

**The Relationship between Public Attitude to
Surveillance Technologies
on the Road, Anxiety, Self-esteem and Driving Styles**

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ABSTRACT

The rapid growth of technologies provides new opportunities for efforts in traffic safety improvement and digitalization of enforcement. Public attitudes to surveillance on the road could potentially influence driving styles used in different countries and be influenced by other psychological constructs such as self-esteem and anxiety. The aim of this study is to understand if there is a relationship between public attitude to observation on the road, anxiety and self-esteem and identify these constructs relationship with driving styles in order to expand on the findings by developing intervention programs and implementation of surveillance technologies. This will in turn strengthen adherence to traffic rules as well as to the development of smart cities by taking into account the public attitude to such type of enforcement.

The results revealed that public attitude to observation on the roads were negatively associated with Anxiety and three types of unsafe driving styles: Dissociative, Risky and High-velocity; positively associated with Self-esteem based contingencies of Family Support, Virtue and Competition and two types of adaptive driving styles: Patient and Careful. Anxiety was found to have a moderation effect in the relationship between public attitude to observations and Risky driving style as well as Careful driving style. The investigated self-worth contingencies have a mediation effect for two unsafe driving styles as Risky and Dissociative driving styles.

Keywords: public attitude, surveillance technologies, anxiety, self-esteem, driving styles.

ÖZ

Teknolojilerin hızlı büyümesi, trafik güvenliğinin iyileştirilmesi ve trafik denetimlerinin dijitalleştirilmesi için yeni fırsatlar sağlıyor. Yolda gözetilmeye karşı tutumun, potansiyel olarak farklı ülkelerde kullanılan sürüş stillerini etkileyebilmekte ve benlik saygısı ve kaygı gibi diğer psikolojik yapılardan etkilenebilmektedir. Bu çalışmanın amacı yollarda yapılan gözlemlere karşı tutum, kaygı ve benlik saygısı arasında bir ilişki olup olmadığını anlamak ve bu yapıların sürüş stilleri ile ilişkisini belirleyerek bu alandaki bulguları geliştirerek müdahale programlarının ve gözetim sistem önerilerinin geliştirilmesidir. Bulgular, akıllı şehirlerin gelişimi ve trafik kullarına uyma davranışlarını, trafik denetimlerine karşı genel tavrı dikkate alarak güçlendirecektir.

Sonuçlar, yollarda gözlem yapmaya yönelik tutumların Anksiyete ve üç tür güvensiz sürüş tarzı, Dissosiyatif, Riskli ve Yüksek hız, ile negatif yönde ilişkili olduğunu; Benlik Saygısı faktörleri Aile Desteği, Erdem ve Rekabetin ve iki tür uyarlanabilir sürüş tarzı, Sabırlı ve Dikkatli, ile pozitif ilişkili olduğunu saptamıştır. Kaygının gözlemlere karşı tutum ile Riskli sürüş stili ve Dikkatli sürüş stili arasındaki ilişkide bir müderasyon etkisine sahip olduğu bulunmuştur. Araştırılan öz-değer faktörleri, iki güvenli olmayan sürüş stili, Riskli ve Dissosiyatif, ile bir aracılık etkisine sahiptir.

Anahtar Kelimeler: tutum, gözetim teknolojileri, kaygı, benlik saygısı, sürüş stilleri.

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LIST OF ABBREVIATIONS

BA	Beck Anxiety Questionnaire
BAI	Beck Anxiety Inventory
CSW	Contingencies of Self-Worth
DF	Demographic Form
DS	Driving Style
MDSI	Multidimensional Driving Style Inventory
PA	Public Attitude
RK	Republic of Kazakhstan

Chapter 1

INTRODUCTION

1.1 Road Safety Overview

According to the World Health Organization approximately 1.35 million people are dying in traffic crashes annually (WHO, 2018). Road traffic injuries are the leading cause of death among children and young people between the ages of 5-29 years old (WHO, 2018). In Kazakhstan the estimated road traffic death rate is 17.6 people per 100 000 population (WHO, 2018), which is more than double the rate of the best performing countries in the region such as Macedonia 6.4 and Serbia 7.4. The road crash fatalities and injuries percentage for economically productive age groups between the ages of 15 - 64 years is 82% (World Bank, 2019). The country had the highest rate of fatal injuries from traffic crashes among former Soviet Union countries in 2016 (Ibrayimiv, et al., 2017). There were more than 15 000 traffic crashes and 2 100 people killed in 2018 according to the data provided by the Crime Statistics Committee of the Prosecutor's office of the Republic of Kazakhstan and calculations made by ranking.kz (Ranking.kz, 2019). The statistics for the first eight months of 2019 (from January until August) showed 10 100 crashes and 1 336 killed people (Ranking.kz, 2019).

The World Health Organization emphasizes the main risk factors for causing crashes as follows: excessive speeding, driving under the influence of alcohol, not properly using seat belts, child safety chairs or helmets, distraction while driving, quality of

road infrastructure, late medical assistance, poor enforcement of obeying traffic legislation and insecure vehicles (WHO, 2018). Risk-taking behavior, level of experience, cognitive and visual abilities and violation of traffic rules are the factors related to drivers' personal characteristics and attitudes are supported to be responsible for crashes as well (Rolison et al., 2018).

According to data provided by the Legal Statistic and Special Accounts Committee of Prosecutor Office of Republic of Kazakhstan the most widespread factors that cause road accidents are violations of speeding and road crossing, not keeping distance, not providing pedestrians' priority, aggressive and wrong way driving, breaking traffic rules and regulations in general, not only by drivers, but by pedestrians as well (Legal Statistic and Special Accounts Committee of Prosecutor Office, 2016). The Almaty region has the leading crash fatality rate with 374 individuals in 2018 (KazInform, 2020). Another widespread reason is vehicles' density, as it has been calculated that there are more than 4 000 000 vehicles in Kazakhstan with the general population a little bit more than 18 500 000 citizens and the improvement of road surface quality has allowed drivers to maximize speed (E-Newspaper Liter, 2020). Excessive speed was the cause of 33.6 % of all crashes in 2019 (MIA KazInform, 2019).

The traditional approach to research in road safety considers the concept of the three E's, which are (1) education, (2) enforcement and (3) engineering. Education is related to knowledge and skills for those who learn and practice how to drive and social campaigns as societal education at large. Engineering is directed to improvements in the road infrastructure, environmental and vehicles engineering, such as road design, surface, not confusing signs, quality of vehicles, passenger's

protection, etc. for the latter. Enforcement uses legal interference to ensure that people obey rules and norms related to traffic safety, which are well recognized as effective strategies in preventing crashes and injuries (Devi, 2016; Groeger, 2011). The data provided by investigating these three domains serves as guidance for safety professionals, engineers and policy makers. This concept has been extended to a seven E's perspective, with the inclusion of Economics, Emergency response, Enablement and Ergonomics (McIlroy et al., 2018) or Exposure, Examination of Competence and Fitness, Emergency response and Evaluation (Groeger, 2011).

For the traffic system to function enforcement of traffic laws, safety system, guidance and requirements which are legally obliged to be followed, are critical, as it has a strong deterrence effect in case of high certainty of punishment (Groeger, 2011). Therefore the task of legal bodies enforcing traffic rules is to provide that certainty. Historically enforcement has been provided by legislative drafts of authorities and social campaigns by the way of information provided through media about the importance of safe driving, enforcement related to driving education process as well as humanized methods namely traffic police officers, who used deterrent measures such as fines and penalties, suspension of driving privileges and sometimes even placement in prison for road users that do not follow traffic legislation (Mäkinen et al., 2002; Groeger, 2011).

Currently the main enforcement strategies for safer traffic management include automated and police control for speeding, use of mobile phones while driving, driving while being intoxicated, driving without a valid driving license, seatbelt use compliance, illegal transportation of passengers, overloading, lane violations and parking regulations (Devi, 2016). As police physically cannot be everywhere to

provide more effective enforcement authorities have been implementing enforcement technologies. Static traffic lights and speeding cameras laid the foundation for a digital approach to enforcement technologies (Pilkington & Kinra Sanjay, 2004; Hawi et al., 2015).

1.2 Enforcement Technologies

With rapid advances of new technologies the opportunities for automated enforcement has increased, such as automated detections speed and red light violations, crossing of public transport and other lanes, number plate recognitions systems and face recognition (Hawi et al., 2015; Groeger, 2011). Automated speed enforcement technologies to aid police traffic enforcement has been used throughout the world since the 1980's, with the United States of America and Australia leading the way in the implementation of such tools (Delaney et al., 2005). In accordance with classical deterrence theory and its further reconceptualization the likelihood of punishment, punishment avoidance and vicarious experience of drivers influence the effect of enforcement and therefore increase the effectiveness of speeding surveillance which detects the offences with a high degree of certainty (Taxman & Piquero, 1998; Thomas et al., 2008; Groeger, 2011). In the United Kingdom about 6 000 speed cameras have appeared on Britain's roads since they were introduced in 1992, generating some £100m in fines each year according to United Kingdom Road Safety minister Mike Penning (BBC, 2010). Findings with regard to red light cameras supported the decrease of violations, but the general safety effect is equivocal (Groeger, 2011).

Despite having a number of advantages with regards to traffic safety, surveillance is also considered to have some obvious disadvantages. Though the majority hold to an

opinion that using cameras on roads is for good, others think that cameras are often mistaken and due to not being a human mechanism do not understand the general situation and factors leading to breaking the rules (Cicchino et al., 2014; Spriggs et al., 2005; Department for transport UK, 2018; Malaysian Institute of Road Safety Research {MIROS}, 2015; Farmer, 2017). According to the Public Attitude Survey, devoted to Automated Enforcement (2018) in the United Kingdom, some people support the idea that implementation of watching systems is leading to better obedience to traffic rules and improvement of traffic safety, including less speeding and easy rush hour traffic. At the same time there is another point of view that using technology to provide traffic safety is just another administrative way of raising more money from the population and generating revenue so that has nothing in common with safety. In addition some citizens experience the feeling of being constantly watched and believe that implementing a digital approach aims to follow and control people which is not acceptable and encroach their human right for private life (Ipsos MORI Social Research Institute, 2018; Farmer, 2017). People's attitude with regards to surveillance on roads and ideas if it is for good or bad is expected to influence people's behavior on the road and therefore driving styles (European Road Safety Observatory, 2017).

In the present day countries are developing infrastructure to create smart cities that provide intelligent responses to issues that residents are facing and also provide surveillance with regards to traffic safety issues (Nagy & Simon, 2018). These developments which include various innovative solutions in information, communication, crime prevention, education and traffic and transportation systems are supposed to be implemented step by step for citizens' well-being, safety and comfort. Smart traffic, in other words, digitalization of cities' traffic system is

expected to decrease violation of traffic rules and therefore lessen the quantity of crashes with use of surveillance technologies (Hawi et al., 2015).

As a part of efforts to improve the current situation with regards to dynamic growth of the five biggest cities in Kazakhstan smart city standards were developed by the Kazakhstan Institute of Standardization and Certification. The Committee on Technical Regulations and Metrology of Republic of Kazakhstan accepted the standards by decree № 290-0Д dated November 18, 2016. The specific project named Sergek is in line with the smart development initiative as surveillance technology intended for monitoring of traffic and crowded places in the capital and four other cities of Kazakhstan started to be implemented since 2017. All of the information detected by observational cameras is directed to the central management point where it is processed by police officers (Informburo.kz, 2018).

1.3 Driving Styles

Human factors are well recognized as the main causes of traffic crashes (Rumar, 1985; Nangana et al., 2016). Interrelations between psychological and engineering sciences investigating people's performance in relations with technological systems and processes to support safety are known as human factors (Russ et al., 2013). The relationship between the driver, vehicle and the road could trigger operational mistakes of the driver and lead to crashes. Various driving styles are associated with different behavior in terms of reckless or careful driving and reflect people's performance on the road. Driving style can be identified as the usual manner the driver manages the vehicle, which reflects driving behavior, attitudes, habits, personal characteristics, level of self-esteem, perception of driving, attitude to the rules and norms and the speed the driver selects (Taubman-Ben-Ari et al., 2004).

In line with the literature, driving style and driving skills are involved in a driver's liability to crashes, as driving skill becomes more practical and improved with time, driving style is the more habitual way of driving and reflects people's attitudes and beliefs (Elander et al., 1993). To classify and measure the usual style or manner of driving in Israel in 2004 the Multidimensional Driving Style Inventory (MDSI) was adapted from several other scales such as Driving Behavior Inventory (DBI) based on stress evaluation developed by Gulian et al. (1989), Driver Behavior Questionnaire (DBQ) questioned deviant behavior by Reason et. al. (1990), Driver Behavior Questionnaire (DBQ) assessed risk measurement by Furnham and Saipe (1993), Driver Style Questionnaire (driving style) evaluate relationships between driving style, decision-making style and crash liability by French at al. (1993); several questions were also added by the authors (Taubman-Ben-Ari et al., 2004).

In general they highlighted four extensive categories responsible for eight driving styles describing the self-reporting categories of safe and unsafe driving. Taubman-Ben-Ari et al. (2004), classified "the facets: (a) reckless and careless driving style, (b) anxious driving style, (c) angry and hostile driving style, (d) patient and careful driving style" (p. 324). Based on the facets above the authors emphasizes adaptive or safe driving style as Patient - individual's inclination to be respectful, demonstration that driver has plenty of time and patience while driving, and Careful - individual's inclination to drive carefully, ability of planning the routes and solving problems appearing on the road. Maladaptive or unsafe driving styles as Dissociative - individual's inclination to be easily abstracted while driving, demonstration of cognitive neglects and dissociations, making driving errors; Angry - individual's inclination to be aggressive towards other drivers and experience range while driving; Risky - individual's inclination to take risk and sensation, engagement in

risky driving, and High-Velocity - individual's inclination to high-speed driving, lack of time demonstration while driving. (Taubman-Ben-Ari et al., 2004). The styles mentioned above have been considered as dependent variables of the current research. The questionnaire was also successfully adapted in Argentina, the Netherlands, Belgium, Spain, Bulgaria, Romania, China, as well as a Russian language version adapted and validated in Belarus. All of the studies showed an association between reckless types of driving and traffic accidents. (Huysduynen et.al., 2015; Totkova & Racheva, 2019; Poó et al., 2013; Wang, et al., 2018; Holman & Havârneanu, 2015; Furmanov & Astreyko, 2016).

The main purpose of the researchers was validation and adaptation of the MDSI questionnaire for the specific country, the second purpose was to investigate interrelations with some personal characteristics of drivers or their country road climate to have more specified questionnaire implementation. For an example, China is the second largest country in the world on the basis of vehicles' owners' quantity and so has extremely congested traffic conditions. In the process of adaptation MDSI for Chinese sample, it was found that personality has a significant association with driving styles, as well as socio-demographic variables such as age and experience in driving which was negatively associated with anxiety, so it could be suggested that driving years can reduce anxiety (Wang et al., 2018; Poó et al., 2013). The statement that young drivers used more aggressive and reckless driving styles was supported by the majority of studies that adapted the questionnaire (Poó et al., 2013, Huysduynen et.al., 2015, Holland et al., 2010, Holman & Havârneanu, 2015; Padillaa et al., 2020). One of the purposes of MDSI validation in the Netherlands and Belgian sample was to determine drivers' profiles for incorporation of some aspects of driving behavior to Advance Driver Assistance System (ADAS) to enhance compliance, another form

of digitalization of the road safety system (Huysduynen et al., 2015). Studies carried out in Spain, China, Bulgaria, Romania and Argentina confirmed that men were more likely to be involved in high speeding and usually show more maladaptive behavior on the road. Women used careful driving styles more, however they also showed higher scores on the anxious scale (Holland et al., 2010; Poó et al., 2013; Holman & Havârneanu, 2015; Padillaa et al., 2020; Wang et al., 2018).

1.4 Anxiety

One of the goals of surveillance on the roads is to provide punishment for offenders and support of careful drivers; nevertheless it touches upon privacy issues to some extent. Anxiety is an emotion which expresses itself in tension, disturbing and compulsive thoughts, experience everlasting burdens and sometimes physical changes such as high blood pressure or physical symptoms like feeling hot, hot/cold sweating, difficulty of breathing or the heart racing (Kazdin, 2000).

Anxiety could also operate as an alerting signal, prompt fear and lead to defensive behavior and escaping from danger or conflict (Steimer, 2002). Individuals with anxiety disorders often exhibit threat and their appraisal of threat is often biased, and could be real, potential or even imagined (Britton et al., 2011). Uncertainties, unknown threat and lack of control contribute to the feeling of anxiety that in turn could decrease the ability to cope with challenging life situations, and this could potentially influence driving behaviors as sometimes it reflects all the above mentioned characteristics (Steimer, 2002, Britton et al., 2011). As anxious individuals usually avoid situations which could provoke additional emotional stress it could influence people's performance on the road and provoke ambiguous reactions (Moss, 2002).

The influence of anxiety has been investigated and reported to have an impact on driver's behavior in terms of three domains; extreme cautiousness, aggressive behavior and poor driving performance (Clapp et al., 2011). Though as an independent psychological construct anxiety has not been studied in connection to MDSI, it could be suggested that its symptoms could affect driver's driving style on the road, especially if we are evaluating physical aspects such as numbness or being unsteady. At the same time suspiciousness often overlaps with anxiety which could be interpreted as people with higher scores on anxiety level could have a negative attitude to surveillance, even if it is done for road safety reasons, and may not trust the data provided by technological or digital devices (Fisher et al., 2014).

1.5 Self-esteem

Self-esteem can be defined as a person's evaluation of their true self, the degree to which an individual values, approves or likes oneself (Robinson, 2013). Self-esteem is a global psychological construct which correlates with psychological well-being (Paradise & Kernis, 2002), prosocial behavior (Zuffianò et al., 2014), communication skills (Gürdoğan et al., 2016), happiness and level of depression (Baumeister et al., 2003). Research findings support the idea that self-esteem is positively associated with adaptive types of behavior (Pyszczynski, Greenberg, Solomon, Arndt, & Schimel, 2004). Taubman-Ben-Ari et al. (2004) investigated the relationships between general self-esteem and driving styles and detected a negative association with dangerous driving styles and positive association with careful and patient driving styles. Self-esteem and extraversion were found to be negatively correlated with maladaptive driving styles (Taubman-Ben-Ari et al., 2004).

Crocker et al. (2001) developed the Contingencies of Self-Worth (CSW) scale emphasizing that people differ in different domains of self-esteem where they invest their energy, due to the fact that a specific domain has a unique significance for an individual's self-esteem for achieving better results in life. Some types of behavior are associated not only with level of self-esteem, but with the domain (contingencies) people based their self-esteem on. Those domains are called contingencies of self-esteem and could be internal and/or external (Crocker et al., 2003). As self-esteem could fluctuate depending on life (Rossi, 2019) positive outcomes or failures, the current research employed three contingencies of self-worth to investigate relationships in interest. Minded the idea that internal contingencies are more connected with personal well-being and therefore more adaptive behavior, an individual's moral code as an internal contingency named Virtue was chosen. It could be defined as placing one's self-worth in the contingency of the idea about oneself as an honest-minded person who owing high moral standards (Crocker et al., 2003). Family support contingency was included as well to investigate the external domain, as a part of the concept "family climate for road safety". According to recent research findings family climate as an external influence has an impact on risky driving behaviors, particularly among young or novice drivers (Carpentier et al., 2014; Yang et al., 2013; Taubman-Ben-Ari et al., 2012). In terms of our research it could be described as individual's self-worth placed in perceived affection, positive assessment and support by significant others such as family members (Crocker et al., 2003). The third contingency which could contribute to the current research is Competition, as the one which includes internal and external component, as self-esteem may be based on being surpassing others (Crocker et al., 2003). The other contingencies like appearance, relationship with partner, competence (as not driving

competence was measured by scale) and other's approval were not included as having less connection with driving behavior.

The investigation of relationships between anxiety and self-esteem showed some contradiction. There is a study which supported that they are relatively balanced (Sowislo & Orth, 2013). Some contrary findings provided evidence that self-esteem has a negative correlation with anxiety, though the correlation is weak (Vink et al., 2008; Suliman & Halabi, 2007). At the same time the association between lower level of self-esteem and increased anxiety was supported in one recent research article (Nguyen et al., 2019).

1.6 Current Study

To our knowledge no research has been carried out to measure public attitude to surveillance technologies on the roads in the Republic of Kazakhstan and the interrelations between these attitudes and habitually used driving styles. The aim of the current study is to investigate the relationships of societies' attitude to the rapid expansion of observation technologies on the road, with anxiety and contingencies of self-worth and understand what the influence of each of the above mentioned constructs on employed individual's driving style.

There are vast amount of studies related to people's behavior on the roads and their driving style (ex. Ellison et al., 2015; Berthié et al., 2015; Eboli et al., 2016). As traffic crash death and injuries rate increase (WHO, 2016) and 90 % of crashes are related to human factors (Ibrayimov, 2017), it is important to understand what factors could lead to maladaptive or unsafe behavior on the roads.

On the basis of a deeper understanding of self-esteem aspects, we aimed to investigate the nature of relationships between the individual's feeling with regard to particular constituent of self-esteem and certain driving style, as one person could value oneself for being approved and accepted by the others, another one for outperforming to others, the next one for keeping high moral and etc (Crocker & Wolfe, 2001; Crocker et al., 2003).

In the current research we investigated the Anxiety level which could potentially lead to adopting unsafe driving styles more often and Contingencies of Self Worth in which an individual could buffer negative attitudes to surveillance and potentially choose safer driving styles. Therefore our purpose is to understand the interrelations between peoples' attitudes to ever increasing digitalization, specifically surveillance on roads, connected to level of Anxiety and its influence to people's choice of safe or unsafe driving styles.

Therefore it was hypothesized that,

- i. High level of anxiety provokes more negative public attitude to camera's observation and positively correlates with unsafe driving styles.
- ii. High level of self-esteem provokes positive or neutral public attitude to camera's observation and positively correlates with safe driving styles.
- iii. Low level of self-esteem positively correlates with negative public attitude to camera's observation, high level of anxiety and unsafe driving styles.
- iv. Anxiety affects the relationships between public attitude and driving styles as a moderator. When level of anxiety is low public attitude to surveillance technologies on the road is positive and it leads to using safe and careful driving styles. When level of anxiety is high public attitude is negative and it

leads to using unsafe/reckless driving styles or be too careful in situations where it is not needed.

- v. Self-Esteem mediates the relationship between public attitude to camera's observation on roads and driving styles. Negative public attitude provokes unsafe driving styles in case of low self-esteem, but if self-esteem is high even in case of negative public attitude the individuals will use safe driving styles.

Chapter 2

METHOD

2.1 Participants

A total of 189 participants residing in Almaty city, Republic of Kazakhstan that speak Russian responded to the Survey. Five (5) participants including those who have been diagnosed with a psychological disorder or received continued a treatment for a psychological disorder; those who have used any medication to treat psychological disorders, as well as those who have received any therapy to treat a psychological disorder in the last five years were excluded from the study. One (1) participant reported being 16 years old and was not included in the study as he did not meet the full legal age to have a driving license. Seven (7) participants withdrew the completing the survey, seventeen (17) participants started and stopped after filling in the consent form, all of them were excluded from calculations. In total, 159 participants ($M = 36.35$, $SD = 10.47$), of which 83 Females ($M = 35.10$, $SD = 10.63$); 64 Males ($M = 37.89$, $SD = 10.29$) and 12 participants who preferred not to answer this question, that hold a valid driving license, took part in the study. Forty seven (47) participants did not answer all the questions of the survey, the majority of them missed demographical information such as quantity of kilometers driven, quantity of crashes or fines for exceeding speed limits, 140 participants completed all the subscales of the survey as Public Attitude, MDSI, CSW, BAI. Non-probability convenience sampling and snowballing technique was used. Individuals that speak

Russian language were chosen due to the fact that it is the most commonly used language in Almaty city.

2.2 Design

The self-administered questionnaires were distributed through internet survey, with use of SurveyMonkey software which enables distribution, administration and management of electronic surveys.

Initially, a principal axis factor analysis was carried out on 14 items of public attitude to surveillance technologies on the roads questionnaire to identify appropriate subscales. A correlational analysis was conducted to check hypotheses 1-3. Hierarchical regression was conducted to check the predictors of safe and unsafe driving styles and compare with previous findings related to driving styles, moderation and mediation analyses were conducted to check the hypothesis number 4 and 5, namely: Anxiety moderates the relationships between public attitude and driving styles; Virtue, Family Support and Competition mediate the relationship between public attitude to surveillance technologies on the road and driving styles. The PROCESS add-on for SPSS written by Andrew F. Hayes, was used for mediation and moderation analyses. The calculations were made with use of IBM SPSS Statistics 23 software.

2.3 Materials

The following five self-administered questionnaires and two forms were distributed through internet survey, with the use of SurveyMonkey software:

1. Demographic Form (DF). Demographic questionnaire was used in order to collect information related to age, gender, years of having driving license, kilometers driven, and number of crashes, speeding fines if any, driving inside or

outside the country or city. As well as control questions related to having psychological disorder, treatment or medication use. During data collection the pandemic situation due to the COVID-19 virus was experienced and 3 additional questions were included to control the study results such as: “I feel more anxious than usual due to the COVID- 19 pandemic” and 5 point Likert scale (see Appendix A).

2. Public Attitude Questionnaire. A questionnaire related to public attitude to surveillance enforcement was developed by the present study researchers in order to measure attitudes to surveillance technologies on the road (see Appendix A). This questionnaire included 14 items, used a 5 point Likert Scale and adapted items from Public Survey reports by specialized Research Institutes such as Ipsos MORI Social Research Institute for the RAC (Royal Automobile Club), 2018, Malaysian Institute of Road Safety Research (MIROS), 2012, Insurance Institute for Highway Safety, Attitudes Toward Red Light Camera Enforcement in Cities With Camera Programs, 2012. The questionnaire was initially created in English and then translated into Russian by a specialized certified translation agency named OLS. This company specializes in translation and works with leading Kazakhstani universities such as Nazarbayev University (see Appendix A). The first two extracted factors showed high reliability values as public attitude support Cronbach`s $\alpha = .85$; public attitude thoughts Cronbach`s $\alpha = .72$.
3. The Multidimensional Driving Style Inventory (MDSI). MDSI is a conceptualized assessing self-administered tool consisted of 44 MDSI items, used 7 points Likert scale, 8 factors related to each driving style (see Appendix B). The original version in English was developed by Taubman-Ben-Ari, O., Mikulincerb, M., & Gillath, O. (2004). The Russian version of MDSI was

adapted by Furmanov, I. A., & Astreyko, N. S. (2016), they preserved the initial structure of 44 questions and reflected 8 subscales. Due to the fact that a majority of the population in Kazakhstan has a good command of the Russian language, the above mentioned Russian version of MDSI was used. Six subscales were taken into consideration. Dissociative (ex. “misjudge the speed of an oncoming vehicle when passing; Cronbach’s $\alpha = .82$), Risky (ex. “enjoy the excitement of dangerous driving”; Cronbach’s $\alpha = .83$), Angry (ex. “swear at other drivers”; Cronbach’s $\alpha = .80$), High-Velocity (ex. “get impatient during rush hours”; Cronbach’s $\alpha = .76$) subscales as detectors of unsafe driving styles; and Patient (ex. “base my behavior on the motto “better safe than sorry”; Cronbach’s $\alpha = .74$) and Careful (ex. “drive cautiously”; Cronbach’s $\alpha = .76$) subscales as detectors of safe driving styles (see Appendix B).

4. Contingencies of Self-Worth (CSW). The scale was initially developed in 2001 by Crocker and Wolfe. The Final Russian-language version of the questionnaire, which was called “Basic foundations of Self-Esteem”, was used. The version was adapted by Molchanova, O. N., & Nekrasova T. Y. (2014). The questionnaire consists of 35 statements which represent 7 subscales with 5 statements each. Three subscales were used in this research, Family support (ex. “When my family members are proud of me, my sense of self-worth increases”; Cronbach’s $\alpha = .84$), Competition (ex. “Doing better than others gives me a sense of self-respect”; Cronbach’s $\alpha = .87$) and Virtue (ex. “My self-esteem would suffer if I did something unethical”; Cronbach’s $\alpha = .83$) as original researchers recommended using specific subscales for further research. These three subscales reflect more internal, more external and mixed domains of contingency and were more relevant to investigating driving behavior than the other subscales. The

subscale Approval of other which could be also appropriate for the investigation as external field, did not achieve applicable validity value, as Cronbach's $\alpha = .46$. In addition Family support was more relevant in terms of researches interest due to the investigating the role of family in road safety and risky driving (see Appendix C).

5. Beck Anxiety Inventory (BAI). The BAI was developed by Beck & Steer, 1990; as a self-administered 21 items tool for assessing physical symptoms of anxiety. A four (4) point Likert scale was used to measure anxiety level of participants due to reflection of physiological anxiety symptoms (ex. "Unable to relax" or "Dizzy or lightheaded"). Fydrich, Thomas & Dowdall, Deborah & Chambless, Dianne (1992) assessed reliability (Cronbach's $\alpha = .94$) and validity of the Beck Anxiety Inventory. The Russian version of Beck Anxiety Inventory from the Oxford University Research Archive Appendix 1.6a by SG Rakovshik, (2011) was used in the study (see Appendix D). The reliability value of our study was assessed and revealed as Cronbach's $\alpha = .96$.

2.4 Procedure

The self-administered questionnaires were distributed through the internet using three types of methods (1) personal invitation through e-mail message, (2) invitation to take part in Survey in social media (Face book, LinkedIn) and (3) reference link (direct invitation through WhatsApp/Messengers). The Eastern Mediterranean University Ethical Board issued approval for conducting the current research. An informed consent form was used in order to receive participants' consent to take part in the research and explain the research nature and purpose (see Appendix E) and a debriefing form was used to explain nature; results and research outcomes and to

provide the details of the potential source of psychological support if necessary (see Appendix F).

The scales and forms were counterbalanced in order to mitigate any ordering effects. The consent form was provided first in order to make sure that the participant understands the research purposes and right to withdraw at any moment and the debrief form was the completing one, in case of the questionnaire is completed or in case of refusal from participation or withdraw. The other questionnaires were provided as such:

- The first group of potential participants received the questionnaires in the following order: 1. DF; 2. PA; 3. MDSI; 4. CSW; 5. BAI.
- The second group received the questionnaires as follows: 1. PA; 2. MDSI; 3. CSW; 4. BAI; 5. DF.
- The third group received the questionnaires as follows: 1. MDSI; 2. CSW; 3. BAI; 4. DF; 5. PA.
- The final group received the questionnaires as follows: 1. CSW 2. BAI; 3. DF; 4. PA; 5. MDSI.

After completion the data was automatically gathered, around 30 minutes were needed to complete all the questionnaires. The data was analyzed with IBM SPSS® version-23 and included descriptive statistics, separate Pearson correlation tests, regression, moderation and mediation analyses were conducted to test the relationships between Public attitude, Anxiety, CSW and safe/unsafe driving styles.

Chapter 3

RESULTS

3.1 Demographic Data

Total sample size, quantity of participants who answered each particular scale, their biological gender, years of driving, age and average driving kilometers per year are presented in Table 1. The number of participants who replied “yes” for questions related to crashes and speeding are as follows: 22 participants reported that they had crashes, 14 answered as they were involved in active crashes, 30 in passive, 62 received fines for excessive speeding in the city and 45 out of the city. According to the figures the majority of participants preferred not replying to these questions so information was not used within the inferential statistical analysis.

Table 1: Means and Standard Deviations for MDSI Subscales, CSW Subscales, Anxiety, PA Support, PA Thought, Age, Total Years of Driving and Kilometers Driven per Year for the Whole Sample, Female and Male Road Users.

Characteristic	Total			Female			Male		
	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>N</i>	<i>Mean</i>	<i>SD</i>
Dissociative	146	2.08	0.91	77	2.17	0.88	60	2.04	0.99
Risky	146	2.05	0.96	77	1.93	0.89	60	2.25	1.07
Angry	146	2.98	1.11	77	2.76	1.03	60	3.36	1.16
High- Velocity	146	2.60	0.91	77	2.57	0.89	60	2.67	0.96
Patient	146	4.10	1.19	77	4.13	1.23	60	4.02	1.16

Careful	146	4.59	0.87	77	4.51	0.87	60	4,61	0.90
Family	143	4.79	0.91	78	4.66	0.83	59	4.98	0.99
Support									
Competition	143	4.98	1.32	78	5.02	1.21	59	4.90	1.48
Virtue	143	4.85	1.12	78	4.74	1.10	59	4.99	1.16
Anxiety	140	1.61	0.60	78	1.61	0.56	59	1.60	0.67
PA Support	147	3.26	0.54	80	3.28	0.49	62	3.21	0.61
PA Thoughts	147	2.92	0.65	80	2.97	0.58	62	2.81	0.73
Age	146	36.35	10.47	80	35.10	10.63	64	37.89	10.29
Total years of driving	131	11.47	8.39	73	9.59	7.84	56	13.77	8.66
Kilometers per year	103	16095	18678	54	9740	16802	47	23294	18328

3.2 Factor Analyses of Public Attitude to Surveillance Technologies on the Road

A principal axis factor analysis was carried out on 14 items of public attitude to surveillance technologies on the road questionnaire with orthogonal rotation (varimax). The Kaiser-Meyer-Olkin indicated that the strength of the relationship among variables was average, $KMO = .77$. Initially three factors with an eigenvalue greater than 1 were extracted. A varimax rotation was preferred.

The first factor was with a high eigenvalue of 4.29, and it accounted for 30.62% of the variance in the data. Factor two had an eigenvalue of 2.23 and accounted for a

further 15.29% of the variance. The eigenvalue for factor three was 1.43 and accounted for a further 10.23 % of the variance.

After rotation factor 1 and factor 2 accounted for 23.11%, and 11.69 % of the variance respectively. Factor 3 accounted for 10.33%. The majority of questions that loaded into factor one (six items) were related to the ideas directed to supporting surveillance on the roads, this factor was named Public attitude support. This factor had a high reliability value (Cronbach's $\alpha = .85$). The second factor (5 items) was more related to drivers thinking about the measures taken in connection with surveillance technologies; therefore it was named Public attitude thoughts. This factor had a good reliability value (Cronbach's $\alpha = .72$). The third factor consisted of 3 items, was named Public attitude beliefs on surveillance. The factor had an acceptable reliability value (Cronbach's $\alpha = .61$). The third factor was not included into the research calculations as the initial factor 1 contained the majority of items related to researches' hypothesis in sense of supporting or not supporting the surveillance on the roads. The second factor was included in the correlation analysis. Table 2 includes the three factors and the different items loading values for these specific factors.

Table 2: Factor Model Coefficients of the Public Attitude Questionnaire

Factors and items	Loading
<hr/>	
Factor 1: public attitude support	
[1] I support the monitoring of mobile phone use (e.g. GPS location tracking)	0.70
[2] I support monitoring on public transport (e.g. Using cameras to monitor on buses and trains)	0.85
[3] I support monitoring on roads (e.g. Using cameras to monitor all roadways)	0.83
[4] I support the monitoring of traffic speed (e.g. speed cameras on local roads and motorways)	0.82

[5] I support automated road traffic enforcement (e.g. cameras used to detect and trigger penalties automatically for traffic offences	0.76
[10] I think the number of penalty notices issued should be regularly published for each area	0.44
Factor 2: public attitude thoughts	
[6] I don't believe automated road traffic enforcement works effectively in discouraging drivers from offending	0.54
[8] I think automated road traffic enforcement is designed mainly to raise revenue for the government and local councils	0.65
[9] I think automated road traffic enforcement works less effectively in discouraging drivers from offending than 'human' enforcement by police and other enforcement agencies	0.65
[11] I think automated road traffic enforcement only causes drivers to slow down where the camera is positioned before speeding up again	0.78
[13] I drive slower seeing automated road traffic enforcement according to the fixed limit and take faster speed as I cross the camera	0.56
Factor 3: public attitude beliefs	
[7] I feel safer knowing that automated road traffic enforcement discourages drivers from offending	0.61
[12] I would rather see more automatic traffic enforcement freeing police time to focus on other matters	0.56
[14] My driving performance changed in a better way since automated road traffic enforcement has been installed	0.72

3.3 Correlation Analyses

To investigate the appropriate sample size for the correlation analysis the free software G*Power 3.1.9.2 developed by Faul et al. (2009) was used. The estimated sample size of 138 was calculated for the Correlation as Bivariate normal model p $H_1 = .3$, α error probability 0.05, Power (1- β err prob) 0.95, two-tailed.

As reflected in table 3 the results of the Pearson correlation revealed that unsafe or maladaptive driving styles significantly correlates between each other, particularly High-Velocity driving style strongly correlates with other unsafe driving styles. At

the same time Careful driving style negatively correlates with four investigated dangerous styles, though the second safe driving style in consideration, Patient driving style does not show such pattern and significantly negatively correlates only with Risky driving style. Public attitude support is negatively associated with unsafe driving styles and moderately positively associated with safe driving styles, though a significant correlation with Angry driving style was not revealed. The second factor of Public attitude to observation technologies on the roads named Public attitude thoughts showed a negative significant correlation with Angry driving style only. Anxiety in its turn positively significantly associated with maladaptive driving styles and inversely with Public attitude support and adaptive driving styles.

All three contingencies of self-worth namely Family Support, Competition and Virtue have a strong positive correlation between each other, negatively correlate with Anxiety and positively correlate with Public attitude support. Competition and Family Support have no correlation with Careful driving style and a weak positive correlation with Patient driving style; Virtue significantly positively correlates with both adaptive driving styles. As for unsafe driving style, Competition, Family Support and Virtue has negative association with Dissociative and Risky driving styles; Competition and Family Support show no correlation with Angry or High-Velocity driving styles, Virtue correlates with High-Velocity driving. None of the self-worth contingencies investigated in the study has a significant correlation with Angry driving style.

Age has a moderate significant correlation with two adaptive driving styles (Patient and Careful) and no correlation with any other studied variables. Gender

significantly correlates with Angry driving style and was close to significance with Risky driving style.

The COVID variable, which has been added to the research as a control variable, has a significant positive correlation with Angry driving style and Anxiety.

Table 3: Descriptive Statistics and Correlations for Study Variables

Variable	<i>n</i>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Dissociative	146	-														
2. Risky	146	.65**	-													
3. Angry	146	.30**	.43**	-												
4. High-Velocity	146	.60**	.50**	.68**	-											
5. Patient	146	-.08	-.27**	-.04	-.08	-										
6. Careful	146	-.49**	-.50**	-.20*	-.36**	.50**	-									
7. PA Support	141	-.30**	-.33**	-.04	-.19*	.32**	.38**	-								
8. Anxiety	138	.61**	.60**	.20*	.40**	-.20*	-.39**	-.35**	-							
9. Competition	139	-.27**	-.30**	-.04	-.04	.17*	.10	.17*	-.27**	-						
10. Family Support	139	-.39**	-.31**	.06	-.16	.22**	.14	.23**	-.42**	.63**	-					
11. Virtue	139	-.45**	-.40**	-.15	-.30**	.17*	.26**	.24**	-.45**	.42**	.42**	-				
12. PA Thoughts	139	.12	-.12	-.22*	-.09	-.10	-.15	-.04	-.01	-.12	-.09	-.09	-			
13. Age	136	.05	-.08	.08	.09	.35**	.28**	.14	.07	-.08	-.06	-.01	-.05	-		
14. Gender	137	-.07	.17	.26**	.06	-.05	.05	-.05	-.01	-.05	.18*	.11	-.12	-.13	-	
15. COVID	149	-.02	.12	.20*	.08	.07	-.13	-.06	.19*	.01	.14	.02	.03	-.04	.12	-

* $p < .05$. ** $p < .01$.

3.4 Regression Analyses

To investigate the appropriate sample size for the regression analysis the free software G*Power 3.1.9.2 developed by Faul et al. (2009) was used. For a multiple linear regression the estimated sample size is 129 for medium effect size $f^2 = .15$, α error probability 0.05, Power (1- β err prob) 0.95, with four tested predictors and 6 total predictors.

Hierarchical regression analyses were conducted separately with Anxiety and with CSW as Family Support, Competition and Virtue in the models.

3.4.1 Regression with Anxiety in the Model

As reflected in table 4 the hierarchical regression analysis was conducted in two steps with Age and Gender as the first step and Public attitude support and Anxiety as the second step for unsafe and safe driving styles.

Table 4: Hierarchical regression analyses of Public attitude support and Anxiety on unsafe (Dissociative, Risky, Angry and High-Velocity) and safe (Patient and Careful) driving styles

Step	Independent Variables	R^2	ADJ- R^2	Chang e in R^2	F	df	β
<i>Unsafe driving style Dissociative as a dependent variable</i>							
1.	Age	0.01	-0.01	0.01	0.61	129	.07
	Gender (1=female; 2=male)					129	-.08
2.	PA Support	0.39	0.37	0.38	20.12***	127	-.11
	Anxiety					127	.57***
<i>Unsafe driving style Risky as a dependent variable</i>							
1.	Age	0.03	0.02	0.03	1.97	129	-.09
	Gender (1=female; 2=male)					129	.16
2.	PA Support	0.42	0.40	0.39	22.25***	127	-.11
	Anxiety					127	.57***
<i>Unsafe driving style Angry as a dependent variable</i>							
1.	Age	0.08	0.06	0.08	5.33**	129	.07

	Gender (1=female; 2=male)					129	.26**
2.	PA Support	0.12	0.08	0.04	4.22**	127	.06
	Anxiety					127	.22*
<i>Unsafe driving style High-Velocity as a dependent variable</i>							
1.	Age	0.01	-0.01	0.01	0.92	129	.09
	Gender (1=female; 2=male)					129	.07
2.	PA Support	0.18	0.15	0.16	6.87***	127	-.06
	Anxiety					127	.38***
<i>Safe driving style Patient as a dependent variable</i>							
1.	Age	0.12	0.11	0.12	8.91***	129	.35***
	Gender (1=female; 2=male)					129	-.08
2.	PA Support	0.21	0.19	0.09	8.42***	127	.23**
	Anxiety					127	-.12
<i>Safe driving style Careful as a dependent variable</i>							
1.	Age	0.08	0.06	0.08	5.33**	129	.27**
	Gender (1=female; 2=male)					129	.02
2.	PA Support	0.29	0.27	0.22	13.15***	127	.24**
	Anxiety					127	-.33***

* $p < .05$; ** $p < .01$; *** $p < .001$

3.4.1.1 Unsafe Driving Styles: Dissociative, Risky, Angry, High-Velocity Driving Styles

Dissociative driving style. In step one Age and Gender do not significantly predict Dissociative driving style. In step 2 Public attitude support is not significant, though Anxiety significantly predicts Dissociative driving style. Using hierarchical regression it was found that Age, Gender, Public attitude support and Anxiety together explain a significant proportion of the variance in Dissociative driving style, $R^2 = 0.39$, $F(4, 127) = 20.12$, $p < .001$.

Risky driving style. In step one Age and Gender do not significantly predict Risky driving style. In step two Age and Public attitude support are not significant, though Gender and Anxiety significantly predict Risky driving style. Using hierarchical regression it was found that Age, Gender, Public attitude support and Anxiety together explain a significant proportion of the variance in Risky driving style, $R^2 = 0.42$, $F(4, 127) = 22.55$, $p < .001$.

Angry driving style. In step one Age is not significant; Gender is significant. In step two Age and Public attitude support are not significant, though Gender and Anxiety significantly predict Angry driving style. Using hierarchical regression it was found that Age, Gender, Public attitude support and Anxiety together explain a significant proportion of the variance in Angry driving style, $R^2 = 0.12$, $F(4, 127) = 4.22$, $p = .003$.

High-Velocity driving style. In step one Age and Gender are not significant. In step two Age, Gender and Public attitude support are not significant; though Anxiety is significant in predicting High-Velocity driving style. Using hierarchical regression it was found that Age, Gender, Public attitude support and Anxiety together explain a significant proportion of the variance in High-Velocity driving style, $R^2 = 0.18$, $F(4, 127) = 6.87$, $p < .001$.

3.4.1.2 Safe Driving Styles: Patient and Careful Driving Style

Patient driving style. In step one Age is significant, but Gender is not significant. In step two Gender and Anxiety are not significant; though Age and Public attitude support are significant in predicting Patient driving style. Using hierarchical regression it was found that Age, Gender, Public attitude support and Anxiety

together explain a significant proportion of the variance in Patient driving style, $R^2 = 0.21$, $F(4, 127) = 8.42$, $p < .001$.

Careful driving style. In step one Age is significant, but Gender is not significant. In step two Gender is not significant; Age, Public attitude support and Anxiety are significant in predicting Careful driving style. Using hierarchical regression it was found that Age, Gender, Public attitude support and Anxiety together explain a significant proportion of the variance in Careful driving style, $R^2 = 0.29$, $F(4, 127) = 13.15$, $p < .001$.

3.4.2 Regression Analyses with CSW as Family Support, Competition and Virtue in the Model

As reflected in the table 5 the hierarchical regression analysis was conducted in two steps with Age and Gender as the first step; Public attitude support, Family Support, Competition and Virtue as the second step for unsafe and safe driving styles.

Table 5: Hierarchical Regression Analyses of Public Attitude Support and Self-Worth Contingencies as Family Support, Competition and Virtue on Unsafe (Dissociative, Risky, Angry and High-Velocity) and Safe (Patient and Careful) Driving Styles

Step	Independent Variables	R^2	ADJ- R^2	Change in R^2	F	df	β
<i>Unsafe driving style Dissociative as a dependent variable</i>							
2.	PA Support	0.28	0.25	0.27	8.15***	125	-.18*
	Family Support					125	-.18
	Competition					125	.04
	Virtue					125	.36***
<i>Unsafe driving style Risky as a dependent variable</i>							
2.	PA Support	0.30	0.27	0.27	8.98***	125	-.19*
	Family Support					125	-.20
	Competition					125	.01
	Virtue					125	-.31***
<i>Unsafe driving style Angry as a dependent variable</i>							
2.	PA Support	0.14	0.10	0.06	3.30**	125	.10

	Family Support					125	.15
	Competition					125	.02
	Virtue					125	-.28**
<i>Unsafe driving style High-Velocity as a dependent variable</i>							
2.	PA Support	0.16	0.12	0.15	3.94***	125	-.12
	Family Support					125	-.13
	Competition					125	.23*
	Virtue					125	-.34***
<i>Safe driving style Patient as a dependent variable</i>							
2.	PA Support	0.24	0.20	0.12	6.53***	125	.21*
	Family Support					125	.19
	Competition					125	-.01
	Virtue					125	.06
<i>Safe driving style Careful as a dependent variable</i>							
2.	PA Support	0.25	0.21	0.17	6.86***	125	.27***
	Family Support					125	.16
	Competition					125	-.12
	Virtue					125	.18*

* $p < .05$; ** $p < .01$; *** $p < .001$

3.4.2.1 Unsafe Driving Styles: Dissociative, Risky, Angry, High-Velocity Driving Styles

The results for the step one are the same as table 4 and were not included in Table 5.

Dissociative driving style. In step two Age and Gender as well as Family support and Competition are not significant. Public attitude support and Virtue are significant in predicting Dissociative driving style. Using hierarchical regression it was found that Age, Gender, Public attitude support, Family Support, Competition and Virtue together explain a significant proportion of the variance in Dissociative driving style, $R^2 = 0.28$, $F(4, 127) = 8.15$, $p < .001$.

Risky driving style. In step two Age and Competition are not significant, Family support was close to significance. At the same time Gender, Public attitude support

and Virtue are significant in predicting Risky driving style. Using hierarchical regression it was found that Age, Gender, Public attitude support, Family Support, Competition and Virtue together explain a significant proportion of the variance in Risky driving style, $R^2 = 0.30$, $F(4, 127) = 8.98$, $p < .001$.

Angry driving style. In step two Age, Public attitude support, Family Support and Competition are not significant in predicting Angry driving style. Gender and Virtue are significant in predicting Angry driving style. Using hierarchical regression it was found that Age, Gender, Public attitude support, Family Support, Competition and Virtue together explain a significant proportion of the variance in Angry driving style, $R^2 = 0.14$, $F(4, 127) = 3.30$, $p = .005$.

High-Velocity driving style. In step two Age, Gender, Public attitude support and Family Support are not significant. Virtue and Competition are significant in predicting High-Velocity driving style. Using hierarchical regression it was found that Age, Gender, Public attitude support, Family Support, Competition and Virtue together explain a significant proportion of the variance in High-Velocity driving style, $R^2 = 0.16$, $F(4, 127) = 3.94$, $p = .001$.

3.4.2.2 Safe Driving Styles: Patient and Careful Driving Styles

Patient driving style. In step two Gender, Competition, Family Support and Virtue are not significant. Age and Public attitude support are significant in predicting Patient driving style. Using hierarchical regression it was found that Age, Gender, Public attitude support, Family Support, Competition and Virtue together explain a significant proportion of the variance in Patient driving style, $R^2 = 0.24$, $F(4, 127) = 6.53$, $p < .001$.

Careful driving style. In step two Gender, Competition and Family Support are not significant. At the same time Age, Public attitude support and Virtue are significant in predicting Careful driving style. Using hierarchical regression it was found that Age, Gender, Public attitude support, Family Support, Competition and Virtue together explain a significant proportion of the variance in Careful driving style, $R^2 = 0.25$, $F(4, 127) = 6.86$, $p < .001$.

3.5 Moderation Analyses

A moderation analyses were conducted with independent variable as Public attitude support, Anxiety as Moderator; and Covariate as COVID, the variable which was created by summing up the questions related to worldwide pandemic situation and used to control for Anxiety in the model.

3.5.1 Moderation for Unsafe Driving Styles: Dissociative, Risky, Angry and High-Velocity Driving Styles

A hierarchical multiple regression analysis was conducted to measure if level of Public attitude support influences adoption of unsafe driving styles.

Dissociative driving style. In the first step, Anxiety, Public attitude support and COVID were included. These variables accounted for a significant amount of variance in Dissociative driving style, $R^2 = 0.40$, $F(3, 133) = 29.99$, $p < .001$. To avoid potentially problematic high multicollinearity with the interaction term, the variables were centered and an interaction term between Anxiety and Public attitude support. The new results also accounted for a significant amount of variance in Dissociative driving style, $R^2 = 0.41$, $F(4, 132) = 22.62$, $p < .001$. The Covid variable was not significant in the model, as $b = -.18$, $t(132) = -1.88$, $p = .064$.

Interaction was not significant and no moderation effect was present, $b = -.12$, $t(132) = -0.84$, $p = .401$.

Risky driving style. In the first step, Anxiety, Public attitude support and COVID were included. These variables accounted for a significant amount of variance in Risky driving style, $R^2 = 0.38$, $F(3, 133) = 27.11$, $p < .001$. To avoid potentially problematic high multicollinearity with the interaction term, the variables were centered and an interaction term between Anxiety and Public attitude support. The new results also accounted for a significant amount of variance in Risky driving style, $R^2 = 0.41$, $F(3, 134) = 22.72$, $p < .001$. The COVID variable was not significant in the model, as $b = .06$, $t(132) = 0.64$, $p = .524$.

The interaction was significant, moderation effect presented as $b = -.36$, $t(132) = -2.51$, $p = .013$;

- For low level of Anxiety, Public attitude support was $b = .04$, 95% CI (-0.190, 0.268), $t(134) = 0.34$, $p = .735$ is not significant, so there is no relationship between Public attitude support and Risky driving style if level of Anxiety is low;
- For average level of Anxiety, Public attitude support was $b = -.12$, 95% CI (-0.281, 0.049), $t(134) = -1.40$, $p = .165$ is not significant, no relationship between Public attitude support and Risky driving style;
- For high level of Anxiety, Public attitude support was $b = -.44$, 95% CI (-0.712, -0.175), $t(134) = -3.27$, $p = .001$; there is a significant negative relationship between Public attitude support and Risky driving style.

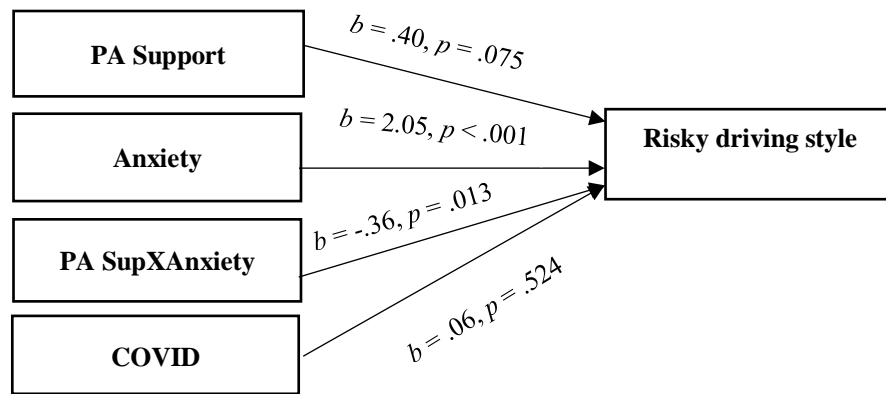


Figure 1: Moderation model for risky driving style

Angry driving style. In the first step, Anxiety, Public attitude support and COVID were included. These variables accounted for a significant amount of variance in Angry driving style, $R^2 = 0.07$, $F(3, 133) = 3.35$, $p = .024$. To avoid potentially problematic high multicollinearity with the interaction term, the variables were centered and an interaction term between Anxiety and Public attitude support. The new results also accounted for a significant amount of variance in Angry driving style, $R^2 = 0.07$, $F(4, 132) = 2.59$, $p = .040$. The COVID variable was significant in the model, as $b = .30$, $t(132) = 2.09$, $p = .040$. Interaction was non-significant $b = -.17$, $t(132) = -0.79$, $p = .430$; no moderation effect for Angry driving style was present.

High-Velocity driving style. In the first step, Anxiety, Public attitude support and COVID were included. These variables accounted for a significant amount of variance in High-Velocity driving style, $R^2 = 0.17$, $F(3, 133) = 8.79$, $p < .001$. To avoid potentially problematic high multicollinearity with the interaction term, the variables were centered and an interaction term between Anxiety and Public attitude support. The new results also accounted for a significant amount of variance in High-Velocity driving style, $R^2 = 0.18$, $F(4, 132) = 7.33$, $p < .001$. The COVID variable

was not significant in the model, as $b = .03$, $t(132) = 0.30$, $p = .766$. Interaction was not significant and no moderation effect was present, $b = -.26$, $t(132) = -1.63$, $p = .106$

3.5.2 Moderation for Safe Driving Styles: Patient and Careful Driving Styles

Moderation regression analysis was conducted to measure if level of Public attitude support influences adoption of Safe driving styles.

Patient driving style. In the first step, Anxiety, Public attitude support and COVID were included. These variables accounted for a significant amount of variance in Patient driving style, $R^2 = 0.12$, $F(3, 133) = 6.23$, $p = .001$. To avoid potentially problematic high multicollinearity with the interaction term, the variables were centered and an interaction term between Anxiety and Public attitude support. The new results also accounted for a significant amount of variance in Patient driving style, $R^2 = 0.12$, $F(4, 132) = 4.65$, $p = .002$. The COVID variable was not significant in the model, as $b = .16$, $t(132) = 1.10$, $p = .273$. Interaction was non-significant and no moderation effect was present, $b = -.04$, $t(132) = -0.18$, $p = .859$ for Patient driving style.

Careful driving style. In the first step, Anxiety, Public attitude support and COVID were included. These variables accounted for a significant amount of variance in Careful driving style, $R^2 = 0.23$, $F(3, 133) = 13.51$, $p < .001$. To avoid potentially problematic high multicollinearity with the interaction term, the variables were centered and an interaction term between Anxiety and COVID. The new results also accounted for a significant amount of variance in Careful driving style, $R^2 = 0.25$, $F(4, 132) = 11.04$, $p < .001$. The COVID variable was not significant in the model, as $b = -.11$, $t(132) = -1.05$, $p = .296$. The interaction effect was not significant but

trended towards a significant effect $b = .26$, $t(132) = 1.73$, $p = .086$. The average and high level of Anxiety had a significant effect;

- For low level of Anxiety, Public attitude support was $b = .15$, 95% CI (-0.079, 0.389), $t(134) = 1.31$, $p = .192$ was not significant, so there was no relationships between Public attitude support and Careful driving style if level of Anxiety is low;
- For average level of Anxiety, Public attitude support was $b = .26$, 95% CI (0.096, 0.433), $t(134) = 3.11$, $p = .002$, so there was significant positive relationships between Public attitude support and Careful driving style;
- For high level of Anxiety, Public attitude support was $b = .50$, 95% CI (0.221, 0.769), $t(134) = 3.57$, $p < .001$; there was a significant positive relationship between Public attitude support and Careful driving style.

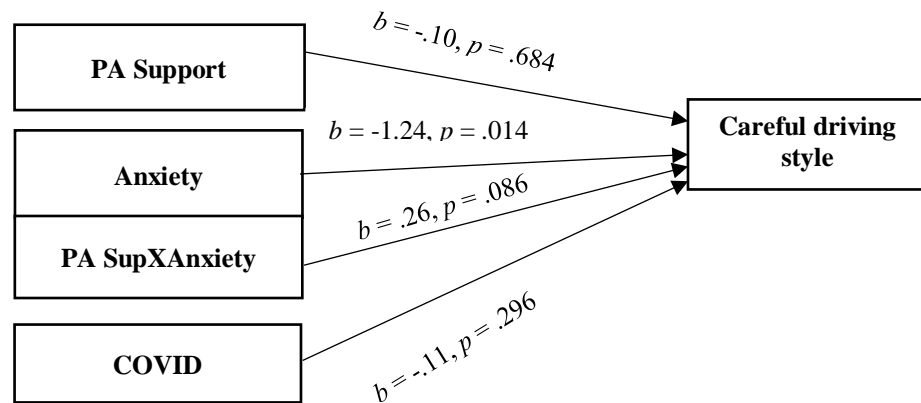


Figure 2: Moderation model for careful driving style

3.6 Mediation

Mediation analyses were conducted to understand the relationships between Public attitude support and safe and unsafe driving styles through three mediators as self-worth contingencies: (1) Family Support, (2) Competition and (3) Virtue.

3.6.1 Mediation for Unsafe Driving Styles: Dissociative, Risky, Angry and High-Velocity Driving Styles

Dissociative driving style. In step one of the mediation model Public attitude support significantly predicted Family support, $b = 0.25$, $t = 2.78$, $p = .006$. This $R^2 = 0.05$ value indicated that the model explains 5% of the variance in Family Support. In step two Public attitude support significantly predicted Competition in the model, $b = 0.27$, $t = 2.07$, $p = .040$. In step three Public attitude support significantly predicted Virtue in the model, $b = 0.32$, $t = 2.89$, $p = .004$. In step four of the analysis Public attitude support significantly predicted Dissociative driving style with Family Support, Competition and Virtue in the model, $b = -0.21$, $t = -2.49$, $p = .014$. Family Support and Competition did not significantly predict Dissociative driving style, Virtue significantly predicted Dissociative driving style, $b = -0.28$, $t = -3.96$, $p < .001$. This $R^2 = 0.26$ value indicated that the model explained 26% of the variance in Dissociative driving style. When the mediators as Family Support, Competition and Virtue were not in the model Public attitude support significantly predicted Dissociative driving style, $b = -0.33$, $t = -3.79$, $p < .001$. This $R^2 = 0.09$ value indicated that the model explained 9% of the variance in Dissociative driving style.

To investigate the relationships between Public attitude support, Family Support, Competition, Virtue and Dissociative driving style a simple mediation was carried out. There was a significant indirect effect of Public attitude support on Dissociative driving style through Family Support, Competition and Virtue, $b = -0.13$, BCa CI [-0.240, -0.039]. This represents a relatively medium effect, $\kappa^2 = -.12$, 95% BCa CI [-.211, -.037].

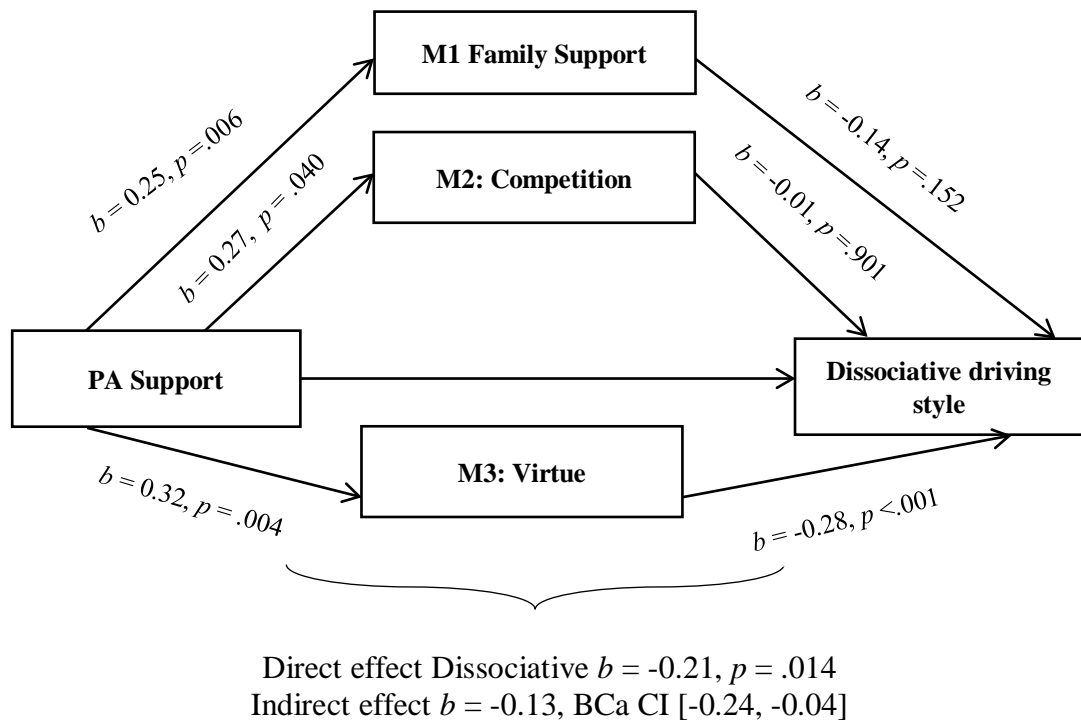


Figure 3: Mediation model for dissociative driving style

Risky driving style. In step one of the mediation model Public attitude support significantly predicted Family support, $b = 0.25, t = 2.78, p = .006$. This $R^2 = .05$ value indicated that the model explained 5% of the variance in Family Support. In step two Public attitude support significantly predicted Competition in the model, $b = 0.27, t = 2.07, p = .040$. This $R^2 = .03$ value indicated that the model explained 3% of the variance in Competition. In step three Public attitude support significantly predicted Virtue in the model, $b = 0.32, t = 2.89, p = .004$. This $R^2 = 0.06$ value indicated that the model explained 6% of the variance in Virtue. In step four of the analysis Public attitude support significantly predicted Risky driving style with Family Support, Competition and Virtue in the model, $b = -0.27, t = -3.04, p = .003$. Family Support and Competition did not significantly predict Risky driving style, Virtue significantly predicted Risky driving style, $b = -0.23, t = -3.13, p = .002$. This $R^2 = 0.24$ value indicated that the model explained 24% of the variance in Risky

driving style. When the mediators as Family Support, Competition and Virtue were not in the model Public attitude support significantly predicted Risky driving style, $b = -0.38$, $t = -4.40$, $p < .001$. This $R^2 = 0.11$ value indicated that the model explained 11% of the variance in Risky driving style.

To investigate the relationships between Public attitude support, Family Support, Competition, Virtue and Risky driving style a simple mediation was carried out. There was a significant indirect effect of Public attitude support on Risky driving style through Family Support, Competition and Virtue, $b = -0.11$, BCa CI [-0.217, -0.029]. This represents a relatively medium effect, $\kappa^2 = .10$; 95% BCa CI [-.187, -.028].

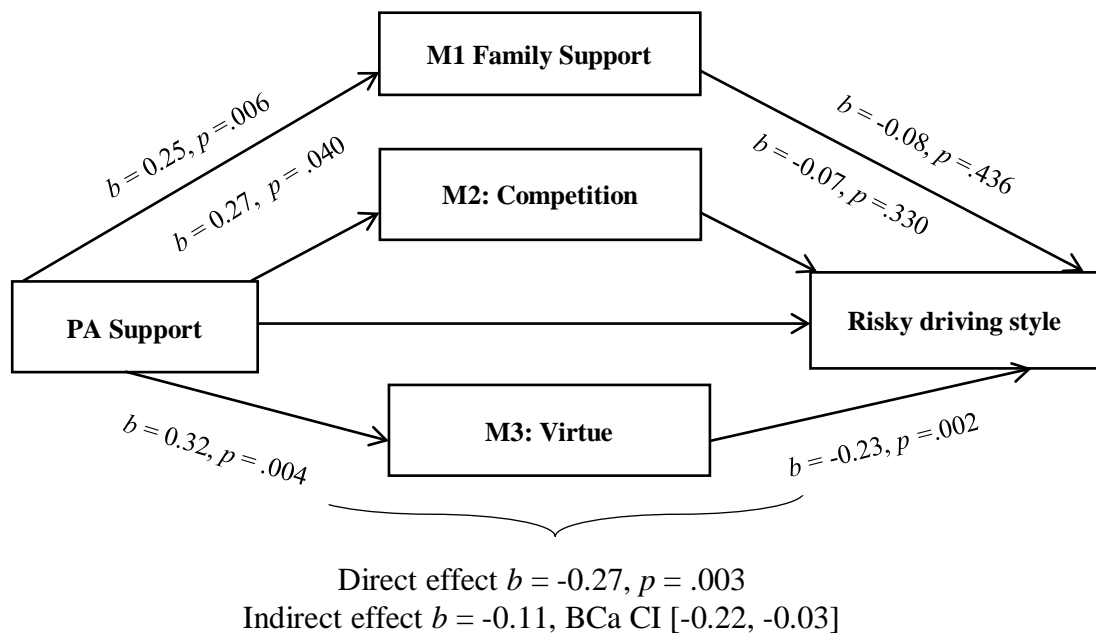


Figure 4: Mediation model for risky driving style

Angry driving style. In step one of the mediation model Public attitude support significantly predicted Family support, $b = 0.25$, $t = 2.78$, $p = .006$. This $R^2 = 0.05$ value indicated that the model explained 5% of the variance in Family Support. In

step two Public attitude support significantly predicted Competition in the model, $b = 0.27$, $t = 2.07$, $p = .040$. This $R^2 = 0.03$ value indicated that the model explained 3% of the variance in Competition. In step three Public attitude support significantly predicted Virtue in the model, $b = 0.32$, $t = 2.89$, $p = .004$. This $R^2 = 0.06$ value indicated that the model explained 6% of the variance in Virtue. In step four of the analysis Public attitude support did not significantly predict Angry driving style with Family Support, Competition and Virtue in the model, $b = -0.05$, $t = -.43$, $p = .671$. PA Support and Competition did not significantly predict Angry driving style, Family support, $b = 0.34$, $t = 2.56$, $p = .011$ and Virtue significantly predicted Angry driving style, $b = -0.21$, $t = -2.25$, $p = .026$. This $R^2 = 0.07$ value indicated that the model explained 7 % of the variance in Angry driving style.

When the mediators as Family Support, Competition and Virtue were not in the model Public attitude support did not significantly predict Angry driving style, $b = -0.06$, $t = -.51$, $p = .608$. This $R^2 = 0.00$ value indicated that the model explained 0.2% of the variance in Angry driving style.

To investigate the relationships between Public attitude support, Family Support, Competition, Virtue and Angry driving style a simple mediation was carried out. The relationships were found to be non-significant, no mediation effect was present.

High-Velocity driving style. In step one of the mediation model Public attitude support significantly predicted Family support, $b = 0.25$, $t = 2.78$, $p = .006$. This $R^2 = 0.05$ value indicated that the model explained 5% of the variance in Family Support. In step two Public attitude support significantly predicted Competition in the model, $b = 0.27$, $t = 2.07$, $p = .040$. This $R^2 = 0.03$ value indicated that the model explained

3% of the variance in Competition. In step three Public attitude support significantly predicted Virtue in the model, $b = 0.32$, $t = 2.89$, $p = .004$. This $R^2 = 0.06$ value indicated that the model explained 6% of the variance in Virtue. In step four of the analysis Public attitude support non-significantly predicted High-Velocity driving style with Family Support, Competition and Virtue in the model, $b = -0.14$, $t = -1.56$, $p = .122$. Public attitude support, Family Support and Competition did not significantly predict High-Velocity driving style, only Virtue significantly predicted High-Velocity driving style, $b = -0.25$, $t = -3.22$, $p = .002$. This $R^2 = 0.12$ value indicated that the model explained 12 % of the variance in High-Velocity driving style.

When the mediators as Family Support, Competition and Virtue were not in the model PA Support significantly predicted High-Velocity driving style, $b = -0.21$, $t = -2.28$, $p = .024$. This $R^2 = 0.04$ value indicated that the model explained 4 % of the variance in High-Velocity driving style. To investigate the relationships between Public attitude support, Family Support, Competition, Virtue and High-Velocity driving style a simple mediation was carried out. The relationships were found to be non-significant, no mediation effect was present.

3.6.2 Mediation for Safe Driving Styles: Patient and Careful Driving Styles

Patient driving style. In step one of the mediation model Public attitude support significantly predicted Family support, $b = 0.25$, $t = 2.78$, $p = .006$. This $R^2 = 0.05$ value indicated that the model explained 5% of the variance in Family Support. In step two Public attitude support significantly predicted Competition in the model, $b = 0.27$, $t = 2.07$, $p = .040$. This $R^2 = 0.03$ value indicated that the model explained 3% of the variance in Competition. In step three Public attitude support significantly

predicted Virtue in the model, $b = 0.32$, $t = 2.89$, $p = .004$. This $R^2 = 0.06$ value indicated that the model explained 6% of the variance in Virtue. In step four of the analysis Public attitude support significantly predicted Patient driving style with Family Support, Competition and Virtue in the model, $b = 0.40$, $t = 3.42$, $p = .001$. Family Support, Competition and Virtue did not significantly predict Patient driving style. This $R^2 = .13$ value indicated that the model explained 13% of the variance in Patient driving style.

When the mediators as Family Support, Competition and Virtue were not in the model Public attitude support significantly predicted Patient driving style, $b = 0.46$, $t = 4.06$, $p < .001$. This $R^2 = .11$ value indicated that the model explained 11% of the variance in Patient driving style.

To investigate the relationship between Public attitude support, Family Support, Competition, Virtue and Patient driving style a simple mediation was carried out. There was a significant indirect effect of Public attitude support on Patient driving style through Family Support, Competition and Virtue, $b = 0.06$, BCa CI [-0.016, 0.145]. This represented a relatively small effect, $\kappa^2 = .042$; 95% BCa CI [-.012, .104]. The lower confidence interval was below zero and the higher confidence interval above zero so the indirect effect was not statistically different than zero.

Careful driving style. In step one of the mediation model Public attitude support significantly predicted Family support, $b = 0.25$, $t = 2.78$, $p = .006$. This $R^2 = 0.05$ value indicated that the model explained 5% of the variance in Family Support. In step two Public attitude support significantly predicted Competition in the model, $b = 0.27$, $t = 2.07$, $p = .040$. This $R^2 = 0.03$ value indicated that the model explained 3%

of the variance in Competition. In step three Public attitude support significantly predicted Virtue in the model, $b = 0.32$, $t = 2.89$, $p = .004$. This $R^2 = 0.06$ value indicated that the model explained 6% of the variance in Virtue. In step four of the analysis Public attitude support significantly predicted Careful driving style with Family Support, Competition and Virtue in the model, $b = 0.35$, $t = 4.25$, $p < .001$. Family Support and Competition did not significantly predict Careful driving style. Virtue significantly predicted Careful driving style, $b = 0.14$, $t = 1.94$, $p = .054$. This $R^2 = 0.19$ value indicated that the model explained 19% of the variance in Careful driving style.

When the mediators as Family Support, Competition and Virtue were not in the model Public attitude support significantly predicted Careful driving style, $b = 0.40$, $t = 4.97$, $p < .001$. This $R^2 = 0.15$ value indicated that the model explained 15% of the variance in Careful driving style.

To investigate the relationships between Public attitude support, Family Support, Competition, Virtue and Careful driving style a simple mediation was carried out. There was a significant indirect effect of Public attitude support on Careful driving style through Family Support, Competition and Virtue, $b = 0.05$, BCa CI [-0.008, 0.130]. This represents a relatively small effect, $\kappa^2 = .046$; 95% BCa CI [-.006, .110]. The lower confidence interval was below zero and the higher confidence interval above zero so the indirect effect was not statistically different than zero.

Chapter 4

DISCUSSION

This study aimed to identify the direction of relationships between societal attitudes to enforcement technologies on the road, anxiety, contingencies of self-worth and its potential influence on using safe or unsafe driving styles.

In line with the ideas that anxiety and suspiciousness overlaps (Fisher et al., 2014); and the connection between increased anxiety and poor performance on the roads with hostile driving behavior (Clapp et al., 2011; Mallia et al., 2015) it was hypothesized that anxiety provokes more negative public attitude to camera's observation technologies on the road and positively correlates with unsafe driving styles (Dissociative, Risky, Angry and High-Velocity driving styles). The results of the current study revealed that anxiety negatively correlates with public attitude support to surveillance equipment on the road, but strongly and positively correlates with maladaptive driving styles. These findings are in line with previous research in terms of the relationships between anxiety and maladaptive driving styles (Taubman-Ben-Ari et al., 2004). The results indicate the existence of a relationship between public attitude support and anxiety, as the growth of one variable was associated with decrease of the other one. In addition public attitude support was related to Dissociative, Risky and High-Velocity driving styles in the same vein and to adaptive styles inversely, as an increase of support of observation technologies on the road was associated with adopting Patient and Careful driving styles. The

relationships between anxiety and Dissociative driving style has the highest correlation score, as anxiety increases worries during driving and individual experiences cognitive gaps and therefore a dissociative state (Taubman-Ben-Ari et al., 2004). The association with Angry driving style is the weakest one, and could be explained by the influence of anxiety on angry driving behavior. According to the literature review anxiety incites fear and provokes escaping from conflict or real or potential danger being an alerting signal, therefore the Angry driving style is the least associated (Steimer, 2002; Britton et al., 2011). In order to express anger the individual is supposed to interact with other people or at least imagine the aggressive interaction, the type of behavior which socially anxious people are trying to avoid, as their threat appraisal is often biased (De Wall et al., 2010; Koster et al., 2006). Threat avoiding model of driving behavior support that suggestion, claiming that driver's behavior widely depends on rewards or punishment for the responses in threatening situations (Fuller, 2007). The other types of unsafe driving styles do not require overt social communication with others, but individuals' feelings and attitudes could be expressed through them because anxious people could think about the others as hostile and keep hostile feeling towards them (DeWall et al., 2010).

Positive self-esteem has been associated with adaptive types of behavior (Pyszczynski et al., 2004); therefore the findings reflected the negative association with unsafe driving styles and a positive association with safe driving styles (Taubman-Ben-Ari et al., 2004). In our research we investigated self-esteem in terms of self-worth contingencies where an individual could base their self-esteem (Crocker et al., 2003). As the contingencies could be internal and external the following three domains of contingencies were considered: Virtue, Family Support

and Competition (as it has internal and external component) and it was hypothesized that a high level of self-esteem (in contingencies of Family Support, Competition and Virtue) provokes positive or neutral public attitude to camera's observation and positively correlates with safe driving styles (Patient and Careful).

According to the results investigated by the original MDSI study, self-esteem as a psychological adaptation construct was positively associated with adaptive driving styles (careful and patient driving styles) and inversely with maladaptive (dissociative and risky driving) (Taubman-Ben-Ari et al., 2004), which was partially supported by the results of the current research. It was revealed that Family Support, and Competition positively correlate with Public attitude support and Patient driving style, but not Careful driving style, though the correlations were weak. Virtue positively correlates with Public attitude support, Patient and Careful driving styles. Self-Esteem has been found to correlate with prosocial behavior (in terms of helping others) (Zuffianò et al., 2014). Taking into account the nature of the Patient subscale questions (ex. "when a traffic light turns green and the car in front of me doesn't get going, I just wait for a while until it moves") it could be speculated that this driving style is more directed to other-oriented behavior, as the self-esteem construct is tightly bounded with benefiting others more than oneself (Eisenberg, 2005). Therefore the relationships between Family Support, Competition and Careful driving styles (ex. "tend to drive cautiously") were found to be not significant. Though, Virtue (as internal contingency of people with high moral standards) was found to be positively associated with Careful driving style. These findings could be explained by external or internal characteristic of the particular contingency where an individual placed its self-esteem. As Family Support and Competition have explicit

external component, though Virtue is internal, inside founded and does not imply need in approval from others or receiving any particular outcome. The necessities to receive other's admiration, positive evaluation, feeling of superiority are the characteristics of narcissism which could be related to excessive self-esteem (Stucke et al., 2002). Though both self-esteem and narcissism implicate a positive evaluation of the self, self-esteem represents an adequate approach to self-worth as a healthy value of oneself, while narcissism is related to the desire to outperform others, receive higher social status and most likely not to be happy with the self (Brummelman et al., 2016, Lakey et al., 2008). The above-mentioned constructs are differentiated in various domains of the self, as narcissists viewed themselves as outgoing, extraverted and intelligent, but not caring or people with high moral standards, at the same time high self-esteem individuals rated themselves higher as more moral people (Campbell et al., 2002). Anger, anxiety, aggressive and antisocial behavior were revealed among high-narcissistic individuals as reflecting more egoistic factors (Stucke et al., 2002; Barry et al., 2003), therefore narcissism supported by the external domain could lead to adapting more unsafe driving styles (Salmivalli, 2001; Taubman-Ben-Ari et al., 2004). Consequently, the domain of self-worth contingency could increase the growth of narcissistic characteristics being supported by family members or by competing with the others, therefore those two contingencies were found to have no relationships with Careful driving style.

The third hypothesis was Low level of self-esteem (in contingencies of Family Support, Competition and Virtue) positively correlates with negative Public attitude to camera's observation, high level of anxiety and unsafe driving styles (Dissociative, Risky, Angry and High-Velocity).

Though the literature review demonstrated some contradiction with regards to interrelations between self-esteem and anxiety, the results of the current study supported the findings of a recent study pointing out that a lower level of self-esteem is associated with increased anxiety (Nguyen et al., 2019). All three contingencies of self-worth investigated in our research showed significant negative correlations with Anxiety, though Family Support and Virtue has a stronger correlation with Anxiety compared to Competition. It could be suggested that competition increases anxiety and thus anxious people might be less willing to be involved in competition and not interested in outperforming others (De Wall et al., 2010). The association between Family Support, Competition and Virtue and maladaptive driving styles as Dissociative and Risky was negative, supporting previous researches findings (Taubman-Ben-Ari et al., 2004, Poó et al., 2013), and in line with the study that one of the social consequences of low levels of self-esteem could be aggressive behavior (Mann et al., 2004).

A moderation analyses were conducted to investigate the forth hypothesis “Anxiety affects the relationships between public attitude and driving styles as a moderator. When level of anxiety is low public attitude to surveillance technologies on the road is positive and it leads to using safe and careful driving styles. When level of anxiety is high public attitude is negative and it leads to using unsafe/reckless driving styles or to be too careful in situations where it is not needed”.

A control variable named COVID was included into correlation analyses and moderation model due to the worldwide pandemic situation and investigation of anxiety, a psychological construct which is directly related to exaggeration of emotional stress (Moss, 2002). The association with Anxiety was expected due to the

nature of investigated construct. Other than this relationship the variable was found to be significantly correlated with the Angry driving style only, but tended towards significance for Dissociative driving style, but not for any other considered driving styles, which could be explained by people being more irritated and coping poorly with day-to-day life in pandemic stress due to frustration and situation of uncertainty (Restubog et al., 2020; Roy et al., 2020).

Our results identified moderation effect on anxiety with unsafe driving style as Risky driving style and safe driving style as Careful driving style. When level of anxiety was low or average there was no relationships between public attitude support and Risky driving style, but for people with high level of anxiety public attitude support influences Risky driving style in the way that the lower the level of public attitude support the more people prefer to adopt Risky driving style on roads.

A relationship between public attitude support of observation technologies on the road and Careful driving style was not present when the level of anxiety was low, but when anxiety was average or high it reflected the pattern as: the higher the level of public attitude support the more often people prefer to adopt Careful driving style. Risky and Careful driving style are contrary to each other, as experiencing risk is essence of that risky habitual behavior on the road, in opposite to careful approach to road behavior, so the direction of both effects is logical.

The reason for moderation effect with Risky and Careful driving styles but not the other driving styles could lie in biological or neuro-anatomical reaction of anxiety arousal on particular individual being dissociative, angry, patient or experiencing haste and time pressure as in case of using High-Velocity driving style (Steimer,

2002). Level or contingency of self-esteem, presence of other states as depression for example (which was not investigated by the current study) could influence the relationships or work as alternative moderator factors as well (Wu et al., 2013). So the fourth hypothesis was partially supported by the current study.

Family Support, Competition and Virtue were investigated as mediators in the current study in terms of the relationships between Public attitude support and safe and unsafe driving styles. The results revealed a strong negative mediation effect of mediators as self-worth contingencies named Family Support, Competition and Virtue and unsafe driving styles as Dissociative and Risky driving styles. However, there was no mediation effect with the same mediators for another two unsafe driving styles as Angry and High-Velocity driving styles. The possible reasoning for that may be in the relationship between self-esteem and externalizing the problems in individual's life (Donellan et al., 2005). The characteristics of Dissociative driving style are inattention, carelessness on the road and making a lot of driving mistakes. The essence of Risky driving style implies individual's relationship with risk-taking irrespective to others, for ex. "enjoy the sensation of driving on the limit". By contrast Angry (ex. "honk my horn at others") and High-Velocity driving styles (in sense that others cause interference on the road, but individual is always in hurry) entail the others.

With support to the previous findings as self-esteem positively correlates with Patient and Careful driving styles and negatively with Dissociative and Angry driving styles (Taubman-Ben-Ari et al., 2004), our results could be partially explained by the presence or absence of correlation relationships between Angry, High-Velocity and Family Support and Competition, Virtue has no correlation only with Angry driving

style, being in the same model the mediators suppressed each other. So the results support the notion that self-esteem is the construct which is supposed to contribute to positive behavior (Pyszczynski et al., 2004). Though both safe driving styles as Patient and Careful driving styles demonstrated a weak positive effect of Mediators, it appeared to be nonsignificant. Though we could expect the significant effect if the sample size were larger due to having correlation in previous findings.

In general the results support Crocker's idea that internal contingencies (Virtue in our study) are more stable and have more influence on individual's well-being and behavior as it has stronger than other contingencies correlation with all the variables in the study, except for Angry driving style (Crocker, 2003). So the fifth hypothesis: "self-esteem mediates the relationship between public attitude to camera's observation on the road and driving styles. Negative public attitude provokes unsafe driving styles in case of low self-esteem, but if self-esteem is high even in case of negative public attitude the individuals will use safe driving styles" was partially supported.

Gender and age was used in the current study as the first step in hierarchical regression models, on the basis of the previous findings demonstrated that unsafe driving styles are used by men more, at the same time as careful driving styles are used more by women and women showed higher level of anxiety; age was founded to be negatively associated with dangerous driving styles and anxiety (Holland et al., 2010; Poó et al., 2013; Holman & Havârneanu, 2015; Padillaa et al., 2020). The results showed that men prefer Angry driving style more, Risky driving style was closed to significance at the first step and significant at the second step of regression model. In the current study the pattern that men tend to use unsafe driving styles was

confirmed with two maladaptive styles. There was found to be no association between gender and safe driving styles. At the same time age was significantly associated with Patient and Careful driving styles, but did not reveal that pattern with unsafe driving styles. So our sample supported the findings of the previous results that young drivers are using more reckless and aggressive styles indirectly as with age people are using safer driving styles (Poó et al., 2013, Huysduynen et al., 2015, Holland et al., 2010, Holman & Havârneanu, 2015; Padillaa et al., 2020). Men and women showed no difference in anxiety level.

Taubman-Ben-Ari et al (2014) provided a follow up review for the adaptation and validation of the MDSI. In accordance with the original findings, the findings with regard to gender and age were equivocal and vastly depended on each sample (Taubman-Ben-Ari, 2014). So, there are samples which showed the results similar to the results of the current study, such as people more adapted Patient and Careful driving styles with age, and in some samples age showed no correlation with unsafe driving styles (Taubman-Ben-Ari, 2014a), Risky and Angry driving styles were more used by men (Shinar & Compton, 2004) and Angry driving style was not reported to correlate or have any relationships with self-esteem (Taubman-Ben-Ari, 2014). Cultural aspect of our sample size could be responsible for the difference with previous results as well, particularly with detecting no gender difference in experiencing anxiety. The same pattern, not supporting the other findings that women are more anxious than men, was revealed in some Asian countries with Thailand, Taiwan and Japan sample (Abbassi, 2018). The investigations of gender and age in Romanian sample showed that Romanian male drivers had higher scores than female in Risky driving style and opposite on Dissociative driving style, in our

study that pattern was close to significance in correlation and significant in regression analyses demonstrating some similarities in terms of Risky driving style, but our results revealed no gender differences for Dissociative driving style. Age positively correlating with Patient and Careful driving styles was found in our study supporting the findings of Romanian sample (Holman & Havarneanu, 2015). The study conducted in China, supported gender difference in terms of Risky driving style and showed no other correlation in terms of variables investigated in our study (Wang et al., 2018).

4.1 Limitations

There are some limitations of the current study which should be reported. First of all the study was conducted in the period of worldwide pandemic situation with COVID-2019. In order to reduce the impact of isolation and fear of being infected and therefore increased anxiety, the COVID variable was included into the research as a control variable when the variable Anxiety was included in a model and consisted of questions as “I feel more anxious than usual due to the COVID- 19 pandemic” or reverse item as “I feel that society has returned back to normal after compulsory isolation due to the COVID-19 pandemic”. The significance of that variable was discussed above. Despite this precaution the pandemic situation may have still impacted the data. As the study was a self-administered internet survey this variable may have not been thoroughly explored. Further information with regards to the influence of the COVID-19 pandemic will become available in future years.

As the sample for the study was obtained only from Almaty city, Republic of Kazakhstan, the results of the study may only be specific for that city and cannot be generalized through other areas. Almaty was selected as it is the largest city in the

Republic of Kazakhstan and its citizens have been the most influenced by observational technologies as a result of project Sergek. Further research could investigate the patterns in other cities/regions or throughout the country or group of countries to provide further context to the issues discussed.

In this study crash numbers and active and passive crash values were also going to be used to provide a further analysis of the results and correlations. Participants did not correctly provide information on these variables and as such they were rendered unusable in the correlation and regression analysis. Further information with regards to crash data would allow for these results to be further elaborated on and provide implications with regards to the use of different driving styles.

Analysis on Anxious driving style was not carried out in this research as it was not related to maladaptive and safe driving styles. Future research in this area would be beneficial, particularly in demonstrating the relationships between Anxious driving style, Anxiety and the COVID variable.

4.2 Implication

In the majority of cases surveillance technologies on the roads are implemented without asking societal opinion, though for safety reasons. It could be quite beneficial to understand public attitude to them, because at the end of the day people are experiencing the consequences of its proper functioning. Though in the current research we were investigating enforcement, the traditional three E's approach includes education and engineering as well. The understanding if people have confidence in that enforcement equipment and if that confidence connected with choosing a habitual way of safe or unsafe types of driving behavior could contribute

to development of trainings, policies and intervention programs related to roads' safety and encourage other citizens to build trust to surveillance technologies. The training or specific education with providing information related to roads' safety and analytical and research findings related to public attitude could be considered as another instrument which may reduce anxiety.

Violation of traffic rules are a common occurrence, such as consequences of excessive speed (which is responsible for almost a third of all crashes in Kazakhstan in 2019), breaking of safety inside the vehicle, risk taking behavior are some of the causes for deaths and injuries in traffic crashes. Driver's personal characteristic impact the adapting of patient and careful or reckless and dangerous driving styles on the roads. The research findings indicated that individuals with a more positive view of automated enforcement technologies were more likely to choose safe driving styles.

In the age of digitalization the certainty of punishment (fines) in case of traffic rules violation become easier with the use of surveillance enforcement and serves as the factor which refrains the drivers from offending. Alternatively, on the basis of research conducted in the field it would be beneficial to also use reward systems, due to the findings that men and young drivers are more reactive to reward than punishment, which could assist in creating new approaches to roads' safety and decrease the anxiety towards the observance and its negative impact for driving styles (Scott-Parker and Weston, 2017; Alghuson et al., 2019; Castella et al., 2004). Reward instead of fines or together with fines and penalties, or reward for those who follow the traffic rules and fines for those who break them, as well as different Apps based on rewards, have been started or considered to be implemented in different

countries and regions such as Africa, India, USA, etc. (ex. “Offering rewards to safe drivers”, 2013; “Discount for diligent drivers”, 2019; “Tempe, USA Soft drinks for safe drivers”, 2019; “The Mobilio concept”, 2019). The extended seven E’s concept provides a basis for further investigation towards encouraging drivers to choose safer driving styles. As healthy self-esteem could buffer anxiety, examining the role of particular contingency of self-worth in anxiety suppression and their interrelations with attitude to surveillance enforcement and driving styles would be beneficial as well. Future research could investigate the effect of training devoted to surveillance technologies and the generation of trust and proper attitude to them in quasi-experimental studies, measuring the preferred driving style and attitude before and after education. Another E, as Emergency response could be investigated with relation to widespread use of observation technologies on the roads in terms of ability to decrease peoples’ anxiety in mobility of first-aid in case of crashes and strengthen positive societal attitude.

In the realm of road safety research, the current study provides an investigation of anxiety in terms of people’s reaction to observation and their combined influence on adaptive or maladaptive behavior. The study findings provide additional analytical and research data which contributes to a comprehensive understanding of the interrelations between societal attitude to surveillance technologies on the roads, anxiety experienced by drivers, self-esteem based domains and safe or reckless driving styles. These findings are in turn useful for use in further efforts to improve road safety and modify drivers’ behavior in terms of preference of more adaptive driving styles and strengthen positive attitudes to observation technologies on the roads.

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APPENDICES

Appendix A: Demographic and Public Attitude Questionnaire

Demographic Form

Please do not mention your name on this form. The information will allow us to provide an accurate description of the sample. For the following items, please select the one response that is most descriptive of you or fill in the blank as appropriate.

1. Gender: Female Male Other Prefer not to respond

2. Age: _____

3. Have you been diagnosed with a psychological disorder or continued a treatment for a psychological disorder in the last five years?

If your answer is yes please state the type of disorder_____

4. Have you used any medication to treat psychological disorders in the last five years?

If yes please state the duration _____ years _____months

5. Have you received any therapy to treat a psychological disorder in the last five years?

For questions 6 – 8 please read the statement and select the level of agreement that best applies to you.

6. I feel more anxious than usual due to the COVID- 19 pandemic.

Strongly disagree Disagree Neither agree nor disagree Agree

Strongly Agree

7. I have faced financial difficulties because of the COVID-19 pandemic.

Strongly disagree Disagree Neither agree nor disagree Agree

Strongly Agree

8. I feel that society has returned back to normal after compulsory isolation due to the COVID-19 pandemic.

Strongly disagree Disagree Neither agree nor disagree Agree

Strongly Agree

9. How many kilometers do you drive per year?

10. How many kilometers have you driven since you received your driving license?

11. How many years/how long have you used a car in Kazakhstan, Almaty?
_____ years

12. Please mention any other countries you have used a car, if any

Country _____ Duration _____ years

13. How many crashes have you been involved in during the last 3 years?

14. How many active crashes (situations where you collided with another road user) have you been involved in during the last 3 years?

15. How many passive crashes (situations where another road user collided with you) have you been involved in during the last 3 years?

16. Have you been ever been fined for exceeding the speed limit in the inner city?

17. Have you ever been fined for exceeding the speed limit while out of the city?

Public Attitude Questionnaire

We would like to ask you some questions about the use of monitoring and enforcement techniques in Kazakhstan today.

With the amount of monitoring cameras in Kazakhstan these days, please mention your attitude to the following statements:

#	Statement	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	I support the monitoring of mobile phone use (e.g. GPS location tracking))					
2	I support monitoring on public transport (e.g. Using cameras to monitor on buses and trains)					
3	I support monitoring on roads (e.g. Using cameras to monitor all roadways)					
4	I support the monitoring of traffic speed (e.g. speed cameras on local roads and motorways)					
5	I support automated road traffic enforcement (e.g. cameras used to detect and trigger penalties automatically for traffic offences)					
6	I don't believe automated road traffic enforcement works effectively in discouraging drivers from offending					
7	I feel safer knowing that automated road traffic enforcement discourages drivers from offending					
8	I think automated road traffic enforcement is designed mainly to raise revenue for the government and local councils					
9	I think automated road traffic					

	enforcement works less effectively in discouraging drivers from offending than 'human' enforcement by police and other enforcement agencies					
10	I think the number of penalty notices issued should be regularly published for each area					
11	I think automated road traffic enforcement only causes drivers to slow down where the camera is positioned before speeding up again					
12	I would rather see more automatic traffic enforcement freeing police time to focus on other matters					
13	I drive slower seeing automated road traffic enforcement according to the fixed limit and take faster speed as I cross the camera					
14	My driving performance changed in a better way since automated road traffic enforcement has been installed					

Appendix B: Multidimensional Driving Style Inventory (MDSI)

Instructions:

Below is a list of statements dealing with your general driving behavior. Please evaluate your usual behavior in relations to the items below from Not at all related (1) to Very much related (6).

#	Statement	Not at all 1	2	3	4	5	Very much 6
1	do relaxing activities while driving						
2	purposely tailgate other drivers						
3	blow my horn or “flash” the car in front as a way of expressing frustrations						
4	feel I have control over driving						
5	drive through traffic lights that have just turned red						
6	enjoy the sensation of driving on the limit						
7	on a clear freeway, I usually drive at or a little below the speed limit						
8	while driving, I try to relax myself						
9	when in a traffic jam and the lane next to me starts to move, I try to move into that lane as soon as						

	possible						
10	driving makes me feel frustrated						
11	I daydream to pass the time while driving						
12	swear at other drivers						
13	when a traffic light turns green and the car in front of me doesn't get going, I just wait for a while until it moves						
14	drive cautiously						
15	lost in thoughts or distracted, I fail to notice someone at the pedestrian crossings						
16	in a traffic jam, I think about ways to get through the traffic faster						
17	when a traffic light turns green and the car in front of me doesn't get going immediately, I try to urge the driver to move on						
18	at an intersection where I have to give right-of-way to oncoming traffic, I wait patiently for cross-traffic to pass						
19	when someone tries to skirt in front of me on the road, I drive in an assertive way in order to prevent it						

20	fix my hair/ makeup while driving						
21	distracted or preoccupied, and suddenly realize the vehicle ahead has slowed down, and have to slam on the breaks to avoid a collision						
22	like to take risks while driving						
23	base my behavior on the motto "better safe than sorry"						
24	like the thrill of flirting with death or disaster						
25	it worries me when driving in bad weather						
26	mediate while driving						
27	forget that my lights are on full beam until flashed by another motorist						
28	when someone does something on the road that annoys me, I flash them with the high beam						
29	get a thrill out of breaking the law						
30	misjudge the speed of an oncoming vehicle when passing						
31	feel nervous while driving						
32	get impatient during rush hours						

33	feel distressed while driving						
34	intend to switch on the windscreen wipers, but switch on the lights instead						
35	attempt to drive away from traffic lights in third gear (or on the neutral mode in automatic cars)						
36	plan my route badly, so that I hit traffic that I could have avoided						
37	use muscle relaxation techniques while driving						
38	plan long journeys in advance						
39	nearly hit something due to misjudging my gap in a parking lot						
40	feel comfortable while driving						
41	always ready to react to unexpected maneuvers by other drivers						
42	tend to drive cautiously						
43	honk my horn at others						
44	enjoy the excitement of dangerous driving						

Appendix C: Contingencies of Self-Worth Scale

Instruction:

Below is a list of statements dealing with your general feelings about your self-worth. Please indicate what you feel about them from 1 (Strongly Disagree) to 7 (Strongly Agree).

#	Statement	1	2	3	4	5	6	7
1	When I think I look attractive, I feel good about myself.							
2	My self-worth is based on God's love.							
3	I feel worthwhile when I perform better than others on a task or skill.							
4	My self-esteem is unrelated to how I feel about the way my body looks.							
5	Doing something I know is wrong makes me lose my self-respect.							
6	I don't care if other people have a negative opinion about me.							
7	Knowing that my family members love me makes me feel good about myself.							
8	I feel worthwhile when I have God's love.							
9	I can't respect myself if others don't respect me.							
10	My self-worth is not influenced by the quality of my relationships with my family members.							
11	Whenever I follow my moral principles, my sense of self-respect gets a boost.							
12	Knowing that I am better than others on a task raises my self-esteem.							
13	My opinion about myself isn't tied to how							

	well I do in school.							
14	I couldn't respect myself if I didn't live up to a moral code.							
15	I don't care what other people think of me.							
16	When my family members are proud of me, my sense of self-worth increases.							
17	My self-esteem is influenced by how attractive I think my face or facial features are.							
18	My self-esteem would suffer if I didn't have God's love.							
19	Doing well in school gives me a sense of self-respect.							
20	Doing better than others gives me a sense of self-respect.							
21	My sense of self-worth suffers whenever I think I don't look good.							
22	I feel better about myself when I know I'm doing well academically.							
23	What others think of me has no effect on what I think about myself.							
24	When I don't feel loved by my family, my self-esteem goes down.							
25	My self-worth is affected by how well I do when I am competing with others.							
26	My self-esteem goes up when I feel that God loves me.							
27	My self-esteem is influenced by my academic performance.							
28	My self-esteem would suffer if I did something unethical.							
29	It is important to my self-respect that I have a family that cares about me.							

30	My self-esteem does not depend on whether or not I feel attractive.							
31	When I think that I'm disobeying God, I feel bad about myself.							
32	My self-worth is influenced by how well I do on competitive tasks.							
33	I feel bad about myself whenever my academic performance is lacking.							
34	My self-esteem depends on whether or not I follow my moral/ethical principles.							
35	My self-esteem depends on the opinions others hold of me.							

Appendix D: Beck Anxiety Inventory (BAI)

Below is a list of common symptoms of anxiety.

Please carefully read each item in the list. Indicate how much you have been bothered by that symptom during the past month, including today, by circling the number in the corresponding space in the column next to each symptom.

		Not at all	Mildly, but it didn't bother me much	Moderately – it wasn't pleasant at times	Severely – it bothered me a lot
1	Numbness or tingling				
2	Feeling hot				
3	Wobbliness in legs				
4	Unable to relax				
5	Fear of worst happening				
6	Dizzy or lightheaded				
7	Heart pounding / racing				
8	Unsteady				
9	Terrified or afraid				
10	Nervous				
11	Feeling of choking				
12	Hands trembling				
13	Shaky / unsteady				
14	Fear of losing control				
15	Difficulty in breathing				

16	Fear of dying				
17	Scared				
18	Indigestion				
19	Faint / lightheaded				
20	Face flushed				
21	Hot / cold sweats				

Appendix E: Informed Consent Form

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The relationship between public attitude to surveillance technologies on the road, driving styles, anxiety and self-esteem in Kazakhstani sample.

Dear participant,

Please take a few minutes to read the following information on this research carefully before you agree to participate. **If at any time you have a question regarding the study, please feel free to ask the researcher who will provide more information.**

This study is being conducted by **Oxana Yakovleva** under the supervision of **Dr. Deniz Atalar**. It aims to investigate **The relationship between public attitude to surveillance technologies on the road, driving styles, anxiety and self-esteem in Kazakhstani sample.** The study should take **30 – 60 minutes** to complete.

Of course, you are not obliged to participate in this research and are free to refuse to participate. You may also withdraw from the study at any point without giving any reason. In this case, all of your responses will be destroyed and omitted from the research. If you agree to participate in and complete the study, all responses and questionnaires will be treated **confidentially**. Your name and identifying information will be kept securely and separately from the

rest of your questionnaire. Data will be stored for a maximum of six years after the study. Once the data is analysed, a report of the findings may be submitted for publication.

To signify your voluntary participation, please complete the consent form below.

CONSENT FORM

Research Title: The relationship between public attitude to surveillance technologies on the road, driving styles, anxiety and self-esteem in Kazakhstani sample.

Name of Researchers: Oxana Yakovleva

Email address of Researchers: (yakovlevaoksana@mail.ru)

Please tick the boxes to confirm that you agree to each statement.

1. I confirm that I have read and understood the information sheet for this study and have had the opportunity to ask any questions.
2. I understand that my participation is voluntary and that I may withdraw from the study at any time without explanation.
3. I agree to take part in this study.

Date

Signature

If you have any concerns about the ethical conduct of this study, please inform Dr. Şenel Husnu Raman, Chair of the Psychology Research & Ethics Committee at Eastern Mediterranean University, in writing, providing a detailed account of your concern (shenelhusnu.raman@emu.edu.tr).

Appendix F: Participant Debrief Form

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Participant Debrief Form

Thank you very much for participating in this study with the title: **The relationship between public attitude to surveillance technologies on the road, driving styles, anxiety and self-esteem in Kazakhstani sample.** Please take a few more minutes to read the following information, which will explain the aims and purpose of the research further. If you have any questions, please feel free to ask the researcher whose contact details are stated below.

This research is investigating if there is a relationship between public attitude to surveillance technologies on the road, driving styles, anxiety and self-esteem in Kazakhstani sample. The other purpose is to understand which driving styles are used in Kazakhstan more and what influence these types of drivers' behaviour in terms of public opinion with regard to recent wide implementation of surveillance technologies on the roads as well as anxiety level and participants self-evaluation. The possible findings could be taken into consideration while developing some intervention programs to provide traffic safety, as well as plans of cities development in smart way minding the public attitude to such type of enforcement and its interrelations with people's anxiety level. To our knowledge no

researches of this type have been conducted in Republic of Kazakhstan. We are extending this work **to see if our study will show that individuals with low self-esteem tend to have higher level of anxiety, negative attitude to camera's observation technologies on the roads and habituate to use reckless driving styles.**

If during the completion of this questionnaire you felt any distress or discomfort and you would like to speak to a professional, please contact Free crisis counselling line (Catastrophic Medical Centre of Ministry of Emergency Situations of Republic of Kazakhstan) by using tel: +7 (7172) 38 03 06 or on-line: <http://www.amansaulyk.kz/consult>. Or use + 7(727)225 99 55, as hotline 24/7. You may also contact the researchers **Oxana Yakovleva, student of EMU General Psychology Master Program, e-mail: yakovlevaoksana@mail.ru** or the research supervisor **Dr. Deniz Atalar (deniz.atalar@emu.edu.tr)**, office- AS218, office phone number- 2411) with any questions.

Once again thank you for your valuable contribution to this research. Your participation is greatly appreciated.

Yours sincerely,

Oxana Yakovleva