# Effects of In-vehicle Activities on Commuters' Perceived Commute Stress and Life Satisfaction

By

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and have found that it is complete and satisfactory in all respects,
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## STATEMENT OF AUTORSHIP

This thesis contains no material which has been accepted for any award or any other degree or diploma in any university or other institution. It is affirmed by the candidate that, to the best of her knowledge, the thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

Signed Handan Ece Karayel

Abstract

Due to the increased commuting hours in our daily lives, one stream of research has investigated psychological outcomes of commuting depending on commute mode and other factors which are caused or affected by the mode such as predictability of the journey, travel duration, commuter's perceived control and so on. Another stream of research has investigated in-vehicle activities while commuting and their effects on commute satisfaction. However, no prior research combined these two and looked into the effects of in-vehicle activities on psychological outcomes beyond commute satisfaction. This study investigated the activity type while commuting --rather than commute mode-- and its effects on commuter's psychological outcomes, such as perceived commute and life stress and life satisfaction. Data was collected from 306 participants. Results showed that frequency rate of in-vehicle activities do not have significant direct effects on perceived commute and life stress. Yet, we showed that higher commute unpredictability and less perceived control lead to higher perceived commute stress for both directions of commute. Perceived commute stress was lower during return commutes. There was a significant and positive relationship between commute and life satisfaction. On both directions, more frequent use of passive in-vehicle activities led to more commute satisfaction than active in-vehicle activities. Although the difference is insignificant, commuters who shared their ride had higher commute satisfaction scores than non-ridesharers for both ways. Additionally, we found that drivers reported significantly higher commute satisfaction scores than non-drivers.

*Keywords:* commute mode, in-vehicle activities, life satisfaction, perceived commute stress

Özet

Günümüzde, ev ve iş arasındaki yolculukta harcanan zamanın artmasıyla birlikte yolculuk sırasında kullanılan araç tipinin kişilerin psikolojisi ve yolculuğun öngörülebilirliği, süresi, yolculuktan duyulan memnuniyet gibi pek çok faktör üzerindeki etkisi incelenmektedir. Aynı şekilde, yolculuk boyunca yapılan aktivitelerle yolculuk memnuniyeti arsındaki ilişki de pek çok kez incelenmiştir. Ancak, daha önce hiçbir çalışmada yolculuk sırasında yapılan aktivitelerin yolculuk memnuniyeti üzerindeki etkisinin ötesinde, yolcuların psikolojisi üzerindeki genel etkileri araştırılmamıştır. Bu çalışmada bizim amacımız bu iki farklı araştırma konusunu birleştirerek, kullanılan araç tipinden ziyade, yolculuk boyunca yapılan aktivitelerin yolcuların algıladıkları stres ve yaşamdan duydukları memnuniyet üzerindeki etkilerini incelemektir. Araştırmanın sonuçları araç içerisinde yapılan aktivite tipinin yolculuk ve yaşam stresi üzerinde doğrudan bir etkisi olmadığını göstermiştir. Öngörülemezlik ve algılanan kontrol yetersizliği daha fazla yolculuk stresine yol açmakta ve eve dönüşlerde hissedilen yolculuk stresi gidişe göre daha az olmaktadır. Yolculuk ve hayat tatmini arasında doğrudan ve pozitif bir ilişki vardır. Pasif araç içi aktiviteleri her iki yönde de yolculuktan duyulan tatmini arttırmaktadır. Aynı şekilde, yolculuğunu paylaşanlar yalnız yolculara göre daha az stres ve daha çok memnuniyet belirtmiştir. Ayrıca sürücülerin yolculuk memnuniyeti araç sürmeyenlerden daha yüksek çıkmıştır.

*Anahtar Sözcükler:* araç tipi, yolculuk aktiviteleri, hayat tatmini, yolculuk stresi

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# Effects of In-Vehicle Activities on Perceived Commute Stress and Life Satisfaction

In the face of a society that increasingly depends on mobility, the time spent traveling seems to be more important than ever. In the field of transport studies, travel is often separated into three distinct categories: *commute, business, and leisure*. The first includes journeys to and from a fixed place of work and, frequently, the home or residence. The second comprises journeys made in the course of work and the last encompasses all the remaining journeys that are conducted for non-work purposes. For many people, the greatest time spent traveling is to and from work, known as commuting (Holley, Jain, & Lyons, 2005). *Commuting* is making the same journey regularly between home and work and, in our study, between home and school, too. Hence, commuting is considered a part of the work and has direct and continuous effects on people's lives (Costa, Pickup, & Di Martino, 1988). For example, the average commute is 100 minutes a day in Istanbul (Ilıcalı, 2014) which adds up to 8.3 hours a week. The typical person who works approximately 250 days a year may spend 417 hours or 17 days each year engaged in commuting behaviors. Therefore, the typical person spends more time on commuting than the average annual leave (14 days). Inevitably, a number of studies have shown direct relationships between commuting and, stress (Sposato, Röderer, & Cervinka, 2012; Evans, 2002; Hooff, 2015); overall well-being, sleeping time, health related problems, absenteeism (Costa et al., 1988); and life satisfaction (Ettema, Friman, Gaerling, Olsson, & Fuji, 2011; Abou-Zied & Akiva, 2011). A possible reason for this is the perception about commuting. Generally, commuting is considered a demand derived from the desire to engage in activities at destinations such as working or meeting someone and commute time is considered wasteful (Lyons, 2008). However, if people can engage in activities while commuting, commute time is not just wasteful but could be productive (Ohmari & Harata, 2007). These activities can be reading, studying, listening to

music, working, watching the beauty along a route or the 'anti-activity' of relaxing itself. (Mokhtarian & Salomon, 2001; Featherstone et al., 2004).

A number of studies show that commuting can be healthy and productive. For instance, when commuting by bicycle some participants reported better health and well-being. They reported to be more satisfied with their work commute than people using other modes of transport (Ettema et al., 2013). Whereas cycling is found to be pleasant and arousing, car commuting is found to provide drivers freedom and control (Gatersleben & Uzzell, 2007) and a positive trip with public transport is associated with the abilitiy to do other things during the trip (Ettema et al., 2012). More importantly, the majority of commuters reported that their use of commute time is not entirely wasted (Lyons et al., 2007) and the ideal commute time is found not to be zero (Mokhtarian & Salomon, 2011). It was found that for the most part, people want some commute time–although generally not long, a mean of 16 minutes with 8.9% of the sample indicating an ideal commute time specifically of 30 minutes, and 2.1% of the sample indicating longer than 30 minutes–(Redmond & Mokhtarian, 2001). That is not to say commuting hours should be increased because harmful effects of a negative commute experience are undeniable and yet the deeper we dive into the literature, the more conflicting the results become. Hence, for the purpose of this study, we will mainly focus on the effects of in-vehicle activities such as people watching, playing mobile video games, reading and so forth on commuting outcomes.

Synthesizing previous literature we see that there is no consensus on the effects of commute mode on commuters'well-being. However, it is clear that the activities commuters perform during their commutes depend on commute mode they use. Simply looking at commute mode may not be enough to explain commuters' perceived stress or life satisfaction. Activities that people engage in during their commute may be partially responsible for some commuting styles to be beneficial, others harmful, and the mixed results

of other commuting styles. Hence, we hypothesize that some commute modes will lead to a greater chance of participants using certain in-vehicle activities which we will refer as *active* or *passive* activities because of their required cognitive involvement from commuters. In return, more frequent use of those activities will be either positively or negatively correlated with commuters' perceived stress and also not only their commute satisfaction but also overall life satisfaction scores. First, we will discuss different modes of commuting, then the mixed findings of psychological outcomes of commuting such as stress and life satisfaction, and finally what types of activities may lead to beneficial or harmful commuting outcomes.

## Literature Review

### Commute Mode

In-vehicle activities naturally depend on commute mode just like the duration of the trip, unpredictability of the journey, commute costs, etc. In all major metropolises in the world, commuters have a variety of commute mode options such as riding a bicycle, driving, bussing, taking the subway, ridesharing/carpooling, and for a small minority taking planes. In Istanbul, where we conducted our study, all commute modes are widely used (other than cycling which is not available due to the city size and infrastructure). The most commonly used modes in Istanbul are buses, minibuses, and metrobuses (together 45%); private cars (19%); metro (9%); and shuttles (7%; Ilıcalı, 2014).

It is shown that car commuters find their journeys more stressful than other mode users. The main sources of this stress are delays caused by traffic congestion and other road users (Gatersleben & Uzell, 2007). However, car commuting is rated higher than bus on *satisfaction with travel* (STS: Satisfaction with Travel Scale; Eriksson, Friman, & Gaerling, 2013). This mode difference was accounted for by ratings of the mode-specific attributes such as fun, lifestyle match, comfort, feeling of self-control, and feeling secure for which car was rated higher than bus (Eriksson et al., 2012; Jakobsson Bergstad et al., 2011).

Similar to car commuters, many users of public transport may often complain about delays caused by traffic; however, unlike car commuting, these delays do not only result in stress but also boredom (Gatersleben & Uzell, 2007). Previous research suggested that public transport journeys may be stressful due to unpredictability (Evans et al., 2002) and travel time (Wener, 2004). Car drivers would like to travel 20.6% less, and those who use public transportation would rather travel 24.9% less than they currently do (Paez & Waehlen, 2010). So, dissatisfaction with the time spent commuting is a common experience; however, people who use public transit are--other things being equal--the least satisfied commuters in this study. In other words, agree or disagree that commute trip serves as a buffer between home and school, transit users still would like to travel less yet, it is still important to note that their ideal commute time is not zero (Mokhtarian & Salomon, 2011). Moreover, students that use public transit appear to perceive commute experience through a social lens. Unlike bicyclers and walkers, however, their response is negative (Paez & Waehlen, 2010).

In all studies, walking and cycling journeys are found to be the most relaxing and exciting. Therefore, they seem to be most optimum forms of travel from an affective perspective (Gatersleben & Uzell, 2007). Driving is found to be relatively unpleasant and arousing, public transport is unpleasant and not arousing, cycling is pleasant and arousing, and walking is pleasant and not arousing. Gatersleben et al. (2007) suggested that the use of private cars may be too arousing (stressful), whereas the use of public transport may be not arousing enough (boring). Walking and cycling, however, score positively on arousal as well as pleasure (exciting and pleasurable). Bicyclers or walkers are also more satisfied with their commute than people using other modes of transport (Eriksson et al., 2012**;** Paez & Waehlen, 2010). There are several possible explanations for this. One is that these commuters are most likely to live closer to work, which makes the work commute less time-consuming. Another explanation is that short walks and biking are perceived as healthy activities (Lawrence,

2006). Moreover, active commuters are not only relatively less dissatisfied with their commute time compared to car and transit users but also, under certain conditions, appear in fact to be willing to spend some more time traveling (Paez & Waehlen, 2010). These types of positive commutes demonstrate that the commuter does not need to be passive as in the case of driving but may instead be active as in the cases of walking and cycling. Similar to being physically active, a commuter can be mentally active inside a vehicle by means of different activities such as reading or working. Thus, we hypothesize that engaging in certain in-vehicle activities instead of being passive during the journey might change one's commute satisfaction and, eventually, overall life satisfaction.

Importantly, St-Louis and colleagues (2013) found that if commute is perceived to have value other than arriving at a destination there is a significant increase in satisfaction scores for all modes. In terms of travel preferences, people who perceive travel only as a means to get to a destination are less satisfied, no matter the mode. This perception may be related to whether the mode is the outcome of a choice or a constraint (St-Louis et al., 2013). Through challenge and hindrance framework we know that challenge stressors have positive effects on us, whereas hindrance stressors have negative effects (LePine et al., 2004). Thus, if commuters have the ability to actively perform in-vehicle activities, they might consider their commute time as a challenge stressor rather than a hindrance stressor. As a result of the new perception of their typical commute, their commute satisfaction with that particular mode may increase which might lead to more positive psychological outcomes for commuters' lives in general.

## Psychological Outcomes of Commuting

Costa, Pickup, and Di Martino (1988) found that commuting adds, on average, about 2.5 hours to the commuters' working day; it is therefore easy to understand the major difficulties workers face mostly in organizing their lives: the time spent for commuting may

shorten that available time for family affairs, social activities, leisure, and sleep time. Interestingly, only 5% of the commuters considered psychological troubles to be directly caused by commuting, whereas 57% thought they were affected or aggravated by commuting, seems a clear indication that commuting status cannot be analysed solely by reference to the commuting environment alone but it must also be evaluated in the broader context of living and working conditions, which interact with the commuting environment to produce these adverse effects. Therefore, almost all studies about commuting note the measurement issues and difficulties in the field. As Costal et al. (1988) points out, both positive and negative effects of commuting are multidimensional concepts with various possible causes. Living and working conditions combining with personality differences make it harder to come up with clear-cut causal links between commuting environment and commuters' well-being. Apart from measurement issues, the second difficulty of providing general conclusions in commute research is that researchers have studied different concepts such as stress, well-being, commute satisfaction, life satisfaction, and happiness that have been also operationalized differently and measured with different scales. Therefore, we did not only study one concept such as stress but rather incorporated different psychological outcomes in one inclusive study.

**Stress and Commuting**

In lay terms, anything that poses a challenge or a threat to our well-being is a stress. Stress has cognitive, affective, and behavioral disposition dimensions; as well as task performance, physiological reactivity, psychological adjustment, and personal health components (Novaco, 2009). We examined factors bearing on the stress of commuting as it connects with home and school domains by using the *Perceived Stress Scale* (PSS; Cohen, 1994). PSS is the most widely used psychological instrument for measuring the *perception* of *stress*. It is a measure of the degree to which situations in one's life are appraised as *stressful*. Its items were

designed to tap how unpredictable, uncontrollable, and overloaded respondents find their lives (Cohen, 1994). By identifying moderating variables and reviewing the findings of PSS and our questions about commuting stress, we will discuss what has been learned about the relationship between in-vehicle activities and commuters' perceived stress but before that, we will discuss causes of commute stress in this section.

**Major causes of stress.**

***Congestion.*** Some attention has been given to traffic congestion as a major component of the adverse impacts of car commuting. Studies showed that greater exposure to congestion is related to elevated psychophysiological stress among car commuters (Schaeffer, Street, Singer, & Baum, 1988; Stokols, Novaco, Stokols, & Campbell, 1978; White & Rotton, 1998) as well as bus drivers (Evans & Carrere, 1991). As congestion increases among car commuters, they also reported more negative effect (Novaco, Kliewer, & Broquet, 1991; Novaco, Stokols, Campbell, & Stokols, 1979; Novaco, Stokols, & Milanesi, 1990; Schaeffer et al., 1988) and motivational deficits indicative of helplessness (Novaco et al., 1979; Schaeffer et al., 1988; White & Rotton, 1998; Evans et al., 2008).

***Speed, distance and duration.*** Commuting stress was found to be significantly associated with distance and duration of the commute, controlling for age and income (Collier & Novaco, 1994). Subjects were more tense and nervous after long, slow trips. But, no differences between groups were observed on sub-tests measuring irritability and impatience (Novaco et al., 1979). Sposato et al. (2011) found that the duration of commute is significantly correlated with commuting stress and significantly interacts with control suggesting that the duration of the daily trip to work is a better predictor of commuting stress than the length of commute. However, results of their further studies clearly showed that even after controlling for the highly correlated duration of commute, the length of commute still has a significant impact on commuting stress. Although it is expected that longer commuting

experiences result in increased levels of withdrawal measures, studies showed mixed results. When a group of frequently absent subjects was compared to a control group, more than twice as many of the former were found to live an hour or more from work as compared to the latter (Knox, 1961). However, survey responses of 1500 workers showed that commuting long distances to work, among other variables, was negatively associated with lateness (Leigh & Lust, 1988). Finally, Novaco et al. (1990) found that subjects with long commutes over a long period of time had the largest number of absence-illness days. However, when the analysis was controlled for covariates such as age, smoking, weight, and alcohol consumption the relationship was no longer linear (Koslowsky, 1997). Moreover, no direct relationship between traveling speed and measures of anxiety or mood have been found (Schaeffer et al., 1988). Synthesizing the above, we do not ask commuters travel speed in our study because in most of the cases it is not in their hands. We do ask the duration of their commute instead of their commute length because the former was found to be a better predictor of commute stress. Similarly, because of the covariates mentioned above we did not add absenteeism into our study as a commute outcome. However, we investigated if gender has an effect on commute stress and satisfaction.

***Predictability and perceived control.*** Men and women who perceived their commute to work as more unpredictable felt greater levels of stress and evidenced higher elevations of salivary cortisol. However, expected differences in motivation in task performance were not found (Evans et al., 2008). Both driving a car (Bellet, Roman, & Kostis, 1969) and taking a train to work (Singer, Lundberg, & Frankenhaeuser, 1978) elevated psychophysiological stress. The more unpredictable the commute to work, the greater the levels of stress experienced by commuters. Information systems, accurate and timely feedback about the journey, and the management of service delivery could all be more closely examined in terms of predictability of the commuting experience. It is also intriguing to consider the possible

role of predictability in commuters' mode selection. Perhaps one explanation for the reluctance of car commuters to switch modes to mass transit alternatives is that they perceive car commuting to be more predictable than mass transit options (Evans et al., 2008). It could also be why walkers and bicyclers are the most satisfied commuters (Gatersleben & Uzell, 2007; Eriksson et al., 2012**;** Paez & Waehlen, 2010). Those are extremely reliable commuting modes that are not subject to unpredictability as much as other commute modes.

*Perceived control* is a belief that individuals are capable of influencing and making a difference in life–in our case, commuting. Sposato et al. (2011) suggested that control is the most powerful predictor of commute stress, followed by the duration of commute, predictability, and impedance. Control significantly interacts with the duration of commute and predictability, and it is suggested that people seek predictability when control is not available (Seligman & Miller, 1979). In low control environments such as public transportation, the important issue becomes whether one can predict certain events or not. Predictability has been shown to have a distinct effect on commuting stress, regardless of the level of control. Thus, it is important to note that there is a major difference between control and predictability. Seligman and Miller's (1979) view is that predictability is a measure reflecting temporary incidents, which force the commuter to adapt, rather than constituting a constant feature of the journey to work, such as control. Summarizing the above, they proposed a relationship of predictability and control in three respects. First, the effect of predictability is not related to low control as a precondition. Second, they argue that predictability constitutes a temporary and intermittent stressor, whereas control acts as a constant stressor. Third, their findings show that there is an interactive effect of predictability and control on commuting stress, which goes beyond the effect of the singular variables (Sposato et al., 2011). If predictability and perceived control help to ameliorate or prevent commute stress, perhaps certain in-vehicle activities such as working or playing games

constantly during the commute make the content of the commute more predictable and enhances the commuter's perceived control on the journey which in turn will decrease commuter's perceived stress and might increase his commute satisfaction.

**Life Satisfaction, Happiness and Well-being**

*Subjective well-being* (SWB) is how people experience the quality of their lives (Ettema et al., 2012). The structure of subjective well-being has been conceptualized as consisting of two major components: the emotional or affective component, and the judgemental or cognitive component (Diener, 1984; Veenhoven, 1984). The judgemental component has also been conceptualized as life satisfaction (Andrews & Withey, 1976). Although the affective component of subjective well-being has received considerable attention from researchers, the judgemental component has been relatively neglected. Global life satisfaction scales ask respondents to evaluate their lives as a whole on a likert-type scale ranging from very satisfying (5) to very dissatisfying (1). The most prevalent one among those scales which we used as well in our study, the *Satisfaction With Life Scale* (SWLS; Diener et al., 1985) was developed as a measure of the judgemental component of SWB and used widely in commuting studies. SWLS meaures life satisfaction by asking respondents to indicate their agreement with five statements from strongly agree (7) to strongly disagree (1).

STS is found to contribute to overall happiness, mood, and to some extent SWB. It is also shown to be affected by not only commute mode but also the number of activities in the daily agenda. More specifically, it was shown that as the number and complexity of activities in the daily agenda increases, commuters feel more time pressure, having negative effects on their STS and mood. In contrast, executing more complex activity agendas may be more rewarding since more goals can be achieved, leading to higher levels of SWB. Thus, consistent with this, the negative effect of agenda was absent on cognitive SWB (Ettema et al., 2011). The results suggest that the relationship between STS and mood are positively

correlated since the effects of mode and agenda were mirrored. So, there is a correlation between travel satisfaction and affect associated with activities and mood, as was found by Jakobsson Bergstad et al. (2009). Taken together, if commuters have a high number of activities in their daily agenda, they feel more time pressure and their STS scores go down, whereas their SWB score go up. However, what we hypothesize is that if they can make use of their commute time productively by means of in-vehicle activities while having the same complex daily agenda, they might increase their SWB simply more because they would achieve more goals on the road and at the same time suffer less from negative effects on STS and mood because they would feel less time pressure.

Abou-Zeid and Akiva (2011) investigated the effect of social comparisons on commute well-being and found that greater comparative happiness arising from favorable comparisons of one's commute to that of others (e.g. shorter commute time than others, same mode as others for car commuters and different mode than others for non-motorized commuters) increases overall commute satisfaction or utility. First, attributes of the commute such as commute time and commute costs affect commute satisfaction. These are expected to affect overall evaluation of the commute (i.e. satisfaction) directly, while other attributes may influence the actual experience (i.e. moods and emotions such as stress and enjoyment) which in turn affects overall satisfaction. The effect of social comparisons on commute well-being is an important example for our study showing that commuting is a perceptual process. The degree to which commute is perceived as stressful affects satisfaction with the commute and life satisfaction in return. In general, commute stress is caused by long commute or waiting time or distance, traffic congestion, unpredictability, and the lack of perceived control, crowding, and other commuting conditions (Evans et al., 2002; Kluger, 1998; Koslowsky et al., 1995, 1996; Novaco et al., 1990; Schaeffer et al., 1988; Singer et al., 1978; Van Rooy, 2006; Wener et al., 2003). It could also be moderated by individual factors, such as the

flexibility of the work schedule (Lucas & Heady, 2002) and the use of en-route time to conduct activities as a coping strategy for reducing stress (Lyons & Urry, 2005) and increasing enjoyment. Enjoyment of the commute may also affect satisfaction with it. People may enjoy their commute for a number of reasons; they may consider their commute as their private time or as a useful transition between work and home (Ory & Mokhtarian, 2005). Because commuting is a perceptual process, certain in-vehicle activities might increase the enjoyment of the commute and hence satisfaction with it which may lead to favorable social comparisons of one's commute to that of others and eventually leading to greater life satisfaction.

So far we have discussed the effect of commute well-being on overall well-being (bottom-up approach) but it can also be that overall well-being has an effect on commute well-being. Overall well-being is likely to affect commute well-being in the sense that people who are satisfied with life and its major domains would also tend to be satisfied with their commutes (Abou-Zeid & Akiva, 2011). Personality and overall well-being effects are related to the ''top-down approach'' to the study of subjective well-being (Diener, 1984; Headey et al., 1991), in the sense that stable traits and overall perspective on life affect how people feel about specific life domains. To better understand this relationship, we will talk about personality differences and other possible causes of commute outcomes in the following section.

**Other Causes of Psychological Outcomes**

***Personality differences.*** Personality has been shown to be a major determinant of overall well-being such that individual characteristics affecting overall well-being may have an effect on commute satisfaction (top-down approach; DeNeve & Cooper, 1998; Diener & Lucas, 1999). Results of some studies indicate that commuters' attitudes and personality (representing motivations) are more important determinants of commute liking than objective

commute amounts. While those who commute long distances do tend to dislike commute travel, personality and attitudes of the commuter are found to be significant moderators (Mokhtarian et al., 2005). For example, individuals with high negative affectivity—those who get stressed out easily—are likely to get irritated by transportation stressors more quickly than others (Hennessy & Wiesenthal, 1997). Those who plan their activities and are generally on time may be more relaxed and satisfied with their commutes if they have arranged their commuting patterns so that they are less stressful (e.g. plan to arrive on time to work), but they may also be more sensitive to unfavorable traffic conditions that may change their plans or delay their arrival at work (Abou-Zeid & Akiva, 2011).

Strong feelings toward a car providing freedom, control, and mobility or a car being a status symbol, plays a key role in how much individuals like to travel, which, in turn, is critical to how much they actually do travel and how much more they want to travel. Similarly, those with a strong sense of curiosity or adventure-seeking, and those who need to escape or need to connect with their surroundings, may voluntarily engage in travel beyond the minimum required to conduct a set of activities. Those who have a positive attitude toward commuting in general may be less likely to engage in commute-reducing behavior, such as living in further neighborhoods (Ory & Mokhtarian, 2005). For instance, if you are a type of person who enjoys reading or if reading decreases your commute stress, you may prefer using commute modes in which the chances for you to sit is higher. These points are important when modeling commute behavior yet the literature has ignored the impacts of attitudes when estimating commute patterns (Ory & Mokhtarian, 2005). We also did not include personality differences in our study because if we keep asking the “why” question, they can be the cause of every human behavior. We thought personality differences inherently affect the commute mode choice which further affects the type of the in-vehicle

activity. For the sake of keeping our models less complex and uderstandable we did not use personality differences as a variable.

***Gender.*** Some studies found no gender interactions for any of the stress-outcome variables (Evans et al., 2002); whereas, some found that stressful effects of long distance commutes (bigger than 20 miles) were further moderated by gender, as women in such commutes perceive much greater commuting stress spillover to work and home. In shorter distance condition, women overall were more satisfied with their commutes than were men (Collier & Novaco, 1994). It was reported that lateness was negatively correlated with commuting distance, too but only for women (Nicholson & Goodge, 1976; Pop & Belohlav, 1982). Women who lived closer to the plant they work in were more likely to arrive late at work. In contrast, Martin (1971) reported that for male workers the relationship between absenteeism and distance travelled was significant, but for women the association was not significant. He suggested that gender may be a moderator variable, with women more likely to find jobs closer to home and men willing to live further away and commute greater distances to work.

Moreover, Jain, Susilo, and Atkins (2013) found marginal differences in how men and women use their travel time, which may be linked to employment structures as well as social trends in technology ownership and use. Men are more likely than women to spend some of their travel time: working/studying (32% vs. 24%); texting/phoning for work (18% vs. 12%); checking emails (21% vs. 14%); internet browsing (12% vs. 8%); and playing games (5% vs. 3%). Meanwhile, women are more likely than men to spend some of their travel time: talking to other passengers (15% vs. 12%); and personal texting/phoning (35% vs. 25%). Therefore, we looked if these inherent differences in activity choice further differentiate perceived commute stress and satisfaction scores between men and women.

***Ridesharing.*** In addition to gender effects, stress-mitigating effects of ridesharing were found, as full-time ridesharers were significantly less bothered by traffic congestion and more satisfied with their commutes than solo drivers (Novaco et al., 1994). In analyses of prospective adoption by solo drivers of alternative commuting modes, it was found that the perception of one's commute as having a negative impact on family life had a very significant effect on the inclination to try carpooling and train/rail, beyond the effect associated with distance itself (Novaco et al., 1994). It is also found that single drivers, as compared to car-pool drivers, did have significantly higher scores on hostility and anxiety measures (Schaeffer et al., 1988). Among drivers, we expect single drivers to suffer more from commute stress and experience less commute satisfaction simply because they will be deprived of the possibility to talk to and socialize with ridesharers. Because drivers cannot engage in most of the in-vehicle activities other than driving itself, we hypothesize that they will report more negative psychological outcomes than other commuters.

***Costs and years of commuting.*** Another factor causing commuting stress is the effect of costs. Specifically, an increase of commuting stress with rising costs of the commute (Sposato et al., 2011). Increasing gas prices, public transport fares, and rising car prices are some of the contributors to commute costs in today's urban life. The effect of costs might be one possible explanation for the higher commute satisfaction of walkers and bicyclers than other vehicle commuters. In addition to the costs, a relationship between the years of commuting and commuting stress is found. Interestingly, the found significant effect was the opposite to what was expected: with the years of commuting, commuting stress seems to be diminishing and a plausible explanation for this might be selection and adaptation processes that take place over time (Sposato et al., 2011).

## In-vehicle Activities

As mentioned earlier, it is widely assumed that travel time is unproductive, and wasted. Therefore, commuting should be minimised (Lyons & Urry, 2015 ). The time consumed in order to travel to a destination has been seen as the price paid for fulfilling the purpose of reaching that destination. By interpreting travel time as a disutility or burden, transport policy has been driven by the goal of quicker, more predictable journeys. Lyons and Urry (2015) challenges these approaches by exploring how travel time can be, and is, being used productively as activity time and perceived as a gift rather than a burden. Moreover, they mention what enhancements to time use might be emerging in the information age. Their theory is that in the modern world, the boundaries between travel time and activity time are increasingly blurred. Specifically, many people are using travel time itself to undertake activities. They theorize that the cost to the individual of travel time is reduced as travel time is converted into activity time. There are essentially two parts of their theory; the first part claims that people are able to compensate themselves (to some extent at least) for the time invested in the journey. The second part of their theory claims that this will affect travel behavior. The travel time is enacted and experienced in multiple ways and is context driven; therefore, not easily reducible to an economic value. However, irrespective of whether the travel time use is judged productive in economic terms, the first part of the hypothesis holds true for an individual who has personally gained some positive (productive) value whether it be through working, playing, socializing, sleeping and so on during the journey (Lyons & Urry, 2015). What we theorize is that people who engage in *active* -- in the sense that they require more cognitive effort and attention-- in-vehicle activities such as reading, studying, and working may find their commutes more productive and valuable which in turn would decrease commute stress and increase their commute satisfaction that is found to be correlated with greater life satisfaction and overall well-being.

Lyons and Urry (2015) divides travel time into four categories. *Fully productive* travel time indicates that the use of time on the journey has been as beneficial as that time would have been if used otherwise. *Ultra productive* travel time indicates that the use of time on the journey has been more beneficial than had that time been used otherwise --for instance, getting more work done because of the lack of interruptions which tend to disrupt thinking in the office--. On the very opposite side, *counter-productive* travel time represents time use that not only achieves no benefit in itself but also has an adverse effect on time use beyond the journey (e.g. a stressful commute journey affects an individual's level of productivity once they reach work). *Unproductive* travel time is that where an individual has achieved no benefit, in other words the travel time is wasted time. (Lyons & Urry, 2015).

When Lyons, Jain and Holley (2005) surveyed rail passengers in the U.K, they found that for round trips completed within a day, the outbound journey could be imagined to be characterised by being wide awake and engaging; and the return journey characterised by being tired and detached. On the contrary, because people feel more awake, we think that they engage in more activities during return journeys than outbound journeys and might perceive the time spent as being more productive and less wasted which might lead to less stress and eventually more commute satisfaction. For instance, nearly one third of commuting during the work day is dominated by working/studying. Primarily, over 40% of this time use is considered very worthwhile (Lyons et al., 2005). The working day for such individuals has clearly overspilled the boundaries of the definition of working day which is why commute research is very important in today's world. This example is also important to show the effect of in-vehicle activities on commuters' perception of their commute time use. As we hypothesize in our study, it is shown that commuters engaging in certain activities—in this case working/studying—consider their time use is worthwhile.

According to Russell, Price, Signal, and Stanley's (2011) structured observations on buses and trains, nearly two-thirds of the passengers observed spent some of their travel time looking ahead or out the window (65.3%) but this was seen more on the bus (76.5% of bus passengers) than on the train, where just over half of train passengers (56.6%) were looking ahead or out at some point during the observation. About a fifth of the passengers were observed reading (21.7% overall), with more than twice the proportion seen reading on the train (28.8%) than on the bus (12.5%). A similar proportion was seen with headphones on (20.9% of train passengers and 17% of bus passengers). It might be because the availability and use of mobile technologies has increased. Lyons et al. (2013) tracked rail passengers' travel time use in Great Britain from 2004 to 2010. Over the six-year period, listening to music in particular has doubled in its incidence suggesting an increasing capacity for travelers to personalize the public space of the railway carriage. Most notably the analysis reveals a substantial increase in the proportion of travelers overall who consider their use of time very worthwhile. The third most common activity they found after reading for leisure and window gazing rail passengers spend most time on in their journeys is working/studying - 14% of all passengers. This shows almost no change over 6 years from 2004. Over half of all business commuters spend some time working/studying on the train. In fact, other activity response categories may also reflect working/studying. Nearly 8% of business commuters indicate spending most time on either checking email (4–5%) or texting/phoning (3%). There have been notable changes between 2004 and 2010 in the use of information and communications technologies. Not identified as specific activity categories in 2004, internet browsing and checking emails are prevalent in 2010 with one in five commuters and nearly one in three business commuters now doing the latter (1 in 20 passengers overall are also accessing social networking sites). Text messaging and making phone calls are still not a focus for many passengers as the activity they spend most time on – although in terms of a

time use during a train journey the part of phone communication has grown – passengers in 2010 are 63% more likely to be texting or phoning for personal reasons and 83% more likely to be doing so for work (Lyons et al., 2013). All these examples demonstrate how much the working day overspilles the boundaries of the workplace. Thus, it can be concluded that being able to spend commute time in a productive way is more important than it has ever been. Synthesizing the above, activities observed more frequently on trains than on buses were reading, using a computer, sleeping/eyes closed, writing (anything including using a pen or pencil to work on crosswords or puzzles as well as writing in notebooks or on printed sheets) and so on (Jain et al., 2013). So, it is clear that the type of the in-vehicle activity commuters perform depends on the commute mode. Activities requiring more cognitive effort and associated more with work such as reading, e-mail checking or using a computer were observed more on trains than on buses. And this might be one possible explanation for the variety of stress and satisfaction levels that commuters reported. Because commuting is a perceptual process, the fact whether a commute mode makes it easier to perform some activities might directly affect commute satisfaction. To be able to better understand the effects of in-vehicle activities --independent of the commute mode -- we also investigated commuters using the same mode but engage in different activities within the vehicle.

Through on-board observation and questionnaire surveys, it was found that the length of in-vehicle time and sitting vs standing affect the participation rate of different types of activities. Moreover, enjoyment of commuting might increase when people can engage in multitasking while commuting (Ory & Mokhtarian, 2005) and when they can sit which makes it a lot easier to engage in certain activities such as reading or working.

One of the most important results of commute studies is that more than two-thirds of the respondents disagreed that “the only good thing about traveling is arriving at your destination”; while nearly half agree that “getting there is half the fun” (Mokhtarian &

Salomon, 2001). It is not reasonable to presume that travel times and activity times are therefore separate from each other and mutually exclusive. There are now many ways in which such times seem to overlap and become undifferentiated from each other (Lyons and Urry, 2005). This is partly because of new mobile technologies which are providing new access to a broader array of activities appealing to those on the move.

All these examples demonstrate us that activities while commuting have consequences both for societies and individuals. Cumulative consequences for society as a whole could be positive. People may come to see collective passenger transport more favorably as the mode that offers the best opportunities for productive commute time use. Commuting longer distances may be increasingly acceptable as travel environments become more equipped or equippable for working or socializing through more technologized transportations. In return, public transport providers might recognize and nurture this positive attribute of their service such that, additionally, vehicles would come to be seen as points of meeting and social engagement rather than merely people movers (Lyons & Urry, 2005).

For individuals, they may or may not change their commute behavior as a result of commute time use but being able to make more productive use of commute time may improve their personal well-being. Restful commute leading to a refreshed or more attentive participation in activities at work or at home, social networking by using commute time to converse with friends or colleagues either present on the journey or remote (Lyons & Urry, 2005), and getting things done for work inside a vehicle might increase commute satisfaction and eventually, commuter's life satisfaction and overall well-being.

## Effects of In-vehicle Activities on Psychological Outcomes

Ettema and colleagues (2012) assessed the influence of in-vehicle activities on Swedish public transport users' subjective well-being in which activities during the work commute by public transport were recorded and subjective well-being during travel was

measured retrospectively using the STS. They found the activities undertaken most frequently during travel are relaxing (sleeping, resting, gazing outside or at fellow travelers) and entertaining (reading, gaming, listening to music). Less frequent activities are working/studying, talking to other passengers, and using information and communication technologies such as phone calls, emailing, and laptops. Results showed that talking to other passengers has the strongest positive effect on STS, whereas activities related to entertainment and relaxation lead to lower STS, possibly since engaging in these activities reflect unsuccessful attempts to abate boredom (Ettema et al., 2012). Engaging in work related activities which are more demanding cognitively might lead to higher STS because commuters would feel more productive than when they engage in activities such as sleeping, eating, or simply doing nothing. In addition, slightly different effects for commutes to and from work were found. For instance, talking to others did make commuters more relaxed or enthusiastic on the way back home than on the way to work (Ettema et al., 2012) and stress mitigating effects of ridesharing were found (Novaco et al., 1994). Thus, we hypothesize that the nature of the commute (outbound vs return) and ridesharing affect the relationship between the effect of the activity and commuter's perceived stress. Some commuters indicated that they do not do anything during their commute but appreciate travel time as a buffer between the work and private sphere, as a period they can use for contemplation and having time for oneself. However, some commuters reported that involvement in the activities made their trip more productive or enjoyable (Ettema et al., 2012). We are expecting the number of this type of commuters to increase because opportunities to engage in activities while commuting by public transit are expected to increase in the years to come with the increasing market penetration of smartphones which allows for a wider range of internet-based activities, such as browsing, social networking, navigation, working, etc. (Lyons & Urry, 2005; Line et al., 2011). In a more general sense, it can be concluded that the

relationship between activities during commute and commute satisfaction is not straightforward. Previous research on SBW (how people experience the quality of their lives) suggests that the impact of commute on SWB arises from three potential sources: (1) the positive and negative affect experienced during commute itself; (2) the fact that commute facilitates engagement in activities, which helps one to progress towards goals and to experience positive emotions; and (3) the fact that the organisation of commute has implications for the ease or amount of stress with which activities are performed (Ettema et al., 2012).

That is to say, it cannot be assumed that satisfaction with commute would always be higher if people would engage in in-vehicle activities. It is still clear that engaging in the activities is not sufficient on its own to make commute a positive experience. The impact of activities depend on many other variables, such as commuters' mindsets. However, activities during commute may be undertaken not to make the trip more pleasant but to achieve satisfaction in other life domains at other times. The opportunity to work or study on board may have an impact on other activities, for instance by making the work or study activity less stressful or more enjoyable or saving time for other, more pleasant activities (Ettema et al., 2012). In this case, activities during commute would not only have a positive effect on satisfaction with commute but also on satisfaction with life in general.

## Our Study

Due to increased commute hours in our daily lives and the important outcomes such as commute satisfaction, perceived commute stress, and life satisfaction (depending on the commute mode — car vs. public vs. cycling/walking), commuting is increasingly being studied (Ohmari & Harata, 2007; Lyons, 2008; Hooff, 2015). In all studies, walking and cycling are found to be the least stressful and most satisfying commute modes (Gatersleben & Uzell, 2007; Eriksson et al., 2012). However, for other modes of commuting there are mixed

results. This may be due to the activities commuters are engaged in. Perhaps the reason why commuters using each mode report different stress and commute satisfaction levels in different studies is the fact that what matters is the type of the in-vehicle activity they engage in rather than the commute mode itself. However, to the authors knowledge there is no literature investigating the in-vehicle activity type while commuting and its effects on perceived commute stress. Does the type of the activity itself --independent of the mode-- lead to stress reduction? We know that more perceived unpredictability (Evans et al., 2008) and less perceived control (Sposato et al., 2011) lead to higher commute stress. Lastly, activities were found to have different effects on commute to work and back home. For instance, an active activity "talking to others" did make commuters more relaxed on the way back home than on the way to work (Ettema et al., 2012). Considering this, we will conduct each analysis separately for commutes to school/work and back home. Thus, we hypothesize that:

**H1a:** More frequent use of passive in-vehicle activities will be correlated with higher perceived control and commute predictability scores for commutes to school/work from home.

**H1b:** More frequent use of active in-vehicle activities will be correlated with higher perceived control and commute predictability scores for commutes from school/work back home.

**H2a:** The relationship between the frequency rate of in-vehicle activities and perceived commute stress is mediated by perceived control and predictability. More frequent use of passive in-vehicle activities will lead to less perceived commute stress through increased perceived control and commute predictability during commutes to school/work from home.

**H2b:** The relationship between the frequency rate of in-vehicle activities and perceived commute stress is mediated by perceived control and predictability. More frequent use of active in-vehicle activities will lead to less perceived commute stress through increased perceived control and commute predictability during return commutes.

Furthermore, stress mitigating effects of ridesharing were found (Novaco et al., 1994), where single drivers had higher scores on hostility and anxiety measures (Schaeffer et al., 1988). Thus, we hypothesize that:

**H3:** Ridesharing moderates the relationship between the frequency rate of in-vehicle activities and perceived commute stress regardless of the activity type and direction of the commute.

Another stream of research investigated activities while commuting and the effect of activity type on commute satisfaction. It is clear that satisfaction with commute changes depending on the activity type. For instance, talking to other passengers had the strongest positive effect on STS (Ettema et al., 2012) during return commutes but what happens beyond commute satisfaction? Does the type of the activity also lead to an increase in overall life satisfaction of the commuter? There is one single study that investigated this relationship and commute satisfaction was found to have an effect on commuter's life satisfaction and well-being (Ettema et al., 2012). Thus, we hypothesize that:

**H4a:** The relationship between frequency rate of in-vehicle activities and life satisfaction scores is mediated by commute satisfaction scores. More frequent use of passive in-vehicle activities will lead to higher life satisfaction through increased commute satisfaction during commutes to school/work.

**H4b:** The relationship between frequency rate of in-vehicle activities and life satisfaction scores is mediated by commute satisfaction scores. More frequent use of active

in-vehicle activities will lead to higher life satisfaction through increased commute satisfaction during commutes back home.

## Methodology

### Participants

Students at a medium sized private university and adults over 18 working in Istanbul, Turkey participated in this study. Initially, the online survey was sent to 730 people. Because our purpose was to investigate the effects of in-vehicle activities, we excluded data from students who live in dorms and all participants who commute by cycling or walking in addition to incomplete surveys. After data cleaning, the sample consisted of 306 participants, 190 female, 115 male and 1 not specified. Age ranged from 18 to 38 ($M$ = 22.51, $SD$ = 3.95). This sample was 87.9% student and 11.8% non-student. A majority of the students (81.4%) had an undergraduate degree, 18.6% of them had a graduate degree. 44% of the students received class credits for their participation, other participants were volunteers who did not get any inducements. The majority of respondents were not drivers (56.5%) but ride-sharers (59% on their commute to school/work from home, 57% on their commute to home from school/work). Descriptive statistics of demographic variables are presented in Table 1.

Table 1

*Descriptive Statistics for Demographics (N = 306)*

| Variable | Percentage |
|---|---|
| Female | 62.1 |
| Male | 37.6 |
| Drivers | 43.5 |
| Ride-sharers | 59.2 |
| Ride-sharers (Return) | 57.2 |
| Undergraduate students | 71.6 |

| | |
|---|---|
| Graduate students | 16.3 |
| Non-students | 11.8 |

On a scale from 1 (never) to 5 (always), the most used vehicles by participants in their typical commute were car (*M* = 2.96, *SD* = 1.4), metro (*M* = 2.81, *SD* = 1.34), shuttle (*M* = 2.77, *SD* = 1.37), bus (*M* = 2.57, *SD* = 1.28), dolmuş (*M* = 2.44, *SD* = 1.27), metrobus (*M* = 1.91, *SD* = 1.17), ferry (*M* = 1.55, *SD* = .92) and lastly motorcycle (*M* = 1.06, *SD* = .41). Participants spent 1.08 hours on average (*SD* = .84) on their commute to school/work from home and 1.24 hours on average (*SD* = .91) to home from school/work (*SD* = .91). On average, they have been commuted for 6.4 years (*SD* = 5.62) ranging from 9 months to 30 years. On a scale from 1 to 5 (never-always), participants reported that most of the time they sit in a vehicle on their way to school/work from home (*M* = 3.77, *SD* = .99) and to home from school/work (*M* = 3.74, *SD* = .99).

**Procedure**

**Pilot test.** A pretest on a small sample of students was conducted to understand their classification of commute behaviour into active and passive categories of activities. Students rated a given set of in-vehicle activities on a 5 point scale (see Appendix A) from very relaxing to very stimulating in terms of their engagement and cognitive effort they need to make while performing the activity. Utilizing K-means Hierarchical Clustering (see Appendix B) we found two distinct clusters of in-vehicle activities. The first cluster consisted of *active* in-vehicle activities which were found to be stimulating such as reading for leisure, working/studying, thinking etc. The second cluster consisted of *passive* in-vehicle activities such as listening to music/radio, sleeping, eating and doing nothing. We used these two clusters as types of in-vehicle activities in data analysis as well.

**Study procedure.** The primary study was a large, online survey prepared with Qualtrics Survey Software (see Appendix H). It was distributed to all participants via e-mail. Participants were able to fill the survey at any time without any restriction or penalty. First, a full description was provided to participants regarding the purpose of the study. After reading the description of the study, participants indicated their consent by clicking a link to begin the online survey. If they agreed to fill the survey, questions about participants' commute behavior, duration, mode, and activities while commuting were presented. Then, Satisfaction with Travel Scale (STS; Friman et. al, 2013), Satisfaction with Life Scale (SWLS; Diener, 1984), and Perceived Commute Stress and Perceived Stress Scale (PSS; Cohen, 1994) were presented in English. The order of all questions and blocks (scales) were counter-balanced to control for response fatigue. The survey took approximately 15 minutes to be completed. The scheduled data collection period ran from July through October.

**Measures**

**Satisfaction with travel**. To measure participants' satisfaction with commute, we used Satisfaction with Travel Scale (STS; Friman et. al, 2013). Participants indicated on a likert scale from 1 (very stressed) to 7 (very calm), the extent to which they perceived their commute experience is stressful, boring, tense etc. There were 10 different items on the scale (a = .90). A sample item is "I experience my commute to be very stressed (1) or very calm (7)" (See, Appendix C). Participants rated the same scale 3 times considering their commute to school/work from home, to home from school/work and their overall commute experience.

**Satisfaction with life**. Satisfaction with Life Scale was developed by Diener (1994) to measure perceived life satisfaction of participants. The scale consists of 5 items (a = .86) and participants responded using a Likert type scale ranging from 1 (strongly disagree) to 7 (strongly agree). A sample item is "In most ways my life is close to my ideal" (See, Appendix D).

**Perceived commute stress.** Perceived Stress Scale (PSS; Cohen, 1994) is the most widely used psychological instrument for measuring the perception of stress. It is a measure of the degree to which situations in one's life are appraised as stressful. Items were designed to tap how unpredictable, uncontrollable, and overloaded respondents find their lives. Participants rated 10 items (a = .85) about their feelings and thoughts during the last month on a scale from 1 (never) to 5 (very often). A sample item is "In the last month, how often have you felt nervous and stressed?" (See, Appendix E). To measure perceived commute stress, we used STS item similar to "How do you experience your commute?". Participants reported their feelings on a scale from 1 (very stressed) to 7 (very calm) (See, Appendix F).

**Perceived control, productivity and predictability**. To measure the extent to which commuters perceive their commute is predictable, productive, and in their control we created a 3-item scale. A sample item is 1 (very unpredictable) to 5 (very predictable).

We also asked on a different scale from 1 (very unlikely) to 5 (very likely) if participants "think" activities they perform while commuting have an effect on productivity and predictability of their commute, and their perceived control. A sample item is "Do you think activities you perform while commuting make your commute more predictable?" (See, Appendix G). Participants rated these scales 3 times considering their commute to school/work from home, to home from school/work and their overall commute experience.

## Results

The aim of the present study was to explore in-vehicle activities and their effects on perceived commute stress and life satisfaction. First we conducted a paired samples t test to compare perceived control and commute predictability scores for both commute directions. There was a significant difference in commute predictability scores $t(305) = 4.97$, $p = .000$ and a non-significant difference in perceived control scores between commutes to school/work and commutes to home from school $t(305) = -.59$, $p = .556$.

Table 2

*Descriptive Statistics and T-test Results for Commute Predictability and Perceived Control*

| Outcome | To School/work | | To Home | | N | 95% CI for Mean Difference | r | t | df |
|---|---|---|---|---|---|---|---|---|---|
| | M | SD | M | SD | | | | | |
| Commute Predictability | 3.87 | .93 | 3.57 | 1.09 | 306 | 1.84, 4.24 | .45* | 4.97* | 305 |
| Perceived Control | 3.10 | 1.02 | 3.14 | 1.06 | 306 | -1.16, 0.84 | .47* | -.59 | 305 |

* $p < .05$.

Then, to examine hypothesis 1, we constructed a univariate correlation matrix and looked at correlate sizes and p-values for each directions of commute separately.

### Commutes to School/Work

Hypothesis 1a predicted that more frequent use of passive in-vehicle activities will be correlated with higher perceived control and commute predictability scores for commutes to school/work from home. As we predicted, there was a positive relationship between frequency rate of passive activities and perceived control and commute predictability scores on commutes to school/work from home. However, this relationship was not significant, $r = .09$, $p = .112$ and $r = .10$, $p = .088$ respectively. Similarly, there was a non-significant negative relationship between both the frequency rate of active in-vehicle activities and commuters' perceived control $r = -.11$, $p = .057$ and between the frequency rate of active in-

vehicle activities and perceived commute predictability $r$ = -.07, $p$ = .224. Additionally, the relationship between passive in-vehicle activities and perceived productivity of the commute was weaker than the one with active in-vehicle activities $r$ = .03, $p$ = .669. Overall, hypothesis 1a suggesting that more frequent use of passive in-vehicle activities will be correlated with higher perceived control and commute predictability scores on commutes to school/work from home was not supported.

Table 3

*Correlations among Study Variables to School/work from Home (N = 306)*

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1. Active Activities | | | | | |
| 2. Passive Activities | .10 | | | | |
| 3. Commute Productivity | .05 | .03 | | | |
| 4. Commute Predictability | -.07 | .10 | .07 | | |
| 5. Commute Control | -.11 | .09 | .11 | .21** | |

*p < .05, two-tailed. **p < .01, two-tailed. ***p < .001, two-tailed.

**Commutes to Home**

Hypothesis 1b predicted that more frequent use of active in-vehicle activities will be correlated with higher perceived control and commute predictability scores during return commutes. As opposed to what we predicted, for commutes to home from school/work, there was a non-significant negative relationship between the frequency rate of active in-vehicle activities and commuters' perceived control $r$ = -.05, $p$ = .349 and non-significant negative relationship between the frequency rate of active in-vehicle activities and perceived commute predictability $r$ = -.07, $p$ = .218. On the way back home, the relationship between passive in-vehicle activities and perceived control and commute predictability scores are again negative

$r$ = -.01, $p$ = .934 and $r$ = -. 02, $p$ = .722 respectively. Additionally, the relationship between passive in-vehicle activities and perceived productivity was found to be stronger than the one with active in-vehicle activities and this time, the relationship was negative $r$ = -.07, $p$ = .245. Overall, hypothesis 1b suggesting that more frequent use of active in-vehicle activities will be correlated with higher perceived control and commute predictability scores during return commutes was not supported.

Table 4

*Correlations among Study Variables to Home from School/work (N = 306)*

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1. Active Activities | | | | | |
| 2. Passive Activities | .15* | | | | |
| 3. Commute Productivity | .03 | -.07 | | | |
| 4. Commute Predictability | -.07 | -.02 | .20** | | |
| 5. Commute Control | -.05 | -.01 | .12* | .23** | |

*p < .05, two-tailed. **p < .01, two-tailed. ***p < .001, two-tailed.

Although the relationships are non-significant, the trend showed that the higher the frequency rate of active in-vehicle activities, the lower the perceived control of commuters and their perceived commute predictability on both directions of the commute. Additionally, for both directions, a non-significant positive relationship between active in-vehicle activities and perceived productivity of the commute was found, for commutes to school/work $r$ = .05, $p$ = .356 and for return commutes $r$ = .03, $p$ = .652.

In addition to participants' actual commute ratings, we also asked if they "think" the activities they perform while commuting make their commute more predictable, controllable and productive. The only significant relationship we found was between active in-vehicle

activities and the perception on the productivity for both ways of the commute. To school/work from home, there was a significant positive relationship between the frequency rate of active in-vehicle activities and their effect on commuters' perception of productivity, $r = .12$, $p = .030$ and to home from school/work, $r = .19$, $p = .001$.

After exploring the correlations, we conducted a paired samples t test to compare perceived commute stress scores for both commute directions. There was a significant difference in perceived commute stress scores between commutes to school/work and commutes to home from school $t(305) = 3.1$, $p = .002$.

Table 5

*Descriptive Statistics and T-test Results for Perceived Commute Stress*

| | To School/work | | To Home | | | 95% CI for Mean Difference | | | |
|---|---|---|---|---|---|---|---|---|---|
| Outcome | M | SD | M | SD | N | | r | t | df |
| Perceived Commute Stress | 3.77 | 1.62 | 3.47 | 1.67 | 306 | .11, .50 | .45* | 3.1* | 305 |

* $p < .05$.

Then, we tested hypothesis 2 by mediation analysis using Baron & Kenny's (1983) Causal Steps Approach.

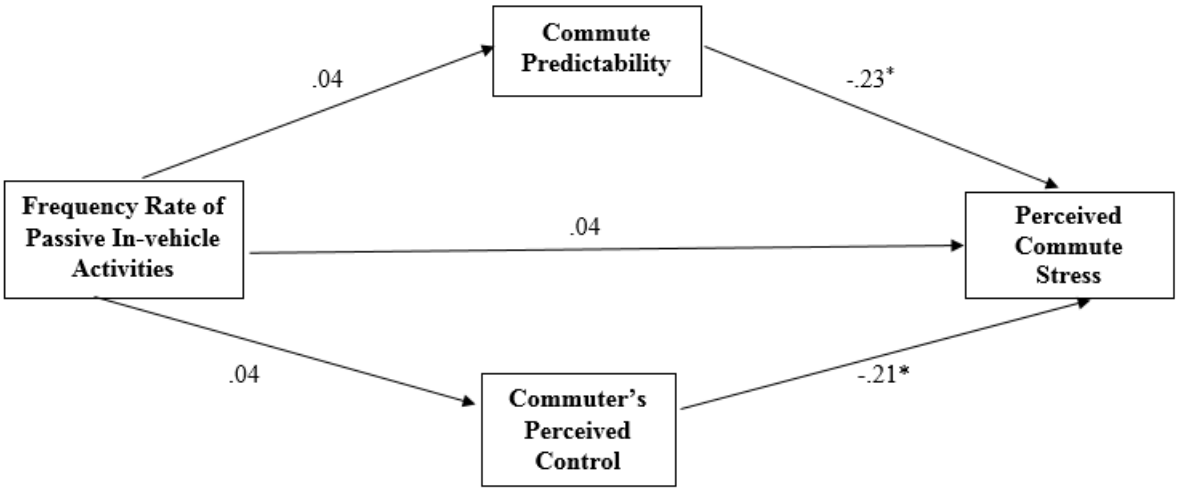
**Commutes to School/Work**

Hypothesis 2a predicted that the relationship between the frequency rate of in-vehicle activities and perceived commute stress is mediated by perceived control and predictability. More frequent use of passive in-vehicle activities will lead to less perceived commute stress through increased perceived control and commute predictability during commutes to school/work from home. For commutes to school/work from home, in Step 1 of the mediation model, the regression of perceived commute stress scores on the frequency rate of passive in-vehicle activities, ignoring mediators, was not significant, $b = .02$, $t(306) = .60$, $p = .551$. Step 2 showed that the regression of the frequency rate of passive in-vehicle activities on

mediators, commute predictability and commuter's perceived control, were not significant, *b* = .04, *t*(306) = 1.71, *p* =.088 and *b* = .04, *t*(306) = 1.59, *p* =.112 respectively. Step 3 of the mediation process showed that mediators commute predictability and perceived control were significantly related to perceived commute stress scores controlling for the frequency rate of passive in-vehicle activities, *b* = -.23, *t*(306) = -2.29, *p* =.023 and *b* = -.21, *t*(306) = -2.30, *p* =.022 respectively. Step 4 of the analyses revealed that controlling for the mediators, frequency rate of passive in-vehicle activities was still not a significant predictor of perceived commute stress scores, *b* = .04, *t*(306) = 1.04, *p* =.297.

Figure 1

*Mediation Model with Passive In-vehicle Activities for Commutes to School/Work from Home*



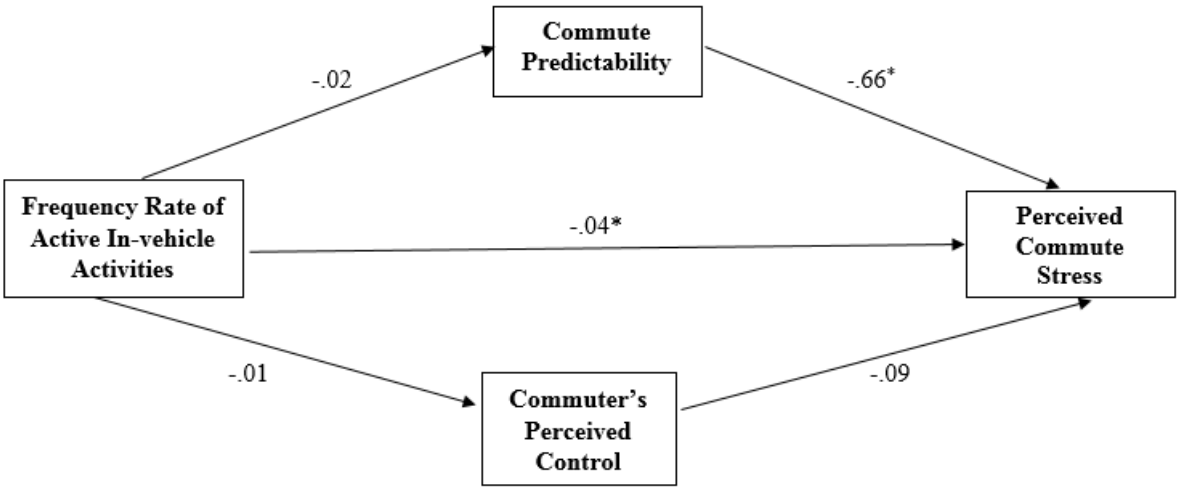

Since 1st and 2nd steps of Baron & Kenny's procedures were not met, our results were not consistent with our mediation hypothesis. Thus, hypothesis 2a suggesting that the relationship between the frequency rate of in-vehicle activities and perceived commute stress is mediated by perceived control and predictability and more frequent use of passive in-vehicle activities will lead to less perceived commute stress through increased perceived control and commute predictability during commutes to school/work was not supported.

**Commutes to Home**

Hypothesis 2b predicted that the relationship between the frequency rate of in-vehicle activities and perceived commute stress is mediated by perceived control and predictability. More frequent use of active in-vehicle activities will lead to less perceived commute stress through increased perceived control and commute predictability during return commutes. For commutes to home from school/work, in Step 1 of the mediation model, the regression of perceived commute stress scores on the frequency rate of active in-vehicle activities, ignoring mediators, was not significant, $b = .03$, $t(306) = 1.24$, $p = .214$. Step 2 showed that the regression of the frequency rate of active in-vehicle activities on mediators, commute predictability and commuter's perceived control, were not significant $b = -.02$, $t(306) = -1.24$, $p = .218$ and $b = -.01$, $t(306) = -.94$, $p = .349$ respectively. Step 3 of the mediation process showed that mediator commute predictability was significantly related to perceived commute stress scores controlling for the rate of active in-vehicle activities, $b = -.66$, $t(306) = 8.18$, $p = .000$. On the other hand, mediator commuter's perceived control score was not significantly related to perceived commute stress scores controlling for the frequency rate of active in-vehicle activities, $b = -.09$, $t(306) = 1.03$, $p = .306$. Step 4 of the analyses revealed that controlling for the mediators, frequency rate of active in-vehicle activities was a significant predictor of perceived commute scores, $b = -.04$, $t(306) = 2.03$, $p = .043$.

Figure 2

*Mediation Model with Active In-vehicle Activities for Commutes to Home from School/Work*




Since 1st and 2nd steps of Baron & Kenny's procedures were not met our results were not consistent with our mediation hypothesis. Thus, hypothesis 2b suggesting that the relationship between the frequency rate of in-vehicle activities and perceived commute stress is mediated by perceived control and predictability and more frequent use of active in-vehicle activities will lead to less perceived commute stress through increased perceived control and commute predictability during commutes back home was not supported. More frequent use of active in-vehicle activities led to less perceived commute stress during return commutes as we predicted but the process was not through increased perceived control and commute predictability.

When we did the same mediation analysis by replacing perceived commute stress with general perceived stress, all the results we found were not significant suggesting that characteristics of commutes to school/work do not have further significant effects on commuters' general perceived stress scores.

Figure 3

*Mediation Model with PSS for Commutes to School/Work*

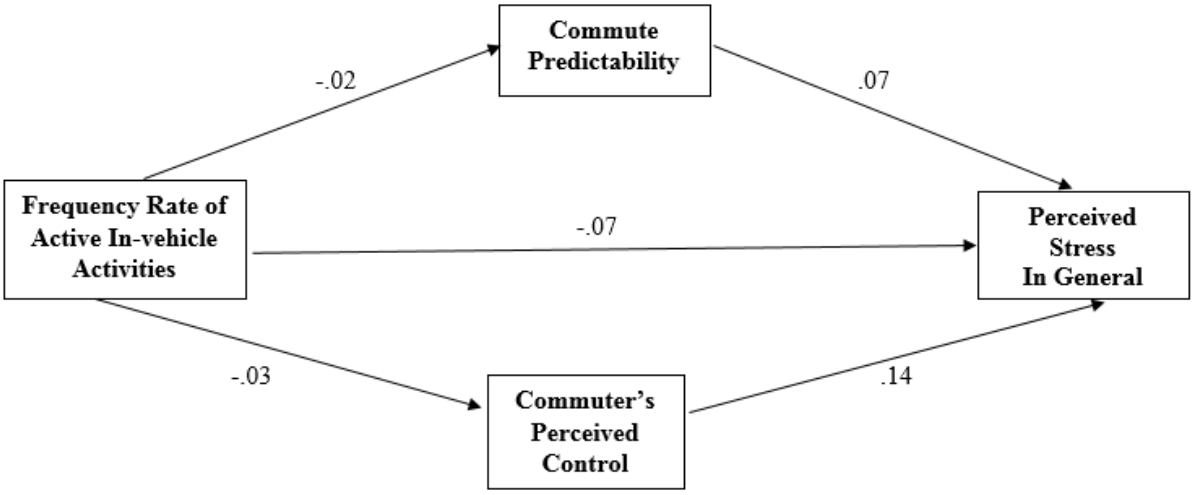
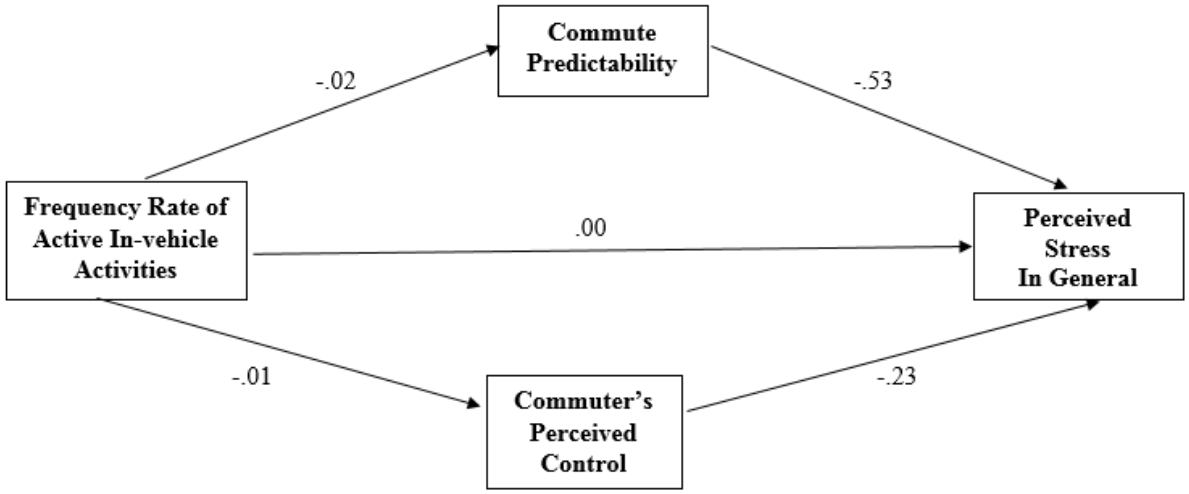



Figure 4

*Mediation Model with PSS for Commutes to Home*




Additionally, we conducted an independent samples t-test to compare commute predictability and perceived control scores for driving and not driving conditions. The only significant difference we found was in perceived control scores during commutes to school/work for driving ($M$ = 3.27, $SD$ = 1.07) and not driving ($M$ = 2.98, $SD$ = .95) conditions, $t(304) = 2.53$, $p = .012$. These results suggest that driving increases all scores scores for both directions. Specifically, when commuters were drivers, their perceived control scores increased significantly on the way to school/work from home.

Table 6

*Results of T-tests and Descriptive Statistics for Commute Predictability & Perceived Control by Driving Condition*

| Outcome | Group | | | | | | 95% CI for Mean Difference | | |
|---|---|---|---|---|---|---|---|---|---|
| | Drivers | | | Non-drivers | | | | | |
| | M | SD | N | M | SD | N | | T | df |
| Commute Predictability | 3.95 | .86 | 133 | 3.81 | .98 | 173 | -.07, .35 | 1.29 | 304 |
| Perceived Control | 3.27 | 1.07 | 133 | 2.98 | .95 | 173 | -.07, .52 | 2.53* | 304 |
| Commute Predictability (Return) | 3.61 | 1.03 | 133 | 3.53 | 1.13 | 173 | -.17, .32 | .62 | 304 |
| Perceived Control (Return) | 3.2 | 1.06 | 133 | 3.1 | 1.06 | 173 | -.14, .34 | .80 | 304 |

* $p < .05$.

Our third hypothesis suggests that ridesharing moderates the relationship between the frequency rate of in-vehicle activities and perceived commute stress regardless of the activity type and direction of the commute. First, we conducted an independent samples t-test to compare perceived commute stress scores for ridesharing and not ridesharing conditions. Both for commutes to school/work and to home there was a non-significant difference in perceived commute stress scores for ridesharing and not ridesharing conditions, $t(304) = -1.02$, $p = .30$ and $t(304) = .08$, $p = .93$ respectively. These results suggest that ridesharing does not have a significant effect on perceived commute stress scores.

Table 7

*Results of T-tests and Descriptive Statistics for Perceived Commute Stress by Ridesharing Condition*

| Outcome | Group | | | | | | 95% CI for Mean Difference | | |
|---|---|---|---|---|---|---|---|---|---|
| | Ridesharers | | | Non-ridesharers | | | | | |
| | M | SD | N | M | SD | N | | T | df |
| Perceived Commute Stress | 3.70 | .86 | 181 | 3.89 | .98 | 125 | -.56, .18 | -1.02 | 304 |
| Perceived Commute Stress (Return) | 3.47 | 1.71 | 175 | 3.46 | 1.62 | 131 | -.36, .40 | .80 | 304 |

* p < .05.

Then, to test our moderation hypothesis, a hierarchical multiple regression analysis was conducted and Baron & Kenny's procedures were followed (1983).

**Commutes to School/Work**

First, we centered our continuous predictor, frequency rate of active in-vehicle activities. Then, we created an interaction term between the centered frequency rate of active in-vehicle activities and our dummy variable for ridesharing. In the first step, both variables were included: frequency rate of active in-vehicle activities and ridesharing. These variables accounted for a very small amount of variance in total perceived commute stress scores, $R^2$ = .01, $F(1, 304) = 1.45$, $p = .236$. In the second step of the regression analysis, we added the interaction term, which accounted for a very small proportion of the variance in perceived commute stress scores, $\Delta R^2 = .00$, $\Delta F(1, 303) = .92$, $p = .338$, $b = -.04$, $t(304) = -.96$, $p = .338$. We did the same analysis with passive activities and ridesharing and the results we found were again not-significant.

**Commutes to Home**

We followed same procedures for return commutes from school/work back home. For return commutes, our variables, frequency rate of passive in-vehicle activities and perceived commute stress, accounted for a very small amount of variance in total perceived commute

stress scores, $R^2$ = .00, $F(2, 303)$ = .33, $p$ = .716. In the second step of the regression analysis, we added the interaction term, which accounted for a very small proportion of the variance in perceived commute stress scores, $\Delta R^2$ = .00, $\Delta F(1, 302)$ = .34, $p$ = .562, $b$ = .04, $t(304)$ = .58, $p$ = .562. We did the same analysis with active activities and ridesharing and the results we found were again not-significant. Thus, we can conclude that hypothesis 3 is not supported suggesting that ridesharing moderates the relationship between frequency rate of in-vehicle activities and perceived commute stress regardless of the activity type and the direction of the commute.

Hypothesis 4 predicted that the relationship between frequency rate of in-vehicle activities and life satisfaction scores is mediated by commute satisfaction scores. First we looked at the correlations between the frequency rate of both types of in-vehicle activities, commute satisfaction and life satisfaction scores for commutes to school/work.

Table 8

*Correlations among Study Variables to School/work from Home (N = 306)*

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| 1. Active Activities | | | | |
| 2. Passive Activities | | | | |
| 3. Commute Satisfaction | -.10 | .12* | | |
| 4. Life Satisfaction | .01 | .03 | .35** | |

*p < .05. **p < .01. ***p < .001.

For commutes to school/work from home, we found a significant relationship between the frequency rate of passive in-vehicle activities and commute satisfaction, $r$ = .12, $p$ = .042 and between commute satisfaction and life satisfaction scores, $r$ = .35 $p$ = .000.

For commutes to home from school/work, the relationship between return commute satisfaction and life satisfaction scores was still significant but weaker than the one during commutes to school/work, $r = .25$ $p = .000$.

Table 9

*Correlations among Study Variables to Home from School/work (N = 306)*

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| 1. Active Activities | | | | |
| 2. Passive Activities | | | | |
| 3. Commute Satisfaction | .04 | .04 | | |
| 4. Life Satisfaction | .02 | .03 | .25** | |

*p < .05. **p < .01. ***p < .001.

Finally, we looked at the correlation between overall (without differentiating the directions) commute satisfaction and life satisfaction. As we predicted, there was a significant positive correlation between overall commute and life satisfaction scores, $r = .34$, $p = .000$.

After exploring the correlations, we conducted a paired samples t test to compare commute satisfaction scores for both commute directions. There was a non-significant difference in commute satisfaction scores between commutes to school/work and commutes to home from school $t(305) = -.83$, $p = .406$.

Table 10

*Descriptive Statistics and T-test Results for Commute Satisfaction by Commute Directions*

| Outcome | To School/work | | To Home | | n | 95% CI for Mean Difference | r | t | df |
|---|---|---|---|---|---|---|---|---|---|
| | M | SD | M | SD | | | | | |
| Commute Satisfaction | 36.36 | 9.30 | 36.76 | 10.79 | 306 | -1.34, .54 | .66* | -.83 | 305 |

* p < .05.

**Commutes to School/Work**

We tested hypothesis 4a by mediation analysis using Baron & Kenny's (1983) Causal Steps Approach. Hypothesis 4a suggested that the relationship between frequency rate of in-vehicle activities and life satisfaction scores is mediated by commute satisfaction scores. More frequent use of passive in-vehicle activities will lead to higher life satisfaction through increased commute satisfaction during commutes to school/work.

For commutes to school/work from home, in Step 1 of the mediation model, the regression of life satisfaction scores on the frequency rate of passive in-vehicle activities, ignoring mediator, was not significant, $b = .08$, $t(306) = .55$, $p = .583$. Step 2 showed that the regression of the frequency rate of passive in-vehicle activities on mediator, commute satisfaction, was significant, $b = .41$, $t(306) = -2.05$, $p = .042$. Step 3 of the mediation process showed that mediator commute satisfaction was significantly related to life satisfaction controlling for the frequency rate of passive in-vehicle activities, $b = .24$, $t(306) = 6.49$, $p = .000$. Step 4 of the analyses revealed that controlling for the mediator, frequency rate of passive in-vehicle activities was still not a significant predictor of life satisfaction, $b = -.02$, $t(306) = -.18$, $p = .860$.

Figure 5

*Mediation Model with Passive In-vehicle Activities for Commutes to School/Work from Home*


We conducted the same mediation analysis using the frequency rate of active in-vehicle activities for commutes to school/work from home. For commutes to school/work from home, in Step 1 of the mediation model, the regression of life satisfaction scores on the frequency rate of active in-vehicle activities, ignoring mediator, was not significant, $b$ = .85, $t$(306) = .20, $p$ = .846. Step 2 showed that the regression of the frequency rate of active in-vehicle activities on mediator, commute satisfaction, was not significant, $b$ = -.21, $t$(306) = -1.68, $p$ =.094. Step 3 of the mediation process showed that mediator commute satisfaction was significantly related to life satisfaction controlling for the frequency rate of active in-vehicle activities, $b$ = .24, $t$(306) = 6.57, $p$ =.000. Step 4 of the analyses revealed that controlling for the mediator, frequency rate of active in-vehicle activities was still not a significant predictor of life satisfaction, $b$ = .07, $t$(306) = .84, $p$ =.403.

Figure 6

*Mediation Model with Active In-vehicle Activities for Commutes to School/Work from Home*


In our model with passive in-vehicle activities, both 2nd and 3rd steps of Baron & Kenny's procedures are met, whereas in our model with active in-vehicle activities only 3rd step of Baron & Kenny's procedures is met. Since 1st and 2nd steps of Baron & Kenny's procedures were not met, our results were not consistent with our mediation hypothesis. As we predicted, more frequent use of passive in-vehicle activities during commutes to school/work led to higher commute satisfaction and increased commute satisfaction led to higher life satisfaction scores but this was not through a mediation process. Thus, hypothesis 4a suggesting that the relationship between frequency rate of in-vehicle activities and life satisfaction scores is mediated by commute satisfaction scores and more frequent use of passive in-vehicle activities will lead to higher life satisfaction through increased commute satisfaction during commutes to school/work was not supported.

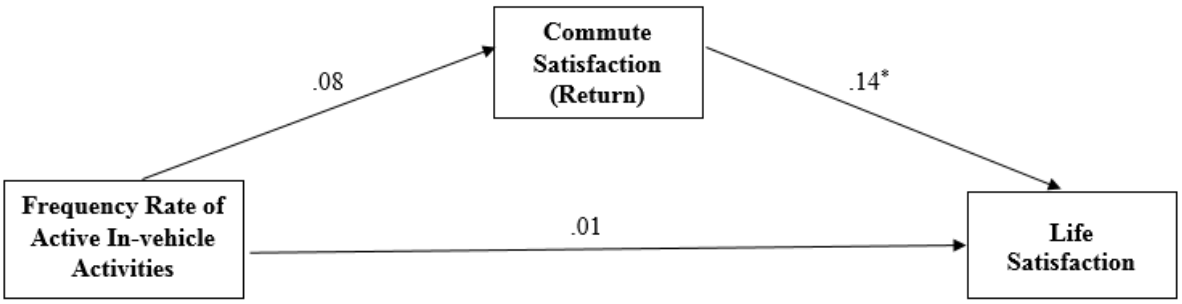
**Commutes to Home**

Hypothesis 4b suggested that the relationship between frequency rate of in-vehicle activities and life satisfaction scores is mediated by commute satisfaction scores. More frequent use of active in-vehicle activities will lead to higher life satisfaction through increased commute satisfaction during commutes back home. For commutes to home from school/work, in Step 1 of the mediation model, the regression of life satisfaction scores on the frequency rate of active in-vehicle activities, ignoring mediator, was not significant, $b$ = .03,

*t*(306) = .34, *p* = .737. Step 2 showed that the regression of the usage rate of active in-vehicle activities on mediator, commute satisfaction, was not significant, *b* = .08, *t*(306) = .65, *p* =.519. Step 3 of the mediation process showed that mediator commute satisfaction was significantly related to life satisfaction controlling for the frequency rate of active in-vehicle activities, *b* = .14, *t*(306) = 4.4, *p* =.000. Step 4 of the analyses revealed that controlling for the mediator, frequency rate of active in-vehicle activities was still not a significant predictor of life satisfaction, *b* = .01, *t*(306) = .18, *p* =.855.

Figure 7

*Mediation Model with Active In-vehicle Activities for Commutes to Home from School/Work*

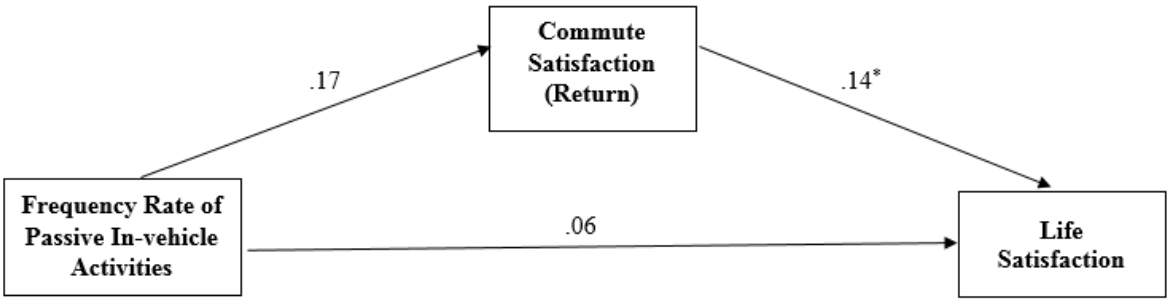



We conducted the same mediation analysis using the frequency rate of passive in-vehicle activities. For commutes to home from school/work, in Step 1 of the mediation model, the regression of life satisfaction scores on the frequency rate of passive in-vehicle activities, ignoring mediator, was not significant, *b* = .08, *t*(306) = .60, *p* = .551. Step 2 showed that the regression of the usage rate of passive in-vehicle activities on mediator, commute satisfaction, was not significant, *b* = .17, *t*(306) = -.72, *p* =.471. Step 3 of the mediation process showed that mediator commute satisfaction was significantly related to life satisfaction controlling for the frequency rate of passive in-vehicle activities, *b* = .14, *t*(306) = 4.39, *p* =.000. Step 4 of the analyses revealed that controlling for the mediator, frequency rate

of passive in-vehicle activities was still not a significant predictor of life satisfaction, $b$ = .06, $t(306)$ = .43, $p$ = .666.

Figure 8

*Mediation Model with Passive In-vehicle Activities for Commutes to Home from School/Work*




Since 1st and 2nd steps of Baron & Kenny's procedures were not met, our results were not consistent with our mediation hypothesis. As we predicted, more frequent use of active in-vehicle activities during commutes to home led to higher commute satisfaction and increased commute satisfaction led to higher life satisfaction scores but this was not through a mediation process. Thus, hypothesis 4b suggesting that the relationship between frequency rate of in-vehicle activities and life satisfaction scores is mediated by commute satisfaction scores and more frequent use of active in-vehicle activities will lead to higher life satisfaction through increased commute satisfaction during commutes back home was not supported.

We also looked at the correlations between perceived commute stress and commute satisfaction scores for both directions of commute. There was a significant negative relationship between perceived commute stress and commute satisfaction on both commutes to school/work, $r$ = -.71, $p$ = .000 and return commutes, $r$ = -.82, $p$ = .000.

Additionally, we conducted an independent samples t-test to compare commute satisfaction scores for driving and not driving conditions. There was a significant difference in commute satisfaction scores during commutes to school/work for driving ($M$ = 37.76, $SD$ =

8.94) and not driving ($M$ = 35.28, $SD$ = 9.45) conditions, $t(304) = 2.33$, $p = .021$. Overall commute satisfaction scores were also significantly different for driving ($M$ = 36.95, $SD$ = 9.80) and not driving ($M$ = 34.17, $SD$ = 9.96) conditions, $t(304) = 2.44$, $p = .015$. These results suggest that driving really does have an effect on commute satisfaction. Specifically, when commuters were drivers, both their commute satisfaction on the way to school/work and overall commute satisfaction scores increased. However, driving did not have a significant effect on return commute satisfaction.

Table 11

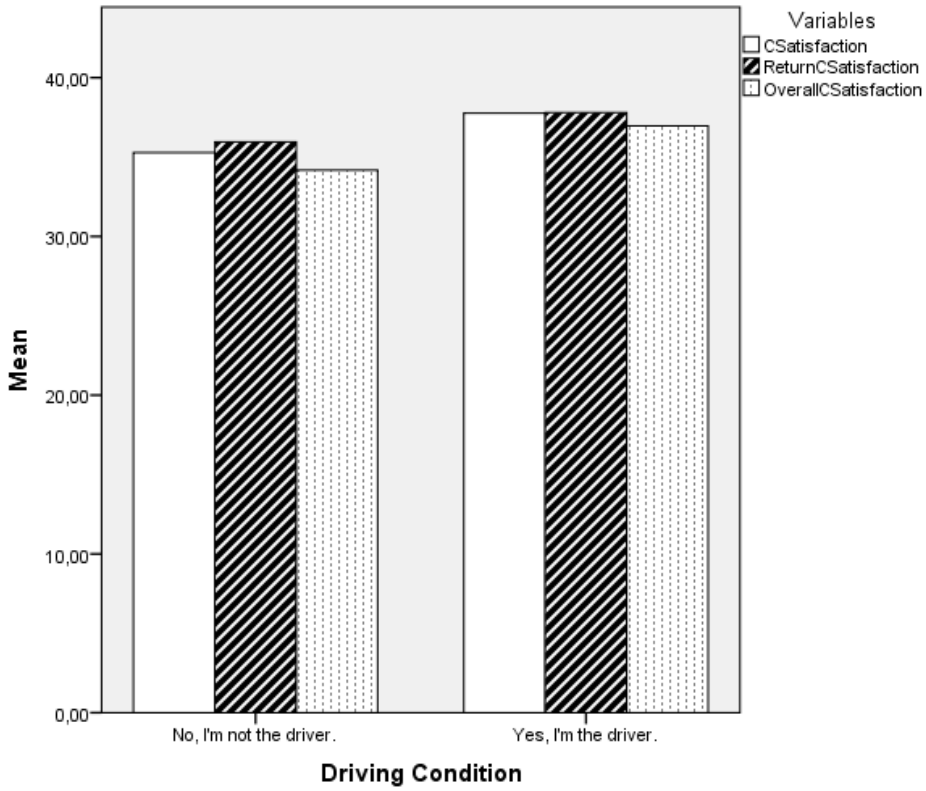
*Results of T-tests and Descriptive Statistics for Commute Satisfaction by Driving Condition*

| Outcome | Group | | | | | | 95% CI for Mean Difference | | |
|---|---|---|---|---|---|---|---|---|---|
| | Drivers | | | Non-drivers | | | | | |
| | M | SD | n | M | SD | n | | T | Df |
| Commute Satisfaction | 37.76 | 8.94 | 133 | 35.28 | 9.45 | 173 | .38, 4.57 | 2.33* | 304 |
| Commute Satisfaction (Return) | 37.78 | 10.51 | 133 | 35.96 | 10.97 | 173 | -.61, 4.28 | 1.48 | 304 |
| Commute Satisfaction (Overall) | 36.95 | 9.80 | 133 | 34.17 | 9.96 | 173 | .54, 5.03 | 2.44* | 304 |

* $p < .05$.

Figure 9

*Commute Satisfaction by Driving Condition*




When we conducted another independent samples t-test to compare commute satisfaction scores for ridesharing and not ridesharing conditions, we found a non-significant difference in commute satisfaction scores for ridesharing and not ridesharing conditions during both commutes to school/work, $t(304) = .91$, $p = .365$ and return commutes, $t(304) = .32$, $p = .746$.

Table 12

*Results of T-tests and Descriptive Statistics for Commute Satisfaction by Ridesharing Condition*

| Outcome | Group | | | | | | 95% CI for Mean Difference | | |
|---|---|---|---|---|---|---|---|---|---|
| | Ridesharers | | | Non-ridesharers | | | | | |
| | M | SD | n | M | SD | n | | t | Df |
| Commute Satisfaction | 36.78 | 9.09 | 175 | 35.80 | 9.58 | 131 | -1.14, 3.10 | .91 | 304 |
| Commute Satisfaction (Return) | 36.93 | 11.03 | 175 | 36.53 | 10.50 | 131 | -2.05, 2.86 | .32 | 304 |

* p < .05.

We also checked if gender has an effect on commute stress and satifaction and our independent samples t-test showed no significant differences between male and female commuters. We found that higher commute duration is significantly associated with lower commute satisfaction for both directions, $r$ = -.20, $p$ = .000 and $r$ = -.22, $p$ = .000 respectively for commutes to school and back home. Commute duration is also positively correlated with perceived commute stress and this relation is significant for return commutes, $r$ = .12, $p$ = .032.

Finally, we looked at the correlations between each in-vehicle activity and perceived commute stress and commute satisfaction without using clusters as active and passive. In other words, we did not group activities into two categories as active and passive but used them separately as reading, working, sleeping etc. As a result, for commutes to school/work, we found only one activity "*talking to other commuters, friends or family members*", the higher frequency rate of which was significantly associated with less perceived commute stress, $r$ = -.12, $p$ = .042 and more commute satisfaction scores, $r$ = .29, $p$ = .000. For return commutes, higher frequency rate of *talking to other commuters, friends or family members* is again significantly associated with less perceived commute stress, $r$ = -.26, $p$ = .000 and more commute satisfaction scores, $r$ = .34, $p$ = .000. More frequency rate of *texting or talking on the phone* was also significantly associated with less perceived commute stress, $r$ = -.13, $p$ = .026 and more commute satisfaction scores, $r$ = .13, $p$ = .028 on return commutes.

## Discussion

There is a growing interest on commute behavior in the literature (e.g., Lyons, 2008; Ohmari & Harata, 2008; Páez & Whalen, 2010; & Urry, 2013; ) and its association with commuters' psychological outcomes (e.g., Evans, 2002; Ettema, Friman, Gärling, Olsson, & Fujii, 2010-2013). The objective of this study was to investigate the effects of in-vehicle activities on perceived commute stress, commute satisfaction and life satisfaction. A growing interest in literature suggest that commute mode has an effect on perceived commute stress (Gatersleben & Uzell, 2007) and in-vehicle activities affect commute satisfaction (Lyons et al., 2005; Ettema et al., 2012). However, up to date there is no research known exploring the effects of in-vehicle activities on psychological outcomes beyond commute satisfaction. We had known commute mode affects perceived commute stress but aimed to investigate if the activity type itself-- independent of the mode-- has an effect on perceived commute stress and commute satisfaction and if these effects can further influence general stress scores and life satisfaction.

### Contributions of the Study

This study has three potential contributions to the growing literature. First, we filled a gap in the literature by investigating the effects of in-vehicle activities instead of commute mode on psychological outcomes such as perceived commute stress, perceived life stress and life satisfaction.

Second, this study is, to our knowledge, the first study exploring commute behavior in a psychological perspective in Turkey. Most of the research in Turkey has focused on traffic accidents. However, an exhaustive search through the Turkish Council of Higher Education Database yielded no other studies on commute behavior. According to a research conducted in whole Europe by PageGroup in 2016, employees in Turkey among all European countries

spend the most time on commuting. Hence, our attempt to examine the effects of how we spend our time while commuting will be useful for future studies in Turkey.

Third, this study tried to explain the effects of in-vehicle activities on different psychological outcomes together. Instead of focusing on one outcome such as perceived commute stress, we tried to incorporate all possible associations in one big study. By exploring the effects of in-vehicle activities on perceived commute stress, general stress, commute satisfaction, and life satisfaction, we aimed to show the combined effect of these activities in our lives and how important they are.

In this study, we found that there is a positive relationship betwen frequency rate of passive in-vehicle activities and perceived control and commute predictability scores during commutes to school/work. However, this relationship was not significant as we predicted. Thus, our hypothesis 1a was not supported. For return commutes, we predicted that more frequent use of active in-vehicle activities were going to correlate with higher perceived control and commute predictability scores. However, on the way back home, more frequent use of both types of in-vehicle activities led to lower perceived control and commute predictability scores. Thus, our hypothesis 1b was not supported. In addition to participants' actual commute ratings, we also asked if they "think" the activities they perform while commuting make their commute more predictable, controllable and productive. The only significant relationship we found was between active in-vehicle activities and the perception on the productivity for both ways of the commute. We can conclude that commuters think active in-vehicle activities make their commute more productive. However, engaging in active in-vehicle activities does not improve neither actual perceived control and commute predictability scores nor the perception of perceived control and commute predictability.

Our results supported the Evans (2008) and Sposato's (2011) findings showing that higher commute unpredictability and less perceived control lead to higher perceived

commute stress for both directions of the commute. For commutes to school/work, more frequent use of passive in-vehicle activities led to more perceived control and commute predictability scores and higher perceived control and commute predictability scores led to lower perceived commute stress. However, there was no mediation process as we predicted and our hypothesis 2a was not supported.

On return commutes, more frequent use of active in-vehicle activities significantly decreased perceived commute stress but as opposed to what we predicted, this effect was not through increased perceived control and commute predictability scores. Interestingly, engaging in active in-vehicle activities led to lower perceived control and commute predictability scores during return commutes. Hence, our hypothesis 2b was not supported. Additionally, our paired sample t-test suggested that perceived commute stress is significantly lower during return commutes. These results support that the nature of the commute (to school/work vs return) has an effect on the relationship between activity type, commute predictability, perceived control, and perceived commute stress.

When we looked at further effects of active in-vehicle activities on perceived life stress in general, we found no significant results suggesting that general stress is affected by many events in life and commuting accounts for only a small portion of it. As a whole, there was no mediation process to support our second hypothesis. However, we proved that perceived commute stress is affected by commute predictability and perceived control as previous literature suggests.

Our t-test suggested that commute stress scores are not significantly different for ridesharing and not ridesharing conditions on both directions. We found that ridesharing does not moderate the relationship between the frequency rate of in-vehicle activities and perceived commute stress. Thus, our 3rd hypothesis was not supported suggesting that ridesharing moderates the relationship between the frequency rate of in-vehicle activities and

perceived commute stress regardless of the activity type and direction of the commute. Even though the results were not significant, we showed that perceived commute stress decreases when commuters share their ride as Novaco et al., (1994) and Schaeffer et al., (1988) suggested. However, the fact that this positive effect of ridesharing on perceived commute stress was only found for commutes to school/work suggesting a capitalization on chance rather than an actual difference between commute directions. Maybe commuting to work with others makes being late a shared-blame experience, while going home does not have that issue since nobody cares much if you return home late. This is just a theory and can be further studied in the future. Our results also revealed that when commuters were drivers their perceived control scores were higher during commutes to school/work.

While testing hypothesis 4 we found that for both directions, higher commute satisfaction scores were significantly related to higher life satisfaction scores. This is consistent with previous literature stating that higher commute satisfaction lead to higher life satisfaction. As we predicted, higher frequency rate of passive in-vehicle activities during commutes to school/work led to higher commute satisfaction scores. However, hypothesis 4a suggesting that the relationship between frequency rate of in-vehicle activities and life satisfaction scores is mediated by commute satisfaction scores and more frequent use of passive in-vehicle activities will lead to higher life satisfaction through increased commute satisfaction during commutes to school/work was not supported because there was no mediation process. Similarly, higher frequency rate of active in-vehicle activities during return commutes led to higher commute satisfaction scores as we predicted. However, hypothesis 4b was not supported since our model did not meet all the procedures for mediation process. Moreover, as opposed to what we predicted, the effect of passive in-vehicle activities on commute satisfaction was bigger than the effect of active in-vehicle activities during return commutes as well.

Although there was no mediation process, we demonstrated that higher commute satisfaction scores significantly lead to higher life satisfaction scores in line with our expectations. The effect of passive in-vehicle activities on commute satisfaction was bigger than the effect of active in-vehicle activities. On both directions, more frequent use of passive in-vehicle activities led to more commute satisfaction than active in-vehicle activities. It is interesting to prove that more frequent use of active in-vehicle activities decreases commute satisfaction on commutes to school/work but increases commute satisfaction on the way back home. Our analyses also revealed that ridesharers score better on commute satisfaction for both commute directions. Furthermore, when commuters were drivers, both their commute satisfaction to school/work and overall commute satisfaction scores increased. There was also a significant negative relationship between perceived commute stress and commute satisfaction on both commute directions.

When we used in-vehicle activities without grouping them into two clusters as active and passive, the only significant relationship for both ways of commuting we found was between "*talking to others*" and psychological outcomes. For both directions, higher frequency rate of talking to other commuters, friends or family members were associated with less perceived commute stress and more commute satisfaction scores. "*Texting or talking on the phone*" had the same effect on commutes to school/work suggesting that activities enabling commuters to socialize, function as a buffer between commuters and negative psychological outcomes.

**Limitations and Suggestions**

This research has three major limitations. First is the issue of causality. Using survey methodology allowed us only to draw correlations, not causalities among the study variables. We think that using experimental methodology was not appropriate for the purposes of this study either, because it was neither possible to create a commute environment in lab settings

nor to observe commuters in their actual commute environment. Hence, we conducted an explanatory research. Because our data was based on only self-reports, it might have been exposed to memory distortions. Therefore, a diary method and a longitudinal study design might provide a better understanding of the relationships between in-vehicle activities and outcome variables.

Second limitation is the issue of in-vehicle activity categorization. We conducted a pretest on a small sample consisting of 40 students and found two distinct clusters of in-vehicle activities. The first cluster consisted of *active* in-vehicle activities which were found to be stimulating such as reading for leisure, working/studying, thinking etc. The second cluster consisted of *passive* in-vehicle activities such as listening to music/radio, sleeping, eating and doing nothing. We used these two clusters in our actual study and the insignificant results we found might be due to a wrong classification. For instance, according to the small sample in our pretest, reading was an active in-vehicle activity but our participants in the actual study could have rated it as a passive activity. It is also a possibility that students in the pretest had different opinions than we did on the definitions of active and passive. We asked them to rate in-vehicle activities from very relaxing to very stimulating in terms of their engagement and cognitive effort they need to make while performing the activity and we clustered activities accordingly. After all, the engagement level and cognitive effort needed to perform an activity may vary from one person to the other. Hence, each person's opinion on what activity is active and passive could be different. Our purpose to force the data to create two clusters as active and passive in-vehicle activities might be one of the reasons why we could not observe the effects as we hypothesized.

Third limitation is the issue of diversity in the sample. The sample was dominated with university students which might have affected the types of in-vehicle activities and the levels of psychological outcomes (e.g., employees may report higher stress scores than

students) reported by students. Most of the previous studies about commuting we based this study on recruited employees. Thus, future studies are recommended to include both employees and students with different ages in the sample to explore whether there would be a significant effect of the type of job and age. Similarly, we have recruited our participants mainly from one university in a selected district of Istanbul, thereby limiting the generalizability of our results to Turkey or even to Istanbul as a whole. Evidence based on a randomly selected sample of students from a greater selection of universities throughout the country could better represent commute behavior of Turkish students.

**Practical Implications**

Our results have important practical implications. They showed the importance of exploring the roles of commute predictability and perceived control on commute stress and commute satisfaction on life satisfaction. Even if we failed to support our hypotheses that the frequency rate of in-vehicle activities significantly affects perceived commute stress and commute satisfaction through mediation and moderation processes, we have still made a valuable contribution to the commute literature. Our results supported the argument that higher commute predictability and perceived control lead to less perceived commute stress. These results can also be transferred to organizational environment. When perceived control level of employees increases, more positive outcomes shall be expected. Frequency rate of in-vehicle activities was not effective to increase commute predictability and perceived control but we found that driving significantly increases perceived control on commutes to school/work. Moreover, during commutes to school/work, commuters who shared their ride had less perceived commute stress scores. When it comes to commute satisfaction, ridesharers reported higher scores than non-ridesharers for both directions of commute. Higher rates of texting/talking to other commuters, friends and family members was significantly associated with less perceived commute stress and more commute satistaction.

In return, public transport providers might hopefully recognize and nurture their service such that, vehicles would be seen as points of meeting and social engagement rather than mereley people movers. Moreover, drivers reported higher commute satisfaction than non-drivers both for commutes to school/work and their overall commute experience. We also proved that there is a significant and positive relationship between commute and life satisfaction.

Summarizing the results, commuters should do what is necessary to increase commute predictability and perceived control if they want to suffer less from commute stress. Activity type is found to be an ineffective remedy. However, both driving and ridesharing during commutes to school/work from home would help commuters to decrease perceived commute stress. Similarly, both ridesharing and driving increase commute satisfaction on both directions and this may be the reason why Istanbul is revealed as one of the most congested cities in the world. Since commute satisfaction has a significant effect on life satisfaction, ways to increase commute satisfaction must be found. After all, a rise in the number of drivers to increase commute satisfaction would lead to other problems.

The findings of the present study are also expected to contribute to human resources practices and policies because commuting is increasingly seen as a part of work. The results of the present study demonstrated that when commuters experience higher commute satisfaction their life satisfaction scores increase as well. However, turnover rates and the number of refused job offers due to commuting are on the rise in Turkey. Turkey is also rated among the worst 5 countries in Europe based on work-life balance (PageGroup, 2016). Thus, companies should expand their work life balance policies that consider commuting experience. In other words, HR practices should pay attention to working hours and provide employees with flexible schedules, transportation facilities, better office locations or new practices. Our result suggesting that passive in-vehicle activities should be preferred on both directions implies that employees should not work within the vehicle. In other words,

providing employees with means to get things done in the office within the hours of work is of greater importance. Because public transit is usually unpredictable in Istanbul, HR professionals can also come up with ideas to encourage carpooling among employees. Finally, we would like to highlight the importance of the above recommendations to increase motivation of Generation Z members especially because they are found to experience work-personal life conflict and care about work-life balance more than previous generations (Tulgan, 2012; Dill, 2015; Jacoby, 2015).

**Future Directions**

In the future, it is necessary to conduct other studies to find ways to decrease perceived commute stress and increase commute satisfaction. It is possible to have significant effects of in-vehicle activities when they are clustered differently. Future studies should extend commuting-psychological outcomes interface by adding other domains such as commute costs, congestion or speed. To explore causality, a simulation technique or a video game about commuting can be created. This study should also be replicated with different samples and the results should be compared to see whether any difference between students and employees would occur.

**Conclusion**

In conclusion, this research shows that commute predictability, perceived control, driving, and ridesharing lead to less perceived commute stress and commute satisfaction significanlty contributes to life satisfaction. This research is limited in its scope but is hoped to stimulate more research on commute behavior and in-vehicle activities, the processes through which they foster other desirable psychological outcomes, and the contingencies under which they become effective.

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Table 1

*Descriptive Statistics for Demographics (N = 306)*

| Variable | Percentage |
|---|---|
| Female | 62.1 |
| Male | 37.6 |
| Drivers | 43.5 |
| Ride-sharers | 59.2 |
| Ride-sharers (Return) | 57.2 |
| Undergraduate students | 71.6 |
| Graduate students | 16.3 |
| Non-students | 11.8 |

Table 2

*Descriptive Statistics and T-test Results for Commute Predictability and Perceived Control*

| Outcome | To School/work | | To Home | | N | 95% CI for Mean Difference | r | t | df |
|---|---|---|---|---|---|---|---|---|---|
| | M | SD | M | SD | | | | | |
| Commute Predictability | 3.87 | .93 | 3.57 | 1.09 | 306 | 1.84, 4.24 | .45* | 4.97* | 305 |
| Perceived Control | 3.10 | 1.02 | 3.14 | 1.06 | 306 | -1.16, 0.84 | .47* | -.59 | 305 |

* $p < .05$.

Table 3

*Correlations among Study Variables to School/work from Home (N = 306)*

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 6. Active Activities | | | | | |
| 7. Passive Activities | .10 | | | | |
| 8. Commute Productivity | .05 | .03 | | | |
| 9. Commute Predictability | -.07 | .10 | .07 | | |
| 10. Commute Control | -.11 | .09 | .11 | .21** | |

*p < .05, two-tailed. **p < .01, two-tailed. ***p < .001, two-tailed.

Table 4

*Correlations among Study Variables to Home from School/work (N = 306)*

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1. Active Activities | | | | | |
| 2. Passive Activities | .15* | | | | |
| 3. Commute Productivity | .03 | -.07 | | | |
| 4. Commute Predictability | -.07 | -.02 | .20** | | |
| 5. Commute Control | -.05 | -.01 | .12* | .23** | |

*p < .05, two-tailed. **p < .01, two-tailed. ***p < .001, two-tailed.

Table 5

*Descriptive Statistics and T-test Results for Perceived Commute Stress*

| Outcome | To School/work | | To Home | | N | 95% CI for Mean Difference | r | t | df |
|---|---|---|---|---|---|---|---|---|---|
| | M | SD | M | SD | | | | | |
| Perceived Commute Stress | 3.77 | 1.62 | 3.47 | 1.67 | 306 | .11, .50 | .45* | 3.1* | 305 |

* $p < .05$.

Table 6

*Results of T-tests and Descriptive Statistics for Commute Predictability & Perceived Control by Driving Condition*

| Outcome | Group | | | | | | 95% CI for Mean Difference | | |
|---|---|---|---|---|---|---|---|---|---|
| | Drivers | | | Non-drivers | | | | | |
| | M | SD | N | M | SD | N | | T | df |
| Commute Predictability | 3.95 | .86 | 133 | 3.81 | .98 | 173 | -.07, .35 | 1.29 | 304 |
| Perceived Control | 3.27 | 1.07 | 133 | 2.98 | .95 | 173 | -.07, .52 | 2.53* | 304 |
| Commute Predictability (Return) | 3.61 | 1.03 | 133 | 3.53 | 1.13 | 173 | -.17, .32 | .62 | 304 |
| Perceived Control (Return) | 3.2 | 1.06 | 133 | 3.1 | 1.06 | 173 | -.14, .34 | .80 | 304 |

* $p < .05$.

Table 7

*Results of T-tests and Descriptive Statistics for Perceived Commute Stress by Ridesharing Condition*

| Outcome | Group | | | | | | 95% CI for Mean Difference | | |
|---|---|---|---|---|---|---|---|---|---|
| | Ridesharers | | | Non-ridesharers | | | | | |
| | M | SD | N | M | SD | N | | T | df |
| Perceived Commute Stress | 3.70 | .86 | 181 | 3.89 | .98 | 125 | -.56, .18 | -1.02 | 304 |
| Perceived Commute Stress (Return) | 3.47 | 1.71 | 175 | 3.46 | 1.62 | 131 | -.36, .40 | .80 | 304 |

* $p < .05$.

Table 8

*Correlations among Study Variables to School/work from Home (N = 306)*

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| 5. Active Activities | | | | |
| 6. Passive Activities | | | | |
| 7. Commute Satisfaction | -.10 | .12* | | |
| 8. Life Satisfaction | .01 | .03 | .35** | |

*p < .05. **p < .01. ***p < .001.

Table 9

*Correlations among Study Variables to Home from School/work (N = 306)*

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| 1. Active Activities | | | | |
| 2. Passive Activities | | | | |
| 3. Commute Satisfaction | .04 | .04 | | |
| 4. Life Satisfaction | .02 | .03 | .25** | |

*p < .05. **p < .01. ***p < .001.

Table 10

*Descriptive Statistics and T-test Results for Commute Satisfaction by Commute Directions*

| Outcome | To School/work | | To Home | | n | 95% CI for Mean Difference | r | t | df |
|---|---|---|---|---|---|---|---|---|---|
| | M | SD | M | SD | | | | | |
| Commute Satisfaction | 36.36 | 9.30 | 36.76 | 10.79 | 306 | -1.34, .54 | .66* | -.83 | 305 |

* $p < .05$.

Table 11

*Results of T-tests and Descriptive Statistics for Commute Satisfaction by Driving Condition*

| Outcome | Group | | | | | | 95% CI for Mean Difference | | |
|---|---|---|---|---|---|---|---|---|---|
| | Drivers | | | Non-drivers | | | | | |
| | M | SD | n | M | SD | n | | T | Df |
| Commute Satisfaction | 37.76 | 8.94 | 133 | 35.28 | 9.45 | 173 | .38, 4.57 | 2.33* | 304 |
| Commute Satisfaction (Return) | 37.78 | 10.51 | 133 | 35.96 | 10.97 | 173 | -.61, 4.28 | 1.48 | 304 |
| Commute Satisfaction (Overall) | 36.95 | 9.80 | 133 | 34.17 | 9.96 | 173 | .54, 5.03 | 2.44* | 304 |

* $p < .05$.

Table 12

*Results of T-tests and Descriptive Statistics for Commute Satisfaction by Ridesharing Condition*

| Outcome | Group | | | | | | 95% CI for Mean Difference | | |
|---|---|---|---|---|---|---|---|---|---|
| | Ridesharers | | | Non-ridesharers | | | | | |
| | M | SD | n | M | SD | n | | t | Df |
| Commute Satisfaction | 36.78 | 9.09 | 175 | 35.80 | 9.58 | 131 | -1.14, 3.10 | .91 | 304 |
| Commute Satisfaction (Return) | 36.93 | 11.03 | 175 | 36.53 | 10.50 | 131 | -2.05, 2.86 | .32 | 304 |

* $p < .05$.

Figure 1

*Mediation Model with Passive In-vehicle Activities for Commutes to School/Work from Home*

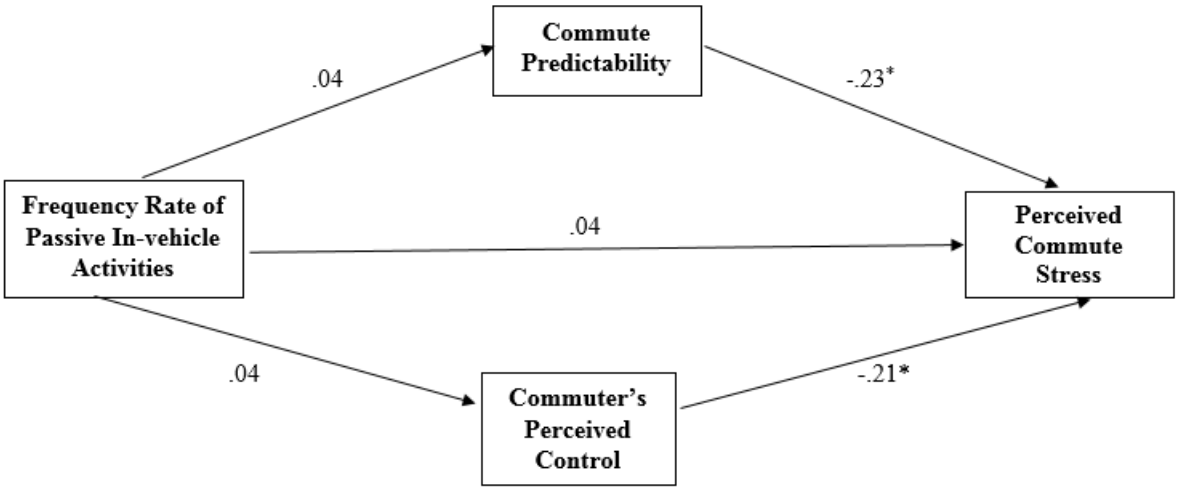


Figure 2

*Mediation Model with Active In-vehicle Activities for Commutes to Home from School/Work*

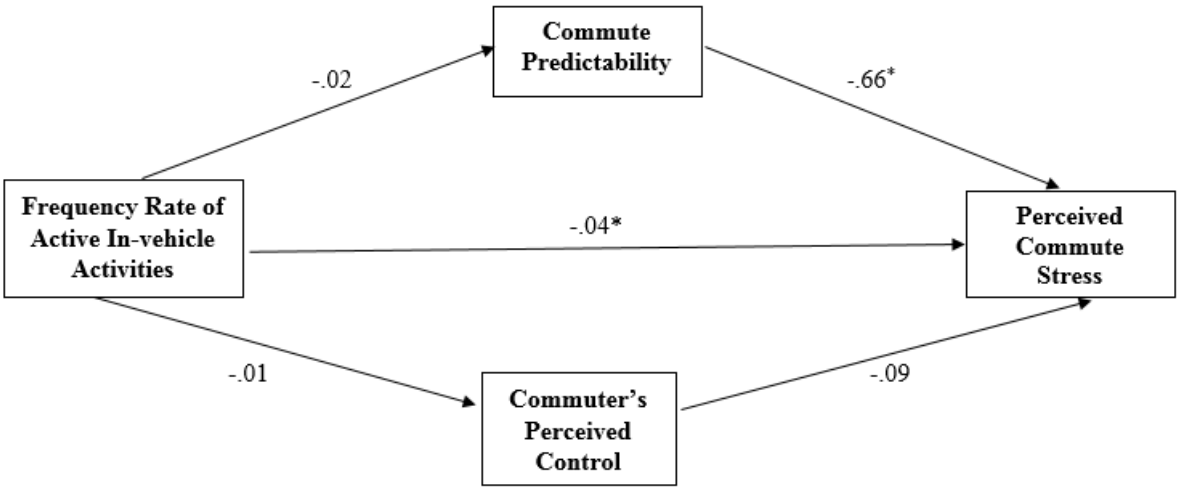


Figure 3

*Mediation Model with PSS for Commutes to School/Work*

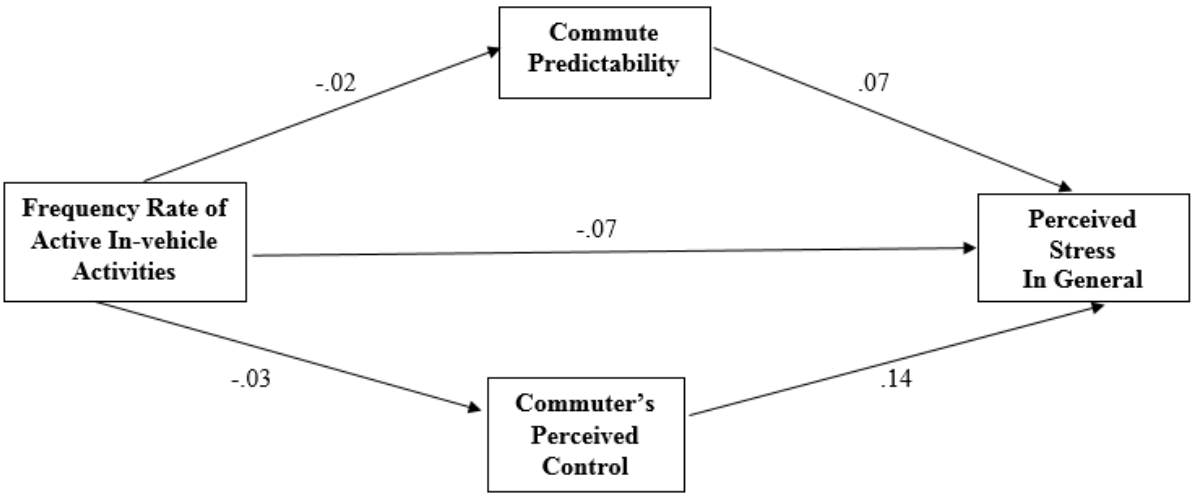


Figure 4

*Mediation Model with PSS for Commutes to Home*

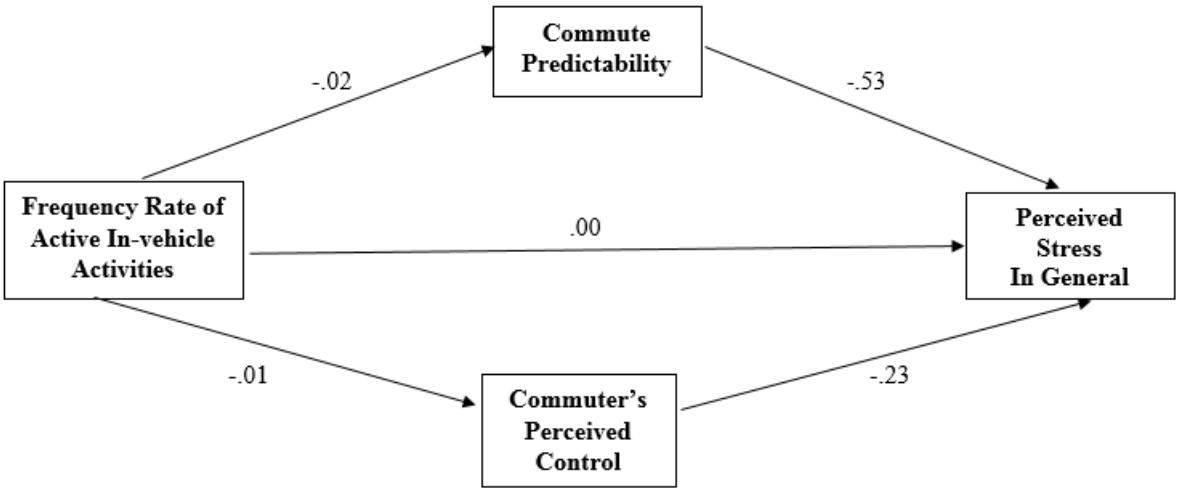


Figure 5

*Mediation Model with Passive In-vehicle Activities for Commutes to School/Work from Home*

Figure 6

*Mediation Model with Active In-vehicle Activities for Commutes to School/Work from Home*

Figure 7

*Mediation Model with Active In-vehicle Activities for Commutes to Home from School/Work*

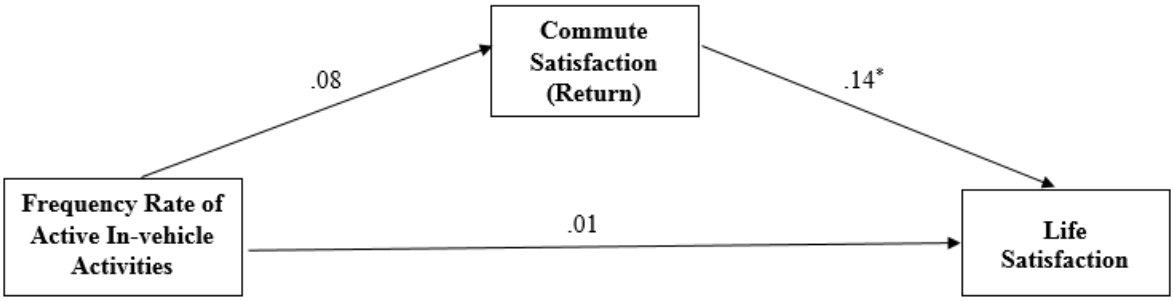


Figure 8

*Mediation Model with Passive In-vehicle Activities for Commutes to Home from School/Work*

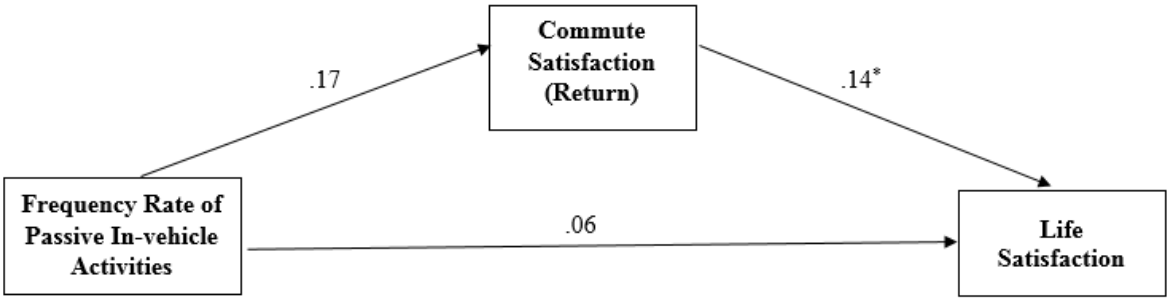
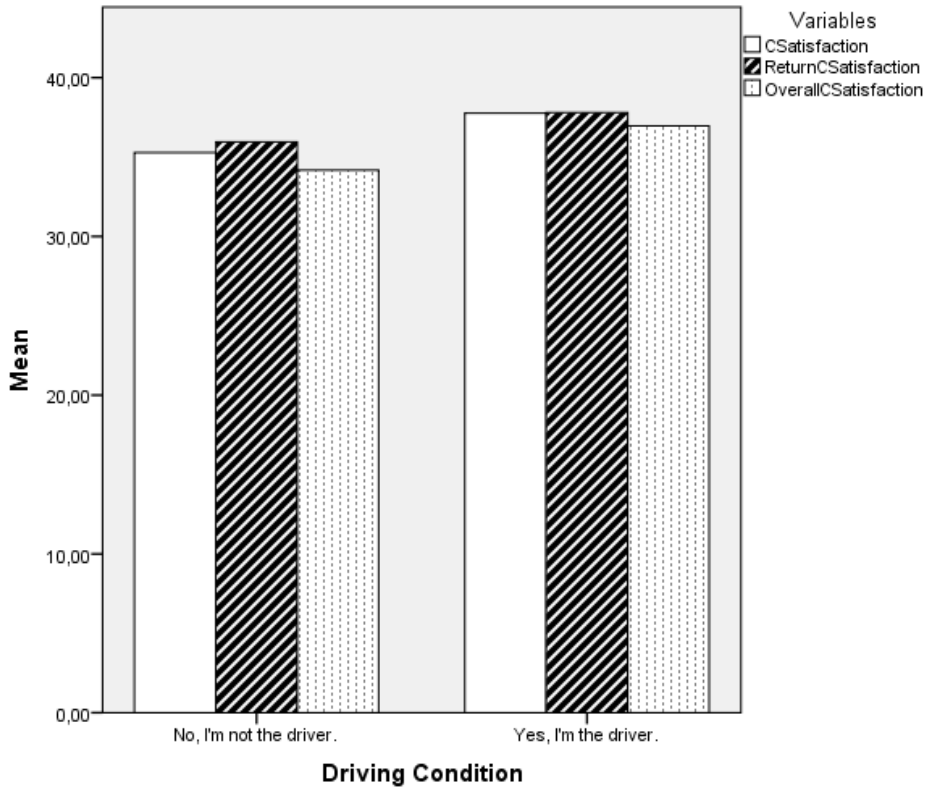


Figure 9

*Commute Satisfaction by Driving Condition*



# Appendix A

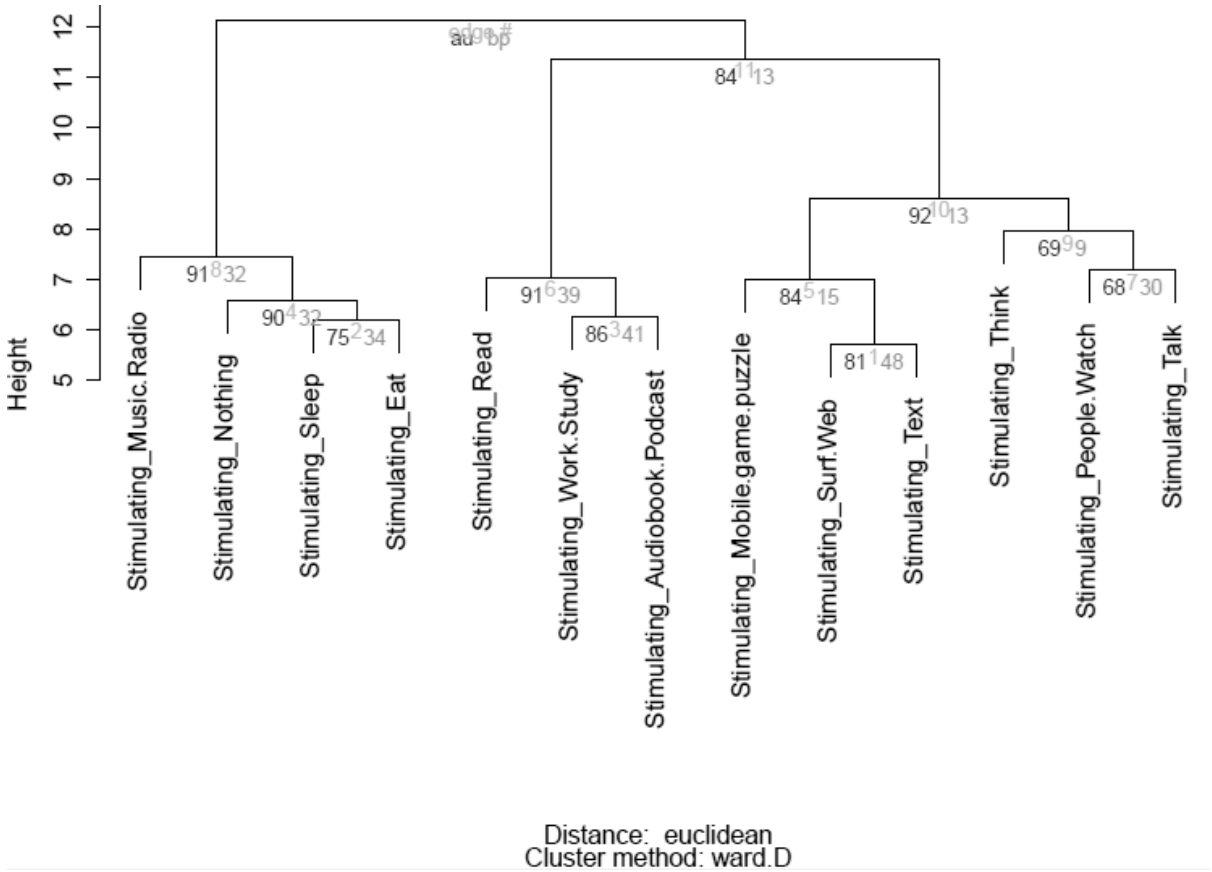
## Pretest

Please think of a typical commute for yourself and rate below activities you perform while commuting from relaxing to stimulating. By relaxing, we mean the activities you perform with minimum cognitive effort and attention; by stimulating, we mean the activities requiring your effort and cognitive engagement.

| | Very relaxing (1) | Somewhat relaxing (2) | Neutral (3) | Somewhat stimulating (4) | Very stimulating (5) |
|---|---|---|---|---|---|
| Reading for leisure (1) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Working/studying (2) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Window gazing / people watching (3) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Listening to the music / radio (4) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Playing podcasts / audiobooks (5) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Sleeping (6) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Surfing the Web (7) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Playing mobile games / puzzles (8) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Talking to other passengers / friends / family members (9) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Texting or talking on the phone (10) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Thinking (11) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Eating (12) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Doing nothing (13) | ❍ | ❍ | ❍ | ❍ | ❍ |

Appendix B

Cluster Dendogram of the Pretest with AU/BP values (%)



Appendix C

Satisfaction with Travel Scale (STS)

Please think about your OVERALL commute experience. How do you experience your commute in general?

| | 1 (1) | 2 (2) | 3 (3) | 4 (4) | 5 (5) | 6 (6) | 7 (7) |
|---|---|---|---|---|---|---|---|
| Very stressed-Very calm (1) | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Very bored-Very enthusiastic (2) | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Worked very poorly-Worked very well (3) | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Very tired-Very alert (4) | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Very low standard-Very high standard (5) | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Very worried-Very confident (6) | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Very tense-Very relaxed (7) | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Fed up-Engaged (8) | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Worst commute I can imagine-Best commute I can imagine (9) | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

In general, how satisfied are you with your OVERALL commute?

| | 1 (1) | 2 (2) | 3 (3) | 4 (4) | 5 (5) | 6 (6) | 7 (7) |
|---|---|---|---|---|---|---|---|
| Dissatisfied-Satisfied (1) | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

Appendix D

Satisfaction with Life Scale (SWLS)

Please think of your life in general. Indicate your agreement with each item by placing the appropriate number on the line preceding that item. Please be open and honest in your responding.

| | Strongly disagree (1) | Disagree (2) | Slightly disagree (3) | Neither agree nor disagree (4) | Slightly agree (5) | Agree (6) | Strongly agree (7) |
|---|---|---|---|---|---|---|---|
| In most ways my life is close to my ideal. (1) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| The conditions of my life are excellent. (2) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I am satisfied with my life. (3) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| So far I have gotten the important things I want in life. (4) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| If I could live my life over, I would change almost nothing. (5) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

Appendix E

Perceived Stress Scale (PSS)

For each statement, please indicate if you have had these thoughts or feelings in the last month.

| | Never (1) | Almost Never (2) | Sometimes (3) | Fairly Often (4) | Very Often (5) |
|---|---|---|---|---|---|
| In the last month, how often have you been upset because of something that happened unexpectedly? (11) | ○ | ○ | ○ | ○ | ○ |
| In the last month, how often have you felt that you were unable to control the important things in your life? (13) | ○ | ○ | ○ | ○ | ○ |
| In the last month, how often have you felt nervous and "stressed"? (14) | ○ | ○ | ○ | ○ | ○ |
| In the last month, how often have you felt confident about your ability to handle your personal problems? (15) | ○ | ○ | ○ | ○ | ○ |
| In the last month, how often have you felt that things were going your way? (17) | ○ | ○ | ○ | ○ | ○ |

| | | | | | |
|---|---|---|---|---|---|
| In the last month, how often have you found that you could not cope with all the things that you had to do? (19) | ○ | ○ | ○ | ○ | ○ |
| In the last month, how often have you been able to control irritations in your life? (22) | ○ | ○ | ○ | ○ | ○ |
| In the last month, how often have you felt that you were on top of things? (23) | ○ | ○ | ○ | ○ | ○ |
| In the last month, how often have you been angered because of things that were out of your control? (24) | ○ | ○ | ○ | ○ | ○ |
| In the last month, how often have you felt difficulties were piling up so high that you could not overcome them? (26) | ○ | ○ | ○ | ○ | ○ |

Appendix F

Perceived Commute Stress Scale

Please think about your OVERALL commute experience. How do you experience your commute in general?

| | 1 (1) | 2 (2) | 3 (3) | 4 (4) | 5 (5) | 6 (6) | 7 (7) |
|---|---|---|---|---|---|---|---|
| Very stressed-Very calm (1) | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

# Appendix G

## Perceived Commute Control and Predictability Scale

How is your actual typical commute on given items:

| | 1 (1) | 2 (2) | 3 (3) | 4 (4) | 5 (5) |
|---|---|---|---|---|---|
| Very unpredictable-Very predictable | ❍ | ❍ | ❍ | ❍ | ❍ |
| Very unproductive-Very productive | ❍ | ❍ | ❍ | ❍ | ❍ |
| Very uncontrollable-Very controllable | ❍ | ❍ | ❍ | ❍ | ❍ |

# Appendix H

## Qualtrics Questionnaire

Dear Participant,

We are inviting you to join a study conducted by Handan E. Karayel (Social & Organizational Psychology) and supervised by Asst. Prof. Scott Withrow. Your participation is voluntary and please read the following before you start.

*Purpose of the Study*

This survey is designed to get an insight about your typical commuting behavior.

*Procedures*

If you agree to continue, we will ask you to complete an online survey. The survey takes around 15 minutes.

*Risks and Benefits*

There are no risks involved in this study and you will contribute to the existing literature with your participation.

*Privacy and Confidentiality*

Be sure that we will not use your name or share any sensitive information about you with third parties. All results will be protected by a password-protected computer and will be deleted after the study is completed.

*Rejection or Withdrawal*

You can fill the survey at any time. You can also withdraw from the survey at any time with no penalties. We kindly ask you to complete all the questions if you decide to participate.

**PLEASE DO NOT FILL THIS SURVEY**:

- IF YOU ARE BELOW 18
- IF YOU DO NOT LIVE IN ISTANBUL
- IF YOU COMMUTE BY WALKING OR BICYCLE (e.g. if you live in dormitories of the school)
- IF YOU ARE NOT A REGULAR COMMUTER (e.g. if you commute regularly but only weekends, you can still participate)
-

**NOTE:** This survey is NOT mobile friendly. Please fill it when you have access to your computer.

**Glossary:** To Commute: to travel the same distance between one's home and place of work (or school) regularly.

If you need to look up a word in an online dictionary please feel free to do so.

If you have any questions regarding the survey please contact hkarayel15@ku.edu.tr.

Thank You

Handan E. Karayel

MA Student, Research & Teaching Assistant
Department of Psychology
Graduate School of Social Sciences & Humanities Koc University
hkarayel15@ku.edu.tr

❍ I agree to continue. (1)

❍ I don't agree to continue. (2)

*If I don't agree to continue is selected, then skip to end of survey.*

Q1 Please think about a typical commute for yourself. How frequently do you use the following between your school and home?

| | Never (1) | Rarely (2) | Sometimes (3) | Most of the time (4) | Always (6) |
|---|---|---|---|---|---|
| Car (1) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Metro (2) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Bus (3) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Metrobus (4) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Ferry (5) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Dolmus (6) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Taxi (7) | ❍ | ❍ | ❍ | ❍ | ❍ |
| School/work shuttle (8) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Motorcycle (9) | ❍ | ❍ | ❍ | ❍ | ❍ |

Q2 If you commute by car or motorcycle, please indicate if you are the driver.

❍ Yes, I'm the driver. (1)
❍ No, I'm not the driver. (2)

Q3 Please think about a typical commute for yourself TO SCHOOL/WORK from home. Do you share it with your friends or family?

❑ Yes, I share. (1)
❑ No, I don't share. (2)

Q4 Please think about a typical commute for yourself TO HOME from school/work. Do you share it with your friends or family?

- ❑ Yes, I share. (1)
- ❑ No, I don't share. (2)

Q5 Please think of a typical commute for yourself. How many hours per day do you spend for commuting?

To School/Work (1)

To Home (2)

Q6 For how many years have you been commuting?

D2 In this block of questions, please ONLY think about your typical commute to SCHOOL/WORK from HOME.

Q7 Please think about a typical commute for yourself. How frequently do you use the following TO SCHOOL/WORK from home?

| | Never (1) | Rarely (2) | Sometimes (3) | Most of the time (4) | Always (6) |
|---|---|---|---|---|---|
| Car (9) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Metro (10) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Bus (11) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Metrobus (12) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Ferry (13) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Dolmus (14) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Taxi (15) | ❍ | ❍ | ❍ | ❍ | ❍ |
| School/work shuttle (16) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Motorcycle (17) | ❍ | ❍ | ❍ | ❍ | ❍ |

Q8 Please think about a typical commute TO SCHOOL/WORK for yourself. Do you sit or stand?

| | Never (1) | Rarely (2) | Sometimes (3) | Most of the time (4) | Always (5) |
|---|---|---|---|---|---|
| Sit (1) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Stand (2) | ❍ | ❍ | ❍ | ❍ | ❍ |

Q9 Please think about a typical commute TO SCHOOL/WORK for yourself. What do you normally do during your commute TO SCHOOL/WORK from home?

| | Never (1) | Rarely (2) | Sometimes (3) | Most of the time (4) | Always (5) |
|---|---|---|---|---|---|
| Driving itself (14) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Reading for leisure (1) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Working/studying (2) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Window gazing / people watching (3) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Listening to the music / radio (4) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Playing podcasts / audiobooks (5) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Sleeping (6) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Surfing the Web (7) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Playing mobile games / puzzles (8) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Talking to other | ❍ | ❍ | ❍ | ❍ | ❍ |

| | | | | | |
|---|---|---|---|---|---|
| passengers / friends / family members (9) | | | | | |
| Texting or talking on the phone (10) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Thinking (11) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Eating (12) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Doing nothing (13) | ❍ | ❍ | ❍ | ❍ | ❍ |

Q10 How is your actual typical commute TO SCHOOL/WORK on given items:

| | 1 (1) | 2 (2) | 3 (3) | 4 (4) | 5 (5) |
|---|---|---|---|---|---|
| Very unpredictable-Very predictable | ❍ | ❍ | ❍ | ❍ | ❍ |
| Very unproductive-Very productive | ❍ | ❍ | ❍ | ❍ | ❍ |
| Very uncontrollable-Very | ❍ | ❍ | ❍ | ❍ | ❍ |

| | | | | | |
|---|---|---|---|---|---|
| controllable | | | | | |

Q11 How would you wish your commute TO SCHOOL/WORK to be on given items:

| | 1 (1) | 2 (2) | 3 (3) | 4 (4) | 5 (5) |
|---|---|---|---|---|---|
| Very unpredictable-Very predictable (1) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Very unproductive-Very productive (2) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Very uncontrollable-Very controllable (3) | ❍ | ❍ | ❍ | ❍ | ❍ |

Q12 Do you think activities you perform while commuting TO SCHOOL/WORK make your commute:

| | Very unlikely (1) | Unlikely (2) | Neither (3) | Likely (4) | Very Likely (5) |
|---|---|---|---|---|---|
| More predictable | ❍ | ❍ | ❍ | ❍ | ❍ |

| | | | | | |
|---|---|---|---|---|---|
| (1) More productive | ❍ | ❍ | ❍ | ❍ | ❍ |
| (2) More controllable | ❍ | ❍ | ❍ | ❍ | ❍ |
| (3) | | | | | |

Q13 Please think about a typical commute TO SCHOOL/WORK for yourself. How do you experience your commute TO SCHOOL from home?

| | 1 (1) | 2 (2) | 3 (3) | 4 (4) | 5 (5) | 6 (6) | 7 (7) |
|---|---|---|---|---|---|---|---|
| Very stressed-Very calm (1) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Very bored-Very enthusiastic (2) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Worked very poorly-Worked very well | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| (3) Very tired- Very alert (4) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Very low standard- Very high standard (5) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Very worried- Very confident (6) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Very tense- Very relaxed (7) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Fed up- Engaged (8) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Worst commute I can imagine- | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Best commute I can imagine (9) | | | | | | | |

Q14 How overall are you satisfied with your commute TO SCHOOL/WORK?

| | 1 (1) | 2 (2) | 3 (3) | 4 (4) | 5 (5) | 6 (6) | 7 (7) |
|---|---|---|---|---|---|---|---|
| Dissatisfied-Satisfied (1) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

D3 In this block of questions, please ONLY think about your typical commute to HOME from school/work.

Q15 Please think about a typical commute for yourself. How frequently do you use the following TO HOME from your school/work?

| | Never (1) | Rarely (2) | Sometimes (3) | Most of the time (4) | Always (6) |
|---|---|---|---|---|---|
| Car (1) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Metro (2) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Bus (3) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Metrobus (4) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Ferry (5) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Dolmus (6) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Taxi (7) | ❍ | ❍ | ❍ | ❍ | ❍ |
| School Shuttle (8) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Motorcycle (9) | ❍ | ❍ | ❍ | ❍ | ❍ |

Q16 Please think about a typical commute TO HOME for yourself. Do you sit or stand?

| | Never (1) | Rarely (2) | Sometimes (3) | Most of the time (4) | Always (5) |
|---|---|---|---|---|---|
| Sit (1) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Stand (2) | ❍ | ❍ | ❍ | ❍ | ❍ |

Q17 Please think about a typical commute TO HOME for yourself. What do you normally do during your commute TO HOME from school/work?

| | Never (1) | Rarely (2) | Sometimes (3) | Most of the time (4) | Always (5) |
|---|---|---|---|---|---|
| Driving itself (14) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Reading for leisure (1) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Working/studying (2) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Window gazing / people watching (3) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Listening to the music / radio (4) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Playing podcasts / audiobooks (5) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Sleeping (6) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Surfing the Web | ❍ | ❍ | ❍ | ❍ | ❍ |

| | | | | | |
|---|---|---|---|---|---|
| (7) Playing mobile games / puzzles (8) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Talking to other passengers / friends / family members (9) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Texting or talking on the phone (10) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Thinking (11) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Eating (12) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Doing nothing (13) | ❍ | ❍ | ❍ | ❍ | ❍ |

Q18 How is your actual typical commute TO HOME on given items:

| | 1 (1) | 2 (2) | 3 (3) | 4 (4) | 5 (5) |
|---|---|---|---|---|---|
| Very unpredictable-Very predictable (1) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Very unproductive-Very productive (2) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Very uncontrollable-Very controllable (3) | ❍ | ❍ | ❍ | ❍ | ❍ |

Q19 How would you wish your commute TO HOME to be on given items:

| | 1 (1) | 2 (2) | 3 (3) | 4 (4) | 5 (5) |
|---|---|---|---|---|---|
| Very unpredictable-predictable (1) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Very unproductive-Very productive (2) | ❍ | ❍ | ❍ | ❍ | ❍ |
| Very uncontrollable-Very controllable (3) | ❍ | ❍ | ❍ | ❍ | ❍ |

Q20 Do you think activities you perform while commuting TO HOME make your commute:

| | Very unlikely (1) | Unlikely (3) | Neither (4) | Likely (5) | Very Likely (6) |
|---|---|---|---|---|---|
| More predictable (1) | ❍ | ❍ | ❍ | ❍ | ❍ |
| More productive (2) | ❍ | ❍ | ❍ | ❍ | ❍ |

| | | | | | |
|---|---|---|---|---|---|
| More controllable (3) | ❍ | ❍ | ❍ | ❍ | ❍ |

Q21 How overall are you satisfied with your commute TO HOME?

| | 1 (1) | 2 (2) | 3 (3) | 4 (4) | 5 (5) | 6 (6) | 7 (7) |
|---|---|---|---|---|---|---|---|
| Dissatisfied-Satisfied (1) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

Q22 Please think about a typical commute TO HOME for yourself. How do you experience your commute TO HOME from home?

| | 1 (1) | 2 (2) | 3 (3) | 4 (4) | 5 (5) | 6 (6) | 7 (7) |
|---|---|---|---|---|---|---|---|
| Very stressed-Very calm (1) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Very bored-Very enthusiastic (2) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Worked very | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| poorly-Worked very well (3) | | | | | | | |
| Very tired-Very alert (4) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Very low standard-Very high standard (5) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Very worried-Very confident (6) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Very tense-Very relaxed (7) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Fed up-Engaged (8) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Worst | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| commute I can imagine- Best commute I can imagine (9) | | | | | | | |

D3 In this block of questions, please think about your OVERALL commute experience.

Q23 Please think about your OVERALL commute experience. How do you experience your commute in general?

| | 1 (1) | 2 (2) | 3 (3) | 4 (4) | 5 (5) | 6 (6) | 7 (7) |
|---|---|---|---|---|---|---|---|
| Very stressed-Very calm (1) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Very bored-Very enthusiastic (2) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Worked very poorly-Worked | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| very well (3) | | | | | | | |
| Very tired- Very alert (4) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Very low standard- Very high standard (5) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Very worried- Very confident (6) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Very tense- Very relaxed (7) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Fed up- Engaged (8) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Worst commute I can | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| imagine-Best commute I can imagine (9) | | | | | | | |

Q24 In general, how satisfied are you with your OVERALL commute?

| | 1 (1) | 2 (2) | 3 (3) | 4 (4) | 5 (5) | 6 (6) | 7 (7) |
|---|---|---|---|---|---|---|---|
| Dissatisfied-Satisfied (1) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

Q25 Do you think your overall commute satisfaction affects your life satisfaction?

| | Very Unlikely (1) | Unlikely (2) | Neither (3) | Likely (4) | Very likely (5) |
|---|---|---|---|---|---|
| My overall commute satisfaction affects my life satisfaction. (1) | ❍ | ❍ | ❍ | ❍ | ❍ |

Q26 Please think of your life in general. Indicate your agreement with each item by placing the appropriate number on the line preceding that item. Please be open and honest in your responding.

| | Strongly disagree (1) | Disagree (2) | Slightly disagree (3) | Neither agree nor disagree (4) | Slightly agree (5) | Agree (6) | Strongly agree (7) |
|---|---|---|---|---|---|---|---|
| In most ways my life is close to my ideal. (1) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| The conditions of my life are excellent. (2) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| I am satisfied with my life. (3) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| So far I have gotten the important things I want in | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| life. (4) If I could live my life over, I would change almost nothing. (5) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

Q27 Please indicate how you generally feel this way, that is, how you feel on average in your life.

| | Never (1) | Almost Never (2) | Rarely (3) | Sometimes (4) | Often (5) | Very Often (6) | Always (7) |
|---|---|---|---|---|---|---|---|
| Interested (1) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Distressed (2) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Excited (3) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Upset (4) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Strong (5) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Guilty (6) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Enthusiastic | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| (7) | | | | | | | |
| Scared (8) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Proud (9) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Hostile (10) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Alert (11) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Irritable (12) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Inspired (13) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Ashamed (14) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Determined (15) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Nervous (16) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Attentive (17) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Jittery (18) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Active (21) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |
| Afraid (22) | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ | ❍ |

Q28 For each statement, please indicate  if you have had these thoughts or feelings in the last month.

| | Never (1) | Almost Never (2) | Sometimes (3) | Fairly Often (4) | Very Often (5) |
|---|---|---|---|---|---|
| In the last month, how often have you been upset because of something that happened unexpectedly? (11) | ❍ | ❍ | ❍ | ❍ | ❍ |
| In the last month, how often have you felt that you were unable to control the important things in your life? (13) | ❍ | ❍ | ❍ | ❍ | ❍ |
| In the last month, how often have you felt | ❍ | ❍ | ❍ | ❍ | ❍ |

| | | | | | |
|---|---|---|---|---|---|
| nervous and "stressed"? (14) | | | | | |
| In the last month, how often have you felt confident about your ability to handle your personal problems? (15) | ❍ | ❍ | ❍ | ❍ | ❍ |
| In the last month, how often have you felt that things were going your way? (17) | ❍ | ❍ | ❍ | ❍ | ❍ |
| In the last month, how often have | ❍ | ❍ | ❍ | ❍ | ❍ |

| | | | | | |
|---|---|---|---|---|---|
| you found that you could not cope with all the things that you had to do? (19) | | | | | |
| In the last month, how often have you been able to control irritations in your life? (22) | ❍ | ❍ | ❍ | ❍ | ❍ |
| In the last month, how often have you felt that you were on top of things? (23) | ❍ | ❍ | ❍ | ❍ | ❍ |
| In the last month, how often have | ❍ | ❍ | ❍ | ❍ | ❍ |

| | | | | | |
|---|---|---|---|---|---|
| you been angered because of things that were out of your control? (24) | | | | | |
| In the last month, how often have you felt difficulties were piling up so high that you could not overcome them? (26) | ❍ | ❍ | ❍ | ❍ | ❍ |

Q29 Please write your age.

Q30 Please indicate your gender.

- Female (1)
- Male (2)

Q31 Are you student?

- Yes (1)
- No (2)

Q32 If you are student, in what year are you?

- Preparation (1)
- 1st year (2)
- 2nd year (3)
- 3rd year (4)
- 4th year (5)
- Master student (7)
- Phd student (8)
- Not a student (9)

Q33 This is the end of our survey. Thank you for your participation. We appreciate your time.Please indicate if you took the survey seriously and read the questions carefully (There will be no penalization according to your answer).

- Yes, I agree. (4)
- No, I don't agree. (5)

Q34 Are you taking this survey for class credit?

- Yes (1)
- No (2)

*If No Is Selected, Then Skip To End of Survey*

Q35 Please fill the following to get class credits. We need your information only to give you credits. For confidentiality, we won't use your names or match them with the results.

Your Name: (1)

Your KU ID: (2)

Your E-mail: (3)