An exploration of levels of emotions towards different modes of transport and when switching between them

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Abstract

Urban car use remains high despite various policies attempting to reduce it. A factor that may have been overlooked by such initiatives is people's emotions towards cars, which may currently be changing due to increasing issues such as congestion and pollution. This study explores people's current emotions towards both cars and alternative modes of transport to provide a basis for targeting emotions in promoting alternative modes and reducing car use. Results show that emotional perceptions towards modes strongly depend on people's sociodemographic background. The younger, the more health-conscious and environmentally concerned people are, the more positive their emotions towards alternative modes. Further, results reveal that some groups in society generally have no positive emotions towards modes of transport other than cars. Such findings are relevant for developing emotion-based promotional measures by mobility providers and policymakers.

Keywords: urban car use, sustainable mobility, transport psychology, self-assessment manikin

1. Introduction

Humans have reached a point at which urban car use must be significantly reduced in order to overcome current transport and environmental challenges (Kang et al., 2019; Schneider, 2013). These challenges include increasing congestion and accidents resulting from too many cars on the roads; air, noise and other pollution, concomitant long-term sustainability and health issues (Rabl & Nazelle, 2012; Woodcock et al., 2009), among others. Moreover, it is expected that approximately 68% of people will live in cities by 2050 (United Nations, 2018), further increasing already high traffic densities and urban space taken up with roads. The need to reduce urban car use and to promote the use of alternative modes of transport instead is thus becoming increasingly crucial. Several cities have tried to reduce the number of cars on the roads by improving existing public transport networks or by imposing higher costs on parking

spaces (Gössling & Cohen, 2014; Hiselius & Rosqvist, 2015). Although such policy initiatives may succeed in convincing some people not to use cars, they do not convince sufficiently large numbers of people on a lasting basis. Cars remain the first mode of choice for many (Chakrabarti, 2017; Grimal, 2020).

A fact that may received too little attention by these policy initiatives are people's emotions towards different forms of transport and towards switching between them. Over decades, car advertisements have targeted these emotions such as senses of power, freedom and status, creating a strong desire in people to experience them and presenting the car as a way to fulfil them (Steg, 2005). This desire seems to be stronger than any regulatory hurdle for many people. Emotions towards cars have been explored in various studies throughout the last decades and could therefore be considered as having been investigated thoroughly (e.g., Gardner & Abraham, 2007; Sheller, 2004; Steg, 2003; 2005; Van Vugt et al., 1995). However, due to the currently changing mobility environment and its concomitant challenges, people's emotions towards cars may have changed. Therefore, an updated exploration of these emotions may be required, which is the first aim of the study. New modes of transport are entering the market and both social and environmental consequences of car use are much more significant today than decades ago (Nieuwenhuijsen et al., 2016). Further, as city roads are becoming more congested, the emotions experienced, for instance, while being stuck in a traffic jam, could frame an updated version of emotional associations with cars: a negative and willingly avoidable condition. Confronting people with the negative emotions felt while driving a car could enable a change in people's overall attitude towards car use. Reducing urban car use thus requires a greater understanding of the current emotions felt during actual car journeys rather than while seeing glamorous car adverts.

The second aim includes exploring people's emotions towards modes of transport *other* than cars. These modes will be referred to as alternative modes in this study, including public transport (in this case, bus and tram), carsharing, cycling and walking. The study of emotions towards such alternative modes is far less developed. However, this does not necessarily imply that people are unemotional towards those. This research therefore explores the level of emotions experienced towards these alternative modes which may eventually serve as satisfactory alternatives to cars. In a final step, the results of the first and second aim are put into a dynamic context for the third aim of the study. The third aim seeks to assess the level of emotions felt during an imagined switch from a car to an alternative mode of transport and vice versa. This imagined switching process may allow us to approximate a real decision between using a car or an alternative mode – even if it is in a fictive survey environment.

Overall, this study explores people's level of emotions towards cars, alternative transport modes as well as towards switching between modes. This exploration will enable a better understanding of people's emotions towards different modes of transport – one that can eventually serve as a basis for policy measures to reduce overall car use in cities. The ascertainment of emotions is conducted in the context of the changing mobility environment. Emotions are assessed by means of a Self-Assessment Manikin (SAM) technique via an online survey with 1,400 participants from Greater London and German-speaking urban areas in Switzerland during a timeframe of three weeks. The findings of the survey provide a foundation for future traffic initiatives, enabling policy makers and mobility providers to reduce urban car use by more effective, emotionally focussed communications. Thereby, the study contributes to the pleasure-arousal theory of emotions. Firstly, an overview of existing literature covering the emotionalisation of transport modes will be discussed, ending in a presentation of the research gap. Secondly, the applied methods and results will be outlined. Lastly, results are analysed, discussed and evaluated.

2. Theoretical background

2.1 Emotions in advertising

According to Vriens and Hofstede (2000), advertisements for highly complex products that focus on functional aspects would be challenging for many consumers. Therefore, marketing strategies for such products should rather address more emotional aspects such as excitement and enjoyment. Other scholars note that it is almost a universal practice in advertising to appeal to emotions and is seen as effective for all kinds of products, simple or complex (Holbrook & O'Shaughnessy, 1984). As stated by Zajonc (1980), addressing emotions may help change attitudes towards various goods and may impact many aspects of people's lives. Thus, as claimed by the author, understanding emotions may help to explain the variability in people's purchasing behaviours.

An emotional process is a combination of cognitive and physiological interactions. The process begins when a message triggers a cognitive appraisal that leads to an evaluation mediated by personal values (Holbrook & O'Shaughnessy, 1984; Lazarus, 1982; Zajonc, 1980). This evaluation against personal values produces an overall judgement of the message's favourability or unfavourability (Lyons, 1980). In addition, the onset of the emotional process involves a physiological change in the level of hormones. Several scholars refer to this change as arousal (Berlyne, 1960; Bradley & Lang, 1994; Osgood, 1952; Russel & Mehrabian, 1977;

Schlosberg, 1954). The stronger the emotional process, the greater the level of arousal. Arousal thus measures how excited or sleepy a person feels towards a presented object.

Arousal should not be confused with the intensity of the feeling as, for instance, a depression can involve low arousal but intense feelings. In addition to arousal, emotions are described by levels of pleasure, i.e. positive/pleasant or negative/unpleasant emotions (Mehrabian, 1996). Pleasure as an instrument in advertising can be designed in such a way that a good is associated with the direct experience of sensual fulfilment (Hirschmann & Holbrook, 1982; Holbrook & O'Shaughnessy, 1984). According to the pleasure-arousal theory, arousal reinforces the experience of pleasure. Hence, the hedonic value of an emotional reaction is maximised when pleasure encounters arousal (Reisenzein, 1994).

2.2 Emotions towards cars

There is general recognition that cars can evoke strong emotions and are associated with them. However, this linkage has not always been there. Early car advertisements before 1920 strongly focused on the car's mechanical and technical features (Laird, 1996; Schorman, 2010). The car was initially perceived as an advancement of a horse-drawn carriage and promoted as such to consumers, without either depicting passengers or evoking feelings of speed and enjoyment (Laird, 1996). This functional and static approach began to change in the mid-1920s. Car advertisements were no longer content with encouraging initial car purchases but wanted to convince people to buy a new car even if they owned a car already (Laird, 1996). This ushered in a new era of car advertising. Promotional themes based on psychological appeals such as power, fun, youthfulness, adventure, social status, as well as being free initiated a focus on targeting people's emotions. Via this emotionalisation, the so-called atmosphere marketing was created appealing to people's social ideals rather than to rationality (Schorman, 2010). As a result, cars were turned into "dream machines and components of our personalities" (Laird, 1996, p.811). Not only advertising, but the media in general, including films and books, created a fascinating image of cars (Greenberg & Atkin, 1983; Van Gorp & Adams, 2012). The emotionalisation of cars has been so successful that today, nearly a century later, many people still define themselves through, and base their self-esteem upon cars (Gardner & Abraham, 2007; Sheller, 2004; Steg, 2005; Van Vugt et al., 1995). Although the primary value of a car has always been its functional ability to reach places, it has an equally important value in creating positive emotions (Sandqvist & Kriström, 2001; Steg, 2005). Unsurprisingly, the more positive emotions are experienced while driving a car, the more it will be used (Steg, 2005).

However, a new mobility environment may be altering the traditional emotions associated with cars. Car advertisements used to be people's main source for (affective)

information about cars (Douglas et al., 2011). With an increasing awareness of social and ecological challenges of car use through non-advert media and politics, a new channel for critical communication has emerged. Moreover, increased urbanisation, improved access to alternative modes (Raimond & Milthorpe, 2010; Thigpen & Handy, 2018) and changing status symbols among younger generations (Delbosc & Currie, 2013; Van der Waard et al., 2013) are factors influencing people's attitude towards cars. While for older generations owning a car has been the ultimate status symbol, this has started to lose its importance, at least in western societies (Delbosc & Currie, 2013; Kuhnimhof et al., 2012; Sivak & Schoettle, 2012).

Due to these changes, our understanding of emotions towards cars which may have been valid just a few years ago may need to be reappraised. More recent research shows that the use of sustainable modes of transport such as walking, cycling or public transport is linked to personal environmental awareness, which is currently increasing worldwide (Kachaner et al., 2020; Li et al., 2021). It was also found that people use cars less often when car use is perceived as stressful (Steg, 2003), which increasingly happens while being stuck in traffic (Emo et al., 2016).

2.3 Emotions towards alternative modes and during switching scenarios

In addition to understanding current emotions towards cars, the level of emotions towards alternative modes must be considered, too. According to Gaterlseben and Uzzel (2006), the level of affect while commuting in public transport is related to high levels of stress and boredom. On a similar vein describes Bissell (2010) how using public transport may elicit feelings of anger and annoyance. The author explains this phenomenon as being due to the presence of strangers, delays and low levels of personal control over the journey. Morris and Guerra (2015) detect a generally weak relationship of individual's mood and mode of transport – although cycling has the most positive effect on one's mood. Gaterlseben and Uzzel (2006) also provide evidence for this assumption by stating that walking and cycling are the most relaxing and exciting modes due to high levels of personal control. According to Kaplan and Prato (2016), this only applies to those who are not too stressed while walking and cycling due to, for instance, other road users. As regards walking, Mondal et al. (2020) find that *recreational* walking is associated with more positive emotions as the route is usually freely selected. Therefore, according to the authors, a more enjoyable atmosphere is chosen than *utilitarian* walking, in which a person undertakes a journey only with the objective of reaching a specific location. Generally, the level of emotions is strongly dependent on journey times, regardless of the mode: the longer the journey, the more negative the emotions (Gaterlseben & Uzzel, 2006; Wener et al., 2003).

Although there are studies examining people's attitude towards alternative modes of transport, they mostly target commuters' perceptions or focus on only a small number of modes. Further, many studies concerned with attitudes towards transport modes focus on people's rational beliefs about those modes, for instance towards costs, flexibility and safety. In this regard, Beirão and Cabral (2007) investigate car users' opinions towards public transport and conclude that service quality and reliability are key factors for its usage. Moreover, Steg (2003) assesses the level of general attractiveness of public transport versus cars. Her findings reveal that the level of perceived attractiveness increases with decreasing car use. Regarding walking and cycling, several studies show that travel satisfaction is stronger towards walking and cycling than towards using public transport (e.g., De Vos et al., 2013; Ye & Titheridge, 2017). Reasons for this preference include health-related aspects of walking and cycling (Frank, 2006). Yet, as stated by Xia et al. (2017), people concerned about safety issues consider cycling as an unsafe option and are thus less likely to cycle at all.

2.4 Emotions towards switching scenarios

The level of emotions experienced while switching from one mode of transport (car) to another (alternative modes) and vice versa has, to the author's knowledge, not yet been examined. Kang et al. (2019) investigated rational drivers of switching from cars to public transport such as convenience and flexibility. However, their study neither explored a switch to any other alternative mode than public transport nor the switch *to* a car. Further, the authors did not consider the level of emotions perceived during a switch. Yet, people's emotional perception of a switching process from one mode to another may perhaps be the most crucial aspect to understand: assessing the experienced level of emotions during a switch from one mode to another reveals differences in the switching direction[1] and thus mode preferences. Further, comprehending potentially negative emotions may enable rectifying them with appropriate promotional strategies. Therefore, insights of this study may be used in publicity campaigns aiming to reduce car use and promote the use of alternative modes.

2.5 Research focus

The aforementioned research findings confirm that although emotions towards cars have been widely studied, they do not take into account the current, changing mobility environment. Further, they reveal that there is only limited scientific research exploring emotions towards alternative modes of transport or as regards a switch from one mode to another. Understanding

[1] Switching direction refers to the switch from a car to an alternative mode versus from an alternative mode to a car.

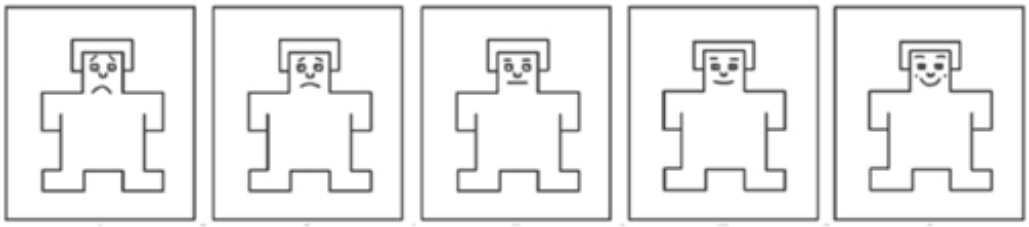
these aspects, however, is important to fully determine the level of emotion towards different modes, ultimately supporting initiatives to reduce overall car use in cities. To gain detailed and distinct insights, this study takes into account several sociodemographic factors while assessing people's level of emotion towards modes of transport. This has not been done by previous scholars in this specific research context and generates an overview of emotions according to sociodemographic patterns.

3. Methodology

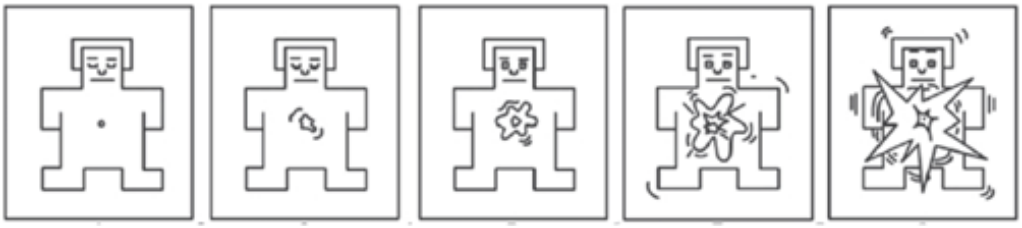
3.1 Method overview and data collection

For assessing emotional responses, a Self-Assessment Manikin (SAM) scale was used. The SAM scale is a non-verbal measure of emotions recording three affective dimensions: pleasure, arousal and dominance (Lang, 1985; Mehrabian & Russell, 1974). As ratings of dominance, concerning the question how dominant a respondent feels towards presented scenarios, were irrelevant for the aim of the study, they were not collected.

Figure 1: The Self-Assessment Manikin Scale by Bradley & Lang, 1994



Above: manikins for determining the ‘pleasure’ dimension



Above: manikins for determining the ‘arousal’ (or ‘stimulation’) dimension

SAM uses images of figures, ranging in their expressions from unhappy and frowning to happy and smiling to represent different degrees of pleasure (Figure 1 top row). For the arousal dimension, the figures range from sleepy and relaxed to wide-eyed and excited (Figure 1 bottom row) (Bradley & Lang, 1994). The SAM scale was used in this study due to its simplicity of interpretation and its cultural independence resulting from the graphic depictions

(ibid.). Moreover, due to the latter, SAM addresses an emotional perception before it is cognitively processed and communicated to the linguistic part of the brain. Thus, results are very intuitive (Isbister et al., 2006). Previous research has validated desirable psychometric properties of the scale (Bradley & Lang 1994; Landwehr et al., 2011), and it therefore seems appropriate for the current research context which involves sample populations in different countries.

Study participants were informed that they would be presented with several pictures of mobility scenarios, involving images of modes of transport, and were instructed to rate their emotions towards the picture(s) displayed via the SAM scale. For reasons of simplicity, the term 'arousal' was referred to as 'stimulation' in the survey. It was indicated that stimulation itself is neutral and can be equally applied to positive and negative situations. The subjects were then firstly shown six static scenarios in succession with one image for each mode: an image of a traffic jam on a large road, a car (passenger view) in a traffic jam, the interior of a public transport mode[2], a person cycling and a person walking as well as a carsharing situation. Secondly, respondents were shown four switching scenarios in which they were to imagine switching from a car to another mode of transport. In these scenarios, two pictures (picture 1 = car; picture 2 = alternative mode) were displayed in addition to a short text describing the switching scenario[3]. Pictures of alternative transport modes included a full public transport vehicle, an empty public transport vehicle, a bike and a person walking. Thirdly, respondents were shown four reverse switching scenarios, which displayed the same pictures as in the switching scenarios but in a reversed order[4].

For the sake of clarity, switching scenarios from car to alternative mode will be referred to as switching-from-car scenarios and reverse switching from an alternative mode to a car will be referred to as switching-to-car scenarios in the remainder of this study. All pictures could be viewed for an unlimited time. Every scenario was presented in combination with the SAM scale on which respondents indicated their felt emotions while viewing the scenarios for both pleasure from 1 (very displeased) to 5 (very pleased) and arousal from 1 (no stimulation) to 5 (extremely stimulated). A back-button allowed respondents to go back and forth between the questions. In addition to the emotion-related questions, all respondents were asked sociodemographic questions concerning their background, lifestyle and current transportation

[2] For public transport it was decided to show an image of a bus for participants from GL and a tram for participants in uGS. This is due to the more common usage of the respective mode in the locations.
[3] Examples of text describing a switching scenario from car to alternative mode: *Up until now, you were often stuck in your car in traffic jams. Now you travel more often by bus instead. / So far, you were driving to work early in the morning alone in your car. Now that you have your own bike, you are cycling on a regular basis. / Usually you drive to work. Now that your car is in the service garage, you walk instead.*
[4] Examples of text describing a switching scenario from alternative mode to car: *Up to now you often had to stand on a full bus to get from A to B. Now you travel by car more often and find yourself stuck in traffic jams regularly.* Or *Previously, you were cycling to work. Now that you own a car, you are driving to get there.* Or *So far you were taking the underground train to your football practice together with your teammates. Starting this week, you will drive in a carpool together.*

behaviour[5]. This information was required to find sociodemographic patterns within the results of the emotional questions.

Overall, 1,400 population-representative respondents aged 18-69 from Greater London (GL) (1,000 participants; 50.5% females) and the German-speaking urban area of Switzerland (uGS) (400 participants; 51.7% females) participated in the online survey. The two locations were chosen as they have a relatively high share of car use despite also having a well-developed public transport network. The survey was provided in both English and German but was otherwise identical for both locations. As data collection took place during three weeks in June 2020, the Covid-19 was an issue to be considered. To avoid potential biases in peoples' responses, all participants were instructed to imagine a post-Covid-19 situation in which chances of an infection are down to zero per cent. Additionally, participants gave their consent to take part in the study and could withdraw from the survey at any time. No personal information by which participants could be identified with was collected and all data was treated anonymously. The survey was created and run on Unipark, a software tool for online surveys.

3.2 Data analysis

All data was analysed using IBM SPSS 27. The normal distribution of the data was confirmed by a Shapiro Wilk test for both GL and uGS. Therefore, all following statistical tests could be conducted for both locations respectively. To assess the level of emotions towards cars and alternative modes both in general and in switching scenarios, the mean values of the levels of pleasure and arousal for all scenarios were calculated. T-tests, or Welch tests if required, were run to test for significant differences in the level of pleasure and arousal in the two locations GL versus uGS for all scenarios. Multiple linear regression analyses were conducted to reveal influential sociodemographic factors for the level of experienced emotions for all three scenarios. All regression models included the variables *age, gender* (male vs. female; default reference category = male), *income, level of health-consciousness* (decreasing values), *distance from where people live to city centre, main mode* (main mode is car vs. main mode is other than car; default reference category = main mode is car), *car ownership* and *the level of environmental concern*[6]. Lastly, paired sample t-test were performed to determine significant differences in the emotional level of switching-from-car scenarios versus reverse switching-to-car scenarios.

[5] These questions assessed respondents' age, gender, ethnicity, occupation, income, place and type of residency, level of education, level of health-consciousness, physical restrictions, level of environmental concern, main mode of transport, and whether they owned a car.
[6] All other sociodemographic variables are not further discussed in this study as they did not show any statistically significant relation with any static or switching scenario.

4. Results

4.1 The level of pleasure and arousal for static and switching scenarios

The results of all levels of pleasure and arousal for all static and switching scenarios in GL and uGS are presented in table 1. The table further indicates the significant differences in levels of pleasure and arousal across the two locations. Overall, the mean level of emotions based on pleasure and arousal towards all scenarios was higher in GL than in uGS. If results of those emotional levels are broken down, a pattern emerges across the locations: In both locations, *cycling*, *walking* and *carsharing* were associated with the highest level of pleasure among the static scenarios. Moreover, the switching-from-car scenarios *car to cycling* and *car to walking* as well as the reverse switching-to-car scenarios *cycling to car* and *walking to car* showed the highest levels of pleasure. In GL, all those levels except the latter were significantly higher than in uGS. In terms of arousal, *public transport*, *traffic jam* and *car in a jam* resulted in the highest levels of arousal for the static scenarios in both locations. In uGS, those levels were all significantly higher than in uGS. Further, the switching-to-car scenarios resulting in relatively high levels of arousal in GL already yielded high in pleasure: *car to cycling* and *car to walking*. The latter did not result in high levels of arousal in uGS. Lastly, regarding switching-to-car scenarios, *full PT to car in a jam* had the highest level of arousal in both GL and uGS and *empty PT to car in a jam* also resulted in high levels of arousal in uGS. Again, those levels were significantly higher in uGS than in GL.

Table 1. Mean values for levels of pleasure and arousal for all scenarios in Greater London and the urban German-speaking area of Switzerland

		GL		uGS	
	Displayed Scenarios	$\mathbf{M_{Pleasure}}$	$\mathbf{M_{Arousal}}$	$\mathbf{M_{Pleasure}}$	$\mathbf{M_{Arousal}}$
Static Scenarios	Public Transport (PT)	1.99	2.30*	2.10	2.55*
	Traffic Jam	1.51	2.66**	1.54	3.20**
	Cycling	3.37	2.21	3.28	2.01
	Car in a Jam	2.07	2.38	2.16	2.47
	Walking	3.63**	1.98	3.27**	1.91
	Carsharing	3.49*	2.03	3.26*	1.85
Switch car to alternative mode	Car in a Jam to Full PT	2.46	2.33	2.48	2.44
	Car in a Jam to Empty PT	3.14	2.24	3.17	2.11
	Car to Cycling	3.41	2.76**	3.39	1.95**
	Car to Walking	3.36*	2.55**	3.08*	2.23**
Switch alternative mode to car	Full PT to Car in a Jam	2.53	2.51*	2.56	2.80*
	Empty PT to Car in a Jam	2.49	2.45**	2.43	2.78**
	Cycling to Car	3.40	2.45**	3.50	2.08**
	Walking to Car	3.27*	2.47**	3.54*	2.01**
$\mathbf{M_{Mean}}$		**2.93**	**2.37**	**2.89**	**2.28**

Note: Pleasure: 1 = very displeased; 2 = slightly displeased; 3 = neutral; 4 = slightly displeased; 5 = very pleased. Arousal: 1 = no stimulation; 2 = slightly stimulated; 3 = stimulated; 4 = very stimulated; 5 = extremely stimulated. * = $p < .05$; ** = $p < .01$, *p*-values indicate significant differences in the level of pleasure and/or arousal between the two locations for respective scenarios.

Differences in the level of pleasure and arousal in switching vs. switching back scenarios

Having reported the results of the levels of pleasure and arousal for static and switching scenarios, differences in the emotional perception between switching-from-car and switching-to-car scenarios were tested. The results of the paired-sample t-tests are presented in table 2. For the level of pleasure, only the scenario *car in a jam to empty PT* was significantly different from the reverse scenario *empty PT to car in a jam* in both locations. In uGS, also the scenario *car to walking* was significantly different in terms of the level of pleasure from its reverse switching scenario. Regarding the level of arousal, all switching-from-car scenarios were significantly different from switching-to-car scenarios in both locations besides *car to cycling* versus *cycling to car* in uGS.

Table 2: Differences in the level of pleasure and arousal for switching back and forth between modes: Paired sample T-test results**.**

	Switching Scenarios	**Mean in GL**	**Mean in uGS**
PLEASURE	Car in a Jam to Full PT vs. Full PT to Car in a Jam	-0.028	-0.072
	Car in a Jam to Empty PT vs. Empty PT to Car in a Jam	0.667***	0.795***
	Car to Cycling vs. Cycling to Car	0.086	-0.064
	Car to Walking vs. Walking to Car	0.170	-0.461**
AROUSAL	Car in a Jam to Full PT vs. Full PT to Car in a Jam	-0.070**	-0.507***
	Car in a Jam to Empty PT vs. Empty PT to Car in a Jam	-0.192***	-0.623***
	Car to Cycling vs. Cycling to Car	0.432***	0.026
	Car to Walking vs. Walking to Car	0.260***	0.374***

Note: * = $p < .05$; ** = $p < .01$; *** = $p < .001$

4.2 Influencing factors of the experienced level of pleasure and arousal

Multiple linear regression analysis was used to develop models for predicting the level of pleasure and arousal for all scenarios. All requirements for running the tests were given in both locations. Tables 3 to 5 show the results of the multiple linear regressions with the influential sociodemographic factors for all three scenarios: static, switching-from-car and switching-to-car.

Significant results for Static Scenarios

For all but one static scenario significant regression equations were found in GL: *traffic jam* $F(8,530) = 7.91$, $p < .001$; *public transport* $F(8, 546) = 4.56$, $p < .001$; *car in a jam* $F(8, 541) = 3.05$, $p = .002$; *cycling* $F(8, 507) = 10.28$, $p < .001$; *carsharing* $F(8, 499) = 2.79$, $p = .005$. *Walking* was the only non-significant model with $F(8, 549) = 1.55$, $p = .139$. In uGS,

traffic jam was the only scenario with a significant regression equation $F(8,189) = 2.34$, $p = .020$. All other models were non-significant; *public transport* $F(8, 192) = .77$, $p = .634$; *car in a jam* $F(8, 178) = 3.40$, $p = .001$; *cycling* $F(8, 192) = 1.44$, $p = .184$; *walking* $F(8, 218) = .71$, $p = .680$; *carsharing* $F(8, 220) = 1.69$, $p = .103$.

In GL, for the static scenarios *traffic jam*, *public transport*, *walking* and *cycling age* negatively influenced respondents' level of emotions. Thus, the older the respondent, the lower was their level of pleasure and/or arousal in these scenarios. The same effect could be seen in uGS, however, only for the scenarios *traffic jam* and *car in a jam*. Further, men experienced higher levels of pleasure for the scenarios *traffic jam* and *public transport* in GL and for *walking* in uGS. Women, in turn, experienced only higher levels of arousal in the scenario *traffic jam*. In addition, higher levels of *health-consciousness* were positively related with higher levels of pleasure and/or arousal in the scenarios *traffic jam, car in a jam, cycling* and *carsharing* in GL. For the case of uGS, this factor was less remarkable and only significant for the scenarios *traffic jam, public transport* and *car in a jam.* For the latter, the higher the level of *health-consciousness*, the lower were respondents' levels of emotions. The factor *main mode* showed significant results for the scenarios *traffic jam* and *walking* in GL. Here, those whose main mode was car had higher levels of pleasure and arousal, respectively. On the contrary, respondents from GL with a car as their main mode experienced lower levels of pleasure for the scenario *cycling*. In uGS, respondents whose main mode was a car showed lower levels of pleasure for *walking* and lower levels of arousal for *carsharing.*

Another noticeable influencing factor, but only in uGS, was *car ownership*. Here, car owners showed higher levels of pleasure and arousal for the scenarios *traffic jam* and *public transport* in comparison to non-car owners. In contrast, for the scenarios *car in a jam* and *carsharing, car ownership* was a negatively moderating factor for pleasure and arousal, respectively. A further factor which only had a significant influence in uGS was the level of *income*: the higher the income, the more pleasure was experienced in the scenario *car in a jam* and the more arousal in the scenario *public transport*. Factors only significant in GL were the *distance from where people live to the city centre* and the level of *environmental concern*. The further respondents live from the city centre, the lower the levels of arousal they experienced for the scenarios *walking* and *carsharing*. For the latter, as well as for *cycling*, a greater concern about the environment was correlated with higher levels of pleasure.

Significant results for Switching-from-car scenarios – from car to alternative mode

Significant regression equations were found for all switching-from-car scenarios in GL: *car in a jam to empty PT* $F(8, 575) = 2.95$, $p = .003$; *car in a jam to full PT* $F(8, 571) = 3.86$, p

< .001; *car to cycling* F(8, 575) = 7.65, p < .001; *car to walking* F(8, 533) = 7.77, p < .001. In uGS, only two significant regression equations were found: *car to cycling* F(8, 208) = 3.25, p = .002; *car to walking* F(8, 224) = 2.48, p = .014. The scenario *car in a jam to empty PT* F(8, 215) = .79, p = .607 and *car in a jam to full PT* F(8, 210) = 1.20, p = .299 were non-significant.

Results revealed that younger and male respondents indicated higher levels of pleasure and/or arousal while switching from *car in a jam to full PT* and from *car to cycling* in GL. For all switching-from-car scenarios, respondents from GL with higher levels of *health-consciousness* experienced more pleasure and arousal. This result also applied for the switching scenario *car to cycling.* In addition, those who are more concerned about the environment felt higher levels of pleasure and arousal in all four switching-from-car scenarios in GL and for *car to walking* in uGS. For *car in a jam to full PT*, the further away respondents lived from the city centre, the more pleasure they experienced in this scenario in both locations. In GL, those who lived further away from the centre experienced higher levels of arousal while switching from *car in a jam to empty PT* than those who lived closer to the centre. The factor *main mode* showed a significant relation for respondents with the main mode car while switching from *car to walking* as they indicated lower levels of pleasure in both locations. This finding also obtained in the case of switching from *car to cycling* for respondents from uGS. Here, car owners also experienced less arousal than non-car owners. Lastly, only respondents from GL with a car as main mode felt higher levels of pleasure for the switching scenario *car in a jam to full PT.*

Significant results for Switching-to-car Scenarios – from alternative mode to car

Significant regression equations were found for all switching-to-car scenarios in GL: *empty PT to car in a jam* F(8, 543) = 5.30, p < .001; *full PT to car in a jam* F(8, 561) = 2.40, p = .015; *cycling to car* F(8, 589) = 4.67, p < .001; *walking to car* F(8, 552) = 4.28, p < .001. In uGS, only the scenarios *empty PT to car in a jam* F(8, 205) = 2.54, p = .012 and *walking to car* F(8, 233) = 2.31, p = .021 had significant regression equations. *Full PT to car in a jam* F(8, 205) = 1.61, p = .123 and *cycling to car* F(8, 199) = 1.81, p = .076 were non-significant.

As for the first two scenarios, *age* also had a significant moderating effect in the switching-to-car scenarios: here, for all scenarios but *cycling to car*, the older the respondent, the less pleasure and/or arousal they experienced in these scenarios. In regard to *gender*, men indicated higher levels of pleasure while switching from *empty PT to car in a jam* and women while switching from *full PT to car in a jam*. Moreover, respondents from GL with high levels of *income* experienced higher levels of pleasure and arousal, respectively while switching from *cycling* and *walking to car.* In contrast, the higher the income of respondents from uGS, the less pleasure they felt during the switch from *empty PT to car in a jam*. Further, all *switching-to-*

car scenarios in GL showed a relation between increasing levels of *health-consciousness* and stronger pleasure and/or arousal. Another factor only significant in GL was the *concern about the environment*: an increasing concern was related with less pleasure for the switching scenarios *empty PT to car in a jam* and *cycling to car*. In the latter scenario, those who lived further away from the city centre experienced lower levels of pleasure and arousal compared to those living closer to the centre. Lastly, those whose main mode was car experienced higher levels of pleasure while switching from *full PT to car in a jam, cycling to car*, and *walking to car* in GL. The latter also held true in uGS.

Table 3. Influencing factors for the level of emotions for Static Scenarios

Traffic Jam	**GL**						**uGS**					
	Pleasure			**Arousal**			**Pleasure**			**Arousal**		
	R^2 = .104			R^2 = .066			R^2 = .091			R^2 = .036		
Variable	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**
Age	-0.006***	0.001	-4.689	-0.002	0.003	-0.637	-0.005*	0.003	-2.093	0.001	0.003	0.224
Gender	0.226**	0.075	3.030	-0.304*	0.146	-2.088	0.181	0.156	1.161	-0.035	0.205	-0.169
Income	0.042	0.036	1.191	0.077	0.070	1.101	-0.006	0.085	-0.065	-0.055	0.109	-0.502
Health-consciousness	-0.137**	0.048	-2.848	-0.199*	0.096	-2.079	-0.288**	0.105	-2.746	-0.032	0.131	-0.244
Distance to city centre	-0.068	0.042	-1.607	0.079	0.082	0.965	-0.081	0.092	-0.876	-0.012	0.118	-0.099
Main mode	0.057**	0.017	3.265	0.040	0.034	1.159	0.008	0.032	0.239	-0.050	0.038	-1.307
Car ownership	0.051	0.087	0.594	0.288	0.172	1.669	-0.412*	0.207	-1.993	0.234	0.289	0.810
Environmental concern	-0.018	0.041	-0.428	0.088	0.081	1.097	0.047	0.090	0.518	0.119	0.128	0.933

Public Transport	**GL**						**uGS**					
	Pleasure			**Arousal**			**Pleasure**			**Arousal**		
	R^2 = .055			R^2 = .115			R^2 = .031			R^2 = .131		
Variable	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**
Age	-0.005***	0.001	-3.648	-0.005**	0.002	-2.457	-0.001	0.003	-0.459	-0.001	0.003	-0.284
Gender	0.329***	0.083	3.949	-0.436**	0.130	-3.347	0.300	0.160	1.872	-0.099	0.198	-0.501
Income	0.035	0.040	0.874	0.029	0.064	0.456	0.023	0.083	0.275	0.221*	0.104	2.126
Health-consciousness	-0.027	0.054	-0.497	-0.069	0.085	-0.807	-0.128	0.100	-1.276	-0.333**	0.121	-2.761
Distance to city centre	0.005	0.046	0.117	-0.105	0.073	-1.430	-0.031	0.093	-0.335	0.183	0.120	1.523
Main mode	0.036	0.019	1.943	0.025	0.030	0.833	0.010	0.032	0.308	0.017	0.042	0.416
Car ownership	-0.111	0.099	-1.120	0.115	0.155	0.745	0.246	0.220	1.119	0.789**	0.272	2.899
Environmental concern	0.043	0.045	0.948	0.114	0.069	1.638	0.016	0.093	0.173	-0.002	0.112	-0.015

Car in Jam	**GL**						**uGS**					
	Pleasure			**Arousal**			**Pleasure**			**Arousal**		
	R^2 = .046			R^2 = .073			R^2 = .132			R^2 = .136		
Variable	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**
Age	-0.003	0.002	-1.454	-0.003	0.002	-1.333	-0.008**	0.003	-2.763	0.001	0.003	0.324
Gender	0.100	0.099	1.012	-0.131	0.135	-0.970	-0.152	0.177	-0.856	-0.116	0.225	-0.514
Income	0.069	0.047	1.460	-0.023	0.064	-0.353	-0.314**	0.096	-3.290	0.064	0.116	0.552
Health-consciousness	-0.203**	0.066	-3.096	-0.263**	0.086	-3.067	0.257*	0.105	2.446	-0.476**	0.137	-3.469
Distance to city centre	-0.100	0.056	-1.786	-0.010	0.075	-0.134	-0.081	0.108	-0.755	0.206	0.125	1.645
Main mode	0.020	0.023	0.880	0.021	0.031	0.694	0.011	0.035	0.319	-0.009	0.048	-0.194
Car ownership	0.148	0.118	1.259	-0.038	0.160	-0.240	-0.693**	0.237	-2.919	0.397	0.307	1.291
Environmental concern	-0.057	0.051	-1.119	0.078	0.070	1.112	-0.127	0.095	-1.335	-0.092	0.118	-0.784

Cycling	**GL**			**uGS**		
	Pleasure			**Pleasure**		
	R^2 = .142			R^2 = .053		
	Arousal			**Arousal**		
	R^2 = .066			R^2 = .063		

Variable	B	Std. Err.	t	B	Std. Err.	t	B	Std. Err.	t	B	Std. Err.	t
Age	-0.005**	0.002	-3.471	-0.005*	0.002	-1.971	0.004	0.003	1.714	-0.003	0.004	-0.670
Gender	0.140	0.089	1.586	0.017	0.133	0.127	-0.131	0.159	-0.825	0.421	0.233	1.807
Income	-0.049	0.041	-1.196	0.131*	0.062	2.119	0.122	0.083	1.474	-0.117	0.118	-0.989
Health-consciousness	-0.176**	0.057	-3.088	-0.109	0.090	-1.221	-0.097	0.100	-0.971	-0.121	0.144	-0.841
Distance to city centre	0.007	0.050	0.141	-0.138	0.077	-1.800	-0.024	0.099	-0.246	-0.099	0.148	-0.669
Main mode	-0.043*	0.020	-2.155	-0.045	0.030	-1.504	-0.044	0.033	-1.323	0.071	0.048	1.471
Car ownership	0.037	0.102	0.361	-0.290	0.155	-1.873	0.333	0.218	1.531	0.147	0.327	0.448
Environmental concern	0.254***	0.046	5.475	0.088	0.068	1.289	-0.039	0.098	-0.400	0.089	0.136	0.652
Walking												
	GL						**uGS**					
	Pleasure			**Arousal**			**Pleasure**			**Arousal**		
	R^2 = .023			R^2 = .092			R^2 = .035			R^2 = .069		
Variable	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**
Age	0.000	0.001	-0.202	-0.006**	0.002	-2.946	-0.002	0.002	-0.865	0.000	0.003	0.124
Gender	-0.081	0.075	-1.077	-0.029	0.111	-0.259	-0.110	0.130	-0.846	0.452*	0.203	2.231
Income	0.025	0.037	0.674	0.033	0.054	0.610	0.106	0.067	1.577	-0.035	0.105	-0.334
Health-consciousness	-0.057	0.048	-1.185	-0.129	0.074	-1.754	-0.046	0.084	-0.554	-0.033	0.126	-0.261
Distance to city centre	-0.064	0.044	-1.463	-0.143*	0.065	-2.206	-0.073	0.077	-0.944	-0.137	0.121	-1.127
Main mode	-0.006	0.017	-0.334	0.057*	0.027	2.140	-0.002	0.026	-0.096	-0.094*	0.042	-2.219
Car ownership	0.041	0.090	0.451	-0.235	0.134	-1.752	-0.014	0.168	-0.081	-0.395	0.282	-1.403
Environmental concern	0.068	0.040	1.700	0.093	0.058	1.613	-0.054	0.073	-0.731	0.184	0.110	1.676
Carsharing												
	GL						**uGS**					
	Pleasure			**Arousal**			**Pleasure**			**Arousal**		
	R^2 = .051			R^2 = .126			R^2 = .059			R^2 = .081		
Variable	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**
Age	0.000	0.001	0.076	-0.001	0.002	-0.606	-0.002	0.002	-0.785	-0.003	0.003	-0.888
Gender	0.010	0.077	0.130	0.219	0.120	1.816	0.154	0.148	1.046	0.117	0.216	0.541
Income	0.032	0.037	0.872	-0.015	0.060	-0.250	-0.037	0.074	-0.496	-0.210	0.110	-1.910
Health-consciousness	-0.053	0.050	-1.049	-0.342***	0.081	-4.229	-0.188*	0.093	-2.028	0.051	0.126	0.404
Distance to city centre	-0.097*	0.045	-2.173	-0.111	0.073	-1.535	0.041	0.088	0.471	0.117	0.132	0.883
Main mode	0.024	0.017	1.379	0.036	0.028	1.291	-0.027	0.030	-0.905	-0.108*	0.043	-2.532
Car ownership	0.076	0.089	0.857	-0.131	0.142	-0.922	0.269	0.189	1.426	-0.663*	0.291	-2.278
Environmental concern	0.127**	0.040	3.191	0.146*	0.064	2.284	-0.146	0.084	-1.736	0.057	0.126	0.453

Note: * = $p < .05$; ** = $p < .01$; *** = $p < .001$

Table 4. Influencing factors for the level of emotions for the Switching Scenarios (I)

Car in Jam to Empty Public Transport												
	GL						**uGS**					
	Pleasure			**Arousal**			**Pleasure**			**Arousal**		
	R^2 = .043			R^2 = .147			R^2 = .038			R^2 = .081		
Variable	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**
Age	-0.001	0.002	-0.782	-0.003	0.002	-1.602	-0.001	0.003	-0.487	-0.003	0.003	-0.919
Gender	0.130	0.101	1.289	-0.114	0.109	-1.042	0.125	0.171	0.731	0.259	0.222	1.167
Income	0.036	0.050	0.724	-0.027	0.053	-0.514	-0.001	0.092	-0.006	-0.050	0.123	-0.408
Health-consciousness	0.052	0.064	0.800	-0.216**	0.071	-3.066	-0.071	0.105	-0.679	-0.265	0.129	-2.055
Distance to city centre	-0.043	0.058	-0.739	-0.219**	0.063	-3.500	-0.044	0.106	-0.411	-0.031	0.139	-0.223
Main mode	-0.006	0.023	-0.238	0.040	0.025	1.597	-0.015	0.035	-0.428	-0.070	0.044	-1.600
Car ownership	0.146	0.121	1.210	-0.030	0.129	-0.230	0.358	0.230	1.556	-0.327	0.314	-1.040
Environmental concern	0.217***	0.054	4.024	0.233***	0.057	4.069	-0.075	0.099	-0.761	0.117	0.128	0.915
Car in Jam to Full Public Transport												
	GL						**uGS**					
	Pleasure			**Arousal**			**Pleasure**			**Arousal**		
	R^2 = .052			R^2 = .100			R^2 = .036			R^2 = .116		
Variable	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**

Age	-0.005**	0.002	-2.735	-0.006**	0.002	-2.684	0.003	0.003	0.980	-0.005	0.003	-1.551
Gender	0.244*	0.099	2.465	-0.234	0.122	-1.918	0.248	0.156	1.589	-0.042	0.198	-0.213
Income	0.032	0.046	0.699	0.009	0.057	0.167	0.079	0.082	0.966	0.013	0.107	0.122
Health-consciousness	-0.103	0.062	-1.648	-0.156*	0.078	-2.006	-0.151	0.103	-1.455	-0.141	0.135	-1.038
Distance to city centre	0.133**	0.056	2.372	-0.016	0.068	-0.231	-0.091	0.096	-0.953	0.433**	0.125	3.479
Main mode	-0.028	0.022	-1.263	0.078**	0.028	2.831	-0.049	0.033	-1.497	-0.016	0.041	-0.382
Car ownership	-0.034	0.118	-0.288	0.221	0.148	1.496	0.076	0.211	0.360	-0.277	0.284	-0.975
Environmental concern	0.106*	0.052	2.056	0.142*	0.064	2.218	0.049	0.091	0.537	0.165	0.114	1.451

Car to Cycling	**GL**						**uGS**					
	Pleasure			**Arousal**			**Pleasure**			**Arousal**		
	R^2 = .101			**R^2 = .081**			**R^2 = .071**			**R^2 = .066**		
Variable	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**
Age	-0.005**	0.002	-2.952	0.000	0.002	0.122	0.001	0.003	0.427	-0.007	0.004	-1.656
Gender	0.308**	0.104	2.945	-0.152	0.118	-1.283	0.216	0.154	1.404	-0.229	0.228	-1.003
Income	-0.012	0.050	-0.242	0.061	0.056	1.099	0.097	0.080	1.224	-0.062	0.123	-0.508
Health-consciousness	-0.270***	0.069	-3.902	-0.242**	0.079	-3.078	-0.288**	0.098	-2.935	0.039	0.145	0.267
Distance to city centre	-0.050	0.060	-0.845	-0.108	0.067	-1.606	0.062	0.093	0.663	-0.200	0.148	-1.353
Main mode	-0.031	0.024	-1.305	-0.050	0.027	-1.860	-0.108***	0.030	-3.540	0.001	0.044	0.034
Car ownership	0.104	0.123	0.846	-0.171	0.135	-1.265	-0.165	0.196	-0.841	-0.692*	0.308	-2.251
Environmental concern	0.202***	0.056	3.596	0.165**	0.062	2.648	-0.107	0.087	-1.227	0.005	0.140	0.039

Car to Walking	**GL**						**uGS**					
	Pleasure			**Arousal**			**Pleasure**			**Arousal**		
	R^2 = .102			**R^2 = .043**			**R^2 = .068**			**R^2 = .048**		
Variable	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**
Age	-0.003	0.002	-1.783	-0.003	0.002	-1.341	-0.002	0.003	-0.568	0.001	0.004	0.375
Gender	-0.172	0.108	-1.592	-0.149	0.119	-1.252	0.324	0.166	1.951	0.022	0.219	0.102
Income	0.013	0.053	0.247	0.044	0.058	0.769	0.083	0.083	1.000	-0.187	0.111	-1.692
Health-consciousness	-0.192**	0.073	-2.623	-0.077	0.082	-0.949	-0.045	0.105	-0.430	0.039	0.136	0.283
Distance to city centre	-0.057	0.062	-0.912	0.010	0.068	0.142	0.024	0.096	0.244	-0.124	0.130	-0.956
Main mode	-0.049*	0.024	-2.018	-0.020	0.027	-0.737	-0.100*	0.034	-2.969	0.002	0.045	0.047
Car ownership	-0.049	0.128	-0.385	-0.248	0.140	-1.769	-0.091	0.213	-0.428	-0.538	0.310	-1.735
Environmental concern	0.271***	0.056	4.804	0.117	0.064	1.824	0.198*	0.092	2.159	0.093	0.115	0.808

Note: * = $p < .05$; ** = $p < .01$; *** = $p < .001$

Table 5. Influencing factors for the level of emotions for the Switching Scenarios (II)

Empty Public Transport to Car in Jam	**GL**						**uGS**					
	Pleasure			**Arousal**			**Pleasure**			**Arousal**		
	R^2 = .074			**R^2 = .081**			**R^2 = .092**			**R^2 = .042**		
Variable	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**
Age	-0.006**	0.002	-3.146	-0.006**	0.002	-2.704	-0.008**	0.003	-2.609	0.001	0.004	0.310
Gender	0.039	0.103	0.377	-0.205	0.120	-1.703	0.434**	0.181	2.390	-0.024	0.242	-0.099
Income	0.059	0.050	1.185	-0.011	0.059	-0.184	-0.234**	0.088	-2.649	-0.035	0.121	-0.289
Health-consciousness	-0.181*	0.070	-2.584	-0.254**	0.084	-3.017	0.011	0.114	0.098	-0.178	0.144	-1.233
Distance to city centre	-0.057	0.060	-0.941	-0.008	0.071	-0.107	-0.070	0.106	-0.659	0.068	0.132	0.513
Main mode	0.038	0.024	1.600	0.018	0.028	0.652	-0.024	0.036	-0.670	-0.028	0.046	-0.602
Car ownership	-0.237	0.124	-1.903	-0.121	0.147	-0.827	-0.441	0.225	-1.961	0.083	0.296	0.280
Environmental concern	-0.198***	0.056	-3.521	0.067	0.067	1.002	0.162	0.103	1.567	0.242	0.133	1.825

Full Public Transport to Car in Jam	**GL**						**uGS**					
	Pleasure			**Arousal**			**Pleasure**			**Arousal**		
	R^2 = .031			**R^2 = .112**			**R^2 = .059**			**R^2 = .012**		
Variable	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**
Age	-0.006**	0.002	-3.350	-0.007**	0.002	-3.410	-0.007**	0.003	-2.378	0.003	0.003	0.773
Gender	0.162	0.105	1.542	-0.400**	0.122	-3.280	0.069	0.172	0.400	0.028	0.212	0.132

Income	0.030	0.049	0.616	0.061	0.057	1.077	0.137	0.093	1.464	-0.025	0.110	-0.224
Health-consciousness	0.012	0.067	0.178	-0.204**	0.076	-2.699	0.051	0.108	0.471	-0.083	0.134	-0.620
Distance to city centre	0.005	0.059	0.086	-0.001	0.067	-0.015	0.043	0.101	0.426	0.086	0.126	0.684
Main mode	0.049*	0.023	2.126	0.015	0.026	0.567	0.039	0.035	1.112	-0.001	0.042	-0.029
Car ownership	0.008	0.121	0.062	-0.159	0.139	-1.137	-0.183	0.235	-0.778	0.094	0.280	0.337
Environmental concern	-0.029	0.055	-0.538	0.110	0.063	1.759	-0.004	0.096	-0.046	0.028	0.126	0.222

Cycling to Car	**GL**						**uGS**					
	Pleasure			**Arousal**			**Pleasure**			**Arousal**		
	R^2 = .049			R^2 = .113			R^2 = .053			R^2 = .019		
Variable	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**
Age	0.001	0.002	0.577	-0.002	0.002	-0.923	-0.004	0.002	-1.786	-0.004	0.004	-0.968
Gender	-0.086	0.098	-0.881	0.181	0.117	1.555	0.007	0.144	0.048	0.018	0.237	0.076
Income	0.099*	0.048	2.073	0.071	0.056	1.261	-0.147	0.076	-1.940	-0.076	0.122	-0.628
Health-consciousness	-0.016	0.063	-0.259	-0.373***	0.076	-4.927	0.098	0.091	1.078	-0.059	0.143	-0.408
Distance to city centre	-0.115*	0.055	-2.068	-0.143*	0.067	-2.150	-0.023	0.092	-0.251	0.085	0.154	0.549
Main mode	0.108***	0.023	4.722	0.051	0.027	1.854	0.079**	0.029	2.730	-0.007	0.048	-0.141
Car ownership	0.129	0.115	1.121	-0.021	0.138	-0.150	-0.011	0.195	-0.059	-0.142	0.314	-0.450
Environmental concern	-0.116*	0.052	-2.247	0.078	0.063	1.248	0.033	0.088	0.377	0.052	0.141	0.372

Walking to Car	**GL**						**uGS**					
	Pleasure			**Arousal**			**Pleasure**			**Arousal**		
	R^2 = .066			R^2 = .053			R^2 = .047			R^2 = .019		
Variable	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**	**B**	**Std. Err.**	**t**
Age	-0.004*	0.002	-2.192	-0.001	0.002	-0.701	-0.005*	0.002	-2.314	0.001	0.003	0.192
Gender	0.020	0.106	0.191	-0.014	0.118	-0.119	0.187	0.143	1.313	0.088	0.204	0.432
Income	-0.018	0.051	-0.344	0.133*	0.056	2.382	0.006	0.073	0.076	-0.023	0.105	-0.221
Health-consciousness	0.044	0.067	0.653	-0.255**	0.075	-3.414	0.010	0.091	0.108	-0.157	0.128	-1.225
Distance to city centre	-0.113	0.059	-1.901	-0.043	0.067	-0.640	-0.057	0.087	-0.658	-0.069	0.127	-0.544
Main mode	0.101***	0.024	4.209	0.023	0.027	0.833	0.088**	0.030	2.950	-0.048	0.042	-1.129
Car ownership	-0.164	0.120	-1.363	0.007	0.136	0.054	0.221	0.198	1.117	-0.037	0.303	-0.123
Environmental concern	-0.010	0.055	-0.190	-0.011	0.062	-0.183	0.104	0.080	1.308	-0.050	0.109	-0.458

Note: * = $p < .05$; ** = $p < .01$; *** = $p < .001$

5. Discussion

5.1 Differences in the two location GL and uGS

The aim of the study was to explore people's emotions towards various modes of transport to provide a basis for emotion-based marketing communication intended to reduce car use and increase the use of alternative modes in cities in the long-term. The results revealed that the mean levels of emotions based on pleasure and arousal towards most of the scenarios were quite similar in the two locations GL and uGS. Yet, some distinct differences emerged: according to the data, people from GL enjoyed *walking*, *cycling* and *carsharing* more than people from uGS, while people from uGS enjoyed *public transport* more and were more aroused by *traffic jams* than people from GL.

An explanation for *walking* and *cycling* as well as *car to walking* and *car to cycling* (and the respective reverse switches) could stem from the fact that the two locations are very distinct in terms of topography. While GL is flat, people from uGS are confronted with steep hills in

cities due to the surrounding Alps. Thus, both *walking* and especially *cycling* are more exhausting and involve more effort in terms of personal endurance. In addition, results for uGS showed that switching from *car to walking* was less pleasurable and more arousing than the reverse switch. In contrast, the reverse switches from *cycling to car* and from *walking to car* were associated with higher levels of pleasure in uGS. *Walking* and *cycling* could therefore be regarded as more stressful by people in uGS compared to other modes and hence less enjoyable than in GL, which is characterised by flat land. This assertion is consistent with the assumption of Kaplan and Prato (2016), who state that if the use of active modes is related to levels of stress they are enjoyed less.

Findings for the higher level of pleasure in GL regarding *carsharing* could be ascribed to people's openness towards new forms of mobility. *Carsharing* is the latest type of the examined modes and has existed in GL for a longer time, where it has also been used more frequently than in uGS (Statista, 2014; 2021). Therefore, people from uGS may be less familiar with the mode in comparison to people from GL, who were already able to create emotional associations with it. Moreover, the higher levels of arousal towards *traffic jams* in uGS could be traced back to the fact that people from GL are more used to traffic jams and thus experience less emotions while being confronted with them. According to Wood et al. (2002) people feel less emotional while performing habitual behaviours. Thus, according to the authors, as people from GL perceive traffic jams as more ordinary than people from uGS, they are less aroused by them. Yet, it should be noticed that the general level of pleasure towards *traffic jams* was low in both regions.

Further, the higher level of arousal towards *public transport* in uGS is accompanied by higher levels of pleasure. It could be concluded that people from uGS are generally more positively emotionalised by *public transport* than people from GL. This finding is evident as Switzerland is known for its excellent public transport services, besides high car ownership rates (Buehler et al., 2017; Petersen, 2016). In contrast, public transport services from GL are usually known for being expensive and frequently delayed (Petersen, 2016), which may be an explanation for the locally lower levels of pleasure. Although public transport issues in GL have started to improve over recent years (Currie & Fournier, 2021; De Oña, 2021), people in this location may still associate public transport with low quality.

These explanations also substantiate the higher levels of arousal in uGS for switching from both *empty* and *full PT to car in a jam*. This finding infers that people from uGS are more aroused while switching from *PT to car in a jam* – regardless of its user density – compared to people from GL. Yet, in both locations, the reverse switch from a *car in a jam to empty or full PT* was perceived as more pleasurable and less arousing. This finding provides evidence that in

both locations, being stuck in a car in a jam is associated with more negative emotions if compared to sitting in public transport. Overall, a pattern of greater enjoyment of *cycling*, *walking* and *carsharing* in GL and a greater enjoyment of using *public transport* and driving a *car* in uGS emerged.

5.2 Influential factors for the level of pleasure and arousal towards modes

Findings for GL

In terms of influential factors regarding emotions towards various modes, results for GL indicated a prominent insight: across all modes and locations, *age* was a clearly determining factor for people's levels of pleasure and/or arousal. The younger the respondents, the more pleasurable they perceived alternative modes. Further, results revealed that levels of pleasure towards alternative modes are higher for people who are both concerned about the environment and have a health-conscious lifestyle. This insight supports existing findings by Wang (2017), who states that people with higher environmental concerns are more prone to purchase sustainable products.

With regard to emotions towards cars stuck in traffic jams, another pattern emerged, showing that respondents whose main mode of transport is a car or who own a car themselves are less irritated by traffic jams. Those people have significantly higher levels of pleasure in both static and switching scenarios resulting in being stuck in a car in traffic jams compared to non-car owners or users. This insight provides new understanding of car owner's stickiness towards cars and shows how resistant drivers may be even when exposed to negative aspects of cars. Therefore, confronting frequent car users with negative emotional aspects of cars, i.e., via being stuck in traffic jams, might not result in a desired reduction in car use.

Yet, on the other hand, results indicated that all *non*-car owners and drivers perceived negative aspects of cars such as traffic jams as particularly unpleasant and arousing. For this group of people, a confrontation with further negative situations triggering negative emotions could be more successful in reducing car use. Moreover, car owners and users experienced switching from any mode to a car as more pleasurable than all non-car owners and users. In contrast, health-conscious respondents who have concerns about the environment were much more aroused and experienced lower levels of pleasure in those scenarios.

Interestingly, the influence of the distance from where people lived to the city centre was very diverse in its effect. On the one hand, the greater that distance, the more pleasure and the less arousal they experienced during a switch from *car in a jam to full public transport* compared to people living closer to the centre. An explanation could be that the desire to reach

home quickly is stronger than the need for the privacy a car could provide. This supports the assumption of Gaterlseben and Uzzel (2006) as well as Wener et al. (2003), stating that, in general, longer journey times are associated with more negative emotions. On the other hand, results revealed that the further away respondents live from the city centre, the less arousal they experience while walking. In terms of speed, this is counterintuitive and contradicts the aforementioned assumption. Yet, the further away people live from the centre, the more they may be used to walking due to the lower number of transport options outside the city centre (Pateman, 2011). Therefore, they may be less emotional towards the behaviour they are habituated to, supporting the findings of Wood et al. (2002).

Findings for uGS

In terms of uGS, fewer sociodemographic factors significantly influenced the level of pleasure and/or arousal towards the explored scenarios. Unlike in GL, where *age* was an influential factor across all scenarios, in uGS it was only a determining factor for scenarios involving being stuck in traffic jams or switching to a car. Here, the older a person, the less pleasure was experienced. This finding shows that, in contrast to GL, in uGS older people are less emotionally irritated by alternative modes of transport. Further, *health-consciousness* and *environmental concern* were factors for high levels of pleasure towards alternative modes. However, for the scenarios *cycling*, *car in a jam to empty PT* and *car in a jam to empty PT* none of the sociodemographic factors – except the *distance from where people live to the city centre* in the case of the latter scenario – significantly moderated emotions. This finding does not imply that there are no influential factors for the level of emotions towards the scenarios for people from uGS. Therefore, further influential factors should be assessed in future studies.

The emotional levels of car owners and frequent users was also similar to that in GL. Here, however, an exception was the switch from *public transport* – regardless of user density – *to car in a jam.* This switch was not more pleasurable or arousing for car users and owners than for non-owners and -users as was the case for GL. It could therefore be concluded that emotional stickiness towards cars in uGS is lower compared to in GL. Hence, in contrast to GL, confronting car users and owners with negative car situations may be more effective. Overall, some of the insights of the study may not be surprising. Yet the study's findings provide significant statistical evidence to what might have been considered as common sense. Moreover, the study not only reveals new knowledge as regards current emotions towards various modes and towards switching from one mode to another but does so on a detailed sociodemographic basis.

6. Implications

The theoretical implications of the study contribute to the study of emotions, particularly via the use of a Self-Assessment Manikin scale, in a transportation context. By applying the psychological method in this new context, novel insights could be generated which may influence and inspire future studies in this field. Furthermore, the findings of the study add to the research into individuals' mode choice with a focus on sociodemographic differences. On this basis, this study further contributes to the discussion of appropriately targeting publicity messages based on people's different emotional perceptions in a mobility context. In this respect, results show that targeting the young and environmentally concerned with individualised messages can trigger negative emotions towards cars and may lead to a reduction in their use. At the same time, results show that for other people in society, i.e., car owners and frequent users, efforts put into reducing car use and increasing the use of alternative modes of transport is less likely to significantly affect them on an emotional level. This finding is relevant for advertising research in a transportation context to build on and explore further influential factors.

The latter finding is also relevant in terms of managerial implications. Understanding sociodemographic differences in the level of emotions towards various modes allows mobility providers to adapt their promotional messages accordingly. Hereby, currently neutral or even negative emotions towards alternative transport modes could be rectified and replaced by positive emotional connotations. In addition, policy makers aiming to increase the use of alternative modes may use location-specific, sociodemographic findings to motivate people via a deliberate reference to their emotions. Potentially, this could result in a reduction in car use. Policy makers could even use findings to go one step further and use people's negatively associated emotions with cars to send emotionally provoking messages reducing car use. Generally, it needs to be borne in mind that some people will always associate cars with positive emotions, especially in the case of those who own a car or use it frequently. Thus, for those people, messages promoting alternative modes based on positive emotions may fall on deaf ears. Here, policy makers might need to consider other measures to influence those people's mobility behaviours. Yet, others are more receptive to these messages. This group of receptive people, i.e., the young, health-conscious, and environmentally concerned, should, ideally, be enlarged by increasing awareness of environmental issues. A greater awareness could then coincide with a more positive emotional attitude towards alternative modes of transport, increasing their use in the long-term. Lastly, findings are also relevant for the car industry. Understanding how some people's emotions towards cars are currently changing for the worse is crucial for adapting product and marketing strategies to meet consumers' long-term needs.

7. Conclusion and limitations

The aim of the study was to explore people's emotions towards various transport modes and also towards switches between modes. For this purpose, the level of people's perceived pleasure and arousal was measured in sample populations in GL and uGS. Further, the study sought to assess sociodemographic factors influencing the level of emotions in the two locations. The data revealed differences in emotional attitudes towards modes in GL versus in uGS. Moreover, the data indicated that – cutting across the two geographic locations – different groups in society perceive alternative modes as more pleasurable than others, particularly young, health-conscious, and environmentally concerned people. This group of people dislikes the use of cars if it means arriving late at a destination. In contrast, findings provided evidence for car owners and frequent users perceiving cars as pleasurable even when confronted with a negative situation, i.e., being stuck in a traffic jam. Overall, the study confirmed that emotions are of significance for transport-related issues. Car advertisements have successfully planted a certain image of cars in peoples' heads, which, according to the study's findings, can – at least for the younger generations – be changed. It will be crucial for policy makers wanting to reduce car use in cities to enlarge this receptive group of people and to gradually increase positive emotional associations with alternative modes of transport.

This study is not without its limitations. For one, data was restricted to sample populations in Greater London and in German-speaking urban areas of Switzerland. Hence, this study does not seek to generalise findings to other parts of the world. Nevertheless, it may serve as a basis for future research by drawing on its findings and exploring their applicability to other regions. Secondly, it should be noted that data was collected during a time when Covid-19 was an issue. Although respondents were instructed to imagine a post-Covid-19 era, this may still have influenced their answers. It remains to be seen whether future pandemics will need to be taken into account when considering transport issues. Thirdly, this study focuses on a list of sociodemographic factors which is by no means exhaustive and results of multiple regression analyses could have been different by including further factors. Future research could investigate the effect of such additional factors, thereby building on this study.

Lastly, subjective bias and distortions of other kinds are inevitable when assessing people's emotions via online surveys. As this study sought to explore emotions of a relatively large sample to generate representative and wide-scale findings, the use of laboratory facilities to assess electroencephalography (EEG) data was not practicable. Future research could validate the study's findings by applying EEG software for a smaller sample, generating fully unbiased results. Besides such limitations, this study was able to provide new evidence in a transport research context for people's current emotions towards various transport modes.

These insights are relevant for future researchers, policy makers as well as mobility providers seeking to reduce car use in cities in the long-term.

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