**0.755**	-	-	-
ATC	0.779	0.543	0.599	0.798	0.774	**0.737**	-	-
SNC	0.891	0.804	0.283	0.941	0.473	0.532	**0.897**	-
PN	0.782	0.643	0.164	0.792	-0.400	-0.405	-0.223	**0.802**

Notes: CR = Composite Reliability; AVE = Average Variance Extracted; MSV = Maximum Shared Variance; MaxR(H) = McDonald Construct Reliability. The square root of AVE is shown on the diagonal in bold faces.

Table 59 – Theory of planned behavior measurement model validity analysis for the car commuter group

Model-Fit Indices	Indicators	Source	Threshold Value	CFA Model
Absolute Fit Indices				
Chi-Square Statistic	CMIN	Hair et al. (2010)	*	68.99**
Goodness-of-Fit Index	GFI	Hu and Bentler (1999)	≥ 0.90	0.981
Root Mean Square Error of Approximation	RMSEA	Hair et al. (2010)	≤ 0.08	
Standardized Root Mean Square Residual	SRMR	Hair et al. (2010)	≤ 0.08	0.025
Normed Chi-Square	CMIN/DF	Kline (2005)	< 3.0	2.226
Incremental Fit Indices				
Normed Fit Index	NFI	Awang (2012)	≥ 0.90	0.973
Tucker-Lewis Index	TLI	Hair et al. (2010)	≥ 0.90	0.973
Comparative Fit Index	CFI	Hu and Bentler (1999)	≥ 0.90	0.985
Parsimony Fit Indices				
Adjusted Goodness-of-Fit Index	AGFI	Hair et al. (2010)	≥ 0.90	0.960

Note: * p-value should be statistically insignificant (p-value ≤ 0.05); ** p-value < 0.01.

The measurement model was then transformed into a recursive structural model based on the paths proposed by Ajzen (1991). After the modifications, the model remained overidentified (df = 35). As the same data set employed for both the integrated framework and the customer-loyalty theory model validation was used, outliers have already been dealt with. Additionally, there is no missing data in the sample. The structural equation model analysis was conducted using a variance-covariance matrix with maximum likelihood estimation (MLE). The multiple indicators of goodness-of-fit suggest that the model fits the data well as reported in Table 60. Moreover, the new chi-square statistic (Chi-square = 79.05, p-value < 0.01, df = 35) was found to be higher than the value previously found (Chi-square = 68.99, p-value < 0.01, df = 31), as expected. Finally, as the variations between the measurement model and the structural equation model factor loadings were all smaller than 0.05, no evidence of interpretational cofounding was found.

Table 60 – Theory of planned behavior SEM validity analysis for the car commuter group

Model-Fit Indices	Indicators	Source	Threshold Value	SEM Model
Absolute Fit Indices				
Chi-Square Statistic	CMIN	Hair et al. (2010)	*	79.05**
Goodness-of-Fit Index	GFI	Hu and Bentler (1999)	≥ 0.90	0.979
Root Mean Square Error of Approximation	RMSEA	Hair et al. (2010)	≤ 0.08	0.045
Standardized Root Mean Square Residual	SRMR	Hair et al. (2010)	≤ 0.08	0.030
Normed Chi-Square	CMIN/DF	Byrne (2013)	< 5.0	2.259
Incremental Fit Indices				
Normed Fit Index	NFI	Awang (2012)	≥ 0.90	0.969
Tucker-Lewis Index	TLI	Hair et al. (2010)	≥ 0.90	0.972
Comparative Fit Index	CFI	Hu and Bentler (1999)	≥ 0.90	0.982
Parsimony Fit Indices				
Adjusted Goodness-of-Fit Index	AGFI	Chau (1997)	≥ 0.80	0.960

Note: * p-value should be statistically insignificant (p-value ≤ 0.05); ** p-value < 0.01.

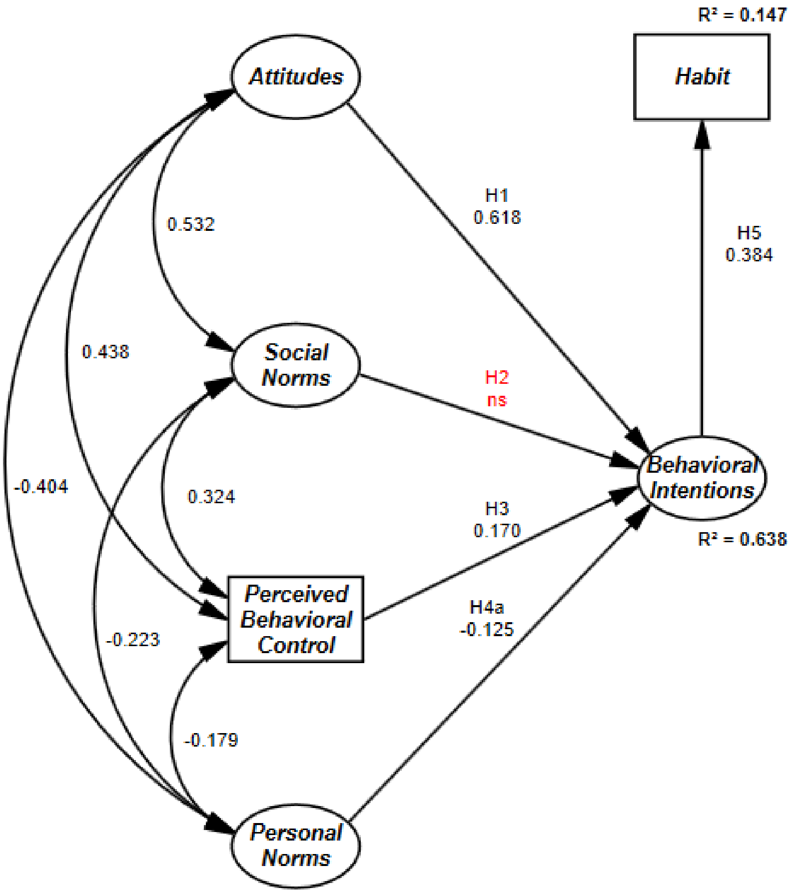
As reported in Figure 47 and summarized in Table 61, out of the 5 hypothesised paths, four were shown to be statistically significant and in the predicted direction.

Table 61 – Summarization of the outcomes for the hypotheses for the theory of planned behavior in the car sample

No.	Hypothesis	Estimate	p-value	Outcome
H1	Attitudes toward Cars → Behavioral Intentions*	0.618	< 0.01	Confirmed
H2	Social Norms toward Cars → Behavioral Intentions*	0.056	0.359	Not Confirmed
H3	Perceived Behavioral Control → Behavioral Intentions*	0.170	< 0.01	Confirmed
H4a	Personal Norms → Behavioral Intentions*	-0.125	< 0.01	Confirmed
H5	Behavioral Intentions* → Habit	0.384	< 0.01	Confirmed

Note: The behavioral intentions construct includes loyalty.

Figure 47 – Car commuter group structural model analysis results for the theory of planned behavior (AJZEN, 1991)



Source: Author (2020)

As found for the integrated framework, behavioral intentions and loyalty was found to be positively affected by attitudes, perceived behavioral control and personal norms, while social norms did not significantly influence the construct. Additionally, the estimated path coefficients found for the theory of planned behavior model were similar to the ones obtained for the integrated framework. Moreover, behavioral intentions and loyalty and attitudes were found to have a positive effect on habit for both models. In this sense, the effects of all latent constructs, including behavioral intentions, on habit were also found to be reduced from the moderate to the strong car habit categories (Table 62). Therefore, similar conclusions could be drawn from both models. Nonetheless, overall, the theory of planned behavioral (R^2 = 0.638) accounted for a slightly higher share of the variance explained on behavioral intentions and loyalty than the integrated framework (R^2 = 0.621) for the car sample.

Table 62 – Total effects on habit, by car habit strength group

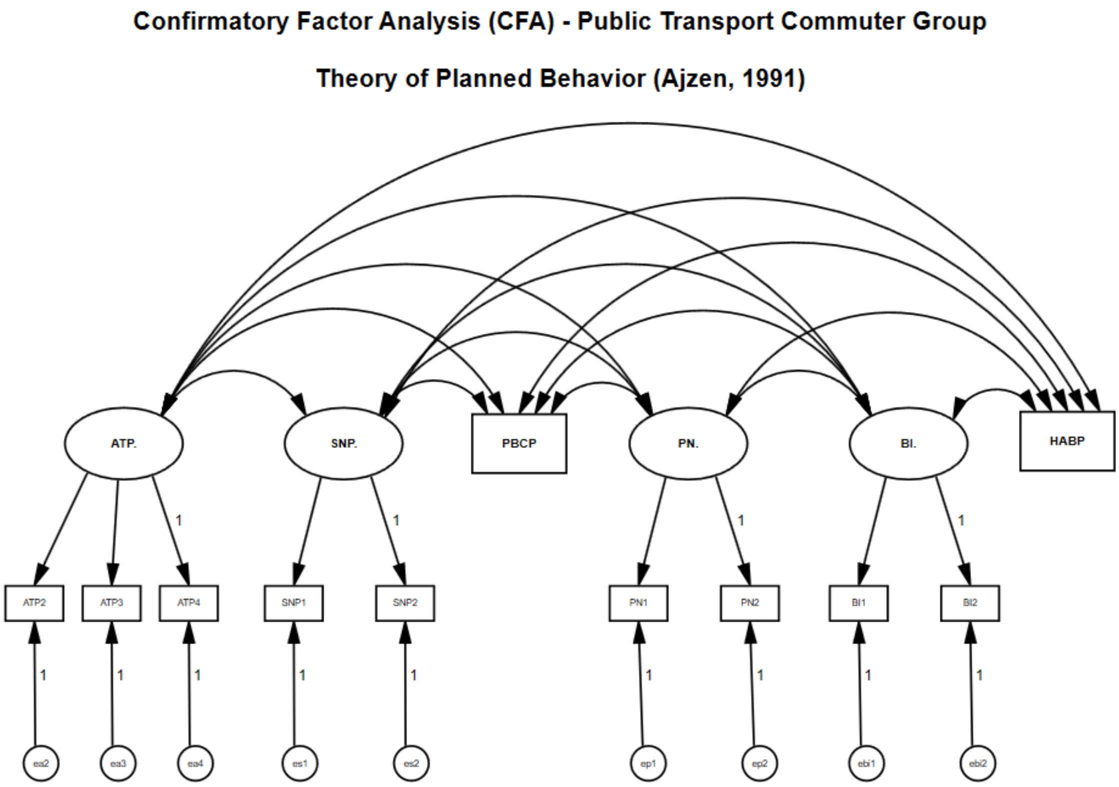
Relationship			Habit Strength		
			Moderate	Strong	Reduction
Attitudes	→	Habit	0.168	0.105	-60%
Social Norms	→	Habit	-0.004	0.017	124%
Perceived Behavioral Control	→	Habit	0.047	0.031	-52%
Personal Norms	→	Habit	-0.041	-0.009	-356%
Behavioral Intentions*	→	Habit	0.270	0.165	-64%

Note: The behavioral intentions construct includes loyalty.

5.3.2.2 Public Transport Commuter Group

For the measurement model, a congeneric path diagram was built in IBM SPSS AMOS 24. The validity and the significance of the model and its associated latent constructs were evaluated through confirmatory factor analysis (Figure 48). As for the car sample, the model was found to be overidentified (df = 31). In relation to the latent constructs, attitudes is just-identified, while social norms, personal norms and behavioral intentions and loyalty are underidentified. Perceived behavioral control and habit were added as single dimensional constructs.

Figure 48 – Public transport commuter group confirmatory factor analysis path diagram for the theory of planned behavior (AJZEN, 1991)



Source: Author (2020)

In this model, the analysis was also based on the same data set employed to validate the integrated framework. Therefore, the 449 observations are enough to fulfill the minimum sample size guidelines proposed by Hair et al. (2014). Moreover, they result in a 41:1 observation-ratio, thus greater than the minimum threshold of 15:1 as to reduce problems originating from deviations from multivariate normality. As there is no missing data in the sample, the confirmatory factor analysis was conducted using a variance-covariance matrix with maximum likelihood estimation (MLE). In this sense, all the factor loadings were found to be at least over 0.50, as reported in Table 63. For instance, 88.9% of the measured indicators exhibited a loading over the ideal threshold of 0.70, thus it suggests that the variables show a strong association with their assigned latent construct. Moreover, no illogical standardized parameters or Heywood cases (negative error variance) were found.

Table 63 – Theory of planned behavior confirmatory factor analysis results for the public transport commuter group

Factor	Variable	Dimension	Measure	Factor Loading
Attitudes toward Cars	ATP2	Experience	Pleasantness	0.881
	ATP3	Utility	Effectiveness	0.711
	ATP4	Experience	Comfort	0.891
Social Norms - Cars	SNP1	Relationships	Strong Ties	0.933
	SNP2	Relationships	Weak Ties	0.906
Personal Norms	PN1	Pro-Environment	Environment Protection	0.841
	PN2		Commitment	0.743
Behavioral Intentions and Loyalty	BI1	Cognitive	Willingness to re-use	0.666
	BI2		Willingness to recommend	0.930

Convergent validity was also evaluated according to the average extracted variance (AVE) and the composite reliability (CR). Consequently, as the latent constructs showed both AVE and CR values over the desired minimum levels, it can be argued that the observed indicators are converging into the expected single dimensional constructs. On the same note, as the AVE results of any two constructs were smaller than the correlation found between them. Therefore, it can be assumed discriminant validity in the sample, as show in Table 64.

Table 64 – Theory of planned behavior convergent and discriminant validity results for the public transport commuter group

	CR	AVE	MSV	MaxR(H)	BI	ATC	SNC	PN
BI	0.786	0.654	0.605	0.878	**0.809**			
ATC	0.870	0.692	0.605	0.893	0.778	**0.832**		
SNC	0.916	0.846	0.269	0.919	0.479	0.519	**0.920**	
PN	0.772	0.630	0.055	0.785	0.234	0.229	0.102	**0.794**

Notes: CR = Composite Reliability; AVE = Average Variance Extracted; MSV = Maximum Shared Variance; MaxR(H) = McDonald Construct Reliability. The square root of AVE is shown on the diagonal in bold faces.

As to measure the validity of the model, the same combination of absolute fit indices, incremental fit indices and parsimony fit indices was used. As reported in Table 65, the results show that the chi-square statistic was not found to comply with the guidelines, and it was significant. Nonetheless, all the other indicators met the criteria. In this sense, the results for the chi-square statistic are not expected to be detrimental to the overall validity of the measurement model. As the model shows sufficient validity, the structural model analysis (SEM) can be performed.

Table 65 – Theory of planned behavior measurement model validity analysis for the public transport commuter group

Model-Fit Indices	Indicators	Source	Threshold Value	CFA Model
Absolute Fit Indices				
Chi-Square Statistic	CMIN	Hair et al. (2010)	*	84.525**
Goodness-of-Fit Index	GFI	Hu and Bentler (1999)	≥ 0.90	0.967
Root Mean Square Error of Approximation	RMSEA	Hair et al. (2010)	≤ 0.08	0.062
Standardized Root Mean Square Residual	SRMR	Hair et al. (2010)	≤ 0.08	0.033
Normed Chi-Square	CMIN/DF	Kline (2005)	< 3.0	2.727
Incremental Fit Indices				
Normed Fit Index	NFI	Awang (2012)	≥ 0.90	0.965
Tucker-Lewis Index	TLI	Hair et al. (2010)	≥ 0.90	0.978
Comparative Fit Index	CFI	Hu and Bentler (1999)	≥ 0.90	0.977
Parsimony Fit Indices				
Adjusted Goodness-of-Fit Index	AGFI	Hair et al. (2010)	≥ 0.90	0.929

Note: * p-value should be statistically insignificant (p-value ≤ 0.05); ** p-value < 0.01.

As to comply with the two-step approach, the measurement model was transformed into a recursive structural model based on the paths proposed by Ajzen (1991). The model was found to remain overidentified (df = 35) and as the analysis used the same data set from the previous step, outliers have already been dealt with.

The structural equation model analysis was conducted using a variance-covariance matrix with maximum likelihood estimation (MLE). Then, the multiple measures of goodness-of-fit were evaluated, suggesting that the model fits the data well (Table 66). Additionally, the new chi-square statistic (Chi-square = 86.728, p-value < 0.01, df = 35) was found to be higher than the value previously found as expected (Chi-square = 84.525, p-value < 0.01, df = 31). As the variations between the measurement model and the structural equation model factor loadings were all smaller than 0.05, no evidence of interpretational cofounding was found in the analysis.

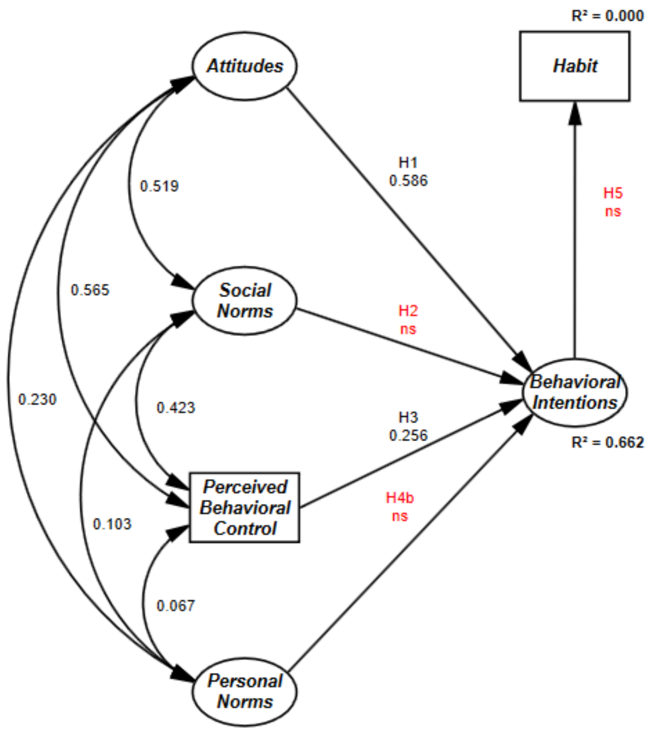
Table 66 – Theory of planned behavior SEM validity analysis for the public transport commuter group

Model-Fit Indices	Indicators	Source	Threshold Value	SEM Model
Absolute Fit Indices				
Chi-Square Statistic	CMIN	Hair et al. (2010)	*	86.728**
Goodness-of-Fit Index	GFI	Hu and Bentler (1999)	≥ 0.90	0.966
Root Mean Square Error of Approximation	RMSEA	Hair et al. (2010)	≤ 0.08	0.057
Standardized Root Mean Square Residual	SRMR	Hair et al. (2010)	≤ 0.08	0.033
Normed Chi-Square	CMIN/DF	Byrne (2013)	< 5.0	2.478
Incremental Fit Indices				
Normed Fit Index	NFI	Awang (2012)	≥ 0.90	0.964
Tucker-Lewis Index	TLI	Hair et al. (2010)	≥ 0.90	0.966
Comparative Fit Index	CFI	Hu and Bentler (1999)	≥ 0.90	0.978
Parsimony Fit Indices				
Adjusted Goodness-of-Fit Index	AGFI	Chau (1997)	≥ 0.80	0.936

Note: * p-value should be statistically insignificant (p-value ≤ 0.05); ** p-value < 0.01.

As reported in Figure 49 and summarized in Table 67, out of the 5 hypothesised paths, only 2 were shown to be statistically significant and in the predicted direction.

Figure 49 – Public transport commuter group structural model analysis results for the theory of planned behavior (AJZEN, 1991)



Source: Author (2020)

Table 67 – Summarization of the outcomes for the hypotheses from the theory of planned behavior in the public transport sample

No.	Hypothesis	Estimate	p-value	Outcome
H1	Attitudes → Behavioral Intentions*	0.586	< 0.01	Confirmed
H2	Social Norms → Behavioral Intentions*	0.060	0.175	Not Confirmed
H3	Perceived Behavioral Control → Behavioral Intentions*	0.256	< 0.01	Confirmed
H4b	Personal Norms → Behavioral Intentions*	0.077	0.06	Not Confirmed
H5	Behavioral Intentions* → Habit	-0.001	0.982	Not Confirmed

Note: The behavioral intentions construct includes loyalty.

As in the integrated framework, behavioral intentions and loyalty was found to be positively influenced by attitudes and perceived behavioral control, while social norms did not significantly influence the construct. Moreover, behavioral intentions also did not influence habit in the overall sample. The theory of planned behavior model also showed a significant effect for the weak public transport habit category (0.115). On the other hand, the models differed on the significance of the personal norms-behavioral intentions and loyalty path. In this sense, the effects of personal norms were found to be reduced according to the theory of planned behavior. Nonetheless, overall, the theory of planned behavioral ($R^2 = 0.662$) accounted for a smaller share of the variance explained on behavioral intentions and loyalty than the integrated framework ($R^2 = 0.701$) for the public transport sample.

5.4 RESEARCH HIGHLIGHTS AND POLICY IMPLICATIONS

Understanding the formation of travel behavior is paramount to developing public policies that successfully encourage sustainable transportation modes. Current travel behavior research can be divided into three main fields: marketing, social psychology, and land-use, which are derived from different theories and beliefs. Even though, constructs from different theoretical frameworks, such as travel satisfaction and attitudes, have been previously studied together, few studies have analysed how a set of constructs from different theories would interact and influence the formation of behavioral intentions and user loyalty. In this sense, the main goal of this research entailed developing a comprehensive framework based on a systematic review of both marketing and social psychology theories as to investigate the formation of behavioral intentions and loyalty bonds towards two commute travel modes, namely commuting by car and by public transport. To this end, a survey was developed and applied in Curitiba, Brazil. The collected data was used to test and validate the integrated framework through a two-step approach based on both confirmatory factor analysis (CFA) and structural equation modeling (SEM).

In average, the car sample ($m = 36.1$, $s.d. = 12.7$) skewed older than the public transport sample ($m = 28.0$, $s.d. = 10.3$). This finding is strongly associated with the survey dissemination strategy, which consisted in approaching several universities in Curitiba. As a result, age was found to be strongly correlated to the respondent's educational level ($r = 0.73$, $p < 0.01$). In the car sample, 24.3% have or are pursuing a PhD degree and 22.2% have or are pursuing a master's degree, while 48.5% of the public transport sample are undergraduate students. Moreover, educational level correlates moderately to monthly household income ($r = 0.41$, $p < 0.01$). In this sense, household income could be used as an indicator of both commute travel mode ($r = -0.39$, $p < 0.01$) and car availability ($r = 0.43$, $p < 0.01$). For instance, 44.0% of the car sample reported receiving over 10 minimum wages per household per month, while 48.5% of the public transport sample declared receiving less than 4 minimum wages per household per month. As expected, the sample is not representative of the overall population according to census data. However, as the main goal of this research relates to achieving an analytical representation of the relationships among multiple variables and not a descriptive analysis of the population, it is more relevant to achieve a large and sufficiently diverse sample rather than a representative one.

Regarding preferred travel mode, 56.1% of car commuters reported the car as their preferred travel mode, while 17.3% chose public transport, and 24.8% selected active travel modes. Thus, the results suggest the existence of loyalty bonds within a large share of the car sample in relation to their current travel mode. On the other hand, only 21.1% of public transport commuters selected commuting by public transport as their preferred travel option, while 31.1% selected active travel modes and 46.2% selected the car. The relative low interest for public transport is concerning. It suggests that the current trend of decrease in ridership is likely to continue, specially if public transport commuters increase their monthly household income. Moreover, it is possible to notice opposing trends regarding commute travel time. In the sample, 73.5% of commutes by car take less than 30 minutes, while 73.6% of commutes by public transport take over 30 minutes. Therefore, public transport commuters could also justify a mode switch to individual modes as a way to save time, however the increasing fleet could lead to, for example, increased air pollution, traffic accident and traffic congestion rates and overall decrease of quality of life, which would decrease the overall sustainability of the city's transportation system.

The descriptive analysis of the latent constructs revealed that public transport commuters reported low levels of perceived value, perceived quality, travel satisfaction, and behavioral intentions and loyalty toward their current travel mode. Contrarily, car commuters reported medium to high levels across all dimensions of the same latent constructs. These results highlight the need for public transport system infrastructural improvements, such as in the tangible infrastructure, safety and security, and reliability, as to reduce problem experiences and increase the perceived value according to the amount spent and perceived quality and comfort per cost ratios. In addition, both pleasantness, effectiveness, comfort, safety, flexibility, and cost dimensions composing the attitudes towards commuting by public transport were negatively evaluated by both interest groups. On the hand, only sustainability and cost were negatively evaluated towards commuting by car. On this note, the overall positive personal norms responses in the car sample indicate the possibility of self-presentation biases. For instance, respondents strongly indicated that they are compelled to protect the environment and that they would switch their travel mode to do so, while also indicating that commuting by car is not sustainable. This dissonance in beliefs could be derived from the strong influence of habit towards using the car among car commuters, which was not found for public transport commuters in relation to using public transport.

Then, aiming to analyse the unidimensionality of the latent constructs, an exploratory factor analysis (EFA) was conducted for both samples. In this process, several observed indicators were excluded from the analysis as they failed to meet the necessary criteria, meaning having either a primary loading factor or achieving communality over 0.50. After the respecification, a 7-factor structure representing perceived value, perceived quality, travel satisfaction, behavioral intentions and loyalty, attitudes, social norms, and personal norms was found for both samples. Moreover, positive results were found for both sample adequacy and the reliability of the constructs. Finally, as previously mentioned, the integrated model framework was validated for both samples based on a two-step approach composed of confirmatory factor analysis (CFA) and structural equation modelling (SEM).

In both the car and public transport commuter groups, perceived value was found to have a positive correlational relationship with perceived quality, while both were found to directly influence travel satisfaction. Even though, perceived quality was found to have a strong influence on the formation of behavioral intentions and user loyalty in the car sample (only behind to attitudes), perceived value accounted for the largest influence in the main construct in the public transport sample. The findings indicate that actions targeting perceived quality, such as improvements in accessibility, tangible infrastructure, problem experiences, and safety would have a greater effect on car commuters' intentions than focusing on perceived value. Contrarily, for public transport commuters, it can be argued that improvements in service quality that do not lead to an increase in perceived value are not likely to significantly increase travel satisfaction or behavioral intentions. Thus, suggesting that car commuters are less sensitive to the costs of their commute travel mode than public transport commuters.

Moreover, perceived quality was found to have a stronger influence in the formation of both attitudes, social norms, perceived behavioral control, and personal norms than travel satisfaction in the car sample. On the other hand, as hypothesized, travel satisfaction showed the largest influence on both attitudes, social norms, perceived behavioral control, and personal norms in the public transport sample.

Consequently, it can be reasoned that the common set of salient beliefs towards commuting by car and by public transport are likely to be derived from different constructs. For instance, perceived quality for the car sample and travel satisfaction for the public transport sample. Nonetheless, the expected association between travel satisfaction and attitudes was found for both samples. Additionally, both constructs were found to significantly influence the formation of behavioral intentions and user loyalty as well as perceived behavioral control and personal norms. On the other hand, the influence of social norms on the main construct was rejected in both samples. The finding is consistent with Thogersen (2006), who did not find an influence of social norms on behavioral intentions for studies performed under stable conditions. Finally, behavioral intentions and loyalty were found to significantly influence the formation of habit in the car sample. Moreover, a significant reduction of coefficient path estimates across all latent constructs was found between moderate and strong habit strength categories. Thus, suggesting that the stronger the habit, the less new relevant information would be processed. In the public transport sample, the influence of behavioral intentions and user loyalty in the formation of habit was not found. For a deeper analysis, please refer to both Section 5.2.4 and Section 5.2.5.

Based on the descriptive analysis of the latent constructs, it has been shown that both public transport and car commuters reported negative attitudes towards commuting by public transport. On the other hand, both groups showed largely positive attitudes towards commuting by car. In this sense, public managers need to design policies as to first retain public transport commuters and then to attract people from other travel modes. Therefore, hard policies are likely to be required. Examining both perceived value, perceived quality, and travel satisfaction dimensions and their relative importance, it can be suggested that the system requires infrastructural improvements that reduce problem experiences and increase safety and reliability as to reduce specially the anxiety and the stress felt by public transport commuters. These recommendations are corroborated by the strong influence of perceived value and travel satisfaction on the formation of both attitudes, social norms, perceived behavioral control, personal norms, and behavioral intentions and user loyalty for public transport commuters as found on the integrated framework model. From the results, it can be argued that improvements in service quality that do not lead to an increase in perceived value are not likely to significantly increase travel satisfaction or behavioral intentions. Nonetheless, as to attract car users, measures improving flexibility and reducing fares would also be necessary.

Additionally, public transport ridership would also benefit from developing an overall pro-public transport environment. As shown by the descriptive analysis of social norms, the sample displays mostly a neutral or dispassionate view of commuting by public transport. Therefore, soft policies, such as offering free tickets and travel planning and informational campaigns targeting specially workplaces due to the strong influence of weak relationships on the formation of social norms could lead to both reducing car habit strength and pro-public transport attitudes. Moreover, infrastructural and policy changes, such as increasing the number of exclusive bus and cycling lanes and increasing the costs of commuting by car, such as congestion charges and decreasing the availability of parking spaces could also be beneficial. However, such measures would only work if public transport is perceived as a viable alternative as shown by previous literature findings (*e.g.* BAMBERG, RÖLLE, WEBER, 2003; ERIKSSON, GARVILL, NORDLUND, 2008). In this sense, as car commuters were found to experience medium to high levels of perceived value, perceived quality, travel satisfaction, and behavioral intentions and user loyalty and moderate to strong levels of car habit strength, such soft and hard policies are made even more necessary as a natural mode switch should be expected.

6 CONCLUSIONS

This study aimed to investigate the formation of behavioral intentions and loyalty bonds toward different commute behaviors based on an integrated model framework composed of both social psychology and marketing theories. Therefore, the process started with a systematic review of the literature as to lay the theoretical grounds for the model development as reported in Chapters 2 and 3. Then, the descriptive variables, latent constructs, and observed variables were examined as to find data trends that could aid explaining commute behavior and guide public policies (Section 5.1). On the same note, the developed integrated framework was validated, and the model results for both samples were analysed and compared as reported in Section 5.2. The results were then compared to two competing theories, namely the customer-loyalty theory (MINSER; WEBB, 2010) and the theory of planned behavior (AJZEN, 1985) (Section 5.3). Finally, possible policy implications were discussed in Section 5.4. Consequently, all specific objectives of this research were achieved. In this chapter, the main findings as well as research limitations are discussed.

From examining both socio-economic and travel and commute variables, it was found that higher levels of monthly household income are linked with an increase in car availability ($r = 0.43$, $p < 0.01$) and commuting by car ($r = 0.39$, $p < 0.01$). For instance, among the analysed occupation categories, commuting by car was only not dominant among unemployed and student respondents. On the other hand, commuting by public transport is largely associated with longer commute travel times ($r = 0.53$, $p < 0.01$), lower education levels ($r = -0.38$, $p < 0.01$), and lower household incomes ($r = -0.39$, $p < 0.01$). In this sense, as public transport commuters show a large preference for commuting by car (46.2%), it could be expected that as their financial situation improve, they are likely to switch towards individual modes. Nonetheless, there is also a significant share of respondents in the overall sample with favorable intentions towards commuting by cycling (17.8%) and walking (10.1%) that should be further investigated.

Overall, public transport commuters were found to experience low levels of perceived value, perceived quality, travel satisfaction, and behavioral intentions and loyalty toward their commute travel mode. In this sense, the combined analysis of attribute evaluation and relative importance highlights the need for system infrastructural improvements that reduce problem experiences and increase safety and reliability as to reduce specially the anxiety and the stress felt by public transport commuters. Such measures are paramount as to enable the formation of positive behavioral intentions and user loyalty bonds toward commuting by public transport, which would enable the formation of habit. In the current scenario, both car and public transport commuters were found to display negative attitudes in relation to the pleasantness, effectiveness, comfort, safety, flexibility and cost dimensions of this travel mode, which corroborate that the needs of public transport commuters are not being fulfilled and that car commuters would not be satisfied if they were to try it. In this sense, such improvements are required as to both retain and increase ridership.

On the other hand, a travel mode switch is not expected from car commuters as they were shown to experience medium to high levels of perceived value, perceived quality, travel satisfaction, and behavioral intentions and user loyalty. In this sense, both car and public transport commuters were found to have positive attitudes toward the positiveness, pleasantness, effectiveness, comfort, safety, and flexibility dimensions of commuting by car. The relative importance analysis revealed that car and public transport commuters' value similar aspects of commuting by car, such as the pleasantness, positiveness, effectiveness, safety and flexibility of this travel mode. Therefore, the findings suggest that the needs of car commuters are being fulfilled, while supporting that most public transport commuters are likely to a mode switch, which is hindered specially by the costs of commuting by car. Moreover, a dissonance is found among car commuters as they display both positive reactions in relation to pro-environmental attitudes and a consonance between chosen travel mode and personal values while indicating that commuting by car is not sustainable, consequently this result could be both explained based on self-presentation biases or the blocking effects of habit on processing and acquiring relevant information. Moreover, the formation of social norms toward both travel modes was found to be more affected by the perceptions of acquaintances and co-workers than by family and close friends or society and media, while involvement as proposed by van Lierop, Badami and El-Geneidy (2017) was found to be significant and relevant in the formation of behavioral intentions and user loyalty, which could be added in future studies as an affective dimension of both constructs. Additionally, car availability was found to be a good indicator of both perceived behavioral control towards cars ($r = 0.34$, $p < 0.01$) and towards public transport ($r = -0.37$, $p < 0.01$).

The integrated model framework was developed based on a systematic literature review of both marketing and social-psychology theories. It was then validated following a two-step approach composed of confirmatory factor analysis and structural equation modelling for both car and public transport commuters. Nonetheless, the model results revealed differences on the formation of behavioral intentions and user loyalty across both samples. For instance, attitudes (0.675), perceived quality (0.507), personal norms (-0.194), perceived behavioral control (0.190), and travel satisfaction (0.135) were the constructs with the largest effect on the main studied construct in the car sample. On the other hand, perceived value (0.497), travel satisfaction (0.449), attitudes (0.342), perceived quality (0.282), perceived behavioral control (0.218), and personal norms (0.123) were the most relevant in the public transport sample.

In both models, perceived quality exhibited a positive correlational relationship to perceived value, and both were found to directly influence travel satisfaction as hypothesised. However, even though perceived quality displayed a significant effect on behavioral intentions and user loyalty in both contexts, perceived value was found to have a negligible effect on the main construct in the car sample, while accounting for the largest effect on it in the public transport sample. Thus, suggesting that car commuters are less sensitive to the costs of their commute travel mode than public transport commuters. Therefore, actions targeting perceived quality dimensions are likely to have a greater effect on car commuters' intentions than focusing on perceived value. Contrarily, for public transport commuters, it can be argued that improvements in service quality that do not lead to an increase in perceived value are not likely to significantly increase travel satisfaction or behavioral intentions.

The model results provide further evidence on the role of travel satisfaction as a driver of positive attitudes as previously found in the literature. Nonetheless, this role is more prominent in the public transport sample than in the car sample. For car commuters, perceived quality was found to have a stronger influence on both attitudes, social norms, and perceived behavioral control than travel satisfaction. Moreover, differently from hypothesised, travel satisfaction was only showed to have a significant influence on attitudes and personal norms under this context. Notwithstanding, travel satisfaction was shown to have the largest total effects on both attitudes, social norms, perceived behavioral control, and personal norms in the public transportation sample as theorized. Consequently, it can be reasoned that the common set of salient beliefs towards commuting by car and by public transport were being derived from different constructs. For instance, perceived quality for the car sample and travel satisfaction for the public transport sample.

Moreover, as expected, attitudes were found to have a positive and significant effect on the formation of behavioral intentions and user loyalty as well as perceived behavioral control. Personal norms, on the other hand, showed a negative impact on behavioral intentions and user loyalty in the car sample, which is believed to be a product from the dissonance between the negative perception of the sustainability of commuting by car allied with positive pro-environmental attitudes. However, a positive influence of personal norms on the main construct was found for the public transport commuters, where the dissonance is reduced. Nonetheless, social norms were not found to significantly affect behavioral intentions and user loyalty. The finding is consistent with prior studies that did not find an influence of social norms on behavioral intentions for investigations performed under stable conditions.

In the car sample, perceived quality, attitudes, and behavioral intentions were found to significantly influence habit. Additionally, re-testing the model according to car habit strength, showed a significant reduction of coefficient path estimates across all latent constructs from the moderate to the strong categories. Thus, suggesting that the stronger the habit, the less new relevant information is processed. Therefore, intervening measures in the form of soft and hard policies would be required to reduce the influence of habit on behavior. However, in the public transport sample, a significant influence of behavioral intentions on habit formation could only be found for the weak public transport habit strength category. Additionally, no other construct was found to have a non-negligible or a positive effect on the formation of habit within the sample. Therefore, the results indicate that the overall negative perception of commuting by public transport is hindering habit formation.

Finally, the integrated framework was compared regarding both the tested hypotheses and the behavioral intentions and user loyalty variance explaining power of the two competing theories. In the car sample, even though the effects of travel satisfaction on behavioral intentions were reduced, the separate theories resulted in similar conclusions to the integrated theory. Moreover, the integrated theory (R^2 = 0.621) showed a significant increase in variance explained on behavioral intentions and user loyalty when compared to the customer-loyalty theory (R^2 = 0.358) and a similar explaining power to the theory of planned behavior (R^2 = 0.638). On the other hand, the integrated theory (R^2 = 0.701) increased the variance explained on behavioral intentions and user loyalty from both the customer-loyalty theory (R^2 = 0.621) and the theory of planned behavior (R^2 = 0.662) for the public transport sample. However, the effects of perceived quality and personal norms were, respectively, increased and reduced when the individual theories are analysed.

Nonetheless, the increase in variance explaining power alone would not be a strong enough reason to advocate for the use of a more complex model framework. The main advantage and contribution of the integrated framework is being able to connect the influence of marketing constructs, such as perceived value, perceived quality, and travel satisfaction, which are commonly used by public managers, to social psychology factors, such as attitudes, social norms, personal norms, and perceived behavioral control, which are key to the development of behavioral intentions and habit. In this sense, it would be possible to evaluate the effects of service quality improvements on both perceived value and travel satisfaction as well as in the formation of attitudes, behavioral intentions and user loyalty, and habit. Therefore, aiding the planning of more detailed, strategic and adaptable public policies that could be applied to heterogeneous groups as to achieve more sustainable cities. Moreover, the increase or decrease in the estimated relationships could also be used as a measure of policy success, however more analyses are needed to evaluate the efficiency of applying the integrated model framework in that regard.

Concluding, despite the contributions, this study has some limitations that call for further analysis. First, it would be interesting to examine the integrated framework according to different travel modes, such as walking, cycling and motorcycles, or even by analysing multi-modal travel patterns. Additionally, perceived value, perceived quality, travel satisfaction, and behavioral intentions indicators could be collected regarding all analysed travel modes as to allow testing the model with the same sample for different behaviors. In this sense, different measures of behavior, such as frequency of use and distance travelled could be gathered as to enable studying the relationship between behavioral intentions, user loyalty, habit and behavior in more depth. Also, a non-recursive approach could be added to the integrated framework as to analyse the influence of feedback loops. Finally, different contexts might influence the role and influence that the latent constructs play on the formation of behavioral intentions, therefore different conclusions could be found.

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APPENDIXES

APPENDIX A – Applied survey

Section 1: Socio-economic characteristics

Code	Item	Options
GEN	*Gender*	Female; Male.
AGE	*Age*	-
OCC	*Occupation*	Employee; Entrepreneur; Public Server; Student; Unemployed; and Retired.
EDU	*Education Level*	Elementary School; High School Studies; High School Degree; Undergraduate Studies; Bachelor's Degree; Specialist; Masters, and PhD.
HHS	*Household Size*	1; 2; 3; 4; 5 or more
HH$	*Monthly Household Income*	Up to US$ 506.00; US$ 506.01 to US$ 1,012.00; US$ 1,012.01 to US$ 2.530.00; US$ 2.530.01 to US$ 5,060.00; and Up to US$ 506.00.
CHI	*Presence of Children*	There are no children; There are children under 6 years-old; and There are children from 7 to 12 years-old.

Section 2: Commute and travel characteristics

Code	Item	Options
CTM	*Current Travel Mode*	Car and Public Transport.
PTM	*Preferred Travel Mode*	Car; Public Transport; Cycling; Walking; and Other.
CTT	*Commute Travel Time*	Less than 10 min; 11 to 20 min; 21 to 30 min; 31 to 45 min; 46 to 60 min; Over 60 min.
CAV	*Car Availability*	No car in the household; Car in the household but not available to the respondent for commuting; Car in the household and eventually available to the respondent for commuting; and Car in the household and available to the respondent for commuting.
BCO	*Bus Card Ownership*	Yes; No.
CTS	*Ridesharing or Carpooling*	Yes; No.

Section 3: Management constructs attitudinal statements

Construct	***Code***	***Item***
Perceived Value	*PV1*	I believe my current travel mode is convenient (practical, easy to use)
	PV2	I believe the amount I spend with my current travel mode is adequate
	PV3	I believe my current travel mode's quality/cost ratio is appropriate
	PV4	I believe my current travel mode's comfort/cost ratio is appropriate
	PV5	I believe my current travel mode is in accordance with my personal interests and values
	PV6	I believe my current travel mode adds me social value (acceptance, prestige, status)
Perceived Quality	*PQ1*	My current travel mode enables me to get to my place of work/study on time
	PQ2	My current travel mode enables me to get to my place of work/study easily
	PQ3	My current travel mode infrastructure suffices my needs
	PQ4	Usually, I do NOT face inconveniences while using my current travel mode to get to my place of work/study
	PQ5	My current travel mode enables me to get to my place of work/study safely
	PQ6	My current travel mode enables me to get to my place of work/study comfortably
Travel Satisfaction	*TS1*	I feel very hurried – very relaxed.
	TS2	I feel very worried – very confident.
	TS3	I feel very stressed – very calm.
	TS4	I feel very tired – very alert.
	TS5	I feel very bored – very enthusiastic.
	TS6	I feel very fed-up – very engaged.
	TS7	I feel the trip is the worst I can think of – the best I can think of.
	TS8	I feel the trip is very low standard – very high standard.
	TS9	I feel the trip worked very poorly – worked very well.
Behavioral Intentions and User Loyalty	*BI1*	I will keep commuting with my current travel mode in the future
	BI2	I would recommend my current travel mode to others.
	BI3	I feel that my current travel mode is consistent with my lifestyle.

Section 4: Social psychology constructs attitudinal statements

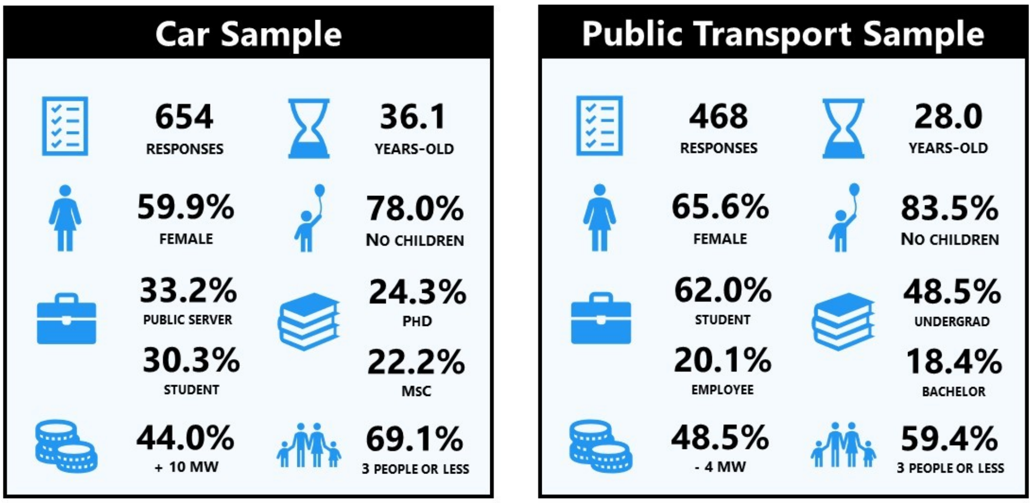
Construct	***Code***	***Item***
Attitudes	*ATC1*	I believe that commuting by car is positive
	ATC2	I believe that commuting by car is pleasant
	ATC3	I believe that commuting by car is effective
	ATC4	I believe that commuting by car is comfortable
	ATC5	I believe that commuting by car is sustainable
	ATC6	I believe that commuting by car is safe
	ATC7	I believe that commuting by car enables me a flexible routine
	ATC8	I believe that commuting by car is cheap
	ATP1	I believe that commuting by public transport is positive
	ATP2	I believe that commuting by public transport is pleasant
	ATP3	I believe that commuting by public transport is effective
	ATP4	I believe that commuting by public transport is comfortable
	ATP5	I believe that commuting by public transport is sustainable
	ATP6	I believe that commuting by public transport is safe
	ATP7	I believe that commuting by public transport enables me a flexible routine
	ATP8	I believe that commuting by public transport is cheap
Social Norms	*SNC1*	I believe that family and close friends would support me commuting to work/school by car
	SNC2	I believe that acquaintances and co-workers would support me commuting to work/school by car
	SNC3	I believe that commuting by car is well seen by society and media
	SNP1	I believe that family and close friends would support me commuting to work/school by public transport
	SNP2	I believe that acquaintances and co-workers would support me commuting to work/school by public transport
	SNP3	I believe that commuting by public transport is well seen by society and media
Perceived Behavioral Control	*PBCC*	For me, to commute to work/school by car would be easy
	PBCP	For me, to commute to work/school by public transport would be easy
Personal Norms	*PN1*	I feel a personal obligation to protect the environment
	PN2	I would feel the need to switch travel mode if it would help the environment
	PN3	I feel a personal obligation to live healthily (food, exercising, etc.)
	PN4	I would feel the need to switch travel mode if it would help me achieve a healthier lifestyle

Section 4: Social psychology constructs attitudinal statements (cont.)

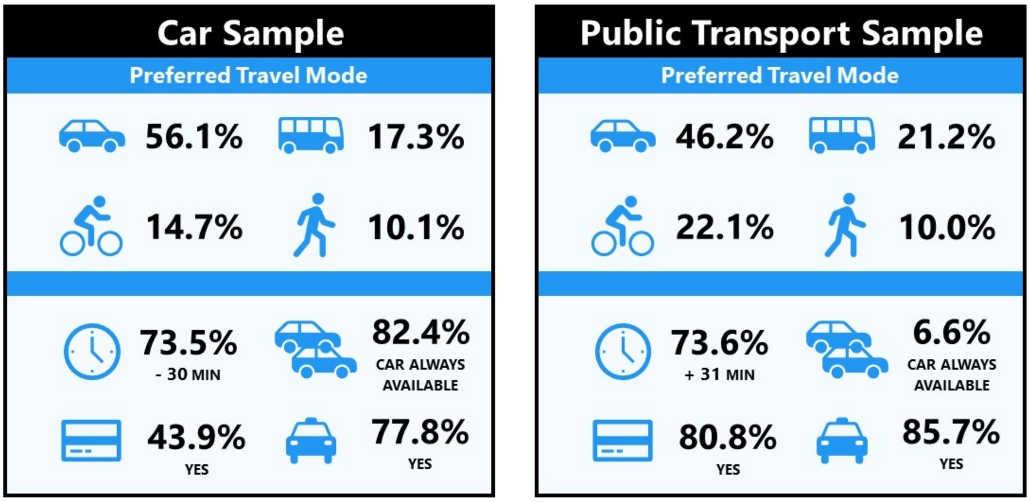
Construct	***Code***	***Item***
Habit	*HAB1*	[Mode Choice] to visit a friend
	HAB2	[Mode Choice] to go grocery shopping
	HAB3	[Mode Choice] to go to the movies
	HAB4	[Mode Choice] to go to the park
	HAB5	[Mode Choice] to go to a concert or play
	HAB6	[Mode Choice] to go out have lunch
	HAB7	[Mode Choice] to go to a drugstore
	HAB8	[Mode Choice] to go out at night
	HAB9	[Mode Choice] to go to the bakery
	HAB10	[Mode Choice] to go to home
	HAB11	[Mode Choice] to commute to work/school
	HAB12	[Mode Choice] to go to a doctor's appointment

APPENDIX B – Sample profiling by commuter group

SOCIO-ECONOMIC PROFILE



TRAVEL CHARACTERISTICS DESCRIPTIVE ANALYSIS



APPENDIX C – Measured Indicators Frequency Tables by Travel Group

Note: Strongly Disagree (1), Disagree (2), Somewhat Agree (3), Neutral (4), Somewhat Agree (5), Agree (6), and Strongly Agree (7)

I BELIEVE MY CURRENT TRAVEL MODE IS CONVENIENT (PRACTICAL, EASY TO USE, ETC.)									
Code	PV1	**Construct**		Perceived Value	**Measure**		Convenience		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	34	3.0	3.0	11	1.7	1.7	23	4.9	4.9
2	42	3.7	6.8	7	1.1	2.8	35	7.5	12.4
3	82	7.3	14.1	22	3.4	6.1	60	12.8	25.2
4	141	12.6	26.6	62	9.5	15.6	79	16.9	42.1
5	216	19.3	45.9	101	15.4	31.0	115	24.6	66.7
6	221	19.7	65.6	130	19.9	50.9	91	19.4	86.1
7	386	34.4	100.0	321	49.1	100.0	65	13.9	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

I BELIEVE THE AMOUNT I SPEND WITH MY CURRENT TRAVEL MODE IS ADEQUATE									
Code	PV2	**Construct**		Perceived Value	**Measure**		Utility Value		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	176	15.7	15.7	70	10.7	10.7	106	22.6	22.6
2	173	15.4	31.1	76	11.6	22.3	97	20.7	43.4
3	214	19.1	50.2	116	17.7	40.1	98	20.9	64.3
4	205	18.3	68.4	127	19.4	59.5	78	16.7	81.0
5	174	15.5	84.0	126	19.3	78.7	48	10.3	91.2
6	89	7.9	91.9	66	10.1	88.8	23	4.9	96.2
7	91	8.1	100.0	73	11.2	100.0	18	3.8	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

I BELIEVE MY CURRENT TRAVEL MODE'S QUALITY/COST RATIO IS APPROPRIATE									
Code	PV3	**Construct**		Perceived Value	**Measure**		Utility Value		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	115	10.2	10.2	15	2.3	2.3	100	21.4	21.4
2	132	11.8	22.0	29	4.4	6.7	103	22.0	43.4
3	161	14.3	36.4	81	12.4	19.1	80	17.1	60.5
4	212	18.9	55.3	126	19.3	38.4	86	18.4	78.8
5	208	18.5	73.8	145	22.2	60.6	63	13.5	92.3
6	153	13.6	87.4	132	20.2	80.7	21	4.5	96.8
7	141	12.6	100.0	126	19.3	100.0	15	3.2	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

Note: Strongly Disagree (1), Disagree (2), Somewhat Agree (3), Neutral (4), Somewhat Agree (5), Agree (6), and Strongly Agree (7)

I BELIEVE MY CURRENT TRAVEL MODE'S COMFORT/COST RATIO IS APPROPRIATE

Code	PV4	Construct	Perceived Value	Measure	Experience Value				
Likert Scale	Overall Sample			Car Group			Public Transport Sample		
	Frequency	%	Acc. (%)	Frequency	%	Acc. (%)	Frequency	%	Acc. (%)
1	134	11.9	11.9	10	1.5	1.5	124	26.5	26.5
2	114	10.2	22.1	13	2.0	3.5	101	21.6	48.1
3	136	12.1	34.2	48	7.3	10.9	88	18.8	66.9
4	149	13.3	47.5	76	11.6	22.5	73	15.6	82.5
5	184	16.4	63.9	131	20.0	42.5	53	11.3	93.8
6	208	18.5	82.4	188	28.7	71.3	20	4.3	98.1
7	197	17.6	100.0	188	28.7	100.0	9	1.9	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

I BELIEVE MY CURRENT TRAVEL MODE IS IN ACCORDANCE WITH MY PERSONAL INTERESTS AND VALUES

Code	PV5	Construct	Perceived Value	Measure	Personal Value				
Likert Scale	Overall Sample			Car Group			Public Transport Sample		
	Frequency	%	Acc. (%)	Frequency	%	Acc. (%)	Frequency	%	Acc. (%)
1	105	9.4	9.4	43	6.6	6.6	62	13.2	13.2
2	110	9.8	19.2	55	8.4	15.0	55	11.8	25.0
3	139	12.4	31.6	82	12.5	27.5	57	12.2	37.2
4	224	20.0	51.5	127	19.4	46.9	97	20.7	57.9
5	205	18.3	69.8	137	20.9	67.9	68	14.5	72.4
6	150	13.4	83.2	82	12.5	80.4	68	14.5	87.0
7	189	16.8	100.0	128	19.6	100.0	61	13.0	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

I BELIEVE MY CURRENT TRAVEL MODE ADDS ME SOCIAL VALUE (ACCEPTANCE, PRESTIGE, STATUS)

Code	PV6	Construct	Perceived Value	Measure	Social Value				
Likert Scale	Overall Sample			Car Group			Public Transport Sample		
	Frequency	%	Acc. (%)	Frequency	%	Acc. (%)	Frequency	%	Acc. (%)
1	444	39.6	39.6	210	32.1	32.1	234	50.0	50.0
2	161	14.3	53.9	82	12.5	44.6	79	16.9	66.9
3	134	11.9	65.9	85	13.0	57.6	49	10.5	77.4
4	203	18.1	84.0	124	19.0	76.6	79	16.9	94.2
5	80	7.1	91.1	66	10.1	86.7	14	3.0	97.2
6	47	4.2	95.3	40	6.1	92.8	7	1.5	98.7
7	53	4.7	100.0	47	7.2	100.0	6	1.3	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

Note: Strongly Disagree (1), Disagree (2), Somewhat Agree (3), Neutral (4), Somewhat Agree (5), Agree (6), and Strongly Agree (7)

OVERALL PERCEIVED VALUE SCORE									
Code	OPV		**Construct**	Perceived Value		**Measure**	Median Score		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	70	6.2	6.2	9	1.4	1.4	61	13.0	13.0
2	113	10.1	16.3	23	3.5	4.9	90	19.2	32.3
3	164	14.6	30.9	59	9.0	13.9	105	22.4	54.7
4	220	19.6	50.5	119	18.2	32.1	101	21.6	76.3
5	251	22.4	72.9	178	27.2	59.3	73	15.6	91.9
6	179	16.0	88.9	151	23.1	82.4	28	6.0	97.9
7	125	11.1	100.0	115	17.6	100.0	10	2.1	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

MY CURRENT TRAVEL MODE ENABLES ME TO GET TO MY PLACE OF WORK/STUDY ON TIME									
Code	PQ1		**Construct**	Perceived Quality		**Measure**	Reliability		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	87	7.8	7.8	5	0.8	0.8	82	17.5	17.5
2	96	8.6	16.3	16	2.4	3.2	80	17.1	34.6
3	102	9.1	25.4	18	2.8	6.0	84	17.9	52.6
4	115	10.2	35.7	50	7.6	13.6	65	13.9	66.5
5	170	15.2	50.8	97	14.8	28.4	73	15.6	82.1
6	238	21.2	72.0	185	28.3	56.7	53	11.3	93.4
7	314	28.0	100.0	283	43.3	100.0	31	6.6	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

MY CURRENT TRAVEL MODE ENABLES ME TO GET TO MY PLACE OF WORK/STUDY EASILY									
Code	PQ2		**Construct**	Perceived Quality		**Measure**	Accessibility		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	41	3.7	3.7	3	0.5	0.5	38	8.1	8.1
2	43	3.8	7.5	7	1.1	1.5	36	7.7	15.8
3	81	7.2	14.7	14	2.1	3.7	67	14.3	30.1
4	85	7.6	22.3	36	5.5	9.2	49	10.5	40.6
5	186	16.6	38.9	101	15.4	24.6	85	18.2	58.8
6	250	22.3	61.1	146	22.3	46.9	104	22.2	81.0
7	436	38.9	100.0	347	53.1	100.0	89	19.0	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

Note: Strongly Disagree (1), Disagree (2), Somewhat Agree (3), Neutral (4), Somewhat Agree (5), Agree (6), and Strongly Agree (7)

MY CURRENT TRAVEL MODE INFRASTRUCTURE SUFFICES MY NEEDS									
Code	PQ3	**Construct**	Perceived Quality		**Measure**	Tangible Infrastructure			
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	44	3.9	3.9	7	1.1	1.1	37	7.9	7.9
2	71	6.3	10.2	24	3.7	4.7	47	10.0	17.9
3	105	9.4	19.6	36	5.5	10.2	69	14.7	32.7
4	171	15.2	34.8	83	12.7	22.9	88	18.8	51.5
5	246	21.9	56.8	147	22.5	45.4	99	21.2	72.6
6	228	20.3	77.1	148	22.6	68.0	80	17.1	89.7
7	257	22.9	100.0	209	32.0	100.0	48	10.3	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

USUALLY, I DO NOT FACE INCONVENIENCES WHILE USING MY CURRENT TRAVEL MODE TO GET TO MY PLACE OF COMMUTE									
Code	PQ4	**Construct**	Perceived Quality		**Measure**	Problem Experience			
	Overall Sample			**Car Group**			**Public Transport Sample**		
Likert Scale	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	96	8.6	8.6	22	3.4	3.4	74	15.8	15.8
2	92	8.2	16.8	28	4.3	7.6	64	13.7	29.5
3	121	10.8	27.5	57	8.7	16.4	64	13.7	43.2
4	156	13.9	41.4	75	11.5	27.8	81	17.3	60.5
5	207	18.4	59.9	128	19.6	47.4	79	16.9	77.4
6	240	21.4	81.3	173	26.5	73.9	67	14.3	91.7
7	210	18.7	100.0	171	26.1	100.0	39	8.3	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

MY CURRENT TRAVEL MODE ENABLES ME TO GET TO MY PLACE OF WORK/STUDY SAFELY									
Code	PQ5	**Construct**	Perceived Quality		**Measure**	Safety			
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	39	3.5	3.5	4	0.6	0.6	35	7.5	7.5
2	58	5.2	8.6	8	1.2	1.8	50	10.7	18.2
3	108	9.6	18.3	23	3.5	5.4	85	18.2	36.3
4	130	11.6	29.9	43	6.6	11.9	87	18.6	54.9
5	185	16.5	46.3	92	14.1	26.0	93	19.9	74.8
6	284	25.3	71.7	210	32.1	58.1	74	15.8	90.6
7	318	28.3	100.0	274	41.9	100.0	44	9.4	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

Note: Strongly Disagree (1), Disagree (2), Somewhat Agree (3), Neutral (4), Somewhat Agree (5), Agree (6), and Strongly Agree (7)

MY CURRENT TRAVEL MODE ENABLES ME TO GET TO MY PLACE OF WORK/STUDY COMFORTABLY									
Code	PQ6	**Construct**		Perceived Quality	**Measure**		Comfort		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	99	8.8	8.8	5	0.8	0.8	94	20.1	20.1
2	95	8.5	17.3	6	0.9	1.7	89	19.0	39.1
3	103	9.2	26.5	6	0.9	2.6	97	20.7	59.8
4	102	9.1	35.6	26	4.0	6.6	76	16.2	76.1
5	140	12.5	48.0	66	10.1	16.7	74	15.8	91.9
6	193	17.2	65.2	167	25.5	42.2	26	5.6	97.4
7	390	34.8	100.0	378	57.8	100.0	12	2.6	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

OVERALL PERCEIVED QUALITY SCORE									
Code	OPQ	**Construct**		Perceived Quality	**Measure**		Median Score		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	31	2.8	2.8	1	0.2	0.2	30	6.4	6.4
2	63	5.6	8.4	4	0.6	0.8	59	12.6	19.0
3	91	8.1	16.5	14	2.1	2.9	77	16.5	35.5
4	147	13.1	29.6	39	6.0	8.9	108	23.1	58.5
5	181	16.1	45.7	87	13.3	22.2	94	20.1	78.6
6	283	25.2	70.9	219	33.5	55.7	64	13.7	92.3
7	326	29.1	100.0	290	44.3	100.0	36	7.7	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

I FEEL VERY HURRIED - VERY RELAXED									
Code	TS1	**Construct**		Travel Satisfaction	**Measure**		Valence Emotion		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	125	11.1	11.1	45	6.9	6.9	80	17.1	17.1
2	145	12.9	24.1	58	8.9	15.7	87	18.6	35.7
3	178	15.9	39.9	91	13.9	29.7	87	18.6	54.3
4	269	24.0	63.9	171	26.1	55.8	98	20.9	75.2
5	185	16.5	80.4	123	18.8	74.6	62	13.2	88.5
6	142	12.7	93.0	102	15.6	90.2	40	8.5	97.0
7	78	7.0	100.0	64	9.8	100.0	14	3.0	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

Note: Strongly Disagree (1), Disagree (2), Somewhat Agree (3), Neutral (4), Somewhat Agree (5), Agree (6), and Strongly Agree (7)

I FEEL VERY WORRIED - VERY CONFIDENT									
Code	TS2	**Construct**	Travel Satisfaction		**Measure**		Valence Emotion		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	103	9.2	9.2	29	4.4	4.4	74	15.8	15.8
2	86	7.7	16.8	31	4.7	9.2	55	11.8	27.6
3	193	17.2	34.0	83	12.7	21.9	110	23.5	51.1
4	280	25.0	59.0	152	23.2	45.1	128	27.4	78.4
5	197	17.6	76.6	137	20.9	66.1	60	12.8	91.2
6	177	15.8	92.3	141	21.6	87.6	36	7.7	98.9
7	86	7.7	100.0	81	12.4	100.0	5	1.1	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

I FEEL VERY STRESSED - VERY CALM									
Code	TS3	**Construct**	Travel Satisfaction		**Measure**		Valence Emotion		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	103	9.2	9.2	26	4.0	4.0	77	16.5	16.5
2	107	9.5	18.7	55	8.4	12.4	52	11.1	27.6
3	196	17.5	36.2	102	15.6	28.0	94	20.1	47.6
4	304	27.1	63.3	174	26.6	54.6	130	27.8	75.4
5	209	18.6	81.9	142	21.7	76.3	67	14.3	89.7
6	131	11.7	93.6	98	15.0	91.3	33	7.1	96.8
7	72	6.4	100.0	57	8.7	100.0	15	3.2	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

I FEEL VERY TIRED - VERY ALERT									
Code	TS4	**Construct**	Travel Satisfaction		**Measure**		Arousal Emotion		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	163	14.5	14.5	34	5.2	5.2	129	27.6	27.6
2	107	9.5	24.1	37	5.7	10.9	70	15.0	42.5
3	176	15.7	39.8	74	11.3	22.2	102	21.8	64.3
4	237	21.1	60.9	157	24.0	46.2	80	17.1	81.4
5	199	17.7	78.6	151	23.1	69.3	48	10.3	91.7
6	157	14.0	92.6	130	19.9	89.1	27	5.8	97.4
7	83	7.4	100.0	71	10.9	100.0	12	2.6	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

Note: Strongly Disagree (1), Disagree (2), Somewhat Agree (3), Neutral (4), Somewhat Agree (5), Agree (6), and Strongly Agree (7)

I FEEL VERY BORED - VERY ENTHUSIASTIC									
Code	TS5	**Construct**		Travel Satisfaction	**Measure**		Arousal Emotion		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	90	8.0	8.0	21	3.2	3.2	69	14.7	14.7
2	115	10.2	18.3	30	4.6	7.8	85	18.2	32.9
3	170	15.2	33.4	58	8.9	16.7	112	23.9	56.8
4	353	31.5	64.9	227	34.7	51.4	126	26.9	83.8
5	196	17.5	82.4	149	22.8	74.2	47	10.0	93.8
6	144	12.8	95.2	121	18.5	92.7	23	4.9	98.7
7	54	4.8	100.0	48	7.3	100.0	6	1.3	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

I FEEL VERY FED UP - VERY ENGAGED									
Code	TS6	**Construct**		Travel Satisfaction	**Measure**		Arousal Emotion		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	118	10.5	10.5	25	3.8	3.8	93	19.9	19.9
2	116	10.3	20.9	35	5.4	9.2	81	17.3	37.2
3	172	15.3	36.2	69	10.6	19.7	103	22.0	59.2
4	314	28.0	64.2	202	30.9	50.6	112	23.9	83.1
5	207	18.4	82.6	163	24.9	75.5	44	9.4	92.5
6	137	12.2	94.8	109	16.7	92.2	28	6.0	98.5
7	58	5.2	100.0	51	7.8	100.0	7	1.5	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

I FEEL THE TRIP IS THE WORST I CAN THINK OF - THE BEST I CAN THINK OF									
Code	TS7	**Construct**		Travel Satisfaction	**Measure**		Cognitive Judgement		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	34	3.0	3.0	8	1.2	1.2	26	5.6	5.6
2	64	5.7	8.7	10	1.5	2.8	54	11.5	17.1
3	138	12.3	21.0	33	5.0	7.8	105	22.4	39.5
4	290	25.8	46.9	143	21.9	29.7	147	31.4	70.9
5	246	21.9	68.8	151	23.1	52.8	95	20.3	91.2
6	203	18.1	86.9	167	25.5	78.3	36	7.7	98.9
7	147	13.1	100.0	142	21.7	100.0	5	1.1	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

Note: Strongly Disagree (1), Disagree (2), Somewhat Agree (3), Neutral (4), Somewhat Agree (5), Agree (6), and Strongly Agree (7)

I FEEL THE TRIP IS VERY LOW STANDARD - VERY HIGH STANDARD									
Code	TS8	**Construct**		Travel Satisfaction	**Measure**		Cognitive Judgement		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	41	3.7	3.7	5	0.8	0.8	36	7.7	7.7
2	61	5.4	9.1	7	1.1	1.8	54	11.5	19.2
3	121	10.8	19.9	23	3.5	5.4	98	20.9	40.2
4	248	22.1	42.0	108	16.5	21.9	140	29.9	70.1
5	299	26.6	68.6	193	29.5	51.4	106	22.6	92.7
6	205	18.3	86.9	176	26.9	78.3	29	6.2	98.9
7	147	13.1	100.0	142	21.7	100.0	5	1.1	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

I FEEL THE TRIP WORKED VERY POORLY - WORKED VERY WELL									
Code	TS9	**Construct**		Travel Satisfaction	**Measure**		Cognitive Judgement		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	31	2.8	2.8	7	1.1	1.1	24	5.1	5.1
2	33	2.9	5.7	4	0.6	1.7	29	6.2	11.3
3	74	6.6	12.3	16	2.4	4.1	58	12.4	23.7
4	220	19.6	31.9	91	13.9	18.0	129	27.6	51.3
5	257	22.9	54.8	138	21.1	39.1	119	25.4	76.7
6	249	22.2	77.0	177	27.1	66.2	72	15.4	92.1
7	258	23.0	100.0	221	33.8	100.0	37	7.9	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

OVERALL TRAVEL SATISFACTION SCORE									
Code	OTS	**Construct**		Travel Satisfaction	**Measure**		Median Score		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	65	5.8	5.8	13	2.0	2.0	52	11.1	11.1
2	76	6.8	12.6	17	2.6	4.6	59	12.6	23.7
3	163	14.5	27.1	43	6.6	11.2	120	25.6	49.4
4	329	29.3	56.4	186	28.4	39.6	143	30.6	79.9
5	270	24.1	80.5	206	31.5	71.1	64	13.7	93.6
6	155	13.8	94.3	129	19.7	90.8	26	5.6	99.1
7	64	5.7	100.0	60	9.2	100.0	4	0.9	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

Note: Strongly Disagree (1), Disagree (2), Somewhat Agree (3), Neutral (4), Somewhat Agree (5), Agree (6), and Strongly Agree (7)

I WILL KEEP COMMUTING WITH MY CURRENT TRAVEL MODE IN THE FUTURE									
Code	BI1	**Construct**		Behavioral Intentions	**Measure**		Willingness to Re-use		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	138	12.3	12.3	25	3.8	3.8	113	24.1	24.1
2	89	7.9	20.2	40	6.1	9.9	49	10.5	34.6
3	106	9.4	29.7	51	7.8	17.7	55	11.8	46.4
4	189	16.8	46.5	127	19.4	37.2	62	13.2	59.6
5	147	13.1	59.6	97	14.8	52.0	50	10.7	70.3
6	199	17.7	77.4	118	18.0	70.0	81	17.3	87.6
7	254	22.6	100.0	196	30.0	100.0	58	12.4	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

I WOULD RECOMMEND MY CURRENT TRAVEL MODE TO OTHERS									
Code	BI2	**Construct**		Behavioral Intentions	**Measure**		Willingness to Recommend		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	111	9.9	9.9	34	5.2	5.2	77	16.5	16.5
2	105	9.4	19.3	40	6.1	11.3	65	13.9	30.3
3	112	10.0	29.2	56	8.6	19.9	56	12.0	42.3
4	246	21.9	51.2	139	21.3	41.1	107	22.9	65.2
5	197	17.6	68.7	125	19.1	60.2	72	15.4	80.6
6	149	13.3	82.0	99	15.1	75.4	50	10.7	91.2
7	202	18.0	100.0	161	24.6	100.0	41	8.8	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

I FEEL THAT MY CURRENT TRAVEL MODE IS CONSISTENT WITH MY LIFESTYLE									
Code	BI3	**Construct**		Behavioral Intentions	**Measure**		Involvement		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	71	6.3	6.3	30	4.6	4.6	41	8.8	8.8
2	45	4.0	10.3	20	3.1	7.6	25	5.3	14.1
3	120	10.7	21.0	67	10.2	17.9	53	11.3	25.4
4	210	18.7	39.8	127	19.4	37.3	83	17.7	43.2
5	210	18.7	58.5	119	18.2	55.5	91	19.4	62.6
6	211	18.8	77.3	111	17.0	72.5	100	21.4	84.0
7	255	22.7	100.0	180	27.5	100.0	75	16.0	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

Note: Strongly Disagree (1), Disagree (2), Somewhat Agree (3), Neutral (4), Somewhat Agree (5), Agree (6), and Strongly Agree (7)

OVERALL BEHAVIORAL INTENTIONS AND LOYALTY SCORE									
Code	OBI		**Construct**	Behavioral Intentions		**Measure**	Median Score		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	82	7.3	7.3	21	3.2	3.2	61	13.0	13.0
2	79	7.0	14.3	26	4.0	7.2	53	11.3	24.4
3	113	10.1	24.4	59	9.0	16.2	54	11.5	35.9
4	242	21.6	46.0	140	21.4	37.6	102	21.8	57.7
5	191	17.0	63.0	116	17.7	55.4	75	16.0	73.7
6	196	17.5	80.5	120	18.3	73.7	76	16.2	90.0
7	219	19.5	100.0	172	26.3	100.0	47	10.0	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

I BELIEVE THAT COMMUTING BY CAR IS POSITIVE									
Code	ATC1		**Construct**	Attitudes - Cars		**Measure**	Positiveness		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	59	5.3	5.3	35	5.4	5.4	24	5.1	5.1
2	92	8.2	13.5	50	7.6	13.0	42	9.0	14.1
3	158	14.1	27.5	84	12.8	25.8	74	15.8	29.9
4	182	16.2	43.8	103	15.7	41.6	79	16.9	46.8
5	207	18.4	62.2	119	18.2	59.8	88	18.8	65.6
6	196	17.5	79.7	115	17.6	77.4	81	17.3	82.9
7	228	20.3	100.0	148	22.6	100.0	80	17.1	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

I BELIEVE THAT COMMUTING BY CAR IS PLEASANT									
Code	ATC2		**Construct**	Attitudes - Cars		**Measure**	Pleasantness		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	31	2.8	2.8	14	2.1	2.1	17	3.6	3.6
2	41	3.7	6.4	20	3.1	5.2	21	4.5	8.1
3	83	7.4	13.8	50	7.6	12.8	33	7.1	15.2
4	149	13.3	27.1	91	13.9	26.8	58	12.4	27.6
5	225	20.1	47.1	137	20.9	47.7	88	18.8	46.4
6	268	23.9	71.0	151	23.1	70.8	117	25.0	71.4
7	325	29.0	100.0	191	29.2	100.0	134	28.6	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

Note: Strongly Disagree (1), Disagree (2), Somewhat Agree (3), Neutral (4), Somewhat Agree (5), Agree (6), and Strongly Agree (7)

I BELIEVE THAT COMMUTING BY CAR IS EFFECTIVE

Code	ATC3	**Construct**	Attitudes - Cars	**Measure**	Effectiveness				
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	32	2.9	2.9	14	2.1	2.1	18	3.8	3.8
2	43	3.8	6.7	20	3.1	5.2	23	4.9	8.8
3	76	6.8	13.5	42	6.4	11.6	34	7.3	16.0
4	147	13.1	26.6	73	11.2	22.8	74	15.8	31.8
5	234	20.9	47.4	130	19.9	42.7	104	22.2	54.1
6	267	23.8	71.2	164	25.1	67.7	103	22.0	76.1
7	323	28.8	100.0	211	32.3	100.0	112	23.9	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

I BELIEVE THAT COMMUTING BY CAR IS COMFORTABLE

Code	ATC4	**Construct**	Attitudes - Cars	**Measure**	Comfort				
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	6	0.5	0.5	1	0.2	0.2	5	1.1	1.1
2	5	0.4	1.0	1	0.2	0.3	4	0.9	1.9
3	11	1.0	2.0	6	0.9	1.2	5	1.1	3.0
4	53	4.7	6.7	30	4.6	5.8	23	4.9	7.9
5	115	10.2	16.9	65	9.9	15.7	50	10.7	18.6
6	314	28.0	44.9	198	30.3	46.0	116	24.8	43.4
7	618	55.1	100.0	353	54.0	100.0	265	56.6	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

I BELIEVE THAT COMMUTING BY CAR IS SUSTAINABLE

Code	ATC5	**Construct**	Attitudes - Cars	**Measure**	Sustainability				
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	481	42.9	42.9	261	39.9	39.9	220	47.0	47.0
2	256	22.8	65.7	134	20.5	60.4	122	26.1	73.1
3	163	14.5	80.2	98	15.0	75.4	65	13.9	87.0
4	135	12.0	92.2	93	14.2	89.6	42	9.0	95.9
5	58	5.2	97.4	44	6.7	96.3	14	3.0	98.9
6	12	1.1	98.5	11	1.7	98.0	1	0.2	99.1
7	17	1.5	100.0	13	2.0	100.0	4	0.9	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

Note: Strongly Disagree (1), Disagree (2), Somewhat Agree (3), Neutral (4), Somewhat Agree (5), Agree (6), and Strongly Agree (7)

I BELIEVE THAT COMMUTING BY CAR IS SAFE									
Code	ATC6	**Construct**	Attitudes - Cars	**Measure**		Safety			
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	15	1.3	1.3	8	1.2	1.2	7	1.5	1.5
2	46	4.1	5.4	22	3.4	4.6	24	5.1	6.6
3	83	7.4	12.8	37	5.7	10.2	46	9.8	16.5
4	217	19.3	32.2	127	19.4	29.7	90	19.2	35.7
5	298	26.6	58.7	173	26.5	56.1	125	26.7	62.4
6	282	25.1	83.9	161	24.6	80.7	121	25.9	88.2
7	181	16.1	100.0	126	19.3	100.0	55	11.8	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

I BELIEVE THAT COMMUTING BY CAR ENABLES ME A FLEXIBLE ROUTINE									
Code	ATC7	**Construct**	Attitudes - Cars	**Measure**		Flexibility			
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	17	1.5	1.5	7	1.1	1.1	10	2.1	2.1
2	12	1.1	2.6	6	0.9	2.0	6	1.3	3.4
3	36	3.2	5.8	13	2.0	4.0	23	4.9	8.3
4	92	8.2	14.0	44	6.7	10.7	48	10.3	18.6
5	164	14.6	28.6	79	12.1	22.8	85	18.2	36.8
6	310	27.6	56.2	184	28.1	50.9	126	26.9	63.7
7	491	43.8	100.0	321	49.1	100.0	170	36.3	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

I BELIEVE THAT COMMUTING BY CAR IS CHEAP									
Code	ATC8	**Construct**	Attitudes - Cars	**Measure**		Cost			
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	344	30.7	30.7	168	25.7	25.7	176	37.6	37.6
2	229	20.4	51.1	143	21.9	47.6	86	18.4	56.0
3	219	19.5	70.6	132	20.2	67.7	87	18.6	74.6
4	182	16.2	86.8	110	16.8	84.6	72	15.4	90.0
5	105	9.4	96.2	69	10.6	95.1	36	7.7	97.6
6	24	2.1	98.3	18	2.8	97.9	6	1.3	98.9
7	19	1.7	100.0	14	2.1	100.0	5	1.1	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

Note: Strongly Disagree (1), Disagree (2), Somewhat Agree (3), Neutral (4), Somewhat Agree (5), Agree (6), and Strongly Agree (7)

OVERALL ATTITUDES TOWARD CARS SCORE									
Code	OATC		**Construct**	Attitudes - Cars	**Measure**		Median Score		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	16	1.4	1.4	7	1.1	1.1	9	1.9	1.9
2	22	2.0	3.4	11	1.7	2.8	11	2.4	4.3
3	61	5.4	8.8	30	4.6	7.3	31	6.6	10.9
4	188	16.8	25.6	101	15.4	22.8	87	18.6	29.5
5	310	27.6	53.2	174	26.6	49.4	136	29.1	58.5
6	299	26.6	79.9	183	28.0	77.4	116	24.8	83.3
7	226	20.1	100.0	148	22.6	100.0	78	16.7	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

I BELIEVE THAT FAMILY AND CLOSE FRIENDS WOULD SUPPORT ME COMMUTING TO WORK/SCHOOL BY CAR									
Code	SNC1		**Construct**	Social Norms - Cars	**Measure**		Strong Ties		
	Overall Sample			**Car Group**			**Public Transport Sample**		
Likert Scale	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	60	5.3	5.3	36	5.5	5.5	24	5.1	5.1
2	40	3.6	8.9	18	2.8	8.3	22	4.7	9.8
3	84	7.5	16.4	41	6.3	14.5	43	9.2	19.0
4	263	23.4	39.8	159	24.3	38.8	104	22.2	41.2
5	176	15.7	55.5	98	15.0	53.8	78	16.7	57.9
6	239	21.3	76.8	142	21.7	75.5	97	20.7	78.6
7	260	23.2	100.0	160	24.5	100.0	100	21.4	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

I BELIEVE THAT ACQUAINTANCES AND CO-WORKERS WOULD SUPPORT ME COMMUTING TO WORK/SCHOOL BY CAR									
Code	SNC2		**Construct**	Social Norms - Cars	**Measure**		Weak Ties		
	Overall Sample			**Car Group**			**Public Transport Sample**		
Likert Scale	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	57	5.1	5.1	36	5.5	5.5	21	4.5	4.5
2	54	4.8	9.9	28	4.3	9.8	26	5.6	10.0
3	79	7.0	16.9	43	6.6	16.4	36	7.7	17.7
4	331	29.5	46.4	199	30.4	46.8	132	28.2	45.9
5	196	17.5	63.9	114	17.4	64.2	82	17.5	63.5
6	193	17.2	81.1	107	16.4	80.6	86	18.4	81.8
7	212	18.9	100.0	127	19.4	100.0	85	18.2	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

Note: Strongly Disagree (1), Disagree (2), Somewhat Agree (3), Neutral (4), Somewhat Agree (5), Agree (6), and Strongly Agree (7)

I BELIEVE THAT COMMUTING BY CAR IS WELL SEEN BY SOCIETY AND MEDIA									
Code	SNC3	**Construct**	Social Norms - Cars	**Measure**		Cultural Norms			
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	116	10.3	10.3	81	12.4	12.4	35	7.5	7.5
2	84	7.5	17.8	56	8.6	20.9	28	6.0	13.5
3	101	9.0	26.8	69	10.6	31.5	32	6.8	20.3
4	268	23.9	50.7	173	26.5	58.0	95	20.3	40.6
5	157	14.0	64.7	88	13.5	71.4	69	14.7	55.3
6	186	16.6	81.3	90	13.8	85.2	96	20.5	75.9
7	210	18.7	100.0	97	14.8	100.0	113	24.1	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

OVERALL SOCIAL NORMS TOWARD CARS SCORE									
Code	OSNC	**Construct**	Social Norms - Cars	**Measure**		Median Score			
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	53	4.7	4.7	32	4.9	4.9	21	4.5	4.5
2	42	3.7	8.5	25	3.8	8.7	17	3.6	8.1
3	86	7.7	16.1	45	6.9	15.6	41	8.8	16.9
4	314	28.0	44.1	197	30.1	45.7	117	25.0	41.9
5	207	18.4	62.6	116	17.7	63.5	91	19.4	61.3
6	208	18.5	81.1	116	17.7	81.2	92	19.7	81.0
7	212	18.9	100.0	123	18.8	100.0	89	19.0	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

FOR ME, TO COMMUTE TO WORK/SCHOOL BY CAR WOULD BE EASY									
Code	PBCC	**Construct**	Perceived Behavioral Control - Cars						
	Overall Sample			**Car Group**			**Public Transport Sample**		
Likert Scale	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	66	5.9	5.9	19	2.9	2.9	47	10.0	10.0
2	65	5.8	11.7	11	1.7	4.6	54	11.5	21.6
3	73	6.5	18.2	19	2.9	7.5	54	11.5	33.1
4	156	13.9	32.1	73	11.2	18.7	83	17.7	50.9
5	187	16.7	48.8	102	15.6	34.3	85	18.2	69.0
6	267	23.8	72.5	195	29.8	64.1	72	15.4	84.4
7	308	27.5	100.0	235	35.9	100.0	73	15.6	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

Note: Strongly Disagree (1), Disagree (2), Somewhat Agree (3), Neutral (4), Somewhat Agree (5), Agree (6), and Strongly Agree (7)

I BELIEVE THAT COMMUTING BY PUBLIC TRANSPORT IS POSITIVE									
Code	ATP1	**Construct**		Attitudes - PT	**Measure**		Positiveness		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	84	7.5	7.5	59	9.0	9.0	25	5.3	5.3
2	71	6.3	13.8	44	6.7	15.7	27	5.8	11.1
3	102	9.1	22.9	61	9.3	25.1	41	8.8	19.9
4	143	12.7	35.7	70	10.7	35.8	73	15.6	35.5
5	189	16.8	52.5	111	17.0	52.8	78	16.7	52.1
6	218	19.4	71.9	127	19.4	72.2	91	19.4	71.6
7	315	28.1	100.0	182	27.8	100.0	133	28.4	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

I BELIEVE THAT COMMUTING BY PUBLIC TRANSPORT IS PLEASANT									
Code	ATP2	**Construct**		Attitudes - PT	**Measure**		Pleasantness		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	332	29.6	29.6	209	32.0	32.0	123	26.3	26.3
2	221	19.7	49.3	132	20.2	52.1	89	19.0	45.3
3	195	17.4	66.7	111	17.0	69.1	84	17.9	63.2
4	185	16.5	83.2	110	16.8	85.9	75	16.0	79.3
5	115	10.2	93.4	58	8.9	94.8	57	12.2	91.5
6	44	3.9	97.3	15	2.3	97.1	29	6.2	97.6
7	30	2.7	100.0	19	2.9	100.0	11	2.4	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

I BELIEVE THAT COMMUTING BY PUBLIC TRANSPORT IS EFFECTIVE									
Code	ATP3	**Construct**		Attitudes - PT	**Measure**		Effectiveness		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	149	13.3	13.3	117	17.9	17.9	32	6.8	6.8
2	133	11.9	25.1	101	15.4	33.3	32	6.8	13.7
3	215	19.2	44.3	120	18.3	51.7	95	20.3	34.0
4	221	19.7	64.0	130	19.9	71.6	91	19.4	53.4
5	202	18.0	82.0	98	15.0	86.5	104	22.2	75.6
6	119	10.6	92.6	43	6.6	93.1	76	16.2	91.9
7	83	7.4	100.0	45	6.9	100.0	38	8.1	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

Note: Strongly Disagree (1), Disagree (2), Somewhat Agree (3), Neutral (4), Somewhat Agree (5), Agree (6), and Strongly Agree (7)

I BELIEVE THAT COMMUTING BY PUBLIC TRANSPORT IS COMFORTABLE									
Code	ATP4	**Construct**		Attitudes - PT	**Measure**		Comfort		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	382	34.0	34.0	234	35.8	35.8	148	31.6	31.6
2	246	21.9	56.0	151	23.1	58.9	95	20.3	51.9
3	221	19.7	75.7	129	19.7	78.6	92	19.7	71.6
4	148	13.2	88.9	85	13.0	91.6	63	13.5	85.0
5	92	8.2	97.1	40	6.1	97.7	52	11.1	96.2
6	22	2.0	99.0	11	1.7	99.4	11	2.4	98.5
7	11	1.0	100.0	4	0.6	100.0	7	1.5	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

I BELIEVE THAT COMMUTING BY PUBLIC TRANSPORT IS SUSTAINABLE									
Code	ATP5	**Construct**		Attitudes - PT	**Measure**		Sustainability		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	28	2.5	2.5	16	2.4	2.4	12	2.6	2.6
2	41	3.7	6.1	24	3.7	6.1	17	3.6	6.2
3	56	5.0	11.1	38	5.8	11.9	18	3.8	10.0
4	128	11.4	22.5	79	12.1	24.0	49	10.5	20.5
5	209	18.6	41.2	109	16.7	40.7	100	21.4	41.9
6	322	28.7	69.9	188	28.7	69.4	134	28.6	70.5
7	338	30.1	100.0	200	30.6	100.0	138	29.5	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

I BELIEVE THAT COMMUTING BY PUBLIC TRANSPORT IS SAFE									
Code	ATP6	**Construct**		Attitudes - PT	**Measure**		Safety		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	234	20.9	20.9	150	22.9	22.9	84	17.9	17.9
2	216	19.3	40.1	141	21.6	44.5	75	16.0	34.0
3	221	19.7	59.8	116	17.7	62.2	105	22.4	56.4
4	206	18.4	78.2	125	19.1	81.3	81	17.3	73.7
5	150	13.4	91.5	73	11.2	92.5	77	16.5	90.2
6	70	6.2	97.8	33	5.0	97.6	37	7.9	98.1
7	25	2.2	100.0	16	2.4	100.0	9	1.9	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

Note: Strongly Disagree (1), Disagree (2), Somewhat Agree (3), Neutral (4), Somewhat Agree (5), Agree (6), and Strongly Agree (7)

I BELIEVE THAT COMMUTING BY PUBLIC TRANSPORT ENABLES ME A FLEXIBLE ROUTINE									
Code	ATP7	**Construct**		Attitudes - PT	**Measure**		Flexibility		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	385	34.3	34.3	235	35.9	35.9	150	32.1	32.1
2	272	24.2	58.6	177	27.1	63.0	95	20.3	52.4
3	191	17.0	75.6	107	16.4	79.4	84	17.9	70.3
4	141	12.6	88.1	72	11.0	90.4	69	14.7	85.0
5	85	7.6	95.7	40	6.1	96.5	45	9.6	94.7
6	36	3.2	98.9	15	2.3	98.8	21	4.5	99.1
7	12	1.1	100.0	8	1.2	100.0	4	0.9	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

I BELIEVE THAT COMMUTING BY PUBLIC TRANSPORT IS CHEAP									
Code	ATP8	**Construct**		Attitudes - PT	**Measure**		Cost		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	187	16.7	16.7	104	15.9	15.9	83	17.7	17.7
2	171	15.2	31.9	97	14.8	30.7	74	15.8	33.5
3	253	22.5	54.5	145	22.2	52.9	108	23.1	56.6
4	205	18.3	72.7	123	18.8	71.7	82	17.5	74.1
5	147	13.1	85.8	86	13.1	84.9	61	13.0	87.2
6	102	9.1	94.9	58	8.9	93.7	44	9.4	96.6
7	57	5.1	100.0	41	6.3	100.0	16	3.4	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

OVERALL ATTITUDES TOWARD PUBLIC TRANSPORT SCORE									
Code	OATP	**Construct**		Attitudes - PT	**Measure**		Median Score		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	130	11.6	11.6	85	13.0	13.0	45	9.6	9.6
2	172	15.3	26.9	113	17.3	30.3	59	12.6	22.2
3	257	22.9	49.8	161	24.6	54.9	96	20.5	42.7
4	296	26.4	76.2	170	26.0	80.9	126	26.9	69.7
5	173	15.4	91.6	82	12.5	93.4	91	19.4	89.1
6	71	6.3	98.0	30	4.6	98.0	41	8.8	97.9
7	23	2.0	100.0	13	2.0	100.0	10	2.1	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

Note: Strongly Disagree (1), Disagree (2), Somewhat Agree (3), Neutral (4), Somewhat Agree (5), Agree (6), and Strongly Agree (7)

I BELIEVE THAT FAMILY AND CLOSE FRIENDS WOULD SUPPORT ME COMMUTING TO WORK/SCHOOL BY PUBLIC TRANSPORT

Code	SNP1	**Construct**	Social Norms - PT	**Measure**		Strong Ties			
	Overall Sample			**Car Group**			**Public Transport Sample**		
Likert Scale	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	167	14.9	14.9	119	18.2	18.2	48	10.3	10.3
2	117	10.4	25.3	70	10.7	28.9	47	10.0	20.3
3	154	13.7	39.0	78	11.9	40.8	76	16.2	36.5
4	386	34.4	73.4	222	33.9	74.8	164	35.0	71.6
5	132	11.8	85.2	75	11.5	86.2	57	12.2	83.8
6	98	8.7	93.9	51	7.8	94.0	47	10.0	93.8
7	68	6.1	100.0	39	6.0	100.0	29	6.2	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

I BELIEVE THAT ACQUAINTANCES AND CO-WORKERS WOULD SUPPORT ME COMMUTING TO WORK/SCHOOL BY PUBLIC TRANSPORT

Code	SNP2	**Construct**	Social Norms - PT	**Measure**		Weak Ties			
	Overall Sample			**Car Group**			**Public Transport Sample**		
Likert Scale	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	130	11.6	11.6	83	12.7	12.7	47	10.0	10.0
2	117	10.4	22.0	72	11.0	23.7	45	9.6	19.7
3	124	11.1	33.1	60	9.2	32.9	64	13.7	33.3
4	466	41.5	74.6	271	41.4	74.3	195	41.7	75.0
5	122	10.9	85.5	69	10.6	84.9	53	11.3	86.3
6	96	8.6	94.0	59	9.0	93.9	37	7.9	94.2
7	67	6.0	100.0	40	6.1	100.0	27	5.8	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

I BELIEVE THAT COMMUTING BY PUBLIC TRANSPORT IS WELL SEEN BY SOCIETY AND MEDIA

Code	SNP3	**Construct**	Social Norms - PT	**Measure**		Cultural Norms			
	Overall Sample			**Car Group**			**Public Transport Sample**		
Likert Scale	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	184	16.4	16.4	91	13.9	13.9	93	19.9	19.9
2	133	11.9	28.3	63	9.6	23.5	70	15.0	34.8
3	181	16.1	44.4	89	13.6	37.2	92	19.7	54.5
4	347	30.9	75.3	220	33.6	70.8	127	27.1	81.6
5	123	11.0	86.3	77	11.8	82.6	46	9.8	91.5
6	91	8.1	94.4	71	10.9	93.4	20	4.3	95.7
7	63	5.6	100.0	43	6.6	100.0	20	4.3	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

Note: Strongly Disagree (1), Disagree (2), Somewhat Agree (3), Neutral (4), Somewhat Agree (5), Agree (6), and Strongly Agree (7)

OVERALL SOCIAL NORMS TOWARD PUBLIC TRANSPORT SCORE									
Code	OSNP		**Construct**	Social Norms - PT		**Measure**	Median Score		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	134	11.9	11.9	87	13.3	13.3	47	10.0	10.0
2	124	11.1	23.0	71	10.9	24.2	53	11.3	21.4
3	147	13.1	36.1	72	11.0	35.2	75	16.0	37.4
4	435	38.8	74.9	258	39.4	74.6	177	37.8	75.2
5	140	12.5	87.3	78	11.9	86.5	62	13.2	88.5
6	83	7.4	94.7	54	8.3	94.8	29	6.2	94.7
7	59	5.3	100.0	34	5.2	100.0	25	5.3	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

FOR ME, TO COMMUTE TO WORK/SCHOOL BY PUBLIC TRANSPORT WOULD BE EASY									
Code	PBCP		**Construct**	Perceived Behavioral Control - Public Transport					
	Overall Sample			**Car Group**			**Public Transport Sample**		
Likert Scale	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	243	21.7	21.7	198	30.3	30.3	45	9.6	9.6
2	171	15.2	36.9	135	20.6	50.9	36	7.7	17.3
3	154	13.7	50.6	94	14.4	65.3	60	12.8	30.1
4	155	13.8	64.4	88	13.5	78.7	67	14.3	44.4
5	149	13.3	77.7	72	11.0	89.8	77	16.5	60.9
6	139	12.4	90.1	43	6.6	96.3	96	20.5	81.4
7	111	9.9	100.0	24	3.7	100.0	87	18.6	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

I FEEL A PERSONAL OBLIGATION TO PROTECT THE ENVIRONMENT									
Code	PN1		**Construct**	Personal Norms		**Measure**	Pro-Environment		
	Overall Sample			**Car Group**			**Public Transport Sample**		
Likert Scale	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	18	1.6	1.6	8	1.2	1.2	10	2.1	2.1
2	6	0.5	2.1	4	0.6	1.8	2	0.4	2.6
3	23	2.0	4.2	15	2.3	4.1	8	1.7	4.3
4	125	11.1	15.3	76	11.6	15.7	49	10.5	14.7
5	194	17.3	32.6	119	18.2	33.9	75	16.0	30.8
6	246	21.9	54.5	144	22.0	56.0	102	21.8	52.6
7	510	45.5	100.0	288	44.0	100.0	222	47.4	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

Note: Strongly Disagree (1), Disagree (2), Somewhat Agree (3), Neutral (4), Somewhat Agree (5), Agree (6), and Strongly Agree (7)

I WOULD FEEL THE NEED TO SWITCH TRAVEL MODE IF IT WOULD HELP THE ENVIRONMENT

Code	PN2	**Construct**	Personal Norms	**Measure**	Pro-Environment				
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	51	4.5	4.5	30	4.6	4.6	21	4.5	4.5
2	56	5.0	9.5	30	4.6	9.2	26	5.6	10.0
3	71	6.3	15.9	41	6.3	15.4	30	6.4	16.5
4	181	16.1	32.0	113	17.3	32.7	68	14.5	31.0
5	227	20.2	52.2	140	21.4	54.1	87	18.6	49.6
6	223	19.9	72.1	135	20.6	74.8	88	18.8	68.4
7	313	27.9	100.0	165	25.2	100.0	148	31.6	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

I FEEL A PERSONAL OBLIGATION TO LIVE HEALTHILY (FOOD, EXERCISING, ETC.)

Code	PN3	**Construct**	Personal Norms	**Measure**	Pro-Health				
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	33	2.9	2.9	16	2.4	2.4	17	3.6	3.6
2	41	3.7	6.6	18	2.8	5.2	23	4.9	8.5
3	75	6.7	13.3	37	5.7	10.9	38	8.1	16.7
4	140	12.5	25.8	76	11.6	22.5	64	13.7	30.3
5	210	18.7	44.5	109	16.7	39.1	101	21.6	51.9
6	234	20.9	65.3	151	23.1	62.2	83	17.7	69.7
7	389	34.7	100.0	247	37.8	100.0	142	30.3	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

I WOULD FEEL THE NEED TO SWITCH TRAVEL MODE IF IT WOULD HELP ME ACHIEVE A HELTHIER LIFESTYLE

Code	PN4	**Construct**	Personal Norms	**Measure**	Pro-Health				
	Overall Sample			**Car Group**			**Public Transport Sample**		
Likert Scale	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	48	4.3	4.3	32	4.9	4.9	16	3.4	3.4
2	43	3.8	8.1	22	3.4	8.3	21	4.5	7.9
3	71	6.3	14.4	37	5.7	13.9	34	7.3	15.2
4	164	14.6	29.1	96	14.7	28.6	68	14.5	29.7
5	213	19.0	48.0	123	18.8	47.4	90	19.2	48.9
6	249	22.2	70.2	156	23.9	71.3	93	19.9	68.8
7	334	29.8	100.0	188	28.7	100.0	146	31.2	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

Note: Strongly Disagree (1), Disagree (2), Somewhat Agree (3), Neutral (4), Somewhat Agree (5), Agree (6), and Strongly Agree (7)

OVERALL PERSONAL NORMS SCORE									
Code	OPN	**Construct**		Personal Norms	**Measure**		Median Score		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
1	14	1.2	1.2	6	0.9	0.9	8	1.7	1.7
2	18	1.6	2.9	10	1.5	2.4	8	1.7	3.4
3	51	4.5	7.4	28	4.3	6.7	23	4.9	8.3
4	147	13.1	20.5	84	12.8	19.6	63	13.5	21.8
5	221	19.7	40.2	131	20.0	39.6	90	19.2	41.0
6	309	27.5	67.7	185	28.3	67.9	124	26.5	67.5
7	362	32.3	100.0	210	32.1	100.0	152	32.5	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

OVERALL MEASURE OF CAR HABIT									
Code	HABC	**Construct**		Habit	**Measure**		Car		
	Overall Sample			**Car Group**			**Public Transport Sample**		
Likert Scale	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
0	16	1.4	1.4	1	0.2	0.2	15	3.2	3.2
1	57	5.1	6.5	0	0.0	0.2	57	12.2	15.4
2	68	6.1	12.6	3	0.5	0.6	65	13.9	29.3
3	82	7.3	19.9	11	1.7	2.3	71	15.2	44.4
4	85	7.6	27.5	17	2.6	4.9	68	14.5	59.0
5	89	7.9	35.4	25	3.8	8.7	64	13.7	72.6
6	96	8.6	43.9	56	8.6	17.3	40	8.5	81.2
7	108	9.6	53.6	75	11.5	28.7	33	7.1	88.2
8	118	10.5	64.1	95	14.5	43.3	23	4.9	93.2
9	118	10.5	74.6	103	15.7	59.0	15	3.2	96.4
10	95	8.5	83.1	85	13.0	72.0	10	2.1	98.5
11	89	7.9	91.0	85	13.0	85.0	4	0.9	99.4
12	101	9.0	100.0	98	15.0	100.0	3	0.6	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

OVERALL MEASURE OF PUBLIC TRANSPORT HABIT									
Code	HABP	**Construct**		Habit	**Measure**		Public Transport		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
0	531	47.3	47.3	504	77.1	77.1	27	5.8	5.8
1	104	9.3	56.6	67	10.2	87.3	37	7.9	13.7
2	96	8.6	65.2	39	6.0	93.3	57	12.2	25.9
3	121	10.8	75.9	24	3.7	96.9	97	20.7	46.6
4	79	7.0	83.0	10	1.5	98.5	69	14.7	61.3
5	67	6.0	88.9	4	0.6	99.1	63	13.5	74.8
6	54	4.8	93.8	6	0.9	100.0	48	10.3	85.0
7	42	3.7	97.5	0	0.0	100.0	42	9.0	94.0
8	20	1.8	99.3	0	0.0	100.0	20	4.3	98.3
9	4	0.4	99.6	0	0.0	100.0	4	0.9	99.1
10	2	0.2	99.8	0	0.0	100.0	2	0.4	99.6
11	2	0.2	100.0	0	0.0	100.0	2	0.4	100.0
12	0	0.0	100.0	0	0.0	100.0	0	0.0	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

OVERALL MEASURE OF WALKING HABIT									
Code	HABW	**Construct**		Habit	**Measure**		Walking		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
0	141	12.6	12.6	122	18.7	18.7	19	4.1	4.1
1	152	13.5	26.1	106	16.2	34.9	46	9.8	13.9
2	200	17.8	43.9	122	18.7	53.5	78	16.7	30.6
3	259	23.1	67.0	142	21.7	75.2	117	25.0	55.6
4	187	16.7	83.7	86	13.1	88.4	101	21.6	77.1
5	100	8.9	92.6	42	6.4	94.8	58	12.4	89.5
6	46	4.1	96.7	21	3.2	98.0	25	5.3	94.9
7	20	1.8	98.5	6	0.9	98.9	14	3.0	97.9
8	13	1.2	99.6	5	0.8	99.7	8	1.7	99.6
9	4	0.4	100.0	2	0.3	100.0	2	0.4	100.0
10	0	0.0	100.0	0	0.0	100.0	0	0.0	100.0
11	0	0.0	100.0	0	0.0	100.0	0	0.0	100.0
12	0	0.0	100.0	0	0.0	100.0	0	0.0	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

OVERALL MEASURE OF CYCLING HABIT									
Code	HABB	**Construct**		Habit	**Measure**		Cycling		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
0	846	75.4	75.4	501	76.6	76.6	345	73.7	73.7
1	178	15.9	91.3	104	15.9	92.5	74	15.8	89.5
2	62	5.5	96.8	34	5.2	97.7	28	6.0	95.5
3	9	0.8	97.6	4	0.6	98.3	5	1.1	96.6
4	12	1.1	98.7	5	0.8	99.1	7	1.5	98.1
5	7	0.6	99.3	2	0.3	99.4	5	1.1	99.1
6	7	0.6	99.9	4	0.6	100.0	3	0.6	99.8
7	0	0.0	99.9	0	0.0	100.0	0	0.0	99.8
8	1	0.1	100.0	0	0.0	100.0	1	0.2	100.0
9	0	0.0	100.0	0	0.0	100.0	0	0.0	100.0
10	0	0.0	100.0	0	0.0	100.0	0	0.0	100.0
11	0	0.0	100.0	0	0.0	100.0	0	0.0	100.0
12	0	0.0	100.0	0	0.0	100.0	0	0.0	100.0
Total	**1122**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

TO VISIT A FRIEND									
Code	HAB1	**Construct**		Habit	**Measure**		-		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
CAR	880	65.1	65.1	582	89.0	89.0	198	42.3	42.3
PT	269	19.9	85.0	21	3.2	92.2	208	44.4	86.8
CYCLING	90	6.7	91.6	18	2.8	95.0	21	4.5	91.2
WALKING	113	8.4	100.0	33	5.0	100.0	41	8.8	100.0
Total	**1352**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

TO GO GROCERY SHOPPING									
Code	HAB2	**Construct**		Habit	**Measure**		-		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
CAR	703	52.0	52.0	474	72.5	72.5	168	35.9	35.9
PT	5	0.4	52.4	1	0.2	72.6	4	0.9	36.8
CYCLING	60	4.4	56.8	14	2.1	74.8	15	3.2	40.0
WALKING	584	43.2	100.0	165	25.2	100.0	281	60.0	100.0
Total	**1352**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

TO GO TO THE MOVIES									
Code	HAB3	**Construct**		Habit	**Measure**		-		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
CAR	820	60.7	60.7	541	82.7	82.7	178	38.0	38.0
PT	333	24.6	85.3	64	9.8	92.5	224	47.9	85.9
CYCLING	33	2.4	87.7	4	0.6	93.1	6	1.3	87.2
WALKING	166	12.3	100.0	45	6.9	100.0	60	12.8	100.0
Total	**1352**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

TO GO TO THE PARK									
Code	HAB4	**Construct**		Habit	**Measure**		-		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
CAR	508	37.6	37.6	343	52.4	52.4	117	25.0	25.0
PT	218	16.1	53.7	26	4.0	56.4	161	34.4	59.4
CYCLING	325	24.0	77.7	134	20.5	76.9	96	20.5	79.9
WALKING	301	22.3	100.0	151	23.1	100.0	94	20.1	100.0
Total	**1352**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

TO GO TO A CONCERT/PLAY									
Code	HAB5	**Construct**		Habit	**Measure**		-		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
CAR	1102	81.5	81.5	597	91.3	91.3	346	73.9	73.9
PT	190	14.1	95.6	40	6.1	97.4	116	24.8	98.7
CYCLING	10	0.7	96.3	1	0.2	97.6	0	0.0	98.7
WALKING	50	3.7	100.0	16	2.4	100.0	6	1.3	100.0
Total	**1352**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

TO GO OUT HAVE LUNCH									
Code	HAB6	**Construct**		Habit	**Measure**		-		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
CAR	640	47.3	47.3	418	63.9	63.9	162	34.6	34.6
PT	115	8.5	55.8	18	2.8	66.7	91	19.4	54.1
CYCLING	39	2.9	58.7	6	0.9	67.6	6	1.3	55.3
WALKING	558	41.3	100.0	212	32.4	100.0	209	44.7	100.0
Total	**1352**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

TO GO TO A DRUGSTORE									
Code	HAB7	**Construct**		Habit	**Measure**		-		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
CAR	320	23.7	23.7	255	39.0	39.0	54	11.5	11.5
PT	21	1.6	25.2	4	0.6	39.6	17	3.6	15.2
CYCLING	85	6.3	31.5	15	2.3	41.9	26	5.6	20.7
WALKING	926	68.5	100.0	380	58.1	100.0	371	79.3	100.0
Total	**1352**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

TO GO OUT AT NIGHT									
Code	HAB8	**Construct**		Habit	**Measure**		-		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
CAR	1253	92.7	92.7	633	96.8	96.8	429	91.7	91.7
PT	59	4.4	97.0	9	1.4	98.2	35	7.5	99.1
CYCLING	10	0.7	97.8	0	0.0	98.2	2	0.4	99.6
WALKING	30	2.2	100.0	12	1.8	100.0	2	0.4	100.0
Total	**1352**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

TO GO TO THE BAKERY									
Code	HAB9	**Construct**		Habit	**Measure**		-		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
CAR	208	15.4	15.4	176	26.9	26.9	23	4.9	4.9
PT	4	0.3	15.7	2	0.3	27.2	2	0.4	5.3
CYCLING	63	4.7	20.3	12	1.8	29.1	19	4.1	9.4
WALKING	1077	79.7	100.0	464	70.9	100.0	424	90.6	100.0
Total	**1352**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

TO GO HOME									
Code	HAB10	**Construct**		Habit	**Measure**		-		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
CAR	663	49.0	49.0	573	87.6	87.6	73	15.6	15.6
PT	388	28.7	77.7	37	5.7	93.3	343	73.3	88.9
CYCLING	103	7.6	85.4	13	2.0	95.3	12	2.6	91.5
WALKING	198	14.6	100.0	31	4.7	100.0	40	8.5	100.0
Total	**1352**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

TO COMMUTE TO WORK/SCHOOL									
Code	HAB11	**Construct**		Habit		**Measure**	-		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
CAR	640	47.3	47.3	592	90.5	90.5	40	8.5	8.5
PT	439	32.5	79.8	29	4.4	95.0	402	85.9	94.4
CYCLING	125	9.2	89.1	20	3.1	98.0	15	3.2	97.6
WALKING	148	10.9	100.0	13	2.0	100.0	11	2.4	100.0
Total	**1352**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**

TO GO TO A DOCTOR'S APPOINTMENT									
Code	HAB12	**Construct**		Habit		**Measure**	-		
Likert Scale	**Overall Sample**			**Car Group**			**Public Transport Sample**		
	Frequency	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**	**Frequency**	**%**	**Acc. (%)**
CAR	836	61.8	61.8	557	85.2	85.2	174	37.2	37.2
PT	370	27.4	89.2	62	9.5	94.6	250	53.4	90.6
CYCLING	38	2.8	92.0	1	0.2	94.8	6	1.3	91.9
WALKING	108	8.0	100.0	34	5.2	100.0	38	8.1	100.0
Total	**1352**	**100.0**	**-**	**654**	**100.0**	**-**	**468**	**100.0**	**-**