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Motility as a mediating variable in the influence of environmental concern on mobility habits

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ABSTRACT

This study employs a second-order structural model (SEM) to conduct a mediation analysis, with the objective of elucidating the intricate relationship between environmental concerns and daily mobility habits. The mediation variable used is motility, defined as the personal capacity to be mobile, and combines individuals' access, skills, and projects related to the transportation system. This study utilizes data from the second wave of the 'National daily mobility panel' (2019, ELIPSS) survey in France to demonstrate that higher environmental concern may lead to stronger public transportation habits and less frequent car use. However, the relationship between these variables is not straightforward but rather significantly contingent upon the unequal distribution of motility among the population. Among lower education or income groups, the lack of motility can impede the translation of environmental concern into mode shift. These findings contribute to the identification of more seamless and less standardized strategies for a transition towards socially and environmentally sustainable daily mobility habits.

1. Introduction

In the context of climate urgency, heightened awareness of environmental change may prompt individuals to scrutinize their habits and practices and to adopt more ecologically sustainable lifestyles (Milfont, 2012). This is also referred to as environmental concern (Le Borgne et al., 2015), which can encompass a range of attitudes and behaviors, from environmental care to eco-anxiety or eco-anger (Panu, 2020; Stanley et al., 2021).

The transportation sector, which constituted 31 % of the greenhouse gas (GHG) emissions in France in 2019 (CITEPA, 2020), plays a pivotal role in this regard. In addition to the pollution caused by air travel (Morten et al., 2018), individuals can be aware of the negative externalities associated with their daily mobility. In particular, the emission of GHG from vehicles and the resulting air pollution are primary causes for people to feel at risk of exposure, according to a recent French national survey.[1] Consequently, environmental concern is becoming a significant factor in people's daily travel choices, with those who express greater concern demonstrating a preference for alternatives to private combustion engine cars, as evidenced by multiple studies (Bouscasse et al., 2018; Garvill, 1999; Nilsson & Küller, 2000; OECD, 2014). However, other studies have observed a lack of significance between environmental concern and mobility patterns (De Groot & Steg, 2007; Walton et al., 2004), including a recent study in France (Demoli et al., 2020).

The compensatory green belief (CGB) theory posits that an explanation for what has been coined 'cognitive dissonance' (Festinger, 1954) is that 'a pro-environmental behavior (e.g., recycling) can offset the negative effects of an environmentally detrimental behavior (e.g., driving)' (Hope et al., 2018). Bouscasse et al. (2018) go on to argue the following:

> '[…] pro-environmental motivation is not enough for most people to engage in behavior that replaces or reduces private car use to the benefit of sustainable travel modes. This is supported by the theory of planned behavior (TPB by Ajzen, 1991), which, through the concept of Perceived Behavioral Control (PBC), states that people are more likely to perform a behavior when they perceive it as *easy to perform*. To better understand the link between environmental concern and travel behavior, attitudes to travel modes need to be explored as well

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[1] Ministère de l'environnement, de l'énergie et de la mer (2022), Enquête sur le sentiment d''exposition aux risques. **More information can be found at** https://www.statistiques.developpement-durable.gouv.fr/les-francais-face-aux-risques-environnementaux-quelle-prise-de-conscience-en-2022-0

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as the extent to which their use is perceived *as easy, pleasant and useful* by passengers'.[2]

In other words, the translation to alternative transportation modes is not a simple or straightforward process. The present study proposes to approach this 'ease of use' of travel modes by examining the individuals' ability to be mobile, also known as motility (Kaufmann et al., 2015). The primary argument put forth is that motility may prove to be a pivotal yet understudied topic of research, offering insights into the ways in which environmental concern can (or cannot) translate into more environmentally conscious travel behaviors. This procedure has been demonstrated to be effective, as evidenced by the work of Cuignet et al. (2020) on the impact of daily mobility on well-being, which elucidates the manner in which motility can serve as a condition of both happiness (hedonic) and actualization of the human's potential (eudaimonic) among older adults.

In his conceptualization of motility, Kaufmann (2014) defines it as 'all of the characteristics of a given actor that allow him/her to be mobile'. Integrating motility with mobility – understood as 'the intention, then the realisation of a crossing of geographical space involving social change' (Sorokin, 1927; McKenzie, 1927) – provides a comprehensive theoretical framework for differentiating the individual capacity to move from contextual opportunities (or constraints) in travel behavior analysis. From this perspective, the transformation of the intention into an effective movement is contingent upon the availability of amenities that facilitate geographical mobility *and* the individual's motility, which are considered two distinct parameters. Consequently, in contrast with, for example, the work of Cuignet et. al. (2020), this study considers that the 'five Ds' of Ewing and Cervero (2010) are related to amenities rather than to motility.

The latter is comprised of three fundamental elements (Kaufmann, 2002). The initial element is the personal access, which encompasses the conditions that facilitate individuals' utilization of the transportation system (e.g., the availability of a public transportation card, the physical and financial accessibility of the offer, or the presence of social conditions that enable access to this system, etc.). The second element pertains to prerequisites for utilizing the system, which are referred to as acquired knowledge and skills (e.g., the ability to read a map and navigate spatial relationships, proficiency in foreign languages, the capacity to utilize telecommunication systems, etc.). The final element is the willingness and aspirations for inactivity or mobility, which relates to the underlying motives for utilizing this system (e.g., the desire to relocate, the satisfaction derived from commuting with a bike to work, etc.). In this study, the third element of motility corresponds to the unified dimension of motility projects (updated by Kaufmann, 2014), which combines attitudes (defined by Cuignet et al. (2020) as perceptions or apprehensions towards each mode) and appropriation (aspirations, willingness). Our approach therefore differs from that of Cuignet et al. (2020), who posit that 'attitudes towards transportation modes play a role within the concept of motility, but they remain a separate component of motility, in parallel with access, competences, and appropriation'. They further suggest that 'this component is mostly related to competences, implying that attitudes towards public transportation are linked to individuals' physical condition, and not related to appropriation as suggested implicitly by Kaufmann and colleagues (2004) or explicitly by Kjaerulff (2011)'. Nevertheless, the research by Cuignet et al. (2020) demonstrated these results only in relation to the perceptions of transit options among older individuals, whose attitudes may be significantly correlated with their physical condition. However, we contend that this relationship cannot be generalized to the entire adult population, which will be the focus of the present study.

The three-element structure of motility provides a broader context for mode choice decision-making, including objective and subjective aspects (norms, attitudes, etc.) that cannot be identified with traditional socioeconomic measures. While the concept of utility has long dominated the literature on transportation mode preferences (De Witte et al., 2013), framing individuals' choices as driven primarily by considerations of time and cost, recent advancements have broadened this perspective. Contemporary research incrasingly acknowledges the importance of subjective preferences, encompassing elements such as individuals' representations of modes, routines, ideologies, and skills (e.g., Abou-Zeid et al., 2012; Domarchi et al., 2008; Kaufmann, 2003; Kroesen et al., 2017; Lang et al., 2011; Van Acker et al., 2010). This shift allows researchers to transcend traditional rationalist approaches, particularly in the context of mode choice, by separating the direct and indirect utility of daily travel (Mokhtarian & Salomon, 2001) and examining the role of factors such as mobility habits (Buhler, 2015) and social norms (Eriksson & Forward, 2011).

Nevertheless, while spatial, socioeconomic, and psychological determinants of mode choice have been the subject of considerable attention in quantitative literature, the role of ease of use remains underexplored. As a number of qualitative studies focusing on motility have shown (Faulconbridge et al., 2009; Fouillé, 2010; Kellerman, 2012; Rivere, 2009; Rocci, 2007; Vincent-Geslin, 2008), this is crucial for understanding why the proximity of public transportation, its affordability, or even favorable attitudes towards it often fail to make it a viable alternative to car use. This study therefore examines the psychological and social processes that underpin mode choice in order to ascertain the conditions under which environmental concern can translate into more sustainable behaviors. From a conceptual standpoint, this necessitates an examination of motility as a mediator between environmental concern and mobility habits, contrasting with a baseline scenario where only a direct effect is assumed.

Accordingly, this study will contribute to the existing literature by fully and rigorously exploiting the explanatory potential of the concept of motility. Notwithstanding previous attempts (e.g., Viry, 2011), these have often been impeded by methodological constraints. This is explicitly stated by Cuignet et al. (2020), who indicate that 'the data used in the case study are not based on a questionnaire aimed at defining motility' (ibid, p.14). Consequently, 'the concept of motility is not identified as such, thus challenging the theoretical framework built on Kaufmann and colleagues' (ibid, p. 11). Therefore, this study aims to address a first gap in the existing literature by validating the modeling of the concept without the need for external and manifest mobility indicators (such as the number of daily activities or journeys) through the use of an *ad-hoc* survey. A second contribution is to address the structural inequalities of the relationship between environmental concern and mobility habits through the use of motility as a mediator. This is accomplished by incorporating socioeconomic explanatory variables into the models, which have frequently been absent in the reviewed literature.

This study relies on structural equation modeling (SEM) techniques used on a French dataset, with a specific focus on mobility habits and motility, which are both presented in detail in Section 2. Section 3 provides a rationale for all the causal hypotheses incorporated into both the measurement and structural models. The initial part of Section 4 delineates the findings from the interaction model in comparison to the baseline model wherein no mediation is taken into account. The second half of Section 4 describes the influence of multiple socioeconomic variables in order to highlight the uneven consequences of motility as a mediating variable. Section 5 concludes by considering the implications of the findings for public policy aimed at promoting the use of public transportation over private vehicles.

[2] Authors' emphasis.

2. Material and methods

2.1. Dataset

This study is based on data from the PaNaMo[3] survey, which is part of the Longitudinal Internet Panel for Social Sciences (ELIPSS) produced by the Center for Socio-Political Data of Sciences Po/CNRS, providing a sample representative of the French metropolitan population. On a monthly basis, the panelists responded to surveys utilizing a tablet and a mobile Internet subscription that was made available to them. The annual survey collected and updated demographic and socioeconomic information.

Among the various surveys of the ELIPSS panel, the PaNaMo survey provides data on the daily mobility of the French population aged between 18 and 79. The questionnaire's authors investigated the factors that influence mobility behaviors, including social norms, habits, intentions, spatial and social situations, and motility. The objective of the project is to elucidate the relationships between personal behaviors and their fluctuations over time, with these five major inputs quantifiable at the individual level. The second wave of the survey was conducted between February and March 2019, and yielded responses from 2066 panelists. Table 1 provides a summary of the most salient characteristics of the sample.

Table 1
Descriptive statistics of the dataset.

Variables	n	Frequency
Gender		
F	1068	51,7 %
M	998	48,3 %
Age		
[18–24]	51	2,5 %
[25–34]	173	8,4 %
[35–44]	409	19,8 %
[45–54]	539	26,1 %
[55–64]	457	22,1 %
[65–79]	437	21,2 %
Educational level		
Secondary school	759	36,7 %
A-level & 2-year technical degree	807	39,1 %
BA, MA, or higher degree	500	24,2 %
Professions		
Farmers	32	1,5 %
Artisans, shopkeepers, and company managers	111	5,4 %
Administrators and managers, higher grade professionals	489	23,7 %
Intermediate professionals	578	28,0 %
Employees	452	21,9 %
Workers	280	13,6 %
Others, no activity	124	6,0 %
Number of children living in the respondent's household		
No children	1568	75,9 %
One child	190	9,2 %
Two children	148	7,2 %
Three children and more	53	2,6 %
No information	107	5,2 %
Occupancy Status		
Tenants	496	24,0 %
Owners	1380	66,8 %
Others (company accommodation, etc.)	71	3,4 %
No information	119	5,8 %

[3] Thomas Buhler, Philippe Signoret, PaNaMo team, ELIPSS team: Panel national mobilité quotidienne – vague 2 (février 2019), Fondation Nationale des Sciences Politiques (FNSP), Centre de Données Socio-Politiques (CDSP). **More information can be found at** http://quanti.dime-shs.sciences-po.fr/

2.2. Methods

The primary independent variables under examination in this study are latent (Ben-Akiva et al., 2002). In other words, it is not possible to observe and measure motility directly from the data (Kaufmann et al., 2015), and the same is true of environmental concern and mobility habits. Therefore, unlike 'manifest' variables such as car ownership or public transportation cards, an analysis cannot quantify and utilize motility with straightforward quantitative techniques, which may explain its relative absence from existing research. Nevertheless, certain exceptions have proposed motility typologies employing factor and cluster analysis to examine professional 'high mobility' in European and cross-border contexts (Dubois, 2017; Dubois et al., 2015; Kaufmann et al., 2010), which have demonstrated that motility can be increased following past experiences of high mobility (Viry et al., 2010). This provides an explanation for the reluctance of some individuals to engage in situations characterized by high levels of mobility (Dubois et al., 2015). In another exploratory operationalization of motility, Witter (2012) revealed the difficulties associated with adapting to a new public transportation system. More recently, Hamidi and Zhao (2020) and Bernier (2024) demonstrated the relevance of combining motility with isochrone mapping to assess potential mobility. While these studies have made important contribution to the literature, they have remained exploratory and have not tested for the statistical significance of motility at the individual level. This is an important limitation, as it would allow for a more nuanced understanding of the concept and the interdependence between its various dimensions. The studies do, however, highlight the quantitative potential of motility, demonstrating its variability depending on social and spatial contexts.

In line with prior research in social sciences (Cuignet et al., 2020; Gerber et al., 2018), this study employs structural equation modeling (SEM, Bollen, 1989) to assess the mediating role of motility in the relationship between environmental concern and mobility habits. The use of SEM is particularly pertinent for two reasons. First, SEM is an efficacious tool for examining individual-level decision-making processes, while simultaneously accounting for the geographical and sociological determinants of transportation behavior. The use of SEM for mediation analysis in transportation research has already proven to be a decisive method for understanding car-use dependency (Van Acker & Witlox, 2010). Second, SEM's latent variables framework facilitates rigorous testing of theoretical models by evaluating their empirical validy across datasets (Jakobowicz, 2007). In the present case, SEM is used to evaluate the manner in which access, skills, and projects shape motility, as well as to assess the extent to which the latter aligns with environmental concern and mobility habits. To the best of our knowledge, Cuignet et al. (2020) are the only researchers to investigate motility using SEM, focusing on its relationship with well-being and drawing on several theoretical propositions (Shliselberg & Givoni, 2018, 2019a, 2019b). However, as previously stated, the PaNaMo survey includes a greater number of indicators pertinent to the measurement of the three dimensions of motility, thereby enabling to avoid latent variables based on less than three indicators.

2.3. Estimation of the model

The LISREL-ML software was employed to estimate the base and the interaction models, assuming multivariate normality of the variables. The Mardia test yielded a p-value under 0.05, thereby rejecting the null hypothesis of multivariate normality. Similarly, the Shapiro-Wilk test returned all p-values <0.05, indicating that the null hypothesis of univariate normality was also rejected (Munim & Noor, 2020). Accordingly, the models were estimated through maximum likelihood with robust standard errors, in accordance with prior observations documented in the literature (Schoenberg & Arminger, 1989). The estimation were conducted on the complete structural equation model using the Lavaan package in R (Rosseel, 2012), as illustrated in Fig. 1. To assess the

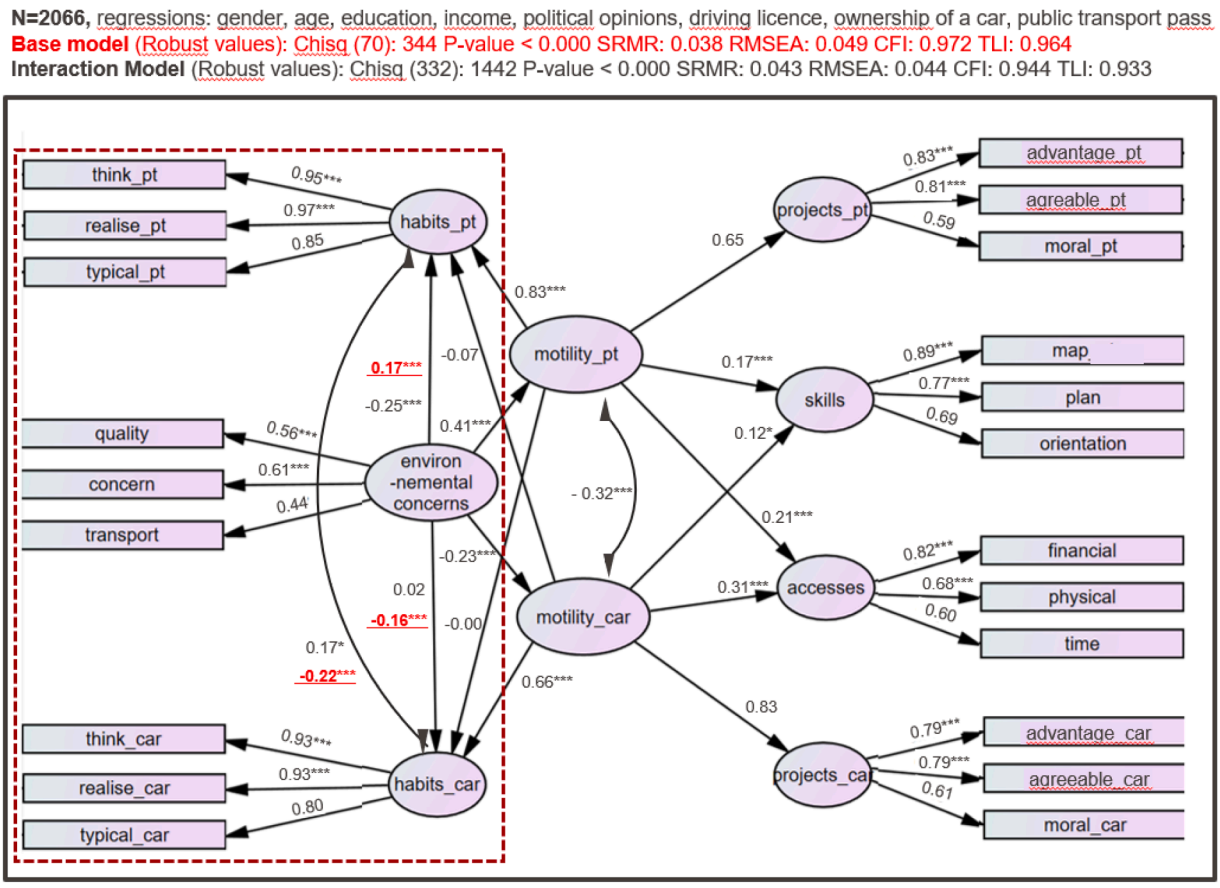

Fig. 1. standardized estimates for the **base model** (red dots) and the **interaction model** (lavaan see appendix for details; *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; no p-value for measurement references).

statistical validity of the models, four traditional indicators were reported (Hooper et al., 2008; Hoyle, 2014), as there were various possibilities in the literature (Yoder, 1998). The models converged, and the fit values obtained satisfied the cut-off criteria for the SRMR, RMSEA, CFI,[4] and TLI indices (Fig. 1). Notably, the comparison between χ^2 and the degrees of freedom in the models is not an optimal approach in the present case due to the sensitivity of this measure to the sample size, which tends to result in the rejection of models (Meijer, 1998; West et al., 1995).

3. Conceptual models

This section presents the conceptual model and provides an overview of the existing research related to the included latent variables. The structural model comprises six latent variables, each of which is represented by a measurement model. These are 'environmental concern' as an independent variable, 'mobility habits' as a dependent variable, and 'motility' as well as its three dimensions (i.e., 'access', 'skills', and 'projects') as mediating variables. Two of the latent variables, namely mobility habits and the projects dimensions of motility, have been divided into two sub-variables in order to accommodate mode-specific considerations (i.e., car versus public transportation).

3.1. Measurement models

In order to capture the latent variables, indicators were employed in the survey that reflected each of the aforementioned constructs in accordance with the framework of the LISREL SEM method. Table 2 provides a summary of the indicators and the corresponding scales, which range from 5 (for mobility habits) to 7 (in all other cases) items on a Likert scale.

Among the various scales used to measure environmental concern (e.g., Dunlap and Van Liere (1978) New Ecological Paradigm scale, see Hawcroft and Milfont (2010) for a discussion), our data enabled to consider two principal dimensions. The first is the cognitive dimension, which encompasses the awareness of how climate-related issues impact one's quality of life (*quality*) and recognition of the environmental impact of different transportation modes (*transport*). The second is the affective dimension, which reflects the importance individuals place on preserving the planet (*concern*). Our dataset lacked the requisite elements to measure the conative dimension (Franzen & Vogl, 2013) of environmental concern, i.e., the intention to protect the environment.

The dependent variables related to mobility habits were measured consistently for both car and public transportation, using three key indicators. The first indicator captures habitual behavior in daily trips based on perceived familiarity with the mode (*typical*), assessed on a global timescale rather than through actual frequency or recurrence of use (see Molin et al., 2016). Additionally, past experiences with mode choice also influence preferences (Verplanken et al., 1994), resulting in unconscious reflexes (*realise*) and mechanical automatisms (*think*) respectively captured by the two other indicators. These mechanisms are consistent with the work of Gardner et al. (2012), who validated the Self-Report Behavioral Automaticity Index, originally developed by

[4] The SRMR relies on the standardised variation between the observed covariances and those derived from the studied model. The RMSEA measures the square root of the average deviation of the χ^2 statistic from its expected value per degree of freedom and is convenient for large data samples. The CFI is derived from the comparison between the studied model and the complete independence model, while the TLI quantifies the progression of the adjustment from the null model to the studied model.

Table 2
Indicators for the latent variables in the dataset.

Code	Label	Likert scale	Mean (sd)
Latent variable: environmental concern			
quality	The planet's condition impacts your and your relatives' quality of life.	7	5.53 (1.34)
concern	You are concerned about the environment's preservation.	7	5.55 (1.08)
transport	Individual transportation mode choices have an impact on the environment.	7	5.27 (1.30)
Latent variable: public transportation habits			
typical_pt	For everyday travel, using public transportation is a typical activity.	5	2.41 (1.94)
realise_pt	For everyday travel, using public transportation is an activity I do before I realise it.	5	2.25 (1.87)
think_pt	For everyday travel, using public transportation is an activity I do without thought.	5	2.32 (1.93)
Latent variable: car habits			
typical_car	For everyday travel, driving a car is a typical activity.	5	4.58 (2.12)
realise_car	For everyday travel, driving a car is an activity I do before I realise it.	5	4.76 (2.23)
think_car	For everyday travel, driving a car is an activity I do without thought.	5	4.74 (2.30)
Latent variable: access (motility 1/3, car and public transportation)			
time	You have enough time to access places you usually go to.	7	5.04 (1.83)
physical	You have good physical condition to access places you usually go to.	7	5.34 (1.75)
financial	You have a good financial situation to access places you usually go to.	7	4.97 (1.87)
Latent variable: skills (motility 2/3, car and public transportation)			
orientation	You are capable of orientating yourself in space.	7	5.39 (1.74)
map	You are capable of reading a road map.	7	6.16 (1.42)
plan	You are capable of reading a public transportation plan.	7	5.90 (1.51)
Latent variable: projects (motility 3/3, car only)			
moral_car	In the coming year, from a moral point of view, driving a car would be a good thing.	7	4.73 (2.01)
agreeable_car	In the coming year, you would appreciate driving a car.	7	5.71 (1.76)
advantage_car	In the coming year, driving a car would be an advantage.	7	5.43 (1.94)
Latent variable: projects (motility 3/3, public transportation only)			
moral_pt	In the coming year, from a moral point of view, riding public transportation would be a good thing.	7	5.28 (2.10)
agreeable_pt	In the coming year, you would appreciate riding public transportation.	7	3.91 (2.06)
advantage_pt	In the coming year, riding public transportation would be an advantage.	7	3.84 (2.23)

Verplanken and Orbell (2003).

As previously conceptualized in the introduction, the three motility dimensions serve to characterize the individuals' affordances to interact with the transportation system. Some of these dimensions can be related to a specific transportation mode, while others can be considered generic in the sense that they condition one's ability to move in space regardless of the mode. In both cases, the dimensions of access, skills and projects do not include external and manifest elements such as geographical accessibility or mobility equipment. In light of the resources available in the PaNaMo survey, the project dimension of motility is modeled as mode-specific while the access and skills dimensions are modeled as generic. For the project dimension, the indicators are based on an approach that draws inspiration from Max Weber's theory (1922), which is well established in the field of mode choice literature (Kaufmann, 1995; Bernier et al. 2022). The models thus accounted for a rational or instrumental dimension of mobility projects (*advantage*), their sensible dimension (*agreeable*), and their social dimension (*moral*) following the concept of morality applied to car use (Abrahamse et al., 2009).

The access dimension of motility is analogous for both the car and public transportation. This latent variable is conceptualized as a combination of physical condition (*physical*), time constraints or scheduling availability (*time*), and economic resources (*financial*). These three elements influence how individuals subjectively assess the utility of travel and select between transportation options (Mokhtarian & Salomon, 2001). Finally, the skills dimension of motility is also generic and comprises individuals' sense of orientation in space (*orientation*) and their capacity to read road maps (*map*) or public transportation plans (*plan*). To test this latent variable, another version of the model was created to distinguish between skills indicative of car versus public transportation use. However, the results were statistically less significant and the models less efficient in terms of evaluation criteria. Consequently, the skills variable should be regarded as an expression of individuals' overall socialization to mobility (Baslington, 2008), which may subsequently correlate differently within car and public transportation motility, respectively.

3.2. Structural model

As indicated in the introduction, two models were developed, each based on a distinct underlying conceptual hypothesis (Fig. 1; red dots represent the base model specification). In the base model, the hypothesis is straightforward, as we only account for the direct effect of environmental concern on both car and public transportation habits. The primary assumption is that individuals with higher environmental concern may exhibit a greater propensity for public transportation and a reduced inclination towards car habits (e.g. Bouscasse et al., 2018; Tran et al., 2020). In the interaction model, motility is introduced and acts as a mediator between environmental concern and mobility habits. A direct effect of environmental concern on mobility habits is retained, while an indirect effect is introduced between the two latent constructs that goes through motility.

From a behavioral perspective, environmental concern may exert an influence on each of the three components of motility. Access is defined as an individual's physical, temporal and financial capacity to utilize the transportation system. This may already reflect some convictions about the environment, given prior decisions regarding mobility equipment (or lack thereof), although such relationships have been found to be variable (Ao et al., 2019; Demoli et al., 2020). The literature on travel socialization demonstrates that pro-environmental attitudes, whether inherited from parents or acquired at school, may result in the development of specific skills related to the use of cars or public transportation (Baslington, 2008; Haustein et al., 2009). The relationship between environmental concern and mobility projects is perhaps the most evident, as individuals will attempt to modify their future conduct or assess transportation policies in accordance with their ecological convictions (Nilsson & Küller, 2000).

Further developments are needed to elucidate the relationship between motility and mobility habits. The distinction between factors that contribute to an individual's *capacity to be mobile*, especially *skills*, and their *mobility habits* can often be subtle. Here, the distinction between these two concepts hinges on the degrees of awareness and control exercised during the processes of acquiring them. While both originate from early socialization within the family unit (Baslington, 2008), the capacity to be mobile allows for a broader scope of adaptation within individuals' life courses, contingent on biographical events and related 'mobility milestones' (Rau & Manton, 2016). Motility is conceptualized as a *potential* that can be activated when necessary or remain in an unused state otherwise (Kaufmann, 2002). In contrast, mobility habits are thought to originate from the repetition of actual acts of movement.

Finally, all three pillars of motility exert an influence on mobility. Once more, the level and type of mobility will vary depending on one's access. For instance, financial constraints may lead to an increased

reliance on personal vehicles in certain urban communities (Curl et al., 2018), whereas empirical evidence suggests that individuals engaged in physical activity tend to prefer public transportation (Wasfi et al., 2013). As previously stated, while mobility skills and habits are distinct, they are nevertheless closely interrelated. The argument here is that the former functions as a conditional parameter for the latter, thereby influencing its development in a specific manner. The ability to orient oneself in space and to utilize public transportation maps, GPS, and other navigation tools collectively contribute to the formation of mobility habits (Hamidi & Zhao, 2020). These also obviously vary depending on mobility projects (Van et al., 2014), as individuals will attempt to adapt to what they perceive to be the optimal situation. However, it is important to bear in mind that prospective plans do not always result in actual changes in behavior, particularly when mobility is constrained (Uteng, 2009).

The structural relationships described in the previous paragraphs are subject to the potential issue of reverse causation. To illustrate one example, the access dimension of motility may either increase or decrease specific mobility habits, which in turn influence individuals to seek out or avoid specific forms of access. Such issues typically emerge in the context of self-selection processes in the transportation literature (e.g., Scheiner, 2018). More fundamentally, there are also reasons to believe that mobility habits can influence environmental concern rather than the other way around. Although this is undoubtedly the case to some extent, such a conceptualization would require, in the case of this study, to reverse the relationship between mobility habits and motility. This would in turn be less consistent with the theoretical definition of mobility presented in the introduction as the intention and *then* the realization of movement in the geographical space.

4. Results and interpretation

This section presents the results of the study in three stages. First, a brief overview of the base model is provided to illustrate the anticipated impact of environmental concern on mobility habits. Second, a detailed account of the interaction model is provided, which demonstrates how motility functions as a mediating variable between environmental concern and mobility habits. Third, the influence of individual characteristics is examined within the interaction model, as they offer valuable insights into the political and sociological implications of sustainable mobility practices. For purpose of comparability, it should be noted that socioeconomics and mobility equipment acts as control variables in both the base and the interaction models with the same paths dependency (when possible), although these are not shown in the results tables or figures for readability purposes (see Table A1 for full information).

4.1. Base and interaction models

The results from the base model (Fig. 1) demonstrate that all measurement relations are significant and consistent with both latent variables (environmental concern and mobility habits). Furthermore, the direct structural relations are also significant: those with sharper environmental concern tend to have looser car habits and stronger public transportation habits. These findings are consistent with the majority of the aforementioned literature, yet there is considerable debate surrounding the behavioral assumptions that underpin these results. The arguments presented range from the assertion that individuals possess strong ecological convictions (Hunecke et al., 2001; Paijmans & Pojani, 2021) to the proposition that social and spatial conditions create unequal opportunities for the adoption of environmentally-friendly mobility practices (Nordfjærn & Rundmo, 2015) or car-free behaviors (Brown, 2017).

The introduction of the motility framework into our structural equation model (*interaction model*) facilitates the elucidation of the psychosocial mechanisms that underpin the relationship between environmental concern and mobility habits (Table 3). Overall, the findings

Table 3
Direct, indirect and total effects on car and public transportation habits; *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$).

	Direct	Indirect *(through car motility)*	Indirect *(through PT motility)*	Total
Car habits	0.020	−0.156 ***	−0.000	−0.137 ***
PT habits	−0.254 ***	0.016	0.345 ***	0.107 ***

indicate that environmental concern does not exert a direct influence on car habits (1) and, unexpectedly, has a negative direct effect on public transportation habits (2). However, environmental concern exerts an anticipated negative total effect on car habits mediated *exclusively* by car motility (3) and a positive total effect on public transportation habits mediated *exclusively* through public transportation motility (4). In the second-order measurement model, all three dimensions (access, skills and projects) are significant for both car and public transportation motility. However, the projects dimension demonstrates a greater influence than access and skills. Although the motility theoretical framework does not imply a predominance of any of its dimensions over the others (Kaufmann, 2002), its quantitative translation in this study cannot be considered to be of the same nature. In light of these findings, it can be concluded that the mediation process primarily operates through individuals' projects with regard to car and public transportation use. This may be confounded, at least in part, by the fact that the projects dimension is more susceptible to declarative biases than the access or skills ones, and thus more aligned with stated environmental concern. This is potentially reinforced by the formulation of the questions, which compare future intentions or projects (i.e., those planned for 'next year') with current access and skills.

Moreover, the model indicates that access is more crucial for car-related motility than for public transportation-related motility. This result lends support to the hypothesis that the financial dimension and the physical health are the most significant factors in the latent variable of access. Even though the items we used to assess this latent construct do not include any reference to driving ability, we can assume here that a physical problem accessing a place by public transportation will generally also affect the ability to drive to that place, whereas the opposite is rarer, particularly for older people in terms of eyesight and lack of reflexes that could prevent them from driving without a strict limitation to a public transportation journey. In contrast to the previous result, the model indicates that orientation skills are given greater weight for public transportation motility than for car motility. While a novice driver can readily navigate without a map by following a road network with more detailed signage than that found on public transportation routes, the latter requires a more systematic approach to planning a route and the last kilometer to reach the destination.

The results of the interaction model (Fig. 1) demonstrate that both car motility and public transportation motility exert a positive and significant influence on car and public transportation habits, respectively. This is an unsurprising result, given that feelings of ease and ability in using a specific mode of transportation may lead to its entrenchment as a more obvious choice, eventually becoming an unquestioned habit. In this regard, motility functions as a decisive latent parameter when dealing with what might be termed 'irrational decisions', cases in which modes of transportation are not chosen despite being cheaper or faster. In contrast, the findings indicate that there is no significant cross effect between car motility and public transportation habits, and similarly, no significant cross effect between public transportation motility and car habits. The capacity to be mobile with a single transportation mode does not result in an increase in the frequency of use of other modes, nor does it impede their use. This could be evidence of the way the distinction between modes of transportation is mainly based on contextual reasons, such as the purpose of the trip or the location of the activity, rather than

on individual capacities. To account for these urban (e.g. Pucher & Renne, 2005), regional (e.g. Lo et al., 2016), and social (e.g. Bamberg et al., 2007) contextual effects, a free covariance parameter was set between car and public transportation motilities. This parameter is both significant and negative, confirming a general trend of repulsion between cars and public transportation motilities.

The findings demonstrate that environmental concern exerts a direct influence on individuals' motility, rather than on their actual mobility. An increase in environmental concern is associated with a rise in public transportation motility, while a decline in car motility is observed. In other words, individuals demonstrate disparate abilities with regard to transportation modes contingent on some of their beliefs regarding sustainability. This affords them the opportunity, under certain social conditions (or prerequisites), to adapt their behavior in accordance with their environmental concern. The following paragraphs will now demonstrate how this potential can be translated into practice. In the base model, a negative correlation was observed between environmental concern and car habits, while the correlation was significant and positive for public transportation habits. The interaction model, which employs motility as a mediating variable, provides a more complex and precise interpretation of these preliminary findings.

First, the total negative effect of environmental concern on car habits is *solely* mediated by car motility (i.e., there is full mediation). This indicates that there is no significant direct effect (1) or indirect effect via public transportation motility (3). The result (1) suggests that a reduction in environmental concern does not directly lead to an increase in car use; rather, it creates a greater *potential* for such a use. This provides evidence of the importance of controlling for what could be a 'selection bias', whereby disregard for the environment is said to matter for mode choice, while it actually affects one's set of possibilities. This also suggests that environmental concern will not prevent individuals from using cars as long as they have the capacity to do so. The result (3) indicates that, despite an increase in public transportation motility, this does not act as a mediating variable for car use. In other words, even if individuals develop stronger predispositions for public transportation because they care for the environment, this will not affect their car habits. This should prompt a reflection on how automobility is (still) deeply rooted in our society, and thus, more challenging to counterbalance with alternatives.

Second, the overall positive impact of environmental concern on public transportation habits is a more multifaceted phenomenon. The findings reveal a significant *direct* but negative effect (2) and one positive and significant *indirect* effect through public transportation motility *only* (4). The result (4) is analogous to the result (3) concerning the relationship between environmental concern and car habits, which is mediated by car motility. In this case, the development of stronger public transportation habits among individuals who care about the environment is contingent upon their ability to utilize this mode with ease. However, in contrast to the psychosocial processes discussed with respect to the car, the relationship between environmental concern and public transportation cannot be characterized as a full mediation. Indeed, result (2) demonstrates a counterintuitive negative direct effect of environmental concern on public transportation. Therefore, while controlling for the potential to be mobile (and relevant socioeconomic factors), higher environmental concern results in a decrease in public transportation habits. In accordance with the SEM literature on mediation (Maassen & Bakker, 2001), this phenomenon is classified as a 'suppressor' effect, wherein the direct and indirect coefficients between the predictor (i.e. environmental concern) and the outcome (i.e. public transportation habits) exhibit opposite signs. To provide an example, an individual concerned about environmental issues may lack the physical capacity or cognitive ability to utilize public transportation, or may lack the insight that doing so is advantageous. Consequently, they may be inclined to rely on the car, thereby hindering the translation of environmental concern into actual alternative mobility habits. As the following section will illustrate, this may be problematic, given that motility is unequally distributed among the population (Kaufmann et al., 2004), which could create obstacles for the positive indirect effects.

The interaction model estimated is critical in that it demonstrates that environmental concern does not directly influence transportation mode habits. Therefore, it would be hazardous to assume that individuals will 'decide' to use car-alternative modes because they care for the environment. Rather, these attitudes must align with their motility in the first place. In other words, mode-specific motility serves as an indispensable catalyst for environmental concern to manifest in more environmentally conscious mobility behaviors. Given that previous research has indicated that mobility may remain in a potential state (Cuignet et al., 2020; Kellerman, 2012), there is no assurance that individuals who identify sustainability as an important matter will ultimately engage in a mode shift.

4.2. Socioeconomics

The interaction model incorporates a number of significant relationships between individuals' socioeconomic characteristics and all latent variables. They provide indispensable insights into the hidden social mechanisms of the measurment and structural models and the resulting inequities. While we can only rely on a limited number of such characteristics which cannot account for every findings in the transportation and mobility literature (for a review, see Kaufmann et al., 2007), Table 4 presents the results of an iterative process where only significant relations were retained in the model. Six socioeconomic variables (gender, age categories, level of education, income, impression of wealth, political opinions) were incorporated in the model at the level of car and public transportation motilities' sub-latent variables (access, skills, projects). Three additional variables (driver license dummy, number of available cars in the household, public transportation pass dummy) were included at the second-order motilities level. This is because mobility equipment is susceptible to exerting a significant and pervasive impact on the capacity of individuals to utilize certain transportation modes, whereas there is less certainty regarding the potential influence of the other variables on some dimensions of motility. Furthermore, this strategy circumvents any potential misinterpretation of other causal relationships that could be attributed to situations of complete dependence on cars or public transportation.

Mobility habits are shaped by a multitude of social determinants, with a particularly pronounced impact on car use. The prevalence of car habits is more common among populations with lower levels of education, whereas the adoption of public transportation habits is more prevalent among individuals with higher levels of education. However, there is no direct influence of declared income on either mode of transportation. Although driving a car remains an expensive undertaking (Gössling et al., 2022), its daily use is more prevalent among rural middle- and working-class populations lacking convenient access to public transportation systems (Demoli et al., 2020). While public transportation may offer a more economical alternative for those with lower socioeconomic status, individuals with higher levels of education tend to develop consistent habits more readily (Roos et al., 2020). Nonetheless, there is a noteworthy correlation between car habits and the perceived wealth among households. This highlights the difficulty in addressing car dependance as an instrumental problem, as it appears to be more closely related to perceived economic difficulties than to an actual lack of income. Finally, there are stronger car habits among individuals who indicated a preference for political parties that are characterized as "right wing". While the underlying mechanisms that drive this relationship may vary in their nature (Börjesson et al., 2015), it is clear that the experiences associated with mobility extend well beyond the purely instrumental rationale of transportation, regardless of how individuals may consciously perceive it.

At the opposite end of the interaction model, only three socioeconomic factors exhibited a significant impact on environmental care. The first factor shows that as individuals age, they demonstrate an increasing

Table 4
Significant causal relations between socioeconomics and latent variables.

Socioeconomics	Latent variables								
	car habits	*pt habits*	*env. care*	*accesses*	*skills*	*projects_car*	*projects_pt*	*motility_car*	*motility_pt*
gender (*ref: man*)	*n.s.*	*n.s.*	.055 (0.036) .	.062 (0.060) *	−.241 (0.065) ***	*n.s.*	*n.s.*	–	–
age (*cont.*)	*n.s.*	*n.s.*	.064 (0.007) *	*n.s.*	.095 (0.012) ***	*n.s.*	.055 (0.010) *	–	–
level of education (*cont.*)	−.115 (0.031) ***	.107 (0.026) ***	*n.s.*	*n.s.*	.159 (0.025) ***	−.120 (0.025) ***	.132 (0.024) ***	–	–
income (*cont.*)	*n.s.*	*n.s.*	*n.s.*	*n.s.*	.144 (0.015) ***	−.066 (0.016) *	*n.s.*	–	–
impression of wealth (*cont.*)	−.005 (0.044) *	*n.s.*	*n.s.*	.088 (0.035) *	*n.s.*	−.047 (0.032) .	.077 (0.029) **	–	–
political opinions (*cont., from left to right*)	.055 (0.019) ***	*n.s.*	−.247 (0.010) ***	*n.s.*	*n.s.*	.097 (0.014) ***	−.065 (0.013) *	–	–
driver license (*ref: no*)	–	–	–	–	–	–	–	.358 (0.226) ***	−.113 (0.136) ***
# available cars (*cont.*)	–	–	–	–	–	–	–	.248 (0.041) ***	−.160 (0.027) ***
pt card (*ref: no*)	–	–	–	–	–	–	–	−.228 (0.091) ***	.476 (0.076) ***

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; . $p < 0.1$.

inclination towards and endorsement of environmental concern.[5] This result may appear contradictory in light of the emergence of young movements advocating for ecological transition in Western countries, including France (Martin, 2020). The application of a piecewise linear age specification in our model[6] provides a more nuanced understanding of these findings. The level of environmental care increases until the age of 64 (the legal retirement age in France) and then declines thereafter. From an individual perspective, retirement represents a significant point in one's perception of environmental issues (Wright et al., 2003). A second significant socioeconomic factor influencing environmental care is gender, women being more likely to express pro-ecological opinions than men. This result is consistent with the majority of research on this topic (McCright & Xiao, 2014). Political opinion represents the third and final socioeconomic variable that significantly influences environmental concern. This is an unsurprising outcome, given that left-wing parties typically espouse progressive stances on environmental issues, whereas right-wing parties tend to adhere to a more conservative discourse (e.g. McCright et al., 2014, for the U.S. context).

Motility is the most socially situated latent variable among all three, thereby confirming that the aptitude to be mobile is far from being equal across the entire population (Kaufmann et al., 2004). First, it can be observed that all three forms of mobility equipment have a significant impact on both car and public transportation motilities. Individuals who possess a driving license and have access to multiple cars within their household tend to develop stronger car habits and have fewer opportunities to become familiar with public transportation options. This mechanism also applies to any public transportation pass (i.e. local, regional, and national), which fosters the development of public transportation habits while simultaneously reducing car habits.

As might be expected, the access latent variable is related to individuals' financial resources. This is because it is partially measured through the perceived financial accessibility of the places they travel to. Nevertheless, while there is a significant relationship between perceived wealth and access, the findings show no causality with declared income. This evidence suggests that individuals from diverse socioeconomic backgrounds may encounter obstacles to daily mobility, particularly given that those with high incomes may be prone to declare temporal scarcity or scheduling complexity. However, these obstacles appear to be surmounted with greater ease by those who feel at ease with their financial circumstances. This result is in line with the work from Cuignet et al. (2020) focusing on the relationship between daily mobility and well-being. The significant gender effect provides evidence that the financial and scheduling inequities experienced by men and women (Drevon & Gumy, 2020) also result in unequal motility.

The skill component of motility serves as a robust discriminant latent variable in our model. The examination of both economic (i.e. income) and cultural (i.e. level of education) capitals illuminates the dispositions that are requisite for motility. Higher incomes are associated with a greater frequency of previous mobility experiences, which provide consistent training in skills such as sense of orientation and map reading. Moreover, post-secondary education serves as a significant conduit for mobility, whether through the incorporation of spatial themes in curricula (e.g. geography, environmental studies, GIS, etc.) or the facilitation of residential mobility (e.g. elite universities, Erasmus programs, etc.) (Kuhn, 2015). While socioeconomics influence individuals to utilize *specific* modes of transportation with greater frequency, thereby fostering habits, they also furnish resources for enhancing the ease in *all* modes of transportation, which ultimately gives rise to more pronounced disparities. Two additional socioeconomic variables were

[5] The target population falls within the age range of 18 to 79 years old at the time of recruitment.

[6] It was not possible to maintain this specification, as it would have necessitated the inclusion of multiple and disparate piecewise linear specifications, contingent upon the specific independent latent variable.

found to be associated with higher levels of motility. The first variable, age categories, demonstrates that mobility skills develop and improve over the course of one's lifetime, which is consistent with the expectation that they require practice and accumulation over time.[7] The second variable is gender, which indicates significantly higher skills among men than women. This result is similar to that reported by Zomer et al. (2019), who identified a stronger orientation ability among men.

The third and final dimension of motility, encompassing car and public transportation projects, demonstrate a contrasting social determination. A general trend can be observed whereby socioeconomics that increase the value placed on future public transportation use simultaneously decrease the value placed on future car use, and vice versa. More specifically, the findings indicate that individuals with lower levels of education and self-identified as politically conservative exhibit greater intentions to utilize cars in the future, whereas the opposite tendency with regard to public transportation is observed. These findings align with previous observations regarding habits, indicating a potential proclivity for car dependency among individuals with lower qualifications. The age of the respondents appears to be a significant factor in their attitudes towards public transportation projects, with a positive and linear effect observed as age increases. This result is significant because it challenges the notion that individuals are less willing to alter their mobility patterns, particularly in favor of increased public transportation use, as they age. This may be attributed to a spatial narrowing of their daily activities (i.e. a tendency to range closer to their place of residence), in which public transportation may be a more efficient option if available (Haustein & Siren, 2015). Ultimately, our findings reveal a notable association between respondents' financial condition and their transportation mode projects. First, a lower declared income is associated with stronger beliefs that cars will remain an important mode of transportation in the future. This indicates that individuals with limited economic capital may be less inclined to perceive the incentives for adopting more environmentally-friendly forms of mobility, particularly given their small contribution to the total energy consumption patterns in this area (ten Dam et al., 2022). Second, the perceived wealth also exerts a similar influence. Those who consider facing financial struggles are more likely to reject the possibility of utilizing public transportation in the future. Therefore, not only does a lower declared income hinder a potential transition towards more sustainable mobility models, but convincing individuals to use public transportation also requires them to feel financially secure.

5. Conclusion

This study was prompted by the need to assess the extent to which individuals' ease of use with various transportation modes, as proposed by Bouscasse et al. (2018), can influence the way environmental concern affects mobility habits. The combination of a new large-scale dataset with detailed information about individuals' motility – defined as the set of characteristics that enable an individual to be mobile – and the promising potential of structural equation modeling techniques (Cuignet et al., 2020) made such an undertaking possible. Accordingly, this study presents a mediation analysis employing the concept of motility to elucidate the interrelationship between environmental concern and mobility habits. The application of structural equation modeling to a French dataset demonstrates that environmental concern is associated with an increase in public transportation habits and a reduction in car habits, but only under specific circumstances. Indeed, motility serves as a pivotal mediator, facilitating the translation of environmental concern into concrete mobility habits. In other words, public policies that encourage environmentally-friendly behavior and alternative modes of transportation must consider the unequal capacity of individuals to be mobile. Therefore, our findings indicate that, in addition to developing new transportation options from an infrastructural perspective, the main focus should be on ensuring that they are socially accessible, straightforward to use, and, above all, conceivable as a genuine alternative, given individuals' projects is the most important latent variable in our framework. Changing people's moving patterns is a significant challenge for public policy, necessitating the implementation of robust support measures (e.g. Roider et al., 2019) to prevent the risk of moral injunction.

The transportation mode-specific motility framework utilized in this study enabled the identification of disparate mediation processes for car and public transportation. The process is straightforward for the former, as the findings indicate that, under the assumption of no other confounding effects, motility fully mediates the existing relationship between environmental concern and habits. The formation of car habits is not a consequence of environmental concern; rather, it is the result of the acquisition of specific access, relevant skills, as well as the development of automobile-related mobility projects, which in turn translate into car practices. In contrast, the inconsistent mediation process identified for the relationship between environmental concern and public transportation habits through motility presents a contrasting narrative. The introduction of individuals' ability to utilize the public transportation system in the model serves as a suppressor effect, underscoring the significant social conditions that facilitate the utilization of this mode based on environmentally-friendly opinions. This illustrates the complex sociopolitical contexts in which the formation of habits with regard to modes of transportation can be situated. Not only does motility appear to reinforce the use of the car among socio-economically disadvantaged and/or less educated groups, but there is also no guarantee that promoting awareness of sustainability will prompt a shift in behavior towards public transportation outside of individuals from the middle-upper class. The ease of use for public transportation, which can enhance the way it is experienced and sometimes appropriated, remains conditional on age categories, income groups, and level of education. This means that there is a significant part of individuals who utilize public transportation out of necessity rather than to preserve the environment. When advocating for either coercive measures against car use or the promotion of public transportation for their ecological benefits (i.e. environmental responsibility), public policies must exercise caution to avoid unintended consequences depending on motility, or lack thereof. Based on the conceptualization used in this study, there is a need to 1) consider whether these solutions are financially, temporally, and physically accessible to the entire population; 2) assess whether they are free from the contingencies of being able to navigate the geographical space with ease; 3) determine whether they espouse – or at the very least do not circumvent – mobility project and aspirations of individuals. While the answers to these conditions may not be immediately apparent, they provide valuable insights that can inform the improvement of environmentally and social fair transportation policies and mobility transition programs.

This study is not without limitations, particularly in regard to its conceptualization and modeling strategy. First, although the majority of structural equation modeling tools rely on reflective causal relations, it would also be justified to model motility with formative relations. This would enable it to be developed as a latent construct, rather than as an underlying variable measuring manifest indicators. This would also result in a higher degree of statistical symmetry in comparison to the assumed causal relationship with environmental concern. Second, our models are established on the assumption that attitudes exert an influence on behavior, a position which is in line with the majority of psychosocial theories of mobility. However, the opposite can also be true as evidenced by Kroesen et al. (2017), cited in Bouscasse et al. (2018), 'who show that the reversed direction of causality from behaviour toward attitudes is stronger' and that 'cognitive dissonance predicts that people whose attitudes are not consistent with their behaviour are more likely to change their attitudes than their behaviour'. Therefore, it would be

[7] We ran a piecewise linear specific sensitivity analysis showing no inflexion after a certain age but highlighting a faster learning curve until 40 years old.

enlightening to examine how habits influence environmental concern, rather than the other way around, by focusing on panel data over extended time periods. This would also facilitate quantitative research on individuals' entire mobility trajectory (i.e. including childhood socialization processes, peer influences and pressures, etc.), rather than concentrating on specific biographical events as driving forces (or milestones) of new behaviors (Cailly et al., 2020). Third, it should be noted that public transportation is not the sole means of reducing the environmental harm caused by the transport sector. Although data limitations impeded the inclusion of cycling, walking, and other non-combustible automotive practices in the study, there is scope for enhancing our comprehension of the manner in which environmental concern may manifest in other mobility habits outside of the car. These alternatives may prove to be more socially equitable and easier to promote than what our results suggest regarding public transportation. Future research could therefore adopt one or more of these approaches to facilitate a more rapid, inclusive and seamless transition away from mobility habits that are dependent on the use of private and polluting vehicles.

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CRediT authorship contribution statement

Alexis Gumy: Conceptualization, Formal analysis, Investigation, Methodology, Software, Validation, Visualization, Writing – original draft, Writing – review & editing. **Eloi Bernier:** Conceptualization, Formal analysis, Investigation, Methodology, Software, Validation, Visualization, Writing – original draft, Writing – review & editing. **Guillaume Drevon:** Conceptualization, Data curation, Funding acquisition, Project administration. **Vincent Kaufmann:** Conceptualization, Data curation, Funding acquisition, Project administration, Supervision. **Thomas Buhler:** Data curation, Funding acquisition.

Declaration of competing interest

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Appendix

Table A1
Standardized estimates (with standard errors) for the base model and the interaction model (*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; no p-value for measurement references).

Variables		Base model		Interaction model	
measurement model					
car habits					
typical_car		.792 (réf.)		.800 (réf.)	
realise_car		.938 (0.029)	***	.935 (0.029)	***
think_car		.933 (0.030)	***	.934 (0.029)	***
pt habits					
typical_pt		.847 (réf.)		.853 (réf.)	
realise_pt		.974 (0.024)	***	.972 (0.023)	***
think_pt		.948 (0.024)	***	.947 (0.024)	***
second-order motility_car					
	accesses	–		.309 (0.070)	***
	skills	–		.121 (0.055)	*
	projects_car	–		.836 (réf.)	
second-order motility_pt					
	accesses	–		.209 (0.078)	***
	skills	–		.172 (0.072)	***
	projects_car	–		.650 (réf.)	
accesses					
time		–		.597 (réf.)	
physical		–		.683 (0.069)	***
financial		–		.817 (0.082)	***
skills					
	orientation	–		.692 (réf.)	
	map	–		.888 (0.048)	***
	plan	–		.766 (0.046)	***
projects_car					
	moral_car	–		.614 (réf.)	
	agreeable_car	–		.791 (0.049)	***
	advantage_car	–		.795 (0.049)	***
projects_pt					
	moral_pt	–		.590 (réf.)	
	agreeable_pt	–		.814 (0.063)	***
	advantage_pt	–		.834 (0.069)	***
environmental concern					
transport		.458 (réf.)		.443 (réf.)	
concern		.606 (0.123)	***	.612 (0.123)	***
quality		.563 (0.125)	***	.558 (0.129)	***

(*continued on next page*)

Table A1 (*continued*)

Variables		Base model		Interaction model	
structural model					
habits_car					
	environmental concern	−0.156 (0.107)	***	.002 (0.118)	
	second ordrer motility car	–		.664 (0.153)	***
	second ordrer motility pt	–		−0.000 (0.155)	
habits_pt					
	environmental concern	.168 (0.096)	***	−0.254 (0.176)	***
	second ordrer motility pt	–		.833 (0.188)	***
	second ordrer motility car	–		−0.069 (0.106)	
second order motility_car					
	environmental concern	–		−0.235 (0.078)	***
second order motility_pt					
	environmental concern	–		.414 (0.086)	***

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