THE DRIVER ACCEPTANCE OF INTELLIGENT SPEED ADAPTATION SYSTEMS IN TÜRKİYE AND ISRAEL: THE UTILITY OF THEORY OF PLANNED BEHAVIOR AND PROTOTYPE WILLINGNESS MODEL

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ABSTRACT

THE DRIVER ACCEPTANCE OF INTELLIGENT SPEED ADAPTATION SYSTEMS IN TÜRKİYE AND ISRAEL: THE UTILITY OF THEORY OF PLANNED BEHAVIOR AND PROTOTYPE WILLINGNESS MODEL

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Speeding is a universal problem for traffic safety around the world. In recent years, technology becomes more important to solving traffic safety problems. One of the specific technological advancements to overcome speeding problem is intelligent speed adaptation (ISA) systems. Although the ISA systems have been found to increase traffic safety, the standard role of drivers in driving a vehicle is challenged by these systems. Therefore, driver acceptance is essential for the implementation of ISA systems. The current study examines the utility of an integrative model based on the theory of planned behavior (TPB) and the prototype willingness model (PWM), which are two popular decision-making frameworks. A total of 334 drivers from Türkiye and 359 drivers from Israel completed a set of questionnaires regarding TPB and PWM constructs via an online link. The data was analyzed by using structural equation modeling. The results showed that the driver acceptance of informative type of ISA was the highest in Türkiye and Israel. Moreover, the integrative model explained driver acceptance of informative type of ISA the best whereas both PWM

and the integrative model explained better the driver acceptance of supportive and intervening types of ISA than TPB in both Türkiye and Israel. Although the integrative model differed between two countries, the reasoned path seems to be more important in Türkiye and Israel for all three types of ISA. The findings, implications and limitations were discussed in the light of the literature.

Keywords: Intelligent Speed Adaptation, Theory of Planned Behavior, Driver Acceptance, Prototype Willingness Model, Country Difference

ÖZ

TÜRKİYE VE İSRAİL'DE AKILLI HIZ UYARLAMA SİSTEMLERİNİN SÜRÜCÜ KABULÜ: PLANLANMIŞ DAVRANIŞ TEORİSİ VE PROTOTİP İSTEKLİLİK MODELİNİN KULLANILABİLİRLİĞİ

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Aşırı hız, trafik güvenliği açısından evrensel bir sorundur. Son yıllarda trafik güvenliği sorunlarının çözümünde teknoloji daha önemli hale gelmiştir. Hız sorununun üstesinden gelmeye yönelik teknolojik gelişmelerden biri de akıllı hız uyarlama (AHU) sistemleridir. AHU sistemlerinin trafik güvenliğini artırdığı bulunmasına rağmen, sürücülerin araç kullanmadaki standart rolü bu sistemler tarafından zorlanmaktadır. Bu nedenle, AHU sistemlerinin uygulanması için sürücünün kabulü çok önemlidir. Bu çalışma, planlı davranış teorisine (PDT) ve prototip isteklilik modeline (PİM) dayanan bütünleştirici bir modelin kullanılabilirliğini incelemektedir. 334 Türk ve 359 İsrailli sürücü, çevrimiçi bir bağlantı aracılığıyla PDT ve PİM yapılarını içeren bir dizi anketi doldurmuştur. Verilerin analizinde yapısal eşitlik modellemesi kullanılmıştır. Sonuçlara göre hem Türkiye hem de İsrail'deki sürücülerin en fazla akıl veren sistemi kabul ettikleri görülmektedir. Ayrıca sonuçlara göre, birleşik model, bilgilendirici sistemin sürücü kabulünü en iyi açıklarken, hem PİM hem de birleştirici model, hem Türkiye'de hem

de İsrail'de destekleyici ve müdahale eden sistemlerin sürücü kabulünü PDT'den daha iyi açıklamaktadır. Birleşik model yapısal olarak iki ülke arasında farklılık gösterse de, her üç sistem için de Türkiye ve İsrail'de gerekçeli yol daha önemli gözükmektedir. Sonuçlar ve sonuçların katkıları ve sınırlılıklar ilgili alan yazın ışığında tartışılmıştır.

Anahtar Kelimeler: Akıllı Hız Uyarlama, Planlı Davranış Teorisi, Sürücü Kabulü, Prototip İsteklilik Modeli, Ülkesel Farklar

To my beloved husband, Utku

and

my family,Güler, Sami and Oğuzcan

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CHAPTER 1

INTRODUCTION

Approximately 1.35 million people die in road accidents each year in the world (World Health Organization (WHO, 2018). According to the National Highway Traffic Safety Administration (NHTSA, 2015), human errors are the cause of 94% of the traffic accidents. Specifically, increased average speed has a direct impact on both the likelihood and severity of accidents. Specifically, each additional 1% of mean speed results in a 4% increase in the risk of fatal accidents and a 3% increase in the risk of serious accidents (Finch et al., 1994).

According to the Global Plan for the Decade of Action for Road Safety 2021-2030, it is targeted to reduce road fatalities and injuries at least 50% (WHO, 2021). It is recommended to improve safety of road infrastructure, enforcement, and vehicle safety. Different features can be incorporated into vehicle design to increase vehicle safety, either to prevent crashes or to lower the risk of injury for road users when accident occurs (WHO, 2021). One recommended system to ensure vehicle safety is intelligent speed adaptation (ISA) systems. ISA refers to system that either warned the driver of regulate the vehicle speed when the driver exceeds the speed limit (Young et al., 2010). ISA is considered to be the most effective collision avoidance system currently available (Carsten & Tate, 2005). Yet, ISA is not on the market among all countries and ISA as standard equipment in new vehicles varies from country to county.

Although ISA systems has been developed, the acceptance by drivers is an important issue for the effectiveness of ISA. Therefore, the acceptance studies have been started to conduct in different countries. The acceptance of ISA was affected by the characteristics of ISA (i.e., ISA types), the context of ISA using (i.e., geographical

position), and the characteristics of drivers (i.e., personality) (Fu et al., 2020). Besides these factors, theoretical models such as Theory of Planned Behavior (TPB) (Rahman et al., 2017). Although the utility of TPB in this regard has been proven in the literature, models adding the social-reactive way to TPB, such as Prototype Willingness Model (PWM) has not been studied regarding driver acceptance of in-vehicle technologies. PWM proposed that behavior is co-determined by both behavioral intentions and behavioral willingness. In addition, researchers attempted to integrate TPB with PWM in traffic and transportation psychology studies. These researchers examined the integrative model alongside the TPB and PWM in their statistical analysis. Yet, the integrative model has not been examined regarding driver acceptance. In the light of these information, this study focuses on examining the utility of TPB, PWM and the integrative model in explaining the driver acceptance of ISA systems in both Türkiye and Israel.

1.1. Speeding Behavior and Road Safety

Speeding, violating the speed limit or driving too fast for the circumstances, is one of the main contributing factors to traffic accidents (Bauernschuster & Rekers, 2022; Hill et al., 2023). According to the European Transport Safety Council (ETSC, 2019), between 35% and 75% of vehicle speed observations exceed the legal speed limit. In a large-scale study examining road safety in 32 countries, exceeding speed limit was the most seen unsafe behavior among all countries (Pires et al., 2020). More than 50% of the drivers from North America and Europe self-reported speeding behavior, and about 45% of the drivers from Africa and Asia reported speeding behavior (Pires et al., 2020). When looking specifically, 79% of the drivers in Israel (Meesman et al., 2018) reported overspeed. Also, in Türkiye, 41.7% of the drivers reported that they exceed speed limit more than half of the time and 45.1% of them reported that they exceed speed limit occasionally (Bıçaksız et al., 2019). Hence, a traffic accident's both likelihood and severity increase with speed, and speed affects both accident risk and severity in more ways than are typically recognized (Job & Brodie, 2022). Speeding-related traffic accidents result in a greater death rate than accidents with other factors (Statistiches Bundesamt, 2018). Speeding is accounted of 24.8% of fatal accidents in Australia (Queensland

Government, 2021) and 29 % of all traffic fatalities in United States of America (USA) (National Center for Statistics and Analysis, 2020). In addition, speeding is responsible for 60% of fatal accidents and 71% of injuries in New Zealand (Job & Brodie, 2022). Also, speeding is responsible for 17.1% of fatal accidents in Israel (OECD, 2020) and 15.87% of traffic accidents in Türkiye (EGM, 2022).

To reduce the occurrence of speed-related traffic accidents countermeasures such as enforcement (Dowling & Holloman, 2008) or slowdown bumps (Antic et al., 2013) have been taken. Speed limits and enforcement are seen effective road safety countermeasures (Elvik et al., 2019). However, even though most countries have adopted speed limits (International Transport Forum, 2022), these regulations of speed limits are not adequately enforced (World Health Organization, 2018). This situation shows that different countermeasures regarding speeding may be more effective. In recent years, technology has become more popular to tackle the problem of speeding, and research and developments are carried out to enhance vehicle safety systems.

1.2. Advanced Driver Assistance Systems

With the emphasis on technology to increase traffic safety, advanced driver assistance systems (ADAS) have been developed. ADAS aim to increase driving efficiency and traffic safety. ADAS assist driver by providing additional information from the environment surrounding the vehicle, however; they do not fully take over the control of the vehicle, therefore; the driver implements critical actions (Ziebinski et al., 2017; Rahman et al., 2018). There are several ADAS types, some of them are critical to safe driving and others help driver to avoid minor accidents, and they can be used either separately or combined to enhance traffic safety (Shaout et al., 2011; Haas et al., 2020).

The safety effects of different types of ADAS were investigated. Spicer and colleagues (2018) reported that vehicles with autonomous emergency braking and lane departure warning systems had a 23% lower accident risk than vehicles without those systems. Moreover, they reported that blind spot detection was linked to a 14%

decrease in crashes after controlling for the existence of autonomous emergency braking and lane departure warning (Spicer et al., 2018). Another type of ADAS, forward collision warning system was found to decrease 35% of near-crash incidents (Yue et al., 2018). Cicchino (2017) reported that forward collision warning system reduce front-to-rear crash rates to 27% and 20% of injuries related to those crashes whereas autonomous emergency braking systems reduce front-to-rear crash rates to 43% and 45% of injuries related to those crashes.

These systems are developed to overcome different traffic safety problems. There are systems concerning about specifically speeding behavior, which are adaptive cruise control (ACC) and intelligent speed adaptation (ISA). ISA aims to improve driver compliance with speed limit (Blum et al., 2012). It is assumed that the likelihood and the severity of accident is decreased by reduced speeds, and ISA has been developed according to this assumption. ISA has a significant potential to both prevent accidents and reduce the seriousness of them (Carsten & Tate, 2005).

1.2.1. Intelligent Speed Adaptation (ISA)

The term ISA refers to a type of sophisticated systems where the vehicle monitors the current speed limit and can use this knowledge to either limit the maximum speed of the vehicle or provide feedback to the driver (Carsten & Tate, 2005). There are three types of ISA: informative, supportive, and intervening (ETSC, 2005). The informative type of ISA gives the driver feedback about the current speed limit with either visual or audio signal. Supportive type of ISA increases the pressure on the accelerator pedal whenever the driver tries to drive faster than speed limit. The driver can override the supportive system by pressing the accelerator pedal harder. Finally, the intervening type of ISA eliminates speeding by restricting fuel injection or requiring downshift, this system cannot be overruled by the driver (ETSC, 2005; Vlassenroot et al., 2007).

1.2.1.1. Research On ISA

After ISA was introduced, the effectiveness of these systems in terms of speeding behavior gained attention. Both on-road studies and simulator studies has been

conducted across different countries. The efficacy of ISA has been examined mostly in European countries.

The very first field studies regarding ISA were conducted in Sweden in 1990s. These studies showed that drivers' speed level was higher than the legal speed limit before using the supportive type of ISA, and drivers' speed levels are closer to legal speed limit after using supportive type of ISA (Almqvist & Nygård, 1997). Based on these early results, the Swedish National Road Administration coordinated a large-scale field study in Sweden. According to these field studies, Várhelyi and colleagues (2004) examined the effectiveness of supportive type of ISA in Lund, and they reported that the drivers speed level decreased with the system and their compliance with the speed limits is increased. Similarly, Adell (2007) examined the driver experience about using supportive type of ISA for between 6 and 12 months in Lund. The drivers' speed level decrease when they use ISA. In addition, they evaluated this system as effective in decreasing speeding behavior and their fine risk regarding speeding.

In UK, a longitudinal project called External Vehicle Speed Control (EVSC) was carried out for three years combining both field tests using vehicles with ISA and simulator tests in United Kingdom (UK) (Carsten & Fowkes, 2000). They compared driver select type of ISA, which can be turned off by the driver, and mandatory type of ISA, which cannot be turned off. The results of the field study showed that drivers turned off driver select type of ISA where the traffic generally exceeds the speed limit, and they deliberately overspeed. However, the mandatory type of ISA decreases the maximum speeds. In another longitudinal study, the effectiveness of the supportive type of ISA in UK, and it is found that the supportive type of ISA reduces the overspeed on roads except where the speed limit is 100 km/h (Lai & Carsten, 2012).

The effectiveness of informative type of ISA was investigated in the Netherlands (Brookhuis & van de Waard, 1999). Twenty-four drivers drove the test vehicle. The experimental group received feedback regarding speed violation, whereas the control group received no feedback. The results showed that the mean speed was 4 km/h

lower for the experimental group than control group, and the reduction in speed variability was significant only for experimental group. Similarly, the Dutch Ministry of Transport investigated the effectiveness of the intervening type of ISA in Tilburg (van Loon & Duynstee, 2001). They reported that the mean speed was reduced on roads where the speed limit 30, 50 and 80 km/h.

Another field study was conducted in Denmark. Twenty-four drivers drove vehicles equipped with the informative type of ISA for six weeks in Aalborg. The results showed that mean speeds decrease about 5-6 km/h and the speed violations reduced by using the informative type of ISA. (Lahrmann et al., 2001). Later on in Denmark, Pay as You Speed (PAYS) projects was initiated (Lahrmann et al., 2012). In this project, informative type of ISA tied to economic incentive for obeying the speed limits. The results of this project showed that the informative type of ISA was found to reduce mean speed from 3.5 to 8.5 km/h and 77% reduction in speeding by more than 5 km/h. Similar to PAYS, another study was conducted to examine the effectiveness of informative type of ISA by recording penalty points whenever the driver exceeds the speed limit (Agerholm et al., 2008). The results of this study showed that the percentage of mileages speeding reduced from 18.7% to 7.4%, from 15.2% to 5.1%, from 18.9% to 4.7%, and from 25.5% to 6.6%., on roads where the speed limit is 50 km/h, 70 km/h, 80 km/h and 110 km/h, respectively.

In Belgium, the effect of supportive type of ISA was investigated (Vlassenroot et al., 2007). Sixty-two drivers drove vehicles with supportive type of ISA. The results showed that the mean speed decreased about 1.1 km/h on roads where the speed limit is 90 km/h. In addition, the driving speeds decrease about 2.5 km/h for the 85% speed for areas where the speed limits are 30, 70 and 90 km/h.

In France, the potential safety benefits of LAVIA ISA system were investigated with a study in which all vehicles are equipped with ISA system. They examined the effectiveness of three type of ISA: the informative, the active type of ISA, which can be turned off by the driver, and the intervening type of ISA. The results of this study showed that the mean speeds were decreased about 2 km/h, 1.4 km/h and 0.8 km/h by active, intervening and informative type of ISA respectively (Lassarre & Saad, 2011).

In Australia, the effectiveness of informative and intervening type of ISA was examined within TAC Safecar project (Regan et al., 2006). Twenty-three drivers experienced vehicles equipped with combined informative and intervening type of ISA. This system warns the driver when the speed limit is exceeded 2 km/h, and if the driver ignores this warning for 2 seconds, the intervening system is activated until the speed of the vehicle decrease to speed limit. The results showed that the mean speed decrease about 2.7 km/h for the 85 % speed. In this study, the effect of ISA with other systems was also examined. The results showed that informative type of ISA was effective in reducing drivers' speed, both alone and combined with other systems.

Besides studies conducted in a single country, studies have also been conducted in different countries at the same time. A project called Managing Speeds of Traffic on European Roads (MASTER), field studies regarding ISA was conducted in Sweden, Netherlands and Spain (Várhelyi et al. 1998). Within this project, 22 drivers from the Netherlands, 20 drivers from Spain and 24 drivers from Sweden drove the vehicle with ISA. It is reported that ISA is effective in decreasing speeds on urban roads where the speed limit is 30 km/h, the mean speed decrease 2 km/h when driving behind another vehicle and 1.5 km/h when driving freely. However, there is no significant difference between countries in terms of ISA effectiveness. Similarly, ISA was found effective in decreasing speed on roads where the speed limit is 50 km/h, the mean speed decrease 3 km/h when driving behind another vehicle and 4 km/h when driving freely. There is significant difference between countries in terms of ISA interference time of total driving. The ISA interference was the highest in Netherlands, followed by Sweden and the lowest in Spain. In motorways, ISA didn't have significant effect on mean speeds in all countries. In addition, the mean the mean speeds were decrease about 16 km/h when driving behind another vehicle and 27.4 km/h when driving freely on roads where the speed limit is 40 km/h and about 7 km/h when driving behind another vehicle and 12.5 km/h when driving freely on roads where the speed limit is 60 km/h in Spain. In Sweden, the mean speed was decreased about 4 km/h on roads where the speed limit is 70 km/h. In addition, Adell and her colleagues (2008) examined how informative and supportive types of ISA effect driver experience. They conducted on-road experiments regarding ISA in

Hungary and Spain. They found that both systems decrease the mean speeds on the roads where the speed limit is 30 km/h, 50 km/h, 80 km/h and 120 km/h, and the supportive type of ISA was found to be more effective in speed decrement.

The safety effects of these systems in reducing crashes were investigated in the literature in different countries. In Netherlands, the estimated safety effects of the intervening type of ISA involve 21% in fatal accidents (van Loon & Duynstee, 2001). In Sweden, both informative and supportive type of ISA were found the reduce the injuries in urban areas up to 20% (Biding & Ling, 2002). In United Kingdoms, the estimated safety effects of the supportive type of ISA involve up to 20% reduction in injury accidents and up to 37% reduction in fatal accidents (Carsten & Tate, 2005). Moreover, in Australia, it was expected that ISA can reduce fatal accident rates %8 and serious injuries 6% (Regan et al., 2006). Also, in Australia, the informative type of ISA reduces the traffic accident risk 24%, 23.6% and 21.9% on roads where the speed limit is 70 km/h, 110 km/h and 60 km/h, respectively (Creef et al., 2011). ETSC (2019) reported that if all new vehicles would be equipped with supportive type of ISA, the road fatality can be reduced by 20 %. Therefore, it can be seen that ISA has a critical role in reducing the traffic accidents and related fatalities and injuries.

The safety effects of these systems were also investigated through simulations. In MASTER Project, a simulator study in the University of Leeds was conducted. The effectiveness of three type of ISA was examined: the informative type of ISA, the intervening type of ISA and the dynamic type of ISA, which limits the speed of the vehicle and apply further speed reduction in hazardous situations. The results showed that the mean speeds in villages were lower in intervening and dynamic types of ISA than informative type of ISA whereas the mean speeds in motorways were higher in intervening type of ISA than both informative and dynamic types of ISA (Várhelyi et al. 1998). In addition, another simulator study in the UK regarding the effectiveness of ISA was conducted as a part of EVSC Project (Carsten & Fowkes, 2000). In this study, three type of ISA; driver select type of ISA, which can be turned off by the driver, the intervening type of ISA, and variable type of ISA, which cannot be turned off and decrease the speed in hazardous situations, was used. The results showed that

these systems had little effect on mean speeds, however; these systems reduce maximum speeds, particularly the intervening type of ISA. In addition, Piao and colleagues (2004) used a simulation in which ISA-equipped vehicles were gradually added to the traffic stream until the entire traffic stream had ISA equipment in the UK. They reported that the mean speed decrease from 124 km/h to 109 km/h on motorways in simulation scenario where 80 % of the vehicles were equipped with ISA. In addition, on the major roads, the mean speed decrease from 61.4 km/h to 59.6 km/h when all vehicles are with ISA.

Within the Project for Research on Speed Adaptation Policies on European Roads, two simulator studies were conducted in Netherlands (Rook et al., 2005). Sixty-four drivers participated in two experiments in which different types of ISA was used. In the first experiment, low force ISA, which is easy to overrule and can be interpreted as informative, and high force ISA, which has stronger counter force, and can be interpreted as more compulsory, were used. In the second experiment, a tactile pedal, which has a vibration on the gas pedal if the driver wants to exceed speed limit and can be interpreted as informative, and dead throttle, which restrict the exceeding speed limit and can be interpreted as compulsory, were used. For both studies, the speed limit was 80 km/h. In the first study, the low force ISA was found to reduce mean speeds as 8.7 km/h and high force ISA reduce mean speeds as 12.9 km/h. In the second study, the tactile pedal was found to reduce mean speeds as 5 km/h and dead throttle reduce mean speeds as 9.3 km/h.

Another simulator study was conducted to examine the effectiveness of the informative type of ISA, which only gives information about speed limit, warning type of ISA, which warns the driver if the speed limit is exceeded, and the intervening type of ISA, which limits the vehicle's speed according to speed limit, in Greece (Spyropoulou et al., 2014). The results showed that the mean speeds are reduced significantly on roads where the speed limit is 32 km/h and 100 km/h when using the intervening type of ISA and only on road where the speed limit is 32 km/h when using the warning type of ISA.

In Australia, the effectiveness of informative and supportive types of ISA among young and inexperienced drivers were investigated in Australia (Young et al., 2010).

Both experienced and inexperienced young drivers participated a simulator study. The results showed that the time spent overspeed was reduced 8% by supportive type of ISA. Moreover, the proportion of time spent overspeed was reduced by both of types of ISA for experienced drivers whereas only supportive type of ISA reduced overspeed and the time spent overspeed by supportive types of ISA for inexperienced drivers on rural 60 km/h speed limit roads. Interestingly, the mean speed of inexperienced drivers was increased by informative type of ISA on 60 km/ speed limit roads. This study shows that driving experience can affect the effectiveness of types of ISA.

In Japan, another simulator study was conducted to examine the effectiveness of informative type of ISA among younger and older drivers (Ando et al., 2014). They used two variants of informative type of ISA, one includes voice information and the other includes picture information. The results of this study showed that for older drivers, the mean speed decrement is significant only for ISA with voice information on wide roads where the speed limit is 30 km/h, whereas both variants of informative type of ISA significantly decrease the mean speeds of younger drivers on 30 km/h limit wide roads and 40 km/h limit roads. In addition, only ISA with voice information decrease the younger drivers' mean speeds on narrow roads where the speed limit is 30 km/h.

Both field and simulator studies conducted in different countries showed that all ISA systems enhance safety by lowering speeds and speed variations. The field studies compare the effectiveness of these types on speed reduction showed that supportive type is more efficient than informative type of ISA. When looking in detail, the simulator studies showed that the intervening type of ISA was found to be more effective on urban roads whereas the informative type of ISA was found to be more effective on motorways.

1.2.1.2. The Driver Acceptance of ISA

Although the safety effects of ISA were shown through literature, these systems require user-technology interaction. Hence, the acceptance of drivers become critical

issue for the utilization of these systems. The potential benefits of ADAS for safety can be reduced because of incorrect use or adversity to their use (Lindgren, Broström, Chen, & Bengtsson, 2007). Also, it is found that the higher levels of automation are accepted more easily by drivers having experience with diverse ADAS (Rödel, Stadler, Meschtscherjakov, & Tscheligi, 2014; Lee, Seppelt, Reimer, Mehler & Coughlin, 2019; Louw et al., 2021). Fully autonomous cars can likely eliminate the causality of human error in traffic accidents (Haboucha, Ishaq & Shiftan, 2017).

The driver acceptance can be defined as the degree of the driver's intention to use the system, and when possible, integrate the system into his/her driving (Adell, 2010). Yet, in the context of assessing driver acceptance, behavioral intention is frequently used as the only criterion because actual use of an ADAS is frequently challenging to determine (Rahman et al., 2017).

The acceptance of ISA was investigated mostly in European countries. The largest trial was carried out in Sweden for three years with seven thousand ISA-equipped vehicles. The results of this trial showed that driver prefer to use informative type of ISA more than supportive type of ISA (Biding & Lind, 2002). A similar result was reported in a field study conducted in Hungary and Spain, drivers showed lower satisfaction for informative type of ISA than supportive type of ISA, however; they were more willing to continue to use the informative type of ISA as compared to supportive type of ISA (Adell et al., 2008). In EVSC project, both simulator and field tests showed that drivers prefer the driver select type of ISA as compared to mandatory type of ISA in UK (Carsten & Fawkes, 2000). The one-year field study was also conducted in Netherlands. It is reported that 64% of the drivers and 90% of the bus drivers rated their experience with ISA as positive (van Loon & Duynstee, 2001). A shorter field study with twenty-four drivers was conducted in Finland. According to the study's findings, the informative type of ISA had the greatest acceptance and was thought to be the most desirable, even though the intervening type of ISA was the most effective in decreasing speed (Paatalo et al., 2001). In France, a field study was conducted with three types of ISA: the informative, the intervening and the active ISA, which can be turned off by the driver. The results of

this study showed that the majority of the drivers accept informative type of ISA after they experienced it. The acceptability of active ISA decreased after their driving experience and the intervening type of ISA was the least accepted type of ISA (Lasarre & Saad, 2011).

The acceptance of ISA hasn't been strictly examined in European countries. Another field study with eleven drivers was conducted in Malaysia. Similar with the results from other countries, the informative type of ISA was more accepted than supportive type of ISA, and the majority of the drivers reported that they were willing to keep informative type of ISA after their trial (Ghadiri et al., 2013). In USA, a simulator study was conducted to understand the acceptance and effectiveness of Advance Vehicular Speed Adaptation System (AVSAS) as well as informative and intervening types of ISA (Arhin et al., 2008). The results showed that 76.2% of the drivers want to have the informative type of ISA whereas only 23.8% of the drivers want the intervening type of ISA as standard equipment of their vehicles. In Japan, the acceptance of informative, supportive, and intervening types of ISA was examined with a field study (Matsuo et al., 2017). The results showed that the acceptance of Japanese drivers were highest for informative type of ISA, followed by supportive type of ISA and the least accepted was the intervening type of ISA.

Not only field or simulator studies were conducted to examined driver acceptance regarding ISA. A large-scale survey study carried out with 6370 drivers from Belgium and 1158 drivers from Netherlands showed that the informative type of ISA was thought to be the most effective across all speed zones (i.e. urban areas, rural areas and highways), in that vein; seven out of ten drivers prefer informative type of ISA whereas three out of ten drivers prefer supportive or intervening types of ISA (Vlassenroot et al., 2009). Another survey study carried out with 476 drivers from Sweden, 477 drivers from Denmark and 366 drivers from Norway, and it is reported that the acceptance of Danish drivers regarding informative type of ISA is higher than both Swedish and Norwegian drivers' acceptance (Eriksson & Bjørnskau, 2012). In addition, it is reported that both Turkish and Swedish drivers were positive toward informative type of ISA, followed by supportive type of ISA whereas they were the most negative toward the intervening type of ISA, however; even though

their opinions toward ISA were similar, Turkish drivers' acceptance of all three types of ISA was higher than Swedish drivers' (Warner et al., 2010).

Almost all acceptance studies regarding ISA showed that the informative type of ISA is preferred across countries. The results showed that even though the intervening types of ISA has more positive effects on reducing speed behavior, they are less acceptable since drivers doesn't feel comfortable to give control to the systems. However, these studies were examined only whether drivers prefer to use ISA systems. The underlying factors of driver acceptance of the ISA systems are also important to improve the acceptance. Some psychosocial models were used to understand the factors affect the driver acceptance.

1.3. Theories Related with Technology Acceptance

1.3.1. Theory of Planned Behavior

Theory of Planned Behavior (TPB) propose that the antecedent of the actual behavior is behavioral intention, and attitude toward the behavior, subjective norms and perceived behavioral control (PBC) have impact on actual behavior via behavioral intention (Ajzen, 1991). The term behavioral intention refers to a person's motivation in the sense of a conscious plan, decision, or self-instruction to perform the behavior (Conner & Sparks, 2015). Behavioral intentions are determined by attitude toward the behavior, subjective norm and PBC. Attitudes are the individual's overall evaluation toward the behavior whereas subjective norms are the individual's perception of the level of social approval or disapproval they will receive from close others if they perform the behavior (Ajzen & Fishbein,1980). PBC refers to individual's belief of their capability of performing the behavior (Ajzen, 2020). PBC is frequently used as a direct predictor of behavior as well as indirect predictor of behavior through intention (Conner & Sparks, 2015). TPB is represented in Figure 1.

TPB has been used extensively in traffic and transportation psychology to understand the driver behavior such as speeding (Paris & Van den Broucke, 2008), and texting

while driving (Bazargan-Hejazi et al., 2017). Besides, TPB has been applied to examine the driver acceptance of technology in traffic context.

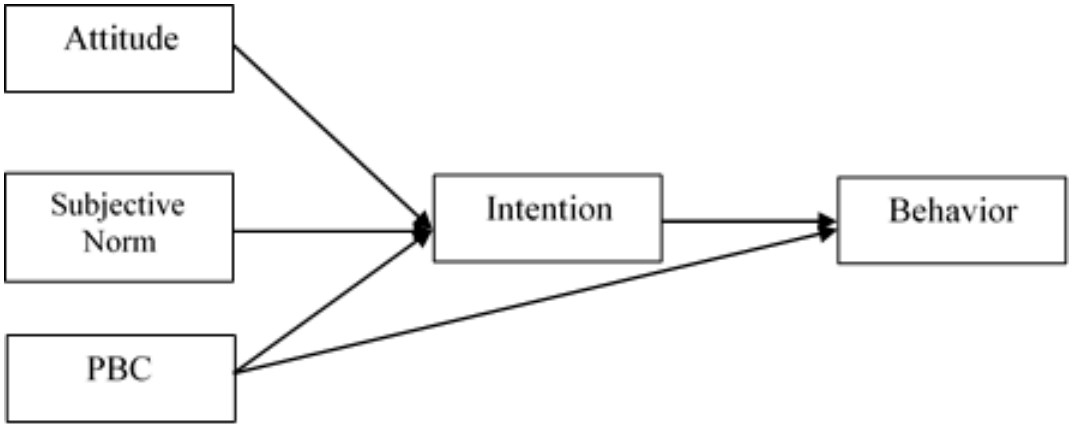

Figure 1. Theory of Planned Behavior.

TPB is applied to examine driver acceptance of automated vehicles. Rejali and colleagues (2023) examined the utility of different models including TPB for fully automated vehicles acceptance in Iran. They reported that TPB was the best model in explaining the behavioral intention to use fully automated vehicles. TPB explained 70.9% of the variance in behavioral intention, and the subjective norm was the strongest predictor followed by attitudes, which have positive effect on behavioral intention (Rejali et al., 2023). TPB was also applied to examine driver acceptance of full automated vehicles in Australia, and it was reported that TPB explained 67.8% of variance in behavioral intention, and attitudes were the strongest predictor followed by subjective norm, and PBC was not a significant predictor of behavioral intention (Kaye et al., 2020). On a broader scale, Kaye and colleagues (2020) examined the utility of different models including TPB to examine driver acceptance of highly automated vehicles in Australia, France, and Sweden. In Australia, France, and Sweden, TPB explained 71.5%, 57.9% and 74.1% variance in behavioral intention, respectively. All three factors were significant predictors of behavioral intention for Australian and French drivers, however; attitude and PBC-capability were significant predictors of behavioral intention for Swedish drivers. Notwithstanding these differences, attitude was the strongest predictor in all three countries (Kaye et al., 2020).

TPB is also applied to examine the driver acceptance of conditional automation, in which safety features are automated but driver can take the control of the vehicle at any time, in USA. TPB explained 46% of variance in behavioral intention, and all three factors were positive predictors of behavioral intention. However, the strongest predictor was PBC followed by attitude and subjective norm (Buckley et al., 2018). The same study was conducted in Australia, TPB explained 66.3% of variance in behavioral intention, and the strongest predictor was attitude followed by subjective norm, which were the positive predictors of behavioral intention whereas PBC was negative predictor of behavioral intention (Kaye et al., 2020).

In terms of the driver acceptance of ADAS, Chen and Chen (2009) examined the utility of different models including TPB for acceptance of automotive telematics in Taiwan. They reported that TPB was the best model in explaining the behavioral intention to use automotive telematics. TPB explained 95% of the variance in behavioral intention, and attitude was the strongest predictor followed by PBC, which have positive effect on behavioral intention. They reported that subjective norm didn't predict behavioral intention (Chen & Chen, 2009). TPB is also applied to examine the driver acceptance of Navigation Systems in Greece. For both the usage of Global Navigation Satellite Systems in city and intercity, TPB successfully explained the driver acceptance and attitude was the strongest predictor followed by subjective norm, whereas PBC didn't significantly predict behavioral intention (Ntasiou et al., 2021). A different pattern was examined driver acceptance of ADAS in USA. Rahman and colleagues (2017) examined the utility of different models including TPB. They reported that TPB factors explained 80% of variance in behavioral intention to use ADAS, and attitude was the strongest predictor with positive strong effect whereas subjective norm showed weak positive and PBC showed weak negative effects. (Rahman et al., 2017). Specific to ISA, Warner and Aberg (2006) applied TPB to Swedish drivers who use informative type of ISA. Attitude, subjective norm and PBC predicts self-reported speeding whereas self-reported speeding and subjective norm predicts drivers' ISA logged speeding and they explained 28% of the variance in logged speeding (Warner & Aberg, 2006). Another study was conducted to examine the long-term ISA impacts regarding TPB constructs (Chorlton & Conner, 2012). They fail to find significant changes among

TPB constructs except intention. The drivers' intention to overspeed was significantly decreased after long-term experience with supportive type of ISA.

In addition to studies examining TPB as a whole, there are also studies examining the factors included in TPB within the framework of ADAS acceptance. In a study conducted in UK, drivers indicated positive attitude toward ADAS can be turned off, and negative attitude toward ADAS cannot be turned off (Blythe & Curtis, 2004). The similar association between positive attitude and the acceptance of ADAS is reported studies in China (Li et al., 2022), Malaysia (Razak et al.,2021), Netherlands (van Loon et al., 2001), Czech Republic (Viktorová & Šucha, 2018), and Indonesia (Zaki et al., 2019). Regarding ISA, it is found that attitude was predict the future intention to use informative type of ISA in Ethiopia (Mamo et al., 2021). Similar to attitude, subjective norm also positively predicts the intention to use ADAS in Indonesia (Zaki et al., 2019). Subjective norm positively predicts the intention to use autonomous vehicles, especially level 2 autonomy in Korea (Cho et al., 2017). However, subjective norm has ambiguous effects on the acceptance of ADAS in Germany (Planing & Britzelmaier, 2012), and not a significant predictor of intention to use informative type of ISA in Ethiopia (Mamo et al., 2021). In addition, PBC wasn't a significant predictor of behavioral intention of ADAS in Indonesia (Zaki et al., 2019). PBC was reported as decreasing as autonomy is getting higher in a study conducted in Australia (Rödel et al., 2014).

It can be interpreted that TPB is effective in explaining the driver acceptance of ADAS from existing studies. In general, attitude seems to be the strongest and positive predictor of behavioral intention in most countries, whereas other factors have ambiguous effects of behavioral intention among different countries.

1.3.2. Prototype Willingness Model

Even though TPB is used widely, TPB fails in explaining a significant part of the behavioral variation (Elliot et al., 2017). Therefore, a model that contains both reactive and deliberate decision-making would be better to determine behavior than a model that only includes deliberative decision-making, such as TPB. Prototype

Willingness Model (PWM, Gibbons et al., 1998) includes two constructs to co-determine behavior: one that represents deliberate decision-making and the other that reflects more reactive decision-making. This model seeks to give a better understanding of spontaneous actions that happen when people perceive a chance to act. Being in a traffic is highly demanding situation that frequently requires rapid choices about how to act in response to situational factors that are constantly changing (Elliott et al., 2015). Therefore, dual processing models like PWM can better in predicting driver behavior than models focus on only deliberate decision-making.

PWM proposed that behavior is co-determined by both behavioral intentions and behavioral willingness. Hence, there are two pathways for behavioral performance: reasoned path and social reactive path. The reasoned path is similar with the TPB, except for PBC: attitudes and subjective norms predict intention, and intentions predicts the behavior. The social reactive path was proposed in an effort to explain unintended behavior, particularly the irrational decisions to initiate, maintain, or discontinue behaviors that could be harmful to individual's health and involves more heuristic process (Gerrard et al., 2008). Both paths include attitude and subjective norm as predictors, however; the social reactive pathway additionally includes two model-specific constructs; prototypes and willingness (Gibbons et al., 2021). Prototypes are people's images of the type of person who displays a specific behavior. They include two primary dimensions: favorability and similarity (Gibbons et al., 2021). PWM assume that everyone has images or prototypes of the type of person who engages the target behavior (Gibbons et al.,1995). Prototype favorability refers to individuals' evaluations whereas prototype similarity refers to individuals' belief about their similarity to prototype (Elliot et al., 2017). The final construct, willingness excludes plans or goal states and includes less forethought (Gibbons et al., 1998). Social reactive path proposes that willingness is determined by attitudes, subjective norms and prototype perceptions. Higher similarity and favorability to prototypes leads to higher willingness to perform the behavior (Gibbons et al.,1995). The PWM constructs are represented in Figure 2.

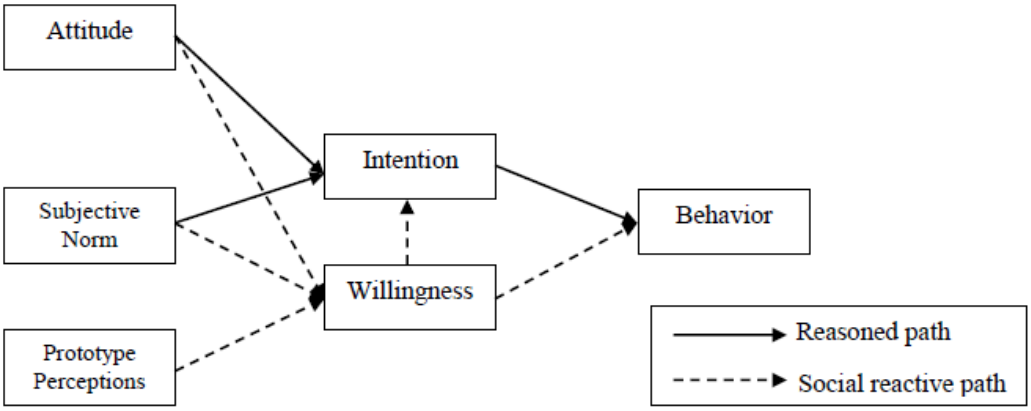

Figure 2. Prototype Willingness Model

PWM has been used in traffic and transportation psychology to understand the risky driver behavior such as drunk driving (Yadav et al., 2021), and safe behavior such as stopping in dilemma zones (Pagomenos et al., 2023). However, the utility of PWM for driver acceptance of technology has not been yet explored.

1.3.3. The Integrative Model

Many researchers attempted to integrate TPB with PWM in traffic and transportation psychology studies. These researchers examined the integrative model alongside the TPB and PWM in their statistical analysis. The integrative model constructs are represented in Figure 3.

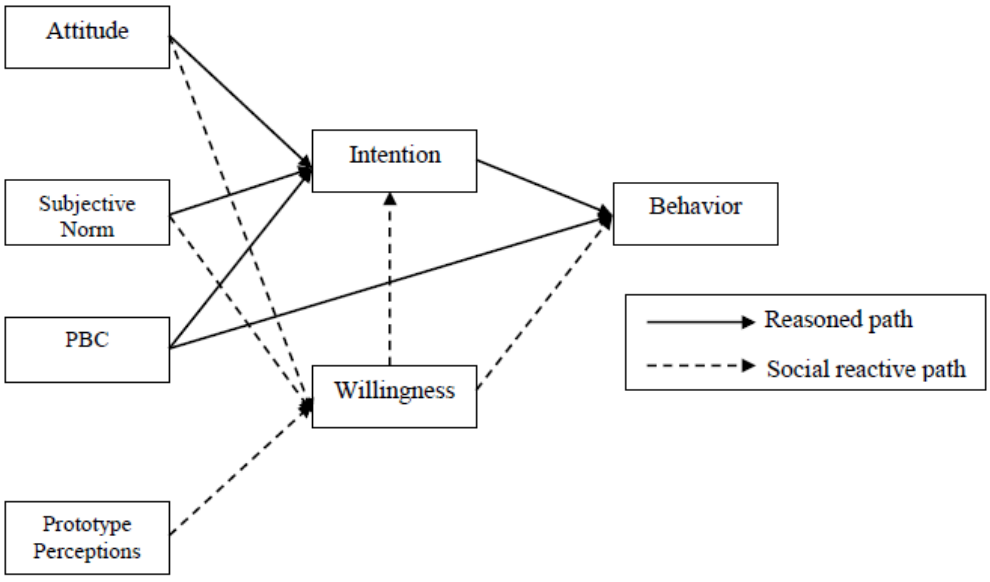

Figure 3. The Integrative Model

Demir and colleagues (2019) applied TPB, PWM and the integrative model to compare the utility of these models in explaining pedestrian violations in Türkiye. They reported that TPB explained 39% and 42% of the variance in intentions and behaviors respectively whereas PWM explained 50%, 39% and 65% of the variance in intentions, willingness, and behaviors respectively. Finally, integrative model explained 56%, 44% and 66% of the variance in intentions, willingness, and behaviors, respectively. The results emphasized that willingness predicted violations better than intentions. They reported that the explained variance in pedestrian violations of the integrative model and PWM was higher than TPB.

Tang and colleagues (2020) compare the utility of TPB, PWM and the integrative model in explaining the red-light running behaviors of electric bikers in China. TPB explained 80.4% and 73.6% of the variance of intention and behavior, respectively. PWM explained 76.6%, 77.4% and 81.3% of the variance in intention, willingness and behavior, respectively. Finally, the integrative model explained 82%, 77.1%, and 81.4% of the variance in intention, willingness, and behavior, respectively. The results emphasized that willingness has a greater impact on behavior than intention. Similar with the previous study, both the integrative model and PWM explain higher variance in red light running behavior than TPB.

Pei and colleagues (2023) conducted a study to examine individuals' back seat belt use by using TPB, PWM and the integrative model in China. TPB explained 57.6% of the variance in intention and 72.9% of the variance in behavior whereas PWM explained 69.6%, 61.9%, and 78.1% of the variance in intention, willingness, and behavior, respectively. Finally, the integrative model explained 69.9%, 62.5%, and 78.4% of the variance in intention, willingness, and behavior, respectively. The results emphasized that intention was a better predictor than willingness. Similar with the previous study, both the integrative model and PWM explain higher variance in back seat belt using behavior than TPB.

Zhao and colleagues (2023) compared the utility of TPB, PWM and the integrative model in explaining the aggressive riding behavior of adolescents in China. TPB explained 41.9% and 13.1% of the variance in intentions and behaviors respectively whereas PWM explained 36.3%, 24.8% and 31.1% of the variance in intentions,

willingness, and behaviors respectively. Finally, integrative model explained 43.1%, 29.4% and 31.1% of the variance in intentions, willingness, and behaviors, respectively. The results emphasized that willingness was a better predictor than intention. They reported that the explained variance in aggressive riding behavior of the integrative model and PWM was higher than TPB.

It can be inferred that the integrative model has higher explanatory power than TPB and PWM in traffic and transportation psychology. Even though integrative model of TPB and PWM is applied for different research topics in traffic and transportation psychology, it has not been yet used in driver acceptance of in-vehicle technologies.

1.4. The Current Study

The results of studies in the literature indicated that although the intervening type of ISA has better safety effect, drivers across countries prefer the ISA system which is either informative or turned off by the driver (Carsten & Fowkes, 2000; Várhelyi, 2002). Furthermore, drivers prefer the informative type of ISA rather than the supportive type of ISA even though drivers are less satisfied with the informative type of ISA (Adell et al., 2008). From the existing literature, it can be inferred that geographical position, which is associated with road types and country, affects drivers' acceptance of ISA (Fu et al., 2020). Although in all countries in which ISA acceptance studies were conducted, the informative type of ISA is the most preferred one, the studies which compared between countries showed that the level of driver acceptance differs between countries which are geographically close, located on Northern Europe, (i.e. Eriksson & Bjørnskau, 2012) as well as geographically distant, one located on Northern Europe and the other is located on Middle East (i.e. Warner et al., 2010). One of the common points of these studies is that in both studies, countries in which estimated road fatality rate (per 100.000 population) is higher, have a greater driver acceptance of ISA. In addition, these studies showed that country of which gross national income per capita is lower, have a greater acceptance of ISA than the country of which gross national income per capita is highest. Furthermore, the former study (Eriksson & Bjørnskau, 2012) showed the difference of driver acceptance among countries in which speed limits differ,

especially on rural roads and motorways. However, the latter study (Warner et al. 2010) showed the difference of driver acceptance among countries in which the speed limits are exactly the same. Therefore, these differences of country characteristics can affect the level of driver acceptance of ISA. The studies regarding ISA have been started to be conducted in different countries once these systems were developed. However, these studies were mostly conducted in European regions and only a few studies were conducted in non-European regions. In the light of this information, Türkiye and Israel were selected to understand the effect of country characteristic differences on driver acceptance. The first reason is that both countries are located in the Middle East. Secondly, Türkiye's estimated road fatality rate (per 100 000 population), which is reported as 12.3 (WHO, 2018), is higher than Israel's, which is reported as 4.2 (WHO, 2018). Thirdly, Türkiye's gross national income per capita, which is reported as 11.180 $ (WHO,2018), is lower than Israel's, which is reported as 36.190 $ (WHO,2018). Finally, Türkiye has higher speed limits on rural roads, which is 110 km/h, and motorways, which is 120 km/h, than Israel, whose speed limits on rural roads and motorways are 80 km/h and 110 km/h, respectively.

Although there is a growing literature about the safety effect of ISA, targeting the drivers for whom the system will be most helpful is crucial when considering maximizing the safety effect of ISA (Hjälmdahl, 2003). Speeding behavior is very common among young drivers (Horswill et al., 2022; Perez et al., 2021). In addition, speeding is an important problem among young drivers both in Türkiye (Bıçaksız et al., 2019) and Israel (Sadia et al., 2018). Hence, the target sample of this study is young drivers.

In the light of the relevant literature, the first aim of this study is to examine the utility of TPB, PWM and the integrated model in explaining the driver acceptance of ISA. The second aim of this study is to compare the utility of these models in Türkiye and Israel.

Specifically, the following hypotheses are tested in the light of the relevant literature:

1) The drivers' intention, willingness, and preference to use of informative type of ISA will be higher than both supportive and intervening types of ISA in Türkiye and Israel.

2) The drivers' intention, willingness, and preference to use of supportive type of ISA will be higher than intervening type of ISA in Türkiye and Israel.
3) PWM and the integrative model would account for a larger proportion of variance than TPB for explaining the preference to use of all types of ISA in both Türkiye and Israel.
4) The integrative model would account for a larger proportion of variance than PWM for explaining the preference to use of all types of ISA in both Türkiye and Israel.
5) The utility of the models will differ in Türkiye and Israel.

CHAPTER 2

METHOD

2.1. Sample

The data was collected from drivers in Israel and Türkiye. The final sample consisted of 693 drivers. Of the participants, 359 (51,80%) were Israeli drivers, and 334 (48,20%) Turkish drivers. The detailed information regarding both samples were presented in Table 1.

2.1.1. Turkish Sample

The mean age drivers is 29.29 (*SD* = 4.20). Drivers held a driver license for 9.02 years (*SD* = 4.48). Most of the participants, 96,4 % of drivers, have an academic degree. Similarly, most of the participants either working, 80,2 % of drivers, or student, 39,5 % of drivers. Half of the drivers haven't been in accident for the last 3 years. Similarly, 62,6 % of the drivers haven't been received speed ticket for the last 3 years. When asked about their experience with ADAS, 84.3 % of drivers either knows or use ADAS. In addition, 63.2 % of the drivers have at least one type of ADAS and 84 % of them use ADAS in daily life.

2.1.2. Israeli Sample

The mean age of drivers is 26.42 (*SD* = 4.13). Drivers held a driver license for 8.16 years (*SD* = 4.43). More than the half of the participants, 62,7 % of drivers, have an academic degree. Similarly, most of the participants either working, 68 % of drivers, or student, 70,5 % of drivers. Sixty-two-point one percent of drivers haven't been in accident for the last 3 years. Similarly, 90,3 % of the drivers haven't been received

speed ticket for the last 3 years. When asked about their experience with ADAS, 75.5 % of the drivers either knows or use ADAS. In addition, almost 50% of the drivers have at least one type of ADAS and 88% of them use ADAS in daily life.

Table 1. The Demographical Information of Sample

Variables	**Israeli Drivers**	**Turkish Drivers**	**Difference Test**
N	359	334	
Age of drivers	26.42 *(4.13)*	29.29 (4.20)	$t(691)=9.10^{***}$
Weekly mileage	297.91 (2181.30)	565,65 (5478.56)	t(689)=0.85
Yearly mileage	12496.25 (36117.78)	12418.21 (58207,06)	t(685)=-0.21
Having license (year)	8.16 *(4.43)*	9.02 (4.48)	$t(688)=2.53^{***}$
Gender			$\chi^2= 11.67^{**}$
Men	%41.2 (*N*=148)	%54.2 (*N*=181)	
Women	%58.8 (*N*=211)	%45.8 (*N*=153)	
Education level			$\chi^2= 188.68^{***}$
Elementary	%0.6 (*N*=2)	%0 (*N*=0)	
High School	%36.8 (*N*=132)	%3.6 (*N*=12)	
Associate Degree	%15.3 (*N*=55)	%3.9 (*N*=13)	
Bachelor's degree	%32.9 (*N*=118)	%47.9 (*N*=160)	
Master's degree	%12.8 (*N*=46)	%28.7 (*N*=96)	
PhD	%1.7 (*N=6*)	%15.9 (*N*=53)	
Economic status			$\chi^2= 95.32^{***}$
Well below average	%8.6 (*N*=31)	%0.9 (*N=3*)	
Below average	%25.9 (*N*=93)	%7.2 (*N*=24)	
Average	%50.7 (*N*=182)	%55.7 (*N*=186)	
Above average	%12.3 (*N*=44)	%34.4 (*N*=115)	
Well above average	%2.5 (*N*=9)	%1.8 (*N=6*)	
Employment status			$t(691)=-3.71^{***}$
Working	%68.0 (*N*=244)	%80.2 (*N*=268)	
Non-working	%32.0 (*N*=115)	%19.8 (*N*=66)	
Student	%70.5 (*N*=253)	%39.5 (*N*=132)	$t(691)=8.61^{***}$
Accident experience			$\chi^2= 6.69^{*}$
Having Accident	%37.9 (*N*=136)	%47.6 (*N*=159)	
Not Having Accident	%62.1 (*N*=223)	%52.4 (*N*=175)	
Speed ticket			$\chi^2= 74.63^{***}$
Yes	%9.7 (*N*=35)	%37.4 (*N*=125)	
No	%90.3 (*N*=324)	%62.6 (*N*=209)	

Table 1. (continued)

ADAS experience			χ^2= 12.90*
Do not know ADAS	%8.6 (*N*=31)	%4.2 (*N*=14)	
Heard about ADAS	%15.9 (*N*=57)	%11.4 (*N*=38)	
Know ADAS	%27.9 (*N*=100)	%32.3 (*N*=108)	
Occasionally use ADAS	%28.1 (*N*=101)	%25.7 (*N*=86)	
Regularly use ADAS	%19.5 (*N*=70)	%26.3 (*N*=88)	
Having ADAS in vehicle			χ^2= 12.46***
Yes	%49.9 (*N*=179)	%63.2 (*N*=211)	
No	%50.1 (*N*=180)	%36.8 (*N*=123)	
Using ADAS in vehicle			χ^2= 1.34
Yes	%88.8 (*N*=159)	%84.8 (*N*=179)	
No	%11.2 (*N*=20)	%15.2 (*N*=32)	

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

2.1.3. Comparison between the samples from Türkiye and Israel

With respect to the demographical variables mentioned above, independent samples t- test and Chi square analyses were conducted to assess the differences between Türkiye and Israel. The results showed that there were more men and less women in Turkish sample than Israeli sample. The results also showed that the Turkish sample was significantly older, had a higher license year, having been involved in more accidents and having more speed tickets than Israeli sample. In addition, more drivers have ADAS in their vehicle in Türkiye than drivers in Israel.

2.2. Instruments

The TPB and the PWM constructs were assessed in three different sections with the following order: informative system, supportive system and intervene system. At the beginning of each section, the definition of the types of the system were given participants to create standardized understanding among the participants. The definitions can be seen on Table 2. After each definition, the items regarding each factor are asked in the following order: attitude, subjective norm, PBC, intention, prototype similarity, prototype favorability, willingness, and preference.

Table 2. The definitions of the types of ISA given to participants

Types of ISA	Definition
Informative	The system displays the current speed limit under the speedometer on the control panel. In addition, if the speed limit is exceeded, the system warns the driver with a flashing red light and acoustic signals
Supportive	The system displays the current speed limit under the speedometer on the control panel. In addition, the system counter-forces the accelerator pedal at speeds above the speed limit. That is, the driver has to press the accelerator pedal 3 to 5 times harder than normal to exceed the speed limit.
Intervening	The system displays the current speed limit under the speedometer on the control panel. In addition, the system interacts with the vehicle, making it impossible for the driver to exceed the speed limit.

2.2.1. The Demographical Information Form

The form inquired about demographical information (age, sex, education level, employment status and economic status), their driving history (years of having driver license, weekly and yearly mileage, accident experience and speeding ticket) as well as the experience with ADAS and having ADAS.

2.2.2. The TPB and PWM Questions

To measure attitudes toward each system, participants were asked to think about the given system and rate nine semantic differential items taken from Van der Laan, Heino and De Waard (1997), rates ranging from 1 to 7. Higher scores show more positive attitudes toward the given system. The Cronbach alpha value was .92 for informative system, .94 for supportive system and .94 for intervene system for Turkish drivers. For Israeli drivers, the Cronbach alpha values were .88 for informative system, .90 for supportive system and .93 for intervene system.

Subjective norm was measured by asking the perceived social approval of using each system from three referent groups; family, close friends and people who are important for the participant. Participants were asked to rate four items adapted from

Venkatesh and Davis (2000) on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Higher scores show higher social acceptance of use of the given system The Cronbach alpha value was .93 for informative system, .96 for supportive system and .97 for intervene system for Turkish drivers. For Israeli drivers, the Cronbach alpha values were .90 for informative system, .94 for supportive system and .95 for intervene system.

PBC was measured by four items adapted from Rahman (2016). Participants were asked to rate four items on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Higher scores show that participants find it easier to use the given system. The Cronbach alpha value was .85 for informative system, .87 for supportive system and .90 for intervene system for Turkish drivers. For Israeli drivers, the Cronbach alpha values were .80 for informative system, .82 for supportive system and .83 for intervene system.

The intention of participants to use the given system was assessed by three items adapted from Rahman and colleagues (2017). Participants were asked to rate three items on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Higher scores show more intention to use the given system. The Cronbach alpha value was .97 for informative system, .98 for supportive system and .99 for intervene system for Turkish drivers. For Israeli drivers, the Cronbach alpha values were .80 for informative system, .94 for supportive system and .96 for intervene system.

The prototype similarity was assessed by two items adapted from Demir (2017). Participants were asked to rate two items on a 7-point Likert scale ranging from 1 (not at all) to 5 (absolutely). Higher scores show more similarities with the typical person who use the given system. The Cronbach alpha value was .95 for informative system, .96 for supportive system and .98 for intervene system for Turkish drivers. For Israeli drivers, the Cronbach alpha values were .85 for informative system, .90 for supportive system and .92 for intervene system.

The prototype favorability was assessed by twelve adjectives taken from Gibbons and colleagues (1995). Participants were asked to rate twelve adjectives on a 7-point Likert scale ranging from 1 (not at all) to 5 (absolutely). Higher scores show more favorability of the typical person who use the given system. The Cronbach alpha value was .86 for informative system, .89 for supportive system and .89 for intervene system for Turkish drivers. For Israeli drivers, the Cronbach alpha values were .89 for informative system, .87 for supportive system and .87 for intervene system.

Participants' willingness to use the given system were assessed by following three items: "Suppose you are driving in urban roads (where the speed limit is 50 km/h), would you be willing to use the system?", "Suppose you are driving in non-urban roads (where the speed limit is 80 - 90 km/h), would you be willing to use the system?", and "Suppose you are driving in highways (where the speed limit is 100 - 120 km/h), would you be willing to use the system?". Participants rated each item on a 7-point Likert scale ranging from 1 (not at all) to 5 (absolutely). Higher scores show higher willingness to use the given system. The Cronbach alpha value was .75 for informative system, .87 for supportive system and .91 for intervene system for Turkish drivers. For Israeli drivers, the Cronbach alpha values were .84 for informative system, .88 for supportive system and .88 for intervene system.

The preference of the using system was assessed with following item: "How much likely would you prefer to use it if you have in your vehicle?" Participants were asked to respond the item on 7-point Likert scale ranging from 1 (extremely unlikely) to 5 (extremely likely) for each given system. Higher scores show higher preference to use the given system.

2.3. Procedure

Ethical approval was provided from the Ethical Commitee of Middle East Technical University and Institutional Review Board of Bar-Ilan University. Convenience sampling were used to reach participants. The instruments were distributed by using Qualtrics. Participants were given information detailing the purpose and requirements of the study, their anonymity, voluntary participation and right to

withdraw. Since the data was collected from 2 different groups, 2 different links were created containing the scales in the native language of the participants, these languages are Hebrew and Turkish. After providing participant's consent, they were asked to fill out a questionnaire to measure basic demographics, and the TPB (attitudes, subjective norm, PBC, intention) and the PWM constructs (prototype similarity, prototype favorability, willingness) for each type of ISA. After completing the questionnaire, they were thanked for their participation.

2.4. Analyses

After completing the data collection process, data were analyzed by using SPSS 26.0 program. The samples from Türkiye and Israel were compared based on demographical information. Three independent sample t-tests were conducted to examine the country differences among variables for each type of ISA. Finally, the within sample differences was examined by one-way ANOVA to test the first and the second hypotheses of this study.

In order to examine the utility of TPB, PWM and the integrative model for each type of ISA, nine different path analyses via structural equation model were conducted for each country. To compare the efficiency of each model for explaining the variance in driver acceptance of each type of ISA, three Hotelling's t-test for non-independent correlations was performed for each country. The third, fourth and fifth hypotheses of this study were tested with these analyses.

CHAPTER 3

RESULTS

3.1. Basic Analysis

The means, standard deviations, distributional properties of skewness and kurtosis, and the correlations of the variables considering each type of ISA for both countries are shown separately in Table 3, Table 4 and Table 5.

For all types of ISA, all bivariate correlations are significant for both Turkish and Israeli drivers.

Table 3. Descriptive statistics and correlations for Informative Type of ISA

	1	2	3	4	5	6	7	8
1.Attitude	-	**.43***	**.33***	**.34***	**.46***	**.60***	**.58***	**.64***
2.Subjective Norm	.30*	-	**.51***	**.40***	**.47***	**.60***	**.47***	**.53***
3.PBC	.19*	.49*	-	**.40***	**.43***	**.51***	**.45***	**.37***
4. Prototype Similarity	.32*	.47*	.40*	-	**.41***	**.39***	**.28***	**.40***
5.Prototype Favorability	.42*	.44*	.23*	.55*	-	**.54***	**.56***	**.56***
6.Intention	.44*	.60*	.50*	.63*	.52*	-	**.75***	**.81***
7.Willingness	.40*	.37*	.24*	.61*	.60*	.60*	-	**.79***
8. Preference	.45*	.44*	.27*	.66*	.60*	.74*	.71*	-
Mean								
Turkish	5.37	5.35	5.13	4.52	5.12	5.27	4.47	5.46
Israeli	4.91	4.52	5.23	4.36	5.24	5.09	4.75	4.94
SD								
Turkish	1.42	1.51	1.44	1.56	1.04	1.75	1.57	1.64
Israeli	1.27	1.44	1.23	1.19	1.02	1.72	1.52	1.64
Skewness								
Turkish	-0.91	-.74	-.59	-.46	-.63	-.89	-.32	-1.24
Israeli	-.32	-.18	-.61	-.22	-.29	-.67	-.45	-.60
Kurtosis								
Turkish	.37	-.26	-.22	-.24	.71	-.12	-.36	.68
Israeli	-.29	-.32	.11	.67	-.23	-.48	-.23	-.24

Note 1. The results presented in right-hand side of this table (i.e., bold numbers) show the correlations pertaining to the Israeli sample; the results presented in left-hand side of this table show the correlations pertaining to the Turkish sample, *$p < .001$.

Table 4. Descriptive statistics and correlations for Supportive Type of ISA

	1	2	3	4	5	6	7	8
1.Attitude	-	**.57***	**.46***	**.46***	**.51***	**.67***	**.65***	**.69***
2.Subjective Norm	.61*	-	**.55***	**.48***	**.48***	**.59***	**.58***	**.56***
3.PBC	.39*	.59*	-	**.46***	**.43***	**.51***	**.46***	**.46***
4. Prototype Similarity	.56*	.59*	.49*	-	**.41***	**.55***	**.57***	**.53***
5.Prototype Favorability	.56*	.59*	.34*	.60*	-	**.50***	**.50***	**.48***
6.Intention	.67*	.76*	.57*	.76*	.62*	-	**.87***	**.86***
7.Willingness	.61*	.57*	.40*	.74*	.63*	.77*	-	**.84***
8. Preference	.64*	.66*	.46*	.74*	.66*	.86*	.79*	-
Mean								
Turkish	5.04	5.06	4.72	3.97	4.85	4.57	3.79	4.70
Israeli	4.13	4.15	4.60	3.81	4.88	3.80	3.71	3.57
SD								
Turkish	1.65	1.75	1.62	1.81	1.20	2.04	1.91	2.04
Israeli	1.42	1.63	1.40	1.42	1.04	1.91	1.75	1.92
Skewness								
Turkish	-.52	-.67	-.29	-.07	-.56	-.34	0.9	-.53
Israeli	-.13	-.23	-.35	-.31	.01	-.03	.01	.17
Kurtosis								
Turkish	-.67	-.39	-.67	-.99	.64	-1.15	-1.08	-1.07
Israeli	-.34	-.49	-.08	-.13	-.34	-1.12	-.89	-1.07

Note 1. The results presented in right-hand side of this table (i.e., bold numbers) show the correlations pertaining to the Israeli sample; the results presented in left-hand side of this table show the correlations pertaining to the Turkish sample, *$p < .001$.

Table 5. Descriptive statistics and correlations for Intervene Type of ISA

	1	2	3	4	5	6	7	8
1.Attitude	-	**.65***	**.48***	**.46***	**.53***	**.76***	**.73***	**.75***
2.Subjective Norm	.63*	-	**.53***	**.50***	**.50***	**.66***	**.60***	**.58***
3.PBC	.43*	.62*	-	**.43***	**.35***	**.45***	**.42***	**.43***
4. Prototype Similarity	.61*	.64*	.53*	-	**.36***	**.53***	**.50***	**.49***
5.Prototype Favorability	.60*	.60*	.40*	.61*	-	**.44***	**.44***	**.42***
6.Intention	.68*	.77*	.63*	.77*	.63*	-	**.89***	**.87***
7.Willingness	.67*	.63*	.51*	.78*	.62*	.81*	-	**.84***
8. Preference	.70*	.67*	.51*	.78*	.64*	.84*	.82*	-
Mean								
Turkish	4.53	4.69	4.45	3.62	4.61	4.09	3.49	4.15
Israeli	3.63	3.78	4.33	3.46	4.66	3.18	3.10	3.02
SD								
Turkish	1.81	1.90	1.78	1.96	1.29	2.21	2.05	2.24
Israeli	1.58	1.71	1.53	1.55	1.12	1.87	1.74	1.94
Skewness								
Turkish	-.16	-.40	-.24	.13	-.37	-.07	.30	-.19
Israeli	.21	.02	-.33	-.005	.09	.44	.44	.59

Table 5. (continued)

Kurtosis								
Turkish	-1.06	-.83	-.86	-1.19	.10	-1.38	-1.19	-1.48
Israeli	-.52	-.69	-.23	-.59	-.28	-.86	-.77	-.87

Note 1. The results presented in right-hand side of this table (i.e., bold numbers) show the correlations pertaining to the Israeli sample; the results presented in left-hand side of this table show the correlations pertaining to the Turkish sample, *$p < .001$.

3.2. Within Group Comparison

3.2.1. Within Group Comparison for Türkiye

Eight one-way within subjects ANOVA were conducted to compare the differences among variables for each type of ISA. In all analyses sphericity is violated, hence; Wilk's Lambda results were reported. The results can be seen on Table 6.

The results showed that attitude toward informative, supportive and intervening type of ISA significantly differ from each other, Wilk's Lambda= 0.79, F (2, 332) = 44.13, $p < .001$, $\eta^2 = .210$. Pairwise comparison with Bonferonni adjustment showed that the mean score of attitude toward informative type of ISA is higher than the mean scores of attitude toward both supportive and intervening types of ISA; and the mean score of attitude toward supportive type of ISA is higher than the mean score of attitude toward intervening type of ISA for Turkish drivers.

The results showed that subjective norm regarding informative, supportive and intervening type of ISA significantly differ from each other, Wilk's Lambda= 0.87, F (2, 332) = 24.10, $p < .001$, $\eta^2 = .127$. Pairwise comparison with Bonferonni adjustment showed that the mean score of subjective norm regarding informative type of ISA is higher than the mean scores of subjective norm regarding both supportive and intervening types of ISA; and the mean score of subjective norm regarding supportive type of ISA is higher than the mean score of subjective norm regarding intervening type of ISA for Turkish drivers.

The results showed that PBC regarding informative, supportive, and intervening type of ISA significantly differ from each other, Wilk's Lambda= 0.87, F (2, 332) =

24.10, $p < .001$, $\eta^2 = .127$. Pairwise comparison with Bonferonni adjustment showed that the mean score of PBC regarding informative type of ISA is higher than the mean scores of PBC regarding both supportive and intervening types of ISA; and the mean score of PBC regarding supportive type of ISA is higher than the mean score of PBC regarding intervening type of ISA for Turkish drivers.

The results showed that prototype similarity regarding informative, supportive, and intervening type of ISA significantly differ from each other, Wilk's Lambda= 0.79, F (2, 332) = 43.57, $p < .001$, $\eta^2 = .208$. Pairwise comparison with Bonferonni adjustment showed that the mean score of prototype similarity regarding informative type of ISA is higher than the mean scores of prototype favorability regarding both supportive and intervening types of ISA; and the mean score of prototype similarity regarding supportive type of ISA is higher than the mean score of prototype similarity regarding intervening type of ISA for Turkish drivers.

The results showed that prototype favorability regarding informative, supportive, and intervening type of ISA significantly differ from each other, Wilk's Lambda= 0.79, F (2, 332) = 42.27, $p < .001$, $\eta^2 = .203$. Pairwise comparison with Bonferonni adjustment showed that the mean score of prototype favorability regarding informative type of ISA is higher than the mean scores of prototype favorability regarding both supportive and intervening types of ISA; and the mean score of prototype favorability regarding supportive type of ISA is higher than the mean score of prototype favorability regarding intervening type of ISA for Turkish drivers.

The results showed that intention to use informative, supportive, and intervening type of ISA significantly differ from each other, Wilk's Lambda= 0.79, F (2, 332) = 43.67, $p < .001$, $\eta^2 = .208$. Pairwise comparison with Bonferonni adjustment showed that the mean score of intention to use informative type of ISA is higher than the mean scores of intention to use both supportive and intervening types of ISA; and the mean score of intention to use supportive type of ISA is higher than the mean score of intention to use intervening type of ISA for Turkish drivers.

The results showed that willingness to use informative, supportive, and intervening type of ISA significantly differ from each other, Wilk's Lambda= 0.73,4 F (2, 332) =

60.18, $p < .001$, $\eta^2 = .266$. Pairwise comparison with Bonferonni adjustment showed that the mean score of willingness to use informative type of ISA is higher than the mean scores of willingness to use both supportive and intervening types of ISA; and the mean score of willingness to use supportive type of ISA is higher than the mean score of willingness to use intervening type of ISA for Turkish drivers.

The results showed that preference to use informative, supportive, and intervening type of ISA significantly differ from each other, Wilk's Lambda= 0.72,4 F (2, 332) = 64.81, $p < .001$, $\eta^2 = .283$. Pairwise comparison with Bonferonni adjustment showed that the mean score of preference to use informative type of ISA is higher than the mean scores of preference to use both supportive and intervening types of ISA; and the mean score of preference to use supportive type of ISA is higher than the mean score of preference to use intervening type of ISA for Turkish drivers.

From the results, it can be seen that the first and the second hypotheses of this study was supported for Turkish drivers.

Table 6. One-Way Within ANOVA Results and Mean Comparisons for Turkish Drivers

	N	**F**	**Mean**	**SD**
Attitude		44.13^{***}		
Informative Type of ISA	334		5.37_a	.08
Supportive Type of ISA	334		5.04_b	.09
Intervening Type of ISA	334		4.53_c	.10
Subjective Norm	334	24.10^{***}		
Informative Type of ISA	334		5.35_d	.08
Supportive Type of ISA	334		5.06_e	.10
Intervening Type of ISA	334		4.69_f	.10
PBC		24.10^{***}		
Informative Type of ISA	334		5.13_g	.08
Supportive Type of ISA	334		4.72_h	.09
Intervening Type of ISA	334		$4.45_ı$	.10
Prototype Similarity		43.57^{***}		
Informative Type of ISA	334		4.52_j	.09
Supportive Type of ISA	334		3.97_k	.10
Intervening Type of ISA	334		3.62_l	.11
Prototype Favorability		42.27^{***}		
Informative Type of ISA	334		5.12_m	.06

Table 6. (continued)

Supportive Type of ISA	334		4.85_n	.07
Intervening Type of ISA	334		4.61_o	.07
Intention		43.67^{***}		
Informative Type of ISA	334		5.27_p	.10
Supportive Type of ISA	334		4.57_r	.11
Intervening Type of ISA	334		4.10_s	.12
Willingness		60.18^{***}		
Informative Type of ISA	334		4.47_t	.08
Supportive Type of ISA	334		3.79_u	.11
Intervening Type of ISA	334		3.49_v	.11
Preference		64.81^{***}		
Informative Type of ISA	334		5.45_w	.09
Supportive Type of ISA	334		4.70_x	.11
Intervening Type of ISA	334		4.15_y	.12

Note. Means not sharing same subscripts differ significantly. ** $p < .01$, *** $p < .001$

3.2.2. Within Group Comparison for Israel

Eight one-way within subjects ANOVA were conducted to compare the differences among variables for each type of ISA. When the sphericity is violated, Wilk's Lambda results were reported. The results can be seen on Table 7.

The results showed that attitude toward informative, supportive, and intervening type of ISA significantly differ from each other, Wilk's Lambda= 0.66, F (2, 357) = 93.15, $p < .001$, $\eta^2 = .343$. Pairwise comparison with Bonferonni adjustment showed that the mean score of attitude toward informative type of ISA is higher than the mean scores of attitude toward both supportive and intervening types of ISA; and the mean score of attitude toward supportive type of ISA is higher than the mean score of attitude toward intervening type of ISA for Israeli drivers.

The results showed that subjective norm regarding informative, supportive, and intervening type of ISA significantly differ from each other, Wilk's Lambda= 0.83, F (2, 357) = 36.78, $p < .001$, $\eta^2 = .171$. Pairwise comparison with Bonferonni adjustment showed that the mean score of subjective norm regarding informative type of ISA is higher than the mean scores of subjective norms regarding both supportive and intervening types of ISA; and the mean score of subjective norm

regarding supportive type of ISA is higher than the mean score of subjective norm regarding intervening type of ISA for Israeli drivers.

The results showed that PBC regarding informative, supportive, and intervening type of ISA significantly differ from each other, Wilk's Lambda= 0.75, F (2, 357) = 58.33, $p < .001$, $\eta^2 = .246$. Pairwise comparison with Bonferonni adjustment showed that the mean score of PBC regarding informative type of ISA is higher than the mean scores of PBC regarding both supportive and intervening types of ISA; and the mean score of PBC regarding supportive type of ISA is higher than the mean score of PBC regarding intervening type of ISA for Israeli drivers.

The results showed that prototype similarity regarding informative, supportive, and intervening type of ISA significantly differ from each other, Wilk's Lambda= 0.75, F (2, 357) = 58.82, $p < .001$, $\eta^2 = .248$. Pairwise comparison with Bonferonni adjustment showed that the mean score of prototype similarity regarding informative type of ISA is higher than the mean scores of prototype favorability regarding both supportive and intervening types of ISA; and the mean score of prototype similarity regarding supportive type of ISA is higher than the mean score of prototype similarity regarding intervening type of ISA for Israeli drivers.

The results showed that prototype favorability regarding informative, supportive, and intervening type of ISA significantly differ from each other, Wilk's Lambda= 0.728, F (2, 357) = 66.61, $p < .001$, $\eta^2 = .272$. Pairwise comparison with Bonferonni adjustment showed that the mean score of prototype favorability regarding informative type of ISA is higher than the mean scores of prototype favorability regarding both supportive and intervening types of ISA; and the mean score of prototype favorability regarding supportive type of ISA is higher than the mean score of prototype favorability regarding intervening type of ISA for Israeli drivers.

The results showed that intention to use informative, supportive, and intervening type of ISA significantly differ from each other, Wilk's Lambda= 0.59, F (2, 357) = 126.14, $p < .001$, $\eta^2 = .414$. Pairwise comparison with Bonferonni adjustment showed that the mean score of intention to use informative type of ISA is higher than

the mean scores of intention to use both supportive and intervening types of ISA; and the mean score of intention to use supportive type of ISA is higher than the mean score of intention to use intervening type of ISA for Israeli drivers.

The results showed that willingness to use informative, supportive, and intervening type of ISA significantly differ from each other, Wilk's Lambda= 0.60,4 F (2, 357) = 117.67, $p < .001$, $\eta^2 = .397$. Pairwise comparison with Bonferonni adjustment showed that the mean score of willingness to use informative type of ISA is higher than the mean scores of willingness to use both supportive and intervening types of ISA; and the mean score of willingness to use supportive type of ISA is higher than the mean score of willingness to use intervening type of ISA for Israeli drivers.

The results showed that preference to use informative, supportive, and intervening type of ISA significantly differ from each other, Wilk's Lambda= 0.72,4 F (2, 357) = 142.16, $p < .001$, $\eta^2 = .444$. Pairwise comparison with Bonferonni adjustment showed that the mean score of preference to use informative type of ISA is higher than the mean scores of preference to use both supportive and intervening types of ISA; and the mean score of preference to use supportive type of ISA is higher than the mean score of preference to use intervening type of ISA for Israeli drivers.

From the results, it can be seen that the first and the second hypotheses of this study was supported for Israeli drivers.

Table 7. One-Way Within ANOVA Results and Mean Comparisons for Israeli Drivers.

	N	**F**	**Mean**	**SD**
Attitude		93.15^{***}		
Informative Type of ISA	359		4.91_a	.07
Supportive Type of ISA	359		4.13_b	.08
Intervening Type of ISA	359		3.63_c	.08
Subjective Norm		36.78^{***}		
Informative Type of ISA	359		4.52_d	.08
Supportive Type of ISA	359		4.15_e	.09
Intervening Type of ISA	359		3.78_f	.09

Table 7. (continued)

PBC		58.33^{***}		
Informative Type of ISA	359		5.23_{g}	.07
Supportive Type of ISA	359		4.60_{h}	.07
Intervening Type of ISA	359		$4.33_{ı}$	.08
Prototype Similarity		58.82^{***}		
Informative Type of ISA	359		4.36_{j}	.06
Supportive Type of ISA	359		3.81_{k}	.08
Intervening Type of ISA	359		3.46_{l}	.08
Prototype Favorability		66.61^{***}		
Informative Type of ISA	359		5.24_{m}	.05
Supportive Type of ISA	359		4.88_{n}	.06
Intervening Type of ISA	359		4.66_{o}	.06
Intention		126.14^{***}		
Informative Type of ISA	359		5.09_{p}	.09
Supportive Type of ISA	359		3.80_{r}	.10
Intervening Type of ISA	359		3.18_{s}	.10
Willingness		117.67^{***}		
Informative Type of ISA	359		4.75_{t}	.08
Supportive Type of ISA	359		3.71_{u}	.09
Intervening Type of ISA	359		3.10_{v}	.09
Preference		142.16^{***}		
Informative Type of ISA	359		4.94_{w}	.09
Supportive Type of ISA	359		3.57_{x}	.10
Intervening Type of ISA	359		3.02_{y}	.10

Note. Means not sharing same subscripts differ significantly. ** $p < .01$, *** $p < .001$

3.3. Between Group Comparison

Eight independent sample t-tests were conducted to examine the country differences among variables for each type of ISA.

The results for the informative type of ISA can be seen on Table 8. For the informative type of ISA, Turkish drivers' attitude and subjective norm scores were higher than Israeli drivers' ($t(668.166)=4.50$, $p < .001$, $t(681.274)= 7.39$, $p < .001$, respectively). Similarly, Turkish drivers' preference to use informative type of ISA score was higher than that of Israeli drivers ($t(691)= 4.22$, $p < .001$). In contrast, Israeli drivers' willingness to use informative type of ISA was higher than that of Turkish drivers ($t(691)= -2.37$, $p = .018$). The scores of PBC, prototype similarity, prototype favorability and intention for Turkish and Israeli drivers weren't significantly different from each other (all p's > .05).

Table 8. Group Differences Among Variables for Informative Type of ISA

	Türkiye		Israel					
	M	SD	M	SD	df	t	p	Cohen's *d*
Attitude	5.37	1.42	4.91	1.27	668.166	4.50	.000	0.34
Subjective Norm	5.35	1.51	4.52	1.44	681.274	7.39	.000	0.56
PBC	5.13	1.44	5.23	1.23	656.938	-1.01	.314	0.07
Prototype Similarity	4.52	1.56	4.36	1.19	662.279	1.54	.124	0.11
Prototype Favorability	5.12	1.04	5.24	1.02	691	-1.45	.147	0.12
Intention	5.27	1.75	5.09	1.72	691	1.30	.194	0.10
Willingness	4.47	1.57	4.75	1.52	691	-2.37	.018	0.18
Preference	5.46	1.64	4.94	1.64	691	4.22	.000	0.32

The results for the supportive type of ISA can be seen on Table 9. For the supportive type of ISA, Turkish drivers' attitude and subjective norm scores were higher than that of Israeli drivers' ($t(658.866)= 7.74$, $p < .001$, $t(677.880)= 7.08$, $p < .001$, respectively). Similarly, Turkish drivers' intention and preference to use supportive type of ISA scores were higher than that of Israeli drivers' ($t(691)= 5.13$, $p < .001$, $t(691)= 7.55$, $p < .001$, respectively). The scores of PBC, prototype similarity, prototype favorability and willingness for Turkish and Israeli drivers weren't significantly different from each other (all p's > .05).

Table 9. Group Differences Among Variables for Supportive Type of ISA

	Türkiye		Israel					
	M	SD	M	SD	df	t	p	Cohen's *d*
Attitude	5.04	1.65	4.13	1.42	658.866	7.74	.000	0.59
Subjective Norm	5.06	1.75	4.15	1.63	677.880	7.08	.000	0.54
PBC	4.72	1.62	4.60	1.40	660.085	1.05	.292	0.08
Prototype Similarity	3.97	1.81	3.81	1.42	631.046	1.31	.191	0.10
Prototype Favorability	4.85	1.20	4.88	1.04	691	-.339	.734	0.03
Intention	4.57	2.04	3.80	1.91	691	5.13	.000	0.39
Willingness	3.79	1.91	3.71	1.75	673.229	.589	.556	0.04
Preference	4.70	2.04	3.57	1.92	691	7.55	.000	0.57

The results for the intervene type of ISA can be seen on Table 10. For the intervene type of ISA, Turkish drivers' attitude and subjective norm scores were higher than

that of Israeli drivers' (t(662.035)= 7.003, p < .001, t(669.883)= 6.63, p < .001, respectively). Similarly, Turkish drivers' intention, willingness and preference to use intervening type of ISA score was higher than that of Israeli drivers' (t(654.904)= 5.88, p < .001, t(654.626)= 2.66, p = .008, t(654.405)= 7.02, p < .001, respectively). The scores of PBC, prototype similarity, prototype favorability and intention for Turkish and Israeli drivers weren't significantly differentfrom each other (all p's > .05).

Table 10. Group Differences Among Variables for Intervene Type of ISA

	Türkiye		Israel					
	M	SD	M	SD	df	t	p	Cohen's *d*
Attitude	4.53	1.81	3.63	1.58	662.035	7.003	.000	0.53
Subjective Norm	4.69	1.90	3.78	1.71	669.833	6.63	.000	0.50
PBC	4.45	1.78	4.33	1.53	658.594	.97	.331	0.07
Prototype Similarity	3.62	1.96	3.46	1.55	634.447	1.15	.250	0.09
Prototype Favorability	4.61	1.29	4.66	1.12	659.327	-.504	.614	0.04
Intention	4.09	2.21	3.18	1.87	654.904	5.88	.000	0.44
Willingness	3.49	2.05	3.10	1.74	654.626	2.66	.008	0.21
Preference	4.15	2.24	3.02	1.94	654.405	7.02	.000	0.54

3.4. Path Analysis

3.4.1. Türkiye

3.4.1.1. The Path Analysis for Informative Type of ISA

3.4.1.1.1. Model 1- The Theory of Planned Behavior

The results showed that Multivariate Kurtosis (Mardia's Z = 12.41) is higher than 5, therefore; robust estimations were reported. According to the results, S-B χ^2 (2) = 10.81, p < .001, CFI = .98, RMSEA = .115, 90% CI [.055, .186]. It seems like model did not fit the data well (χ^2 /df = 10.81/2, RMSEA = .115, CFI = .98). Thus, the modification indices were evaluated. This modification was the inclusion of the direct path from attitude to preference. After this modification, the model provided a good fit to the data (S-B χ^2 (1) = 0.14, p = .72, χ^2 /df = 0.14/1, CFI = 1.00, RMSEA

= .000, 90% CI [.000, .105]). The model explained 47.7% of the variance in intention and 57.8% of the variance in preference. The results showed that, attitude (B = .27, p < .05), subjective norm (B = .39, p < .05), and PBC (B = .25, p < .05) predicted intention. In addition, attitude (B = .15, p < .05), PBC (B = -.13, p < .05), and intention (B = .74, p < .05) predicted the preference (see Figure 4).

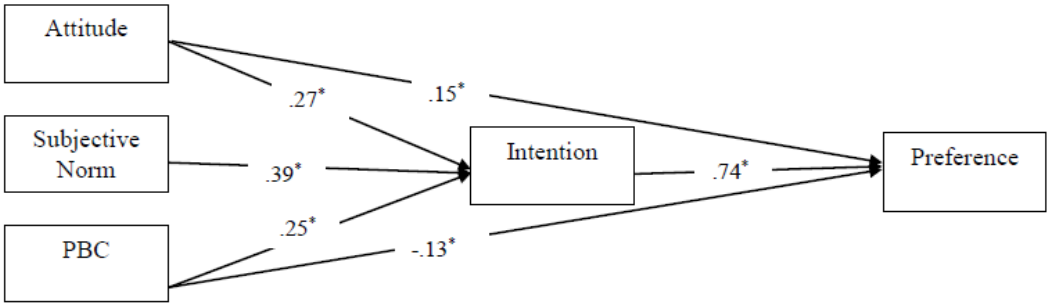

Figure 4 . The TPB for informative type of ISA for Turkish drivers.

Note. Age, gender, and general technology acceptance were controlled in further analysis and none of them affect intention and preference significantly.

3.4.1.1.2. Model 2- Prototype Willingness Model

The results showed that Multivariate Kurtosis (Mardia's Z = 11.65) is higher than 5, therefore; robust estimations were reported. According to the results, S-B χ^2 (6) = 57.32, p < .001, CFI = .94, RMSEA = .160, 90% CI [.123, .198. It seems like model did not fit the data well (χ^2 /df = 57.32/6, RMSEA = .160, CFI = .94). Thus, the modification indices were evaluated. These modifications were the inclusion of the path from prototype similarity from intention and direct paths from prototype similarity and favorability to preference. After these modifications, the model provided a good fit to the data (S-B χ^2 (3) = 6.63, p = .08, χ^2 /df = 6.63/3, CFI = .99, RMSEA = .06, 90% CI [.000, .123]). The model explained 58.8% of the variance in intention, 48.5% of the variance in willingness, and 68.5% of the variance in preference. The results showed that, attitude (B = .15, p < .05), subjective norm (B = .33, p < .05), prototype similarity (B = .27, p < .05) and willingness (B = .26, p < .05) predicted intention. In addition, attitude (B = .14, p < .05), prototype similarity (B = .38, p < .05) and prototype favorability (B = .33, p < .05) predicted willingness whereas the path between subjective norm and willingness was insignificant (B = -.006, p > .05). Finally, intention (B = .39, p < .05), prototype similarity (B = .17, p <

.05), prototype favorability (B = .12, p < .05) and willingness (B = .30, p < .05) predicted the preference (see Figure 5).

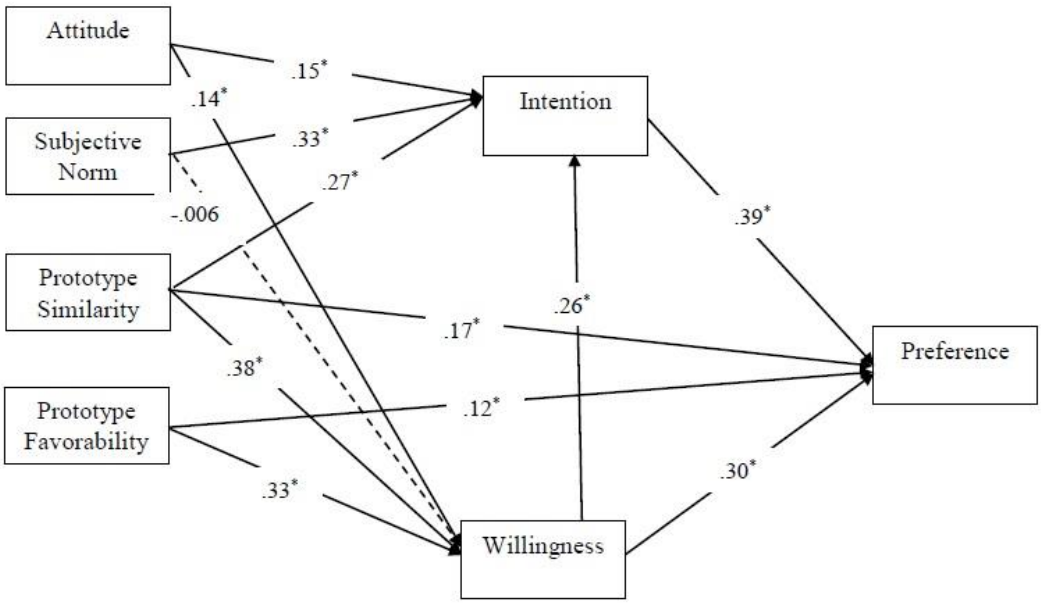

Figure 5. The PWM for informative type of ISA for Turkish drivers. Dashed path indicates non-significant association.

Note. Age, gender, and general technology acceptance were controlled in further analysis and none of them affect intention, willingness, and preference significantly.

3.4.1.1.3. Model 3- The Integrative Model

The results showed that Multivariate Kurtosis (Mardia's Z = 14.49) is higher than 5, therefore; robust estimations were reported. According to the results, S-B χ^2 (7) = 53.39, p < .001, CFI = .95, RMSEA = .14, 90% CI [.107, .176]. It seems like model did not fit the data well (χ^2 /df = 53.39/7, RMSEA = .14, CFI = .95). Thus, the modification indices were evaluated. These modifications were the inclusion of the path from prototype similarity to intention and direct paths from prototype similarity and favorability to preference. After these modifications, the model provided a good fit to the data (S-B χ^2 (4) = 4.90, p = .30, χ^2 /df = 4.90/4, CFI = .99, RMSEA = .026, 90% CI [.000, .090]). The model explained 61.3% of the variance in intention, 48.5% of the variance in willingness and 69.7% of the variance in preference. The results showed that, attitude (B = .14, p < .05), subjective norm (B = .26, p < .05), PBC (B = .19, p < .05), prototype similarity (B = .22, p < .05) and willingness (B = .27, p <

.05) predicted intention. In addition, attitude (B = .14, p < .05), prototype similarity (B = .38, p < .05) and prototype favorability (B = .33, p < .05) predicted willingness whereas the path between subjective norm and willingness was insignificant (B = -.006, p > .05). Finally, PBC (B = -.13, p < .05), intention (B = .45, p < .05), prototype similarity (B = .20, p < .05), prototype favorability (B = .12, p < .05) and willingness (B = .28, p < .05) predicted the preference (see Figure 6).

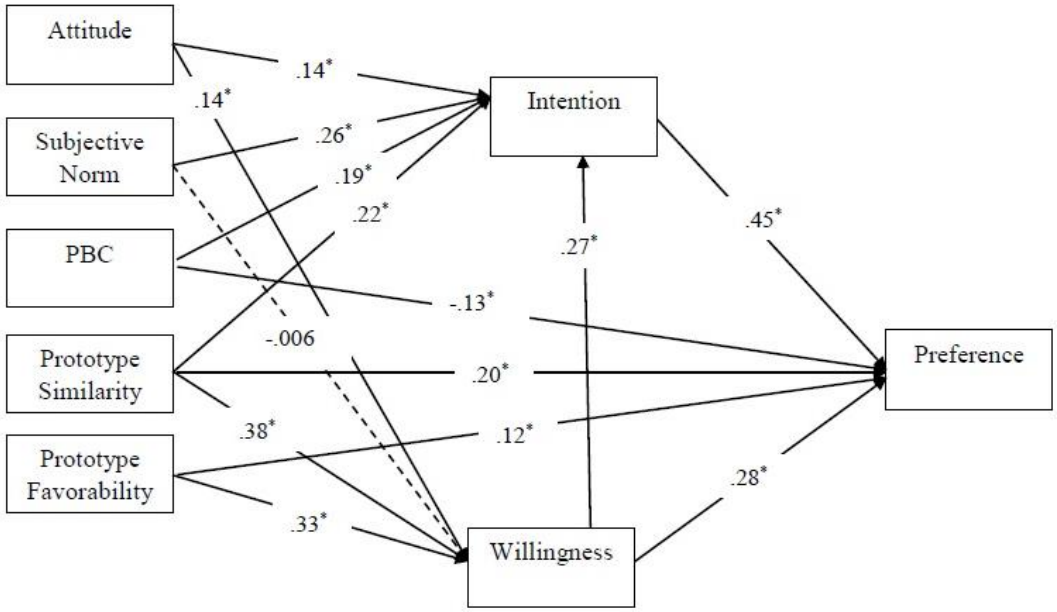

Figure 6. The integrative model for informative type of ISA for Turkish drivers. Dashed path indicates non-significant associations.

Note. Age, gender, and general technology acceptance were controlled in further analysis and none of them affect intention, willingness, and preference significantly.

3.4.1.1.4. The Comparison Between TPB, PWM and the Integrative Model for Informative Type of ISA

To compare the efficiency of each model for explaining the variance in driver acceptance of informative type of ISA, Hotelling's t-test for non-independent correlations was performed. The differences in the ability to predict preference to use informative type of ISA between TPB – modified model (R^2 = .578) and PWM – modified model (R^2 = .685), t (331) = -5.64, p < .001, and the integrative modified model (R^2 = .697) were significant, t(331) = -6.79, p < .001. Similarly, the differences the ability to predict preference to use informative type of ISA between

PWM – modified model and the integrative modified model was also significant, t(331) = -2.27, p = .02. The integrative modified model was found to exhibit the highest R^2 among the three models.

3.4.1.2. The Path Analysis for Supportive Type of ISA

3.4.1.2.1. Model 1- The Theory of Planned Behavior

The results showed that Multivariate Kurtosis (Mardia's Z = 13.27) is higher than 5, therefore; robust estimations were reported. According to the results, S-B χ^2 (2) = 7.91, p < .01, CFI = .99, RMSEA = .094, 90% CI [.032, .67]. It seems like model did not fit the data well (χ^2 /df = 7.91/2, RMSEA = .094, CFI = .99). Thus, the modification indices were evaluated. This modification was the inclusion of the direct path from attitude to preference. After this modification, the model provided a good fit to the data (S-B χ^2 (1) = 0.08, p = .77, χ^2 /df = 0.08/1, CFI = 1.00, RMSEA = .000, 90% CI [.000, .096]). The model explained 66.9% of the variance in intention and 74.6% of the variance in preference. The results showed that, attitude (B = .32, p < .05), subjective norm (B = .47, p < .05), and PBC (B = .17, p < .05) predicted intention. In addition, attitude (B = .13, p < .05) and intention (B = .81, p < .05) predicted the preference whereas the path between PBC and preference was insignificant (B = -.054, p > .05, see Figure 7).

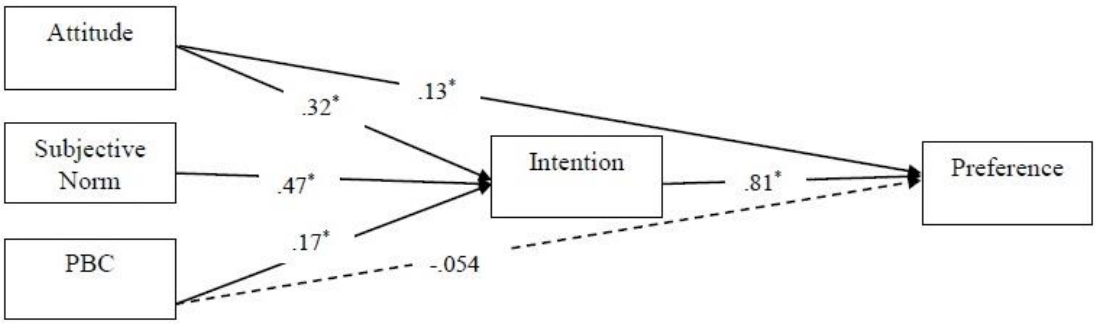

Figure 7. The TPB for supportive type of ISA for Turkish drivers. Dashed path indicates non-significant associations.

Note. Age, gender, and general technology acceptance were controlled in further analysis and none of them affect intention and preference significantly.

3.4.1.2.2. Model 2- Prototype Willingness Model

The results showed that Multivariate Kurtosis (Mardia's Z = 16.59) is higher than 5, therefore; robust estimations were reported. According to the results, S-B χ^2 (6) = 41.35, p < .001, CFI = .98, RMSEA = .133, 90% CI [.096, .174]. It seems like model did not fit the data well (χ^2 /df = 41.35/6, RMSEA = .133, CFI = .98). Thus, the modification indices were evaluated. These modifications were the inclusion of the path from prototype similarity to intention and a direct path from prototype favorability to preference. After these modifications, the model provided a good fit to the data (S-B χ^2 (4) = 4.39, p = .36, χ^2 /df = 4.39/4, CFI = 1.00, RMSEA = .017, 90% CI [.000, .086]). The model explained 78.6% of the variance in intention, 62.6% of the variance in willingness, and 79.1% of the variance in preference. The results showed that, attitude (B = .12, p < .05), subjective norm (B = .37, p < .05), prototype similarity (B = .25, p < .05) and willingness (B = .30, p < .05) predicted intention. In addition, attitude (B = .19, p < .05), prototype similarity (B = .47, p < .05) and prototype favorability (B = .20, p < .05) predicted willingness whereas the path between subjective norm and willingness was insignificant (B = .06, p > .05). Finally, intention (B = .56, p < .05), willingness (B = .27, p < .05) and prototype favorability (B = .15, p < .05) predicted the preference (see Figure 8).

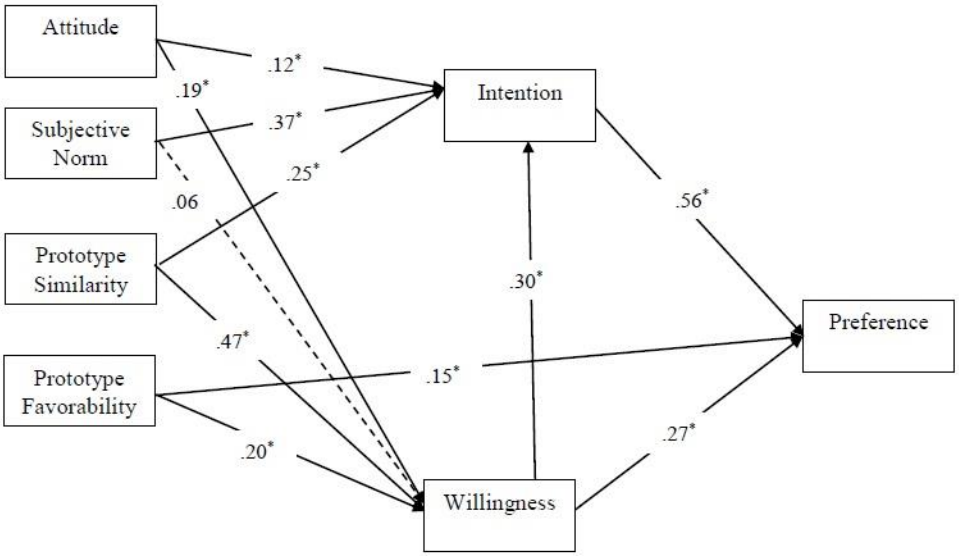

Figure 8. The PWM for supportive type of ISA for Turkish drivers. Dashed path indicates non-significant association.

Note. Age, gender, and general technology acceptance were controlled in further analysis and none of them affect intention, willingness, and preference significantly.

3.4.1.2.3. Model 3- The Integrative Model

The results showed that Multivariate Kurtosis (Mardia's Z = 18.31) is higher than 5, therefore; robust estimations were reported. According to the results, S-B χ^2 (7) = 41.32, $p < .001$, CFI = .98, RMSEA = .121, 90% CI [.087, .158]. It seems like model did not fit the data well (χ^2 /df = 41.32/7, RMSEA = .12, CFI = .98). Thus, the modification indices were evaluated. These modifications were the inclusion of the path from prototype similarity to intention and direct path from prototype favorability to preference. After these modifications, the model provided a good fit to the data (S-B χ^2 (5) = 5.14, p = .40, χ^2 /df = 5.14/5, CFI = 1.00, RMSEA = .009, 90% CI [.000, .077]). The model explained 79.3% of the variance in intention, 62.6% of the variance in willingness, and 79.1% of the variance in preference. The results showed that, attitude (B = .12, $p < .05$), subjective norm (B = .32, $p < .05$), PBC (B = .10, $p < .05$), prototype similarity (B = .22, $p < .05$) and willingness (B = .31, $p < .05$) predicted intention. In addition, attitude (B = .19, $p < .05$), prototype similarity (B = .48, $p < .05$) and prototype favorability (B = .20, $p < .05$) predicted willingness whereas the path between subjective norm and willingness was insignificant (B = .06, $p > .05$). Finally, intention (B = .58, $p < .05$), prototype favorability (B = .14, $p < .05$) and willingness (B = .26, $p < .05$) predicted the preference whereas the path between PBC and preference was insignificant (B = -.033, $p > .05$, see Figure 9).

3.4.1.2.4. The Comparison Between TPB, PWM and the Integrative Model for Supportive Type of ISA

To compare the efficiency of each model for explaining the variance in driver acceptance of supportive type of ISA, Hotelling's t-test for non-independent correlations was performed. The differences in the ability to predict preference to use supportive type of ISA between TPB – modified model (R^2 = .746) and PWM – modified model (R^2 = .791), t (331) = -5.16, p < .001, and the integrative modified model (R^2 = .791) were significant, t(331) = -5.25, p < .001. However, the differences the ability to predict preference to use supportive type of ISA between PWM – modified model and the integrative modified model was insignificant, t(331)

= 0, p = 1.00 Both PWM – modified model and the integrative modified model were found to exhibit the higher R^2 than TPB – modified model.

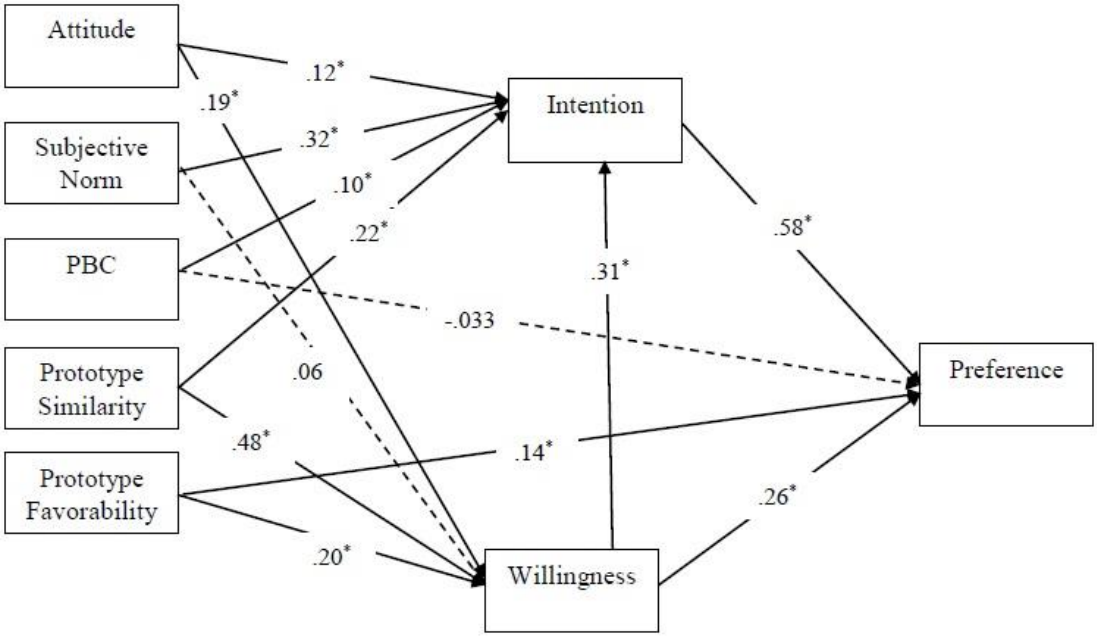

Figure 9. The integrative model for supportive type of ISA for Turkish drivers. Dashed paths indicate non-significant associations.

Note. Age, gender, and general technology acceptance were controlled in further analysis, and it was found that gender negatively predicts willingness.

3.4.1.3. The Path Analysis for Intervening Type of ISA

3.4.1.3.1. Model 1- The Theory of Planned Behavior

The results showed that Multivariate Kurtosis (Mardia's Z = 8.81) is higher than 5, therefore; robust estimations were reported. According to the results, S-B $\chi 2$ (2) = 27.02, p < .001, CFI = .98, RMSEA = .194, 90% CI [.133, .262]. It seems like model did not fit the data well ($\chi 2$ /df = 27.01/2, RMSEA = .194, CFI = .98). Thus, the modification indices were evaluated. This modification was the inclusion of the direct path from attitude to preference. After this modification, the model provided a good fit to the data (S-B χ^2 (1) = 0.003, p = .96, χ^2 /df = 0.003/1, CFI = 1.00, RMSEA = .000,). The model explained 69.2% of the variance in intention and 72.3% of the variance in preference. The results showed that, attitude (B = .30, p < .05),

subjective norm (B = .42, p < .05), and PBC (B = .23, p < .05) predicted intention. In addition, attitude (B = .23, p < .05) and intention (B = .70, p < .05) predicted the preference whereas the path between PBC and preference was insignificant (B = -.036, p > .05, see Figure 10).

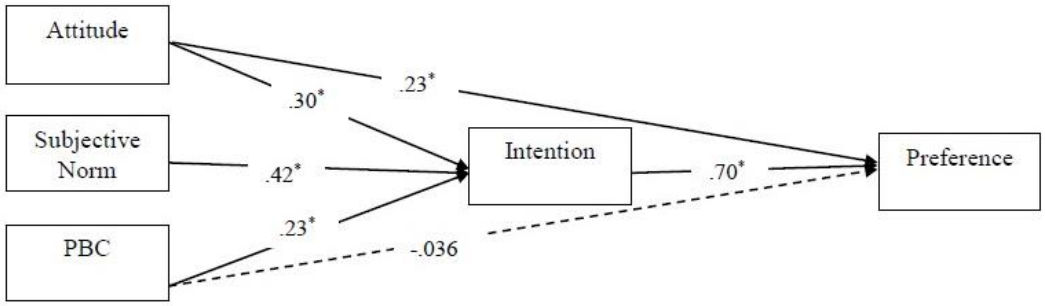

Figure 10. The TPB for intervening type of ISA for Turkish drivers. Dashed path indicates non-significant associations.

Note. Age, gender, and general technology acceptance were controlled in further analysis and none of them affect intention and preference significantly.

3.4.1.3.2. Model 2- Prototype Willingness Model

The results showed that Multivariate Kurtosis (Mardia's Z = 16.75) is higher than 5, therefore; robust estimations were reported. According to the results, S-B $\chi 2$ (6) = 44.32, p < .001, CFI = .98, RMSEA = .138, 90% CI [.102, .178]. It seems like model did not fit the data well ($\chi 2$ /df = 44.32/6, RMSEA = .138, CFI = .98). Thus, the modification indices were evaluated. These modifications were the inclusion of the path from prototype similarity to intention, a direct path from prototype similarity to preference a direct path from attitude to preference. After this modification, the model provided a good fit to the data (S-B $\chi 2$ (3) = 2.72, p = .44, $\chi 2$ /df = 2.72/3, CFI = 1.00, RMSEA = .017, 90% CI [.000, .089]). The model explained 78.8% of the variance in intention, 67.9% of the variance in willingness, and 77% of the variance in preference. The results showed that subjective norm (B = .35, p < .05), prototype similarity (B = .20, p < .05) and willingness (B = .37, p < .05) predicted intention whereas the path between attitude and intention was insignificant (B = .09, p > .05). In addition, attitude (B = .23, p < .05), subjective norm (B = .09, p < .05), prototype similarity (B = .51, p < .05) and prototype favorability (B = .12, p < .05) predicted

willingness. Finally, intention (B = .38, p < .05), willingness (B = .26, p < .05), attitude (B = .15, p < .05), and prototype similarity (B = .19, p < .05) predicted the preference (see Figure 11).

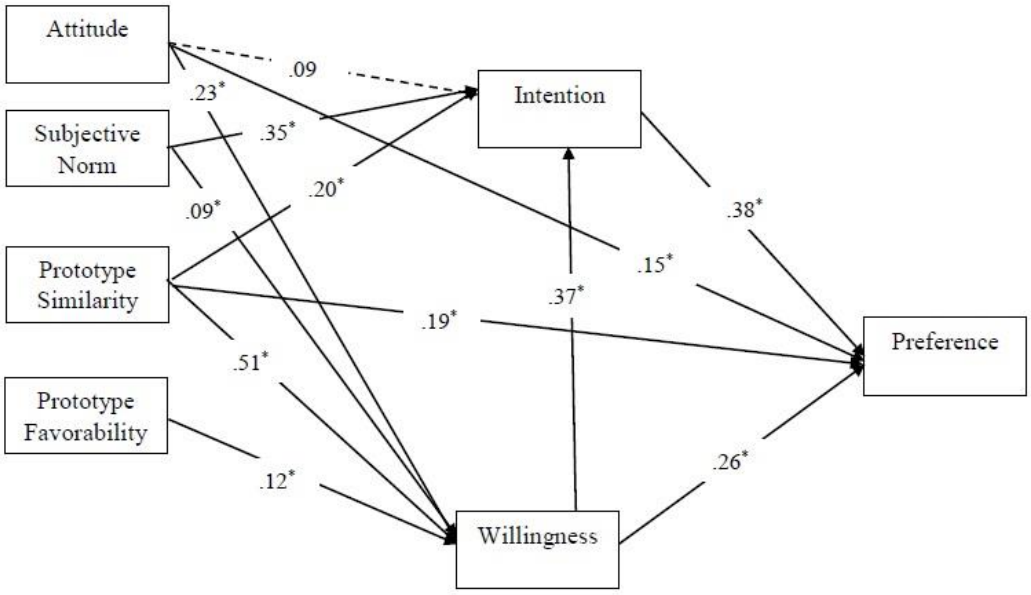

Figure 11. The PWM for intervening type of ISA for Turkish drivers. Dashed path indicates non-significant association.

Note. Age, gender, and general technology acceptance were controlled in further analysis and it was found that gender negatively predicts willingness.

3.4.1.3.3. Model 3- The Integrative Model

The results showed that Multivariate Kurtosis (Mardia's Z = 17.28) is higher than 5, therefore; robust estimations were reported. According to the results, S-B χ^2 (7) = 48.57, p < .001, CFI = .98, RMSEA = .13, 90% CI [.099, .170]. It seems like model did not fit the data well (χ^2 /df = 48.57/7, RMSEA = .13, CFI = .98). Thus, the modification indices were evaluated. These modifications were inclusion of the path from prototype similarity to intention, and direct paths from prototype similarity and attitude to preference. After these modifications, the model provided a good fit to the data (S-B χ^2 (4) = 5.21, p = .27, χ^2 /df = 5.21/4, CFI = .99, RMSEA = .030, 90% CI [.000, .092]). The model explained 79.8% of the variance in intention, 67.9% of the variance in willingness, and 77.1% of the variance in preference. The results showed that, attitude (B = .09, p < .05), subjective norm (B = .29, p < .05), PBC (B = .14, p

< .05), prototype similarity (B = .18, p < .05) and willingness (B = .36, p < .05) predicted intention. In addition, attitude (B = .23, p < .05), subjective norm (B = .09, p < .05), prototype similarity (B = .51, p < .05) and prototype favorability (B = .12, p < .05) predicted willingness. Finally, attitude (B = .15, p < .05) intention (B = .41, p < .05), prototype similarity (B = .19, p < .05) and willingness (B = .26, p < .05) predicted the preference whereas the path between PBC and preference was insignificant (B = -.05, p > .05, see Figure 12).

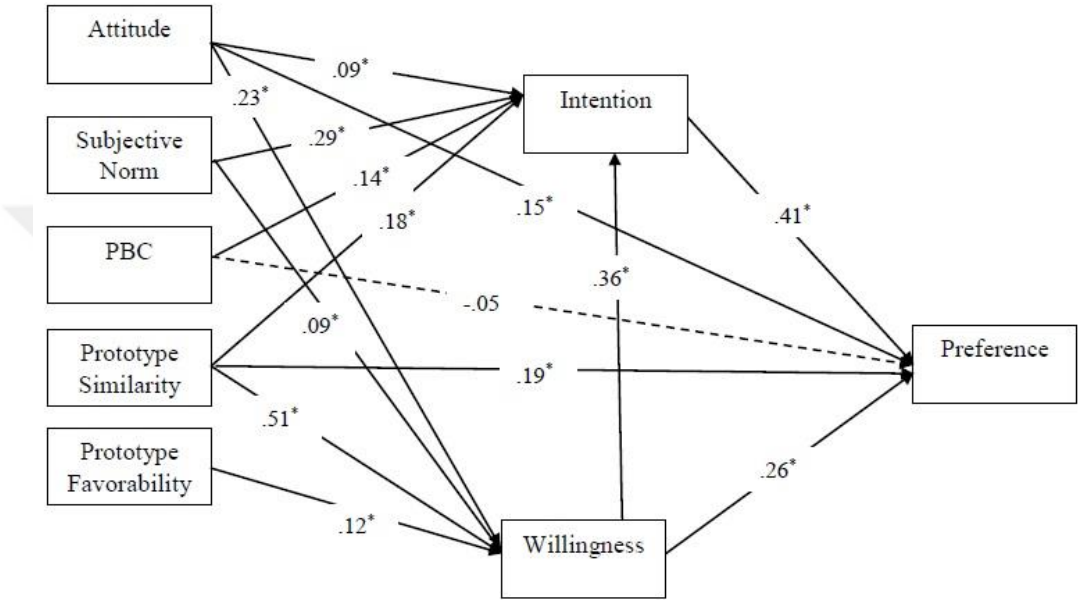

Figure 12. The integrative model for intervening type of ISA for Turkish drivers. Dashed path indicates non-significant associations.

Note. Age, gender, and general technology acceptance were controlled in further analysis and it was found that gender negatively predicts willingness.

3.4.1.3.4. The Comparison Between TPB, PWM and the Integrative Model for Intervening Type of ISA

To compare the efficiency of each model for explaining the variance in driver acceptance of intervening type of ISA, Hotelling's t-test for non-independent correlations was performed. The differences in the ability to predict preference to use intervening type of ISA between TPB – modified model (R^2 = .723) and PWM – modified model (R^2 = .770), t (331) = -5.98, p < .001, and the integrative modified model (R^2 = .771) were significant, t(331) = -6.26, p < .001. However, the differences the ability to predict preference to use intervening type of ISA between

PWM – modified model and the integrative modified model was insignificant, t(331) = -.20, p = .84. Both PWM – modified model and the integrative modified model were found to exhibit the higher R^2 than TPB – modified model.

3.4.1.4. The Comparison of The Utility of Integrative Model for Informative, Supportive and Intervening Types of ISA in Türkiye

To compare the efficiency of integrative modified model for explaining the variance in driver acceptance of three types of ISA, Hotelling's t-test for non-independent correlations was performed. The differences in the ability to predict preference to use informative type of ISA (R^2 = .697) and supportive type of ISA (R^2 = .791), t(331)= -3.30, p < .001, and intervening type (R^2 = .771) were significant, t(331)= -2.40, p < .01. However, the differences in the ability to predict preference to use supportive type of ISA and intervening type of ISA was insignificant, t(331) = 0.91, p = .36. The integrative modified model explained the preference to use supportive and intervening types of ISA better than informative type of ISA in Türkiye.

3.4.2. Israel

3.4.2.1. The Path Analysis for Informative Type of ISA

3.4.2.1.1. Model 1- The Theory of Planned Behavior

The results showed that Multivariate Kurtosis (Mardia's Z = 5.43) is higher than 5, therefore; robust estimations were reported. According to the results, S-B χ^2 (2) = 36.76, p < .001, CFI = .95, RMSEA = .220, 90% CI [.161, .285]. It seems like model did not fit the data well (χ^2 /df = 36.76/2, RMSEA = .220, CFI = .95). Thus, the modification indices were evaluated. This modification was the inclusion of the direct path from attitude to preference. After this modification, the model provided a sufficient fit to the data (S-B χ^2 (1) = 3.39, p = .07, χ^2 /df = 3.39/1, CFI = .99, RMSEA = .082, 90% CI [.000, .184]). The model explained 53.9% of the variance in intention and 69.5% of the variance in preference. The results showed that, attitude (B = .39, p < .05), subjective norm (B = .32, p < .05), and PBC (B = .22, p < .05)

predicted intention. In addition, attitude (B = .24, p < .05), and intention (B = .70, p < .05) predicted the preference whereas the path between PBC and preference was insignificant (B = -.07, p > .05, see Figure 13).

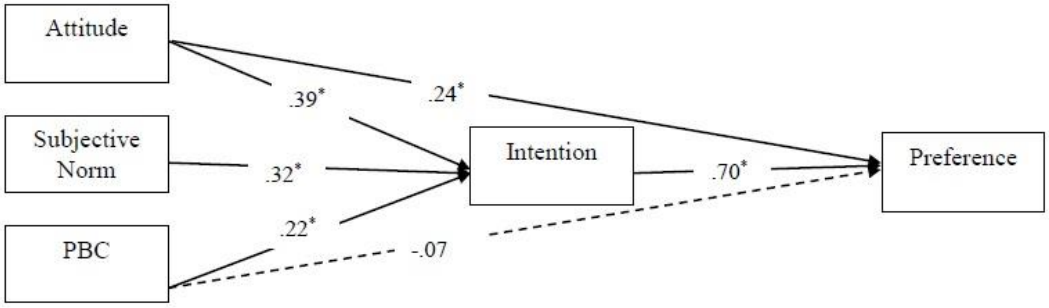

Figure 13. The TPB for informative type of ISA for Israeli drivers. Dashed path indicates non-significant associations.

Note. Age, gender, and general technology acceptance were controlled in further analysis and none of them affect intention and preference significantly.

3.4.2.1.2. Model 2- Prototype Willingness Model

The results showed that Multivariate Kurtosis (Mardia's Z = 8.54) is higher than 5, therefore; robust estimations were reported. According to the results, S-B χ^2 (6) = 26.25, p < .001, CFI = .98, RMSEA = .097, 90% CI [.061, .136]. It seems like model did not fit the data well (χ^2 /df = 26.25/6, RMSEA = .097, CFI = .98). Thus, the modification indices were evaluated. This modification was the inclusion of the direct path from attitude to preference. After this modification, the model provided a good fit to the data (S-B χ^2 (5) = 7.17, p = .23, χ^2 /df = 7.17/5, CFI = .99, RMSEA = .03, 90% CI [.000, .087]). The model explained 66.4% of the variance in intention, 46.8% of the variance in willingness, and 74.7% of the variance in preference. The results showed that, attitude (B = .18, p < .05), subjective norm (B = .28, p < .05), and willingness (B = .51, p < .05) predicted intention. In addition, attitude (B = .36, p < .05), subjective norm (B = .15, p < .05) and prototype favorability (B = .29, p < .05) predicted willingness whereas the path between prototype similarity and willingness was insignificant (B = .08, p > .05). Finally, intention (B = .44, p < .05), willingness (B = .37, p < .05), and attitude (B = .16, p < .05) and predicted the preference (see Figure 14).

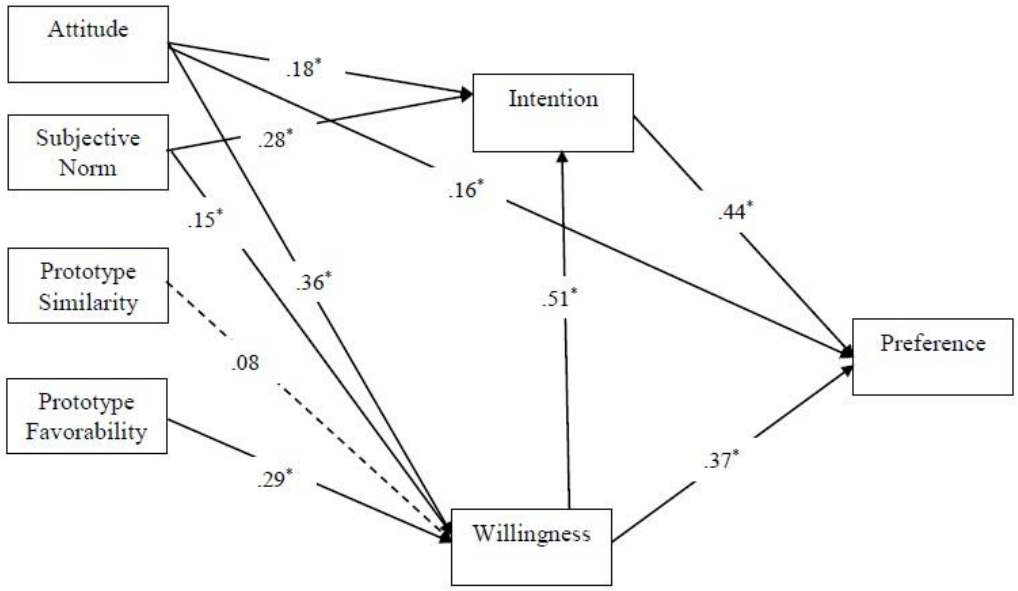

Figure 14. The PWM for informative type of ISA for Israeli drivers. Dashed path indicates non-significant association.

Note. Age, gender, and general technology acceptance were controlled in further analysis and none of them affect intention, willingness, and preference significantly.

3.4.2.1.3. Model 3- The Integrative Model

The results showed that Multivariate Kurtosis (Mardia's Z = 9.72) is higher than 5, therefore; robust estimations were reported. According to the results, S-B χ^2 (7) = 41.24, p < .001, CFI = .97, RMSEA = .117, 90% CI [.084, .152]. It seems like model did not fit the data well (χ^2 /df = 41.24/7, RMSEA = .117, CFI = .97). Thus, the modification indices were evaluated. These modifications were the inclusion of the path from PBC to willingness and direct paths from attitude and prototype favorability to preference. After these modifications, the model provided a good fit to the data (S-B χ^2 (4) = 7.15, p = .14, χ^2 /df = 7.15/4, CFI = .99, RMSEA = .047, 90% CI [.000, .101]). The model explained 67.2% of the variance in intention, 48.2% of the variance in willingness and 75.9% of the variance in preference. The results showed that, attitude (B = .18, p < .05), subjective norm (B = .24, p < .05), PBC (B = .11, p < .05), and willingness (B = .48, p < .05) predicted intention. In addition, attitude (B = .35, p < .05), subjective norm (B = .09, p < .05), PBC (B = .15, p < .05), and prototype favorability (B = .26, p < .05) predicted willingness whereas the path between perceived similarity and willingness was insignificant (B = .06, p >

.05). Finally, attitude (B = .15, p < .05), intention (B = .47, p < .05), prototype favorability (B = .09, p < .05) and willingness (B = .36, p < .05) predicted the preference whereas the path between PBC and preference was insignificant (B = -.12, p > .05, see Figure 15).

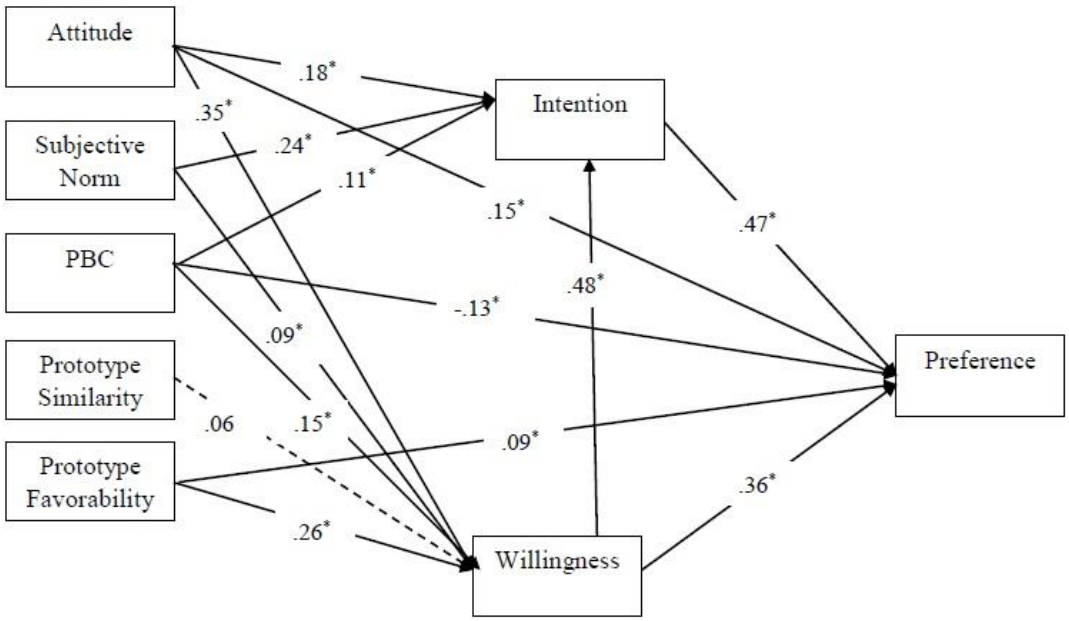

Figure 15. The integrative model for informative type of ISA for Israeli drivers. Dashed path indicates non-significant associations.

Note. Age, gender, and general technology acceptance were controlled in further analysis and none of them affect intention, willingness, and preference significantly.

3.4.2.1.4. The Comparison Between TPB, PWM and the Integrative Model for Informative Type of ISA

To compare the efficiency of each model for explaining the variance in driver acceptance of informative type of ISA, Hotelling's t-test for non-independent correlations was performed. The differences in the ability to predict preference to use informative type of ISA between TPB – modified model (R^2 = .695) and PWM – modified model (R^2 = .747), t (356) = -5.12, p < .001, and the integrative modified model (R^2 = .759) were significant, t(356) = -6.41, p < .001. Similarly, the differences the ability to predict preference to use informative type of ISA between PWM – modified model and the integrative modified model was also significant, t(356) = -2.76, p = .006. The integrative modified model was found to exhibit the highest R^2 among the three models.

3.4.2.2. The Path Analysis for Supportive Type of ISA

3.4.2.2.1. Model 1- The Theory of Planned Behavior

The results showed that Multivariate Kurtosis (Mardia's Z = 6.03) is higher than 5, therefore; robust estimations were reported. According to the results, S-B χ^2 (2) = 26.50, p < .01, CFI = .97, RMSEA = .185, 90% CI [.126, .250]. It seems like model did not fit the data well (χ^2 /df = 26.50/2, RMSEA = .185, CFI = .97). Thus, the modification indices were evaluated. This modification was the inclusion of the direct path from attitude to preference. After this modification, the model provided a good fit to the data (S-B χ^2 (1) = 0.62, p = .43, χ^2 /df = 0.62/1, CFI = 1.00, RMSEA = .000, 90% CI [.000, .128]). The model explained 52.6% of the variance in intention and 76.3% of the variance in preference. The results showed that, attitude (B = .45, p < .05), subjective norm (B = .23, p < .05), and PBC (B = .17, p < .05) predicted intention. In addition, attitude (B = .21, p < .05) and intention (B = .72, p < .05) predicted the preference whereas the path between PBC and preference was insignificant (B = .002, p > .05, see Figure 16).

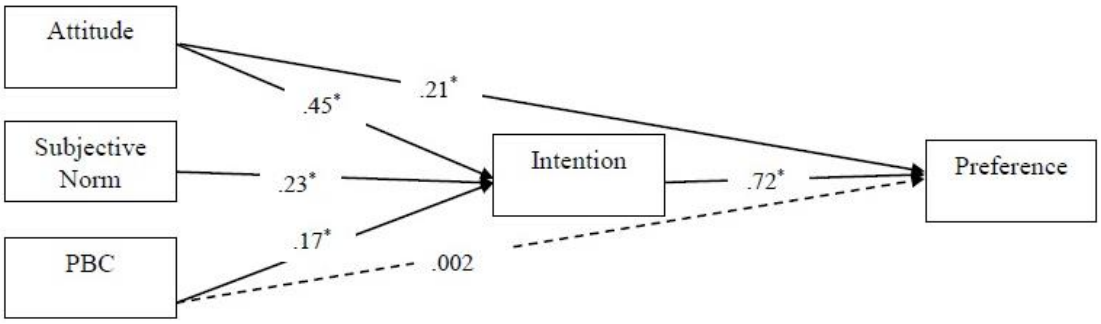

Figure 16. The TPB for supportive type of ISA for Israeli drivers. Dashed path indicates non-significant associations.

Note. Age, gender, and general technology acceptance were controlled in further analysis and none of them affect intention and preference significantly.

3.4.2.2.2. Model 2- Prototype Willingness Model

The results showed that Multivariate Kurtosis (Mardia's Z = 7.33) is higher than 5, therefore; robust estimations were reported. According to the results, S-B χ^2 (6) =

27.08, $p < .001$, CFI = .99, RMSEA = .099, 90% CI [.063, .138]. It seems like model did not fit the data well (χ^2 /df = 27.08/6, RMSEA = .099, CFI = .99). Thus, the modification indices were evaluated. This modification was the inclusion of the direct path from attitude to preference. After this modification, the model provided a good fit to the data (S-B χ^2 (5) = 3.89, $p = .57$, χ^2 /df = 3.89/5, CFI = 1.00, RMSEA = .000, 90% CI [.000, .064]). The model explained 78.4% of the variance in intention, 55.3% of the variance in willingness, and 78.8% of the variance in preference. The results showed that, attitude ($B = .14$, $p < .05$), subjective norm ($B = .08$, $p < .05$), and willingness ($B = .74$, $p < .05$) predicted intention. In addition, attitude ($B = .36$, $p < .05$), subjective norm ($B = .19$, $p < .05$), prototype similarity ($B = .27$, $p < .05$) and prototype favorability ($B = .12$, $p < .05$) predicted willingness. Finally, attitude ($B = .17$, $p < .05$), intention ($B = .45$, $p < .05$), and willingness ($B = .34$, $p < .05$) predicted the preference (see Figure 17).

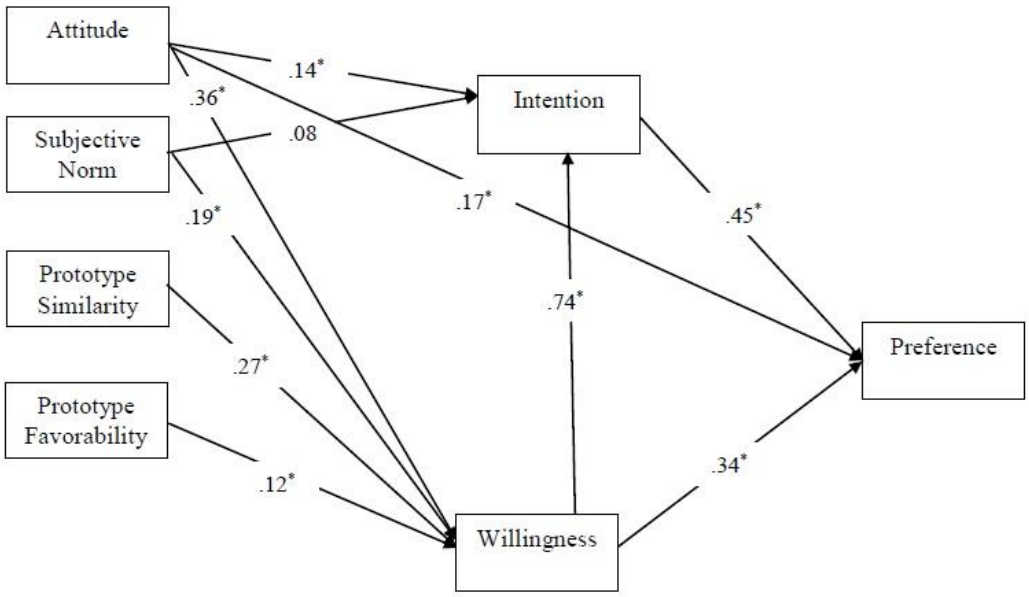

Figure 17. The PWM for supportive type of ISA for Israeli drivers.

Note. Age, gender, and general technology acceptance were controlled in further analysis, and it was found that gender negatively predicts willingness.

3.4.2.2.3. Model 3- The Integrative Model

The results showed that Multivariate Kurtosis (Mardia's $Z = 7.82$) is higher than 5, therefore; robust estimations were reported. According to the results, S-B χ^2 (7) =

23.4630, p = .0014, CFI = .99, RMSEA = .081, 90% CI [.046, .118]. It seems like model did not fit the data well (χ^2 /df = 23.46/7, RMSEA = .081, CFI = .99). Thus, the modification indices were evaluated. This modification was the inclusion the direct path from attitude to preference. After this modification, the model provided a good fit to the data (S-B χ^2 (6) = 1.90, p = .93, χ^2 /df = 1.90/6, CFI = 1.00, RMSEA = .009, 90% CI [.000, .021]). The model explained 79% of the variance in intention, 55.3% of the variance in willingness, and 78.8% of the variance in preference. The results showed that, attitude (B = .13, p < .05), subjective norm (B = .04, p < .05), PBC (B = .10, p < .05), and willingness (B = .72, p < .05) predicted intention. In addition, attitude (B = .36, p < .05), subjective norm (B = .19, p < .05), prototype similarity (B = .27, p < .05) and prototype favorability (B = .12, p < .05) predicted willingness. Finally, attitude (B = .17, p < .05), intention (B = .45, p < .05), and willingness (B = .34, p < .05) predicted the preference whereas the path between PBC and preference was insignificant (B = .003, p > .05, see Figure 18).

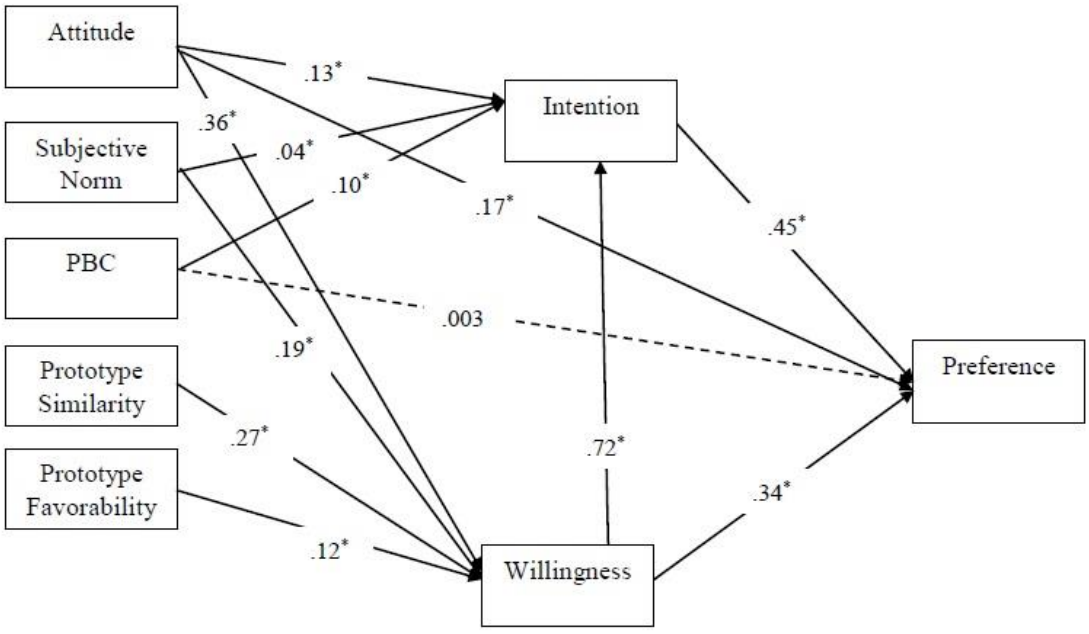

Figure 18. The integrative model for supportive type of ISA for Israeli drivers. Dashed path indicates non-significant associations.

Note. Age, gender, and general technology acceptance were controlled in further analysis it was found that gender negatively predicts willingness.

3.4.2.2.4. The Comparison Between TPB, PWM and the Integrative Model for Supportive Type of ISA

To compare the efficiency of each model for explaining the variance in driver acceptance of supportive type of ISA, Hotelling's t-test for non-independent correlations was performed. The differences in the ability to predict preference to use supportive type of ISA between TPB – modified model (R^2 = .763) and PWM – modified model (R^2 = .788), t (356) = -4.31, p < .001, and the integrative modified model (R^2 = .788) were significant, t(356) = -4.31, p < .001. However, the differences the ability to predict preference to use supportive type of ISA between PWM – modified model and the integrative modified model was insignificant, t(356) = 0, p = 1.00 Both PWM – modified model and the integrative modified model were found to exhibit the higher R^2 than TPB – modified model.

3.4.2.3. The Path Analysis for Intervening Type of ISA

3.4.2.3.1. Model 1- The Theory of Planned Behavior

The results showed that Multivariate Kurtosis (Mardia's Z = 6.98) is higher than 5, therefore; robust estimations were reported. According to the results, S-B $\chi 2$ (2) = 21.50, p < .001, CFI = .98, RMSEA = .165, 90% CI [.107, .231]. It seems like model did not fit the data well ($\chi 2$ /df = 21.50/2, RMSEA = .165, CFI = .98). Thus, the modification indices were evaluated. This modification was the inclusion of the direct path from attitude to preference. After this modification, the model provided a good fit to the data (S-B χ^2 (1) = 1.45, p = .23, χ^2 /df = 1.45/1, CFI = 1.00, RMSEA = .036). The model explained 62.5% of the variance in intention and 77.1% of the variance in preference. The results showed that, attitude (B = .57, p < .05), and subjective norm (B = .26, p < .05) predicted intention whereas the path between and PBC and intention was insignificant (B = .04, p > .05). In addition, attitude (B = .19, p < .05) and intention (B = .72, p < .05) predicted the preference whereas the path between PBC and preference was insignificant (B = .01, p > .05, see Figure 19).

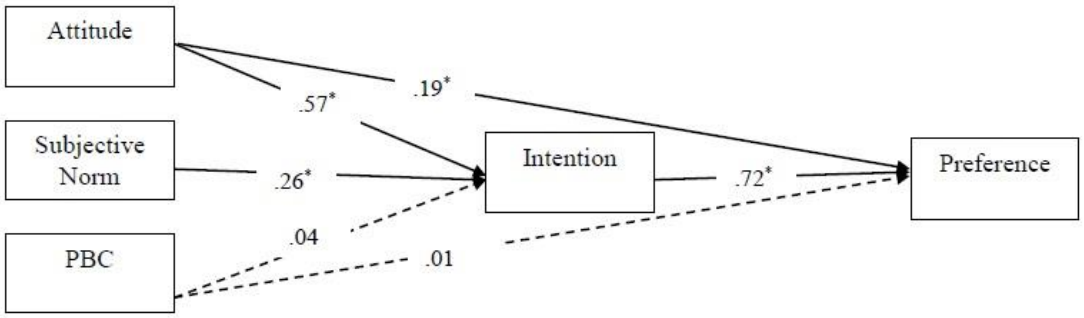

Figure 19. The TPB for intervening type of ISA for Israeli drivers. Dashed paths indicate non-significant associations.

Note. Age, gender, and general technology acceptance were controlled in further analysis and none of them affect intention and preference significantly.

3.4.2.3.2. Model 2- Prototype Willingness Model

The results showed that Multivariate Kurtosis (Mardia's Z = 10.13) is higher than 5, therefore; robust estimations were reported. According to the results, S-B $\chi 2$ (6) = 24.32, $p < .001$, CFI = .99, RMSEA = .092, 90% CI [.056, .132]. It seems like model did not fit the data well ($\chi 2$ /df = 24.32/6, RMSEA = .092, CFI = .99). Thus, the modification indices were evaluated. This modification was the inclusion of the direct path from attitude to preference. After this modification, the model provided a good fit to the data (S-B $\chi 2$ (5) = 7.66, $p = .18$, $\chi 2$ /df = 7.66/5, CFI = .99, RMSEA = .039, 90% CI [.000, .089]). The model explained 82.3% of the variance in intention, 57.5% of the variance in willingness, and 78.7% of the variance in preference. The results showed that attitude (B = .19, $p < .05$), subjective norm (B = .14, $p < .05$), and willingness (B = .67, $p < .05$) predicted intention. In addition, attitude (B = .55, $p < .05$), subjective norm (B = .14, $p < .05$), and prototype similarity (B = .17, $p < .05$) predicted willingness whereas the path between prototype favorability and willingness was insignificant (B = .02, $p > .05$). Finally, attitude (B = .16, $p < .05$), intention (B = .50, $p < .05$), and willingness (B = .28, $p < .05$), predicted the preference (see Figure 20).

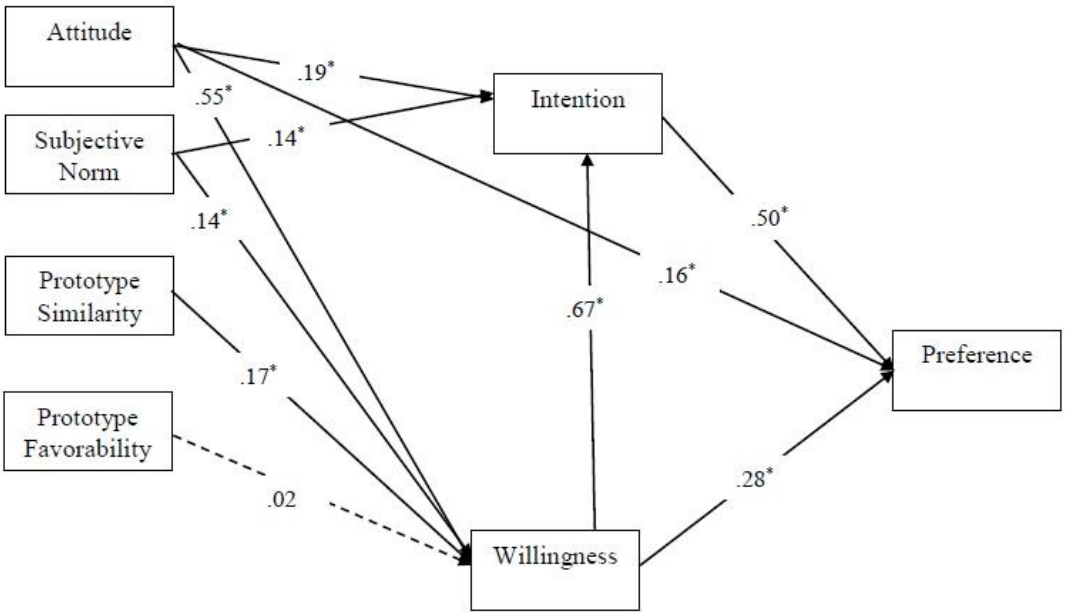

Figure 20. The PWM for intervening type of ISA for Israeli drivers. Dashed path indicates non-significant association.

Note. Age, gender, and general technology acceptance were controlled in further analysis and none of them affect intention, willingness, and preference significantly.

3.4.2.3.3. Model 3- The Integrative Model

The results showed that Multivariate Kurtosis (Mardia's Z = 11.45) is higher than 5, therefore; robust estimations were reported. According to the results, S-B χ^2 (7) = 21.42, p = .003, CFI = .99, RMSEA = .076, 90% CI [.04, .113]. It seems like model did not fit the data well (χ^2 /df = 21.42/7, RMSEA = .076, CFI = .99). Thus, the modification indices were evaluated. This modification was inclusion of the direct path from attitude to preference. After this modification, the model provided a good fit to the data (S-B χ^2 (6) = 7.10, p = .31, χ^2 /df = 7.10/6, CFI = .99, RMSEA = .023, 90% CI [.000, .075]). The model explained 82.3% of the variance in intention, 57.5% of the variance in willingness, and 78.7% of the variance in preference. The results showed that, attitude (B = .18, p < .05), subjective norm (B = .13, p < .05), and willingness (B = .67, p < .05) predicted intention whereas the path between PBC and intention was insignificant (B = .014, p < .05). In addition, attitude (B = .55, p < .05), subjective norm (B = .14, p < .05), and prototype similarity (B = .17 p < .05) predicted willingness whereas the path between prototype favorability and willingness was insignificant (B = .015, p > .05). Finally, attitude (B = .16, p < .05)

intention (B = .50, p < .05), and willingness (B = .28, p < .05) predicted the preference whereas the path between PBC and preference was insignificant (B = .009, p > .05, see Figure 21).

3.4.2.3.4. The Comparison Between TPB, PWM and the Integrative Model for Intervening Type of ISA

To compare the efficiency of each model for explaining the variance in driver acceptance of intervening type of ISA, Hotelling's t-test for non-independent correlations was performed. The differences in the ability to predict preference to use intervening type of ISA between TPB – modified model (R^2 = .771) and PWM – modified model (R^2 = .787), t (356) = -3.48, p < .001, and the integrative modified model (R^2 = .787) were significant, t(356) = -3.48, p < .001. However, the differences the ability to predict preference to use intervening type of ISA between PWM – modified model and the integrative modified model was insignificant, t(356) = 0, p = 1.00. Both PWM – modified model and the integrative modified model were found to exhibit the higher R^2 than TPB – modified model.

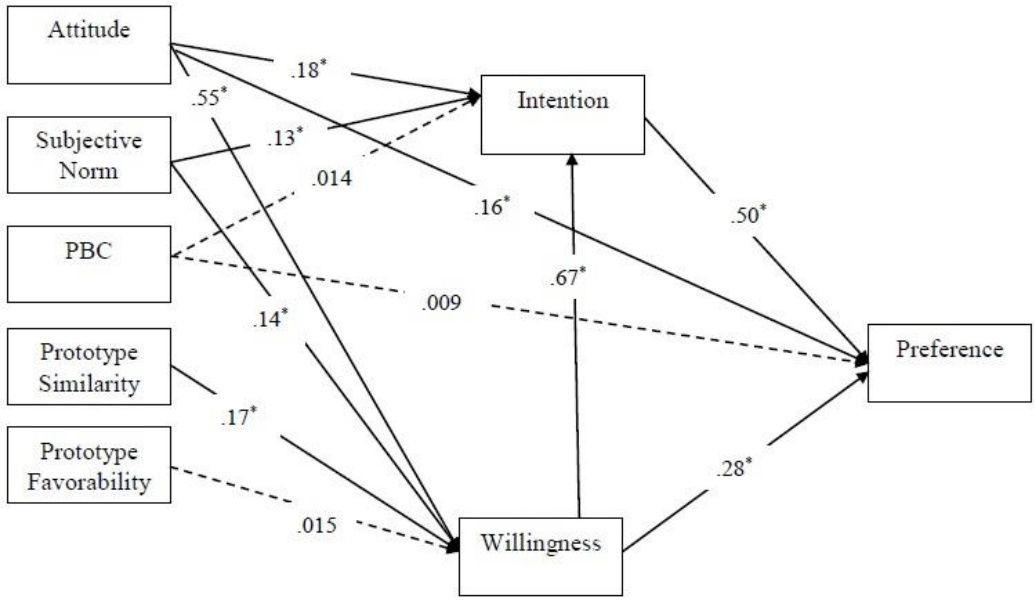

Figure 21. The integrative model for intervening type of ISA for Israeli drivers. Dashed paths indicate non-significant associations.

Note. Age, gender, and general technology acceptance were controlled in further analysis and none of them affect intention, willingness, and preference significantly.

3.4.2.4. The Comparison of The Utility of Integrative Model for Informative, Supportive and Intervening Types of ISA in Israel

To compare the efficiency of integrative modified model for explaining the variance in driver acceptance of three types of ISA, Hotelling's t-test for non-independent correlations was performed. The differences in the ability to predict preference to use informative type of ISA (R^2 = .759) and supportive type of ISA (R^2 = .788), t(359)= -1.06, p = .29, and intervening type (R^2 = .794) were not significant, t(359)= -1.24, p = .22. Similarly, the differences in the ability to predict preference to use supportive type of ISA and intervening type of ISA was insignificant, t(359) = 0.04, p = .97. The utility of integrative modified model in explaining the preference to use informative, supportive and intervening types of ISA is similar in Israel.

3.4.3. The Summary of Model Tests

When comparing the efficiency of each model for explaining the variance in driver acceptance of informative type of ISA, the integrative modified model was found to explain the highest variance in preference for both Israel and Türkiye. Similarly, both PWM- modified and the integrative modified model were found to exhibit the highest variance in preference for both Israel and Türkiye. The summary of path analysis results can be seen in Table 11.

The integrative modified model accounted 69.7%, 79.1%, and 77.1% of variance in preference to use informative, supportive, and intervening types of ISA, respectively in Türkiye. The results showed that the integrative modified model explained the preference to use supportive and intervening types of ISA better than informative type of ISA in Türkiye.

The integrative modified model accounted 75.9%, 78.8%, and 78.7% of variance in preference to use informative, supportive, and intervening types of ISA, respectively in Israel. The results showed that the integrative modified model works similar in explaining the preference to use informative, supportive, and intervening types of ISA in Israel.

For informative type of ISA, the integrative modified model accounted for 69.7% and 75.9% of variance in preference to use the informative type of ISA in Türkiye and Israel, respectively. From the magnitude of percentages of explained variances, it can be inferred that the integrative modified model's utility is higher in Israel. Similarly, the integrative modified model accounted for 77.1% and 78.7% of variance in preference to use the intervening type of ISA in Türkiye and Israel, respectively. Even though the magnitude of percentages of explained variances are close, it can be inferred that the integrative modified model's utility is higher in Israel. Finally, for supportive type of ISA, the integrative modified model accounted for 79.1% and 78.7% of variance in preference in Türkiye and Israel, respectively. Even though the magnitude of percentages of explained variances are close, it seems that the integrative model's utility for supportive and type of ISA is higher in Türkiye.

From the results, it can be inferred that the third hypothesis was supported for all types of ISA whereas the fourth hypothesis was supported only for informative type of ISA. In addition, the fifth hypothesis was supported.

Table 11. Goodness of fit test results and coefficient for determination for each model for Türkiye and Israel

	χ^2 (df)	*p*	CFI	RMSEA	R^2(Intention)	R^2(Willingness)	R^2(Preference)
Informative ISA							
Türkiye							
TPB-Modified	0.14(1)	.72	1.00	.00	.477		.578
PWM-Modified	6.63(3)	.08	.99	.06	.588	.485	.685
Integrative Model - Modified	4.90(4)	.30	.99	.026	.613	.485	.697
Israel							
TPB-Modified	3.39(1)	.07	.99	.082	.539		.695
PWM-Modified	7.17(5)	.23	.99	.03	.664	.468	.747
Integrative Model - Modified	7.15(4)	.14	.99	.047	.672	.482	.759
Supportive ISA							
Türkiye							
TPB-Modified	.08(1)	.77	1.00	.000	.669		.746

Table 11. (continued)

PWM-Modified	4.39(4)	.36	1.00	.017	.786	.626	.791
Integrative Model - Modified	5.14(5)	.40	1.00	.009	.793	.626	.791
Israel							
TPB-Modified	.62(1)	.43	1.00	.000	.526		.763
PWM-Modified	3.89(5)	.57	1.00	.000	.784	.553	.788
Integrative Model - Modified	1.90(6)	.93	1.00	.009	.790	.553	.788
Intervening							
ISA Türkiye							
TPB-Modified	.003(1)	.96	1.00	.000	.692		.723
PWM-Modified	2.72(3)	.44	1.00	.017	.788	.679	.770
Integrative Model - Modified	5.21(4)	.27	.99	.030	.798	.679	.771
Israel							
TPB-Modified	1.45(1)	.23	1.00	.036	.625		.771
PWM-Modified	7.66(5)	.18	.99	.039	.823	.575	.787
Integrative Model - Modified	7.10(6)	.31	.99	.023	.823	.575	.787

Note. CFI = Comparative Fit Index; RMSEA = Root Mean Squared Error Approximation.

CHAPTER 4

DISCUSSION

4.1. Overview

The present study aimed to investigate the driver's acceptance of informative, supportive, and intervening types of ISA in Türkiye and Israel by using TPB and PWM, two common decision-making frameworks, and their integration. In line with this aim, both within-group and between-group differences were examined.Then, the correlations between variables were examined for Türkiye and Israel separately. Finally, the utility of TPB, PWM and the integrated model for each type of ISA were examined by using SEM for Türkiye and Israel separately.

Previous studies emphasized that TPB is a useful framework for understanding the driver acceptance of autonomy in vehicles. However, these previous studies mostly focused on autonomous vehicles or ADAS, and only a few studies focused on speeding behavior while using ISA. In addition, PWM has not been investigated in an attempt to understand the driver's acceptance of in-vehicle technologies at all. As a result, there is a gap in understanding the driver's acceptance of ISA. The present study tries to fill this gap by examining how the TPB, PWM and the integrative model explain the driver acceptance of three types of ISA, and compare the utility of the models.

In the following section, the findings of the present study are discussed in the light of the relevant literature. This is done for within- and between-group differences, as well as the predictive validity of the integrative model on the driver's acceptance of three types of ISA. Then, the implications of the findings and the study limitations are discussed.

4.2. Summary and Discussion of the Results

4.2.1. Within Group Differences

The differences of constructs of TPB, PWM and integrative model for three types of ISA were investigated for Turkish and Israeli drivers separately. However, the similar results were gathered for both groups. For all constructs, the scores were higher for informative type of ISA, followed by supportive type of ISA and the lowest scores were for intervening type of ISA among both Turkish and Israeli drivers. Specifically, the results showed that drivers' intention, willingness, and preference to use informative type of ISA were the highest, followed by supportive type of ISA and the least were regarding intervening types of ISA. Therefore, the first and the second hypotheses of this study were supported.

The current study's results are in line with previous studies, showing that the level of driver acceptance was highest for informative type of ISA, moreover; it tended to decline as the level of interference and control rose (Ryan, 2019). Furthermore, drivers prefer the informative type of ISA rather than the supportive type of ISA even though drivers are less satisfied with the informative type of ISA (Adell et al., 2008). In accordance with that, PBC is decreasing as the autonomy is getting higher (Rödel et al., 2014). The driver cannot exceed the given speed limit with the vehicle equipped with the intervening type of ISA, while the driver controls the speed of the vehicle equipped with the informative type of ISA, which only gives speed limit information. Therefore, it is compatible with the nature of these ISA types that drivers think they have more control of the informative type of ISA.

Previous studies showed that drivers have more positive attitudes toward in vehicle technologies which can be turned off by the driver (i.e., Blythe & Curtis, 2004). Specifically, the more positive attitudes were expressed toward informative type of ISA than the intervening type of ISA (Almqvist & Towliat, 1993). Therefore, the result of this study regarding ISA is in line with the literature. Subjective norm regarding ISA refers to the social pressure one feels to use ISA or not (van der Pas et al., 2008). Therefore, subjective norm can be determined by the view of socially

close groups toward ISA. In addition, prototype perceptions are the images of the types of a typical person who performs certain behavior. Two dimension of prototype perception are prototype favorability, the degree of favoring the image, and prototype similarity, the degree of similarity between the image and oneself. People are more likely to engage the behavior when they their prototype perceptions are higher. Form this point of view, the type of ISA that drivers prefer to use, should be compatible with their attitudes, subjective norm and prototype perceptions. Therefore, it can be said that the within group differences found in this study is compatible with this view.

4.2.2. Cross Country Differences

For all types of ISA, Turkish drivers' attitude and subjective norm scores were higher than Israeli drivers whereas they don't differ from each other in terms of PBC and prototype perceptions.

Regarding attitude, Turkish drivers have more positive attitude toward the given system than Israeli drivers for all types of ISA. It was stated that drivers from countries, where the estimated road fatality rate and gross national income per capita is lower, have more positive attitude toward autonomous vehicles (Syahrivar et al., 2021). Similarly, drivers from countries, where the estimated road fatality rate and motorway speed limits are higher and gross national income per capita is lower, perceived ISA more pleasant (Adell et al., 2008). Therefore, it can be interpreted that the results of this study regarding attitude were in line with literature and support the idea that in countries with higher road fatality rate, higher speed limits, and lower gross national income per capita are in favor of ISA more than other countries. It can be explained by the idea that the high rate of road fatality may lead to a more positive approach towards technological implications that will increase traffic safety in that society.

The results showed that Turkish drivers think that they have more social approval of using the given system than Israeli drivers. The difference between subjective norm may be influenced by culture. The social approval is more important in collectivistic

societies than individualistic societies. The characteristic of the society affects the individual's decision-making mechanisms. According to Hofstede's (2001) individualism dimension, people are less concerned with the views of others and, as a result; feel less pressure to perform a specific behavior in individualistic societies whereas people are worried about the opinions of others, as a result; they are more likely to perform behaviors in collectivistic societies, where the group tends to be more significant than the individual. Hosftede's individualism dimension scores shows that Israel is a blend of individualistic and collectivistic societies whereas Türkiye is a collectivistic society (Hosftede, 2001). Thus, the results regarding subjective norm can be explained by cultural differences. It can be interpreted as that because Türkiye is more collectivistic society, the subjective norm becomes more important than in Israel.

PBC and prototype perceptions did not differ from each other among Turkish and Israeli drivers for all types of ISA. It can be explained by the control power of the ISA types. It is known that PBC is decreasing as the autonomy is getting higher (Rödel et al., 2014). Therefore, PBC can be related with the autonomy level rather than country differences. It can be interpreted that the system control is perceived universal. As for prototypes, this is the first study examined the role of prototypes in driver acceptance of ISA. Therefore, the results regarding prototype perceptions contributes an unprecedented view in the literature. Prototype perceptions can be interpreted as a precursor that if people engage in these behaviors in public, they will be seen by others as a typical person who does this behavior. Interestingly, the results showed that even though Turkish drivers have more social approval and positive attitude toward these ISA systems, their images about a typical user of these ISA systems are similar to Israeli drivers.

Turkish drivers' intention to use supportive and intervening types of ISA were higher than Israeli drivers' while their intention to use informative type of ISA was similar. In addition, Israeli drivers' willingness to use informative type of ISA was higher whereas Turkish drivers' willingness to use intervening type of ISA was higher, and their willingness to use supportive type of ISA was similar. Previous studies showed that drivers from countries, where the estimated road fatality rate is higher and gross

national income per capita is lower, either intend to use highly automated vehicles or show more interest toward having highly automated vehicles (Schoettle & Sivak, 2014; Kaye et al., 2020b). Therefore, the results of this study supported the idea that drivers from countries with high road fatality rate and lower gross national income per capita is more intends to use vehicle technologies, especially when the control of this technologies increasing. Finally, Turkish drivers' preference to use all three types of ISA were higher than Israeli drivers. The cross-cultural studies regarding ISA acceptance shows that the acceptance rates differ among countries according to their estimated road fatality rate (per 100 000 population), gross national income per capita, and different speed limits on rural roads and motorways (i.e. Warner et al. 2010; Eriksson & Bjørnskau, 2012). The result of this study is in line with the previous studies. In Türkiye, where the estimated road fatality rate and motorway speed limit are higher and gross national income per capita is lower, drivers prefer to use all types of ISA more than in Israel, where the estimated road fatality rate and motorway speed limit are lower and gross national income per capita is higher.

4.2.3. Utility of the TPB, PWM and Integrative Model

The results showed that the integrative modified model was found to explain the highest variance in preference to use informative type of ISA in both Türkiye and Israel. Furthermore, both PWM- modified and the integrative modified model were found to exhibit the highest variance in preference for supportive and intervening types of ISA in Türkiye and Israel. Hence, the third hypothesis was supported for all types of ISA whereas the fourth hypothesis was supported only for informative type of ISA. The results are in agreement with the previous studies conducted in traffic and transportation psychology (i.e. Pei et al., 2023). Since the explained variances of PWM- modified and the integrative modified model were similar for supportive and intervening types of ISA, the integrative modified model was taken to explain the differences in this section.

When looking at the utility of the integrative modified model in explaining the driver acceptance of ISA, the model explained more variance in preference to use informative and intervening types of ISA in Israel whereas it explained slightly

higher variance in preference to use supportive type of ISA in Türkiye. Similarly, the model explained more variance in intention to use informative and intervening types of ISA in Israel whereas it explained slightly higher variance in intention to use supportive type of ISA in Türkiye. Distinctly, the model explained slightly higher variance in willingness to use informative type and higher variance in willingness to use supportive and intervening types of ISA in Türkiye. This can be interpreted as that the social-reactive path come into prominence, especially considering supportive and intervening types of ISA, in Türkiye as compared to Israel. Therefore, the fifth hypothesis was supported.

The model itself differed between Türkiye and Israel for all types of ISA. In Türkiye, prototype similarity predicted intentions to use all types of ISA, and preference to use informative and intervening types of ISA. In addition, prototypes favorability predicted the preference to use supportive type of ISA, and attitude predicted the preference to use intervening type of ISA. It can be seen that prototype perceptions stand out among TPB and PWM constructs in Türkiye. Both prototype similarity and favorability were found to related to intention, willingness and behavior, and prototype similarity showed stronger associations with health-protective behavior as compared to prototype favorability in health studies (van Lettow et al., 2016). This can explain the prototype similarity's role in the integrative modified model. Since it is assumed that using ISA will decrease the traffic accidents, fatalities, and injuries, it can be considered as health-protective behavior. This also explains the higher beta weights of prototype similarity over prototype favorability in predicting willingness to use ISA in Türkiye. It can be suggested that people may perform the behavior regardless of how favorably the prototype is seen if their self-image is similar to that of the prototype in Türkiye. In the integrative modified model, attitude predicted the preference to use all types of ISA, PBC predicted the willingness, and prototype favorability predicted the preference to use informative type of ISA in Israel. It can be seen that attitude stand out among the TPB and PWM constructs in Israel. In the literature, it has been shown that attitude negatively predicted behaviors such as violations and errors (i.e. Lucidi et al., 2019). Attitude indicates how a behavior is evaluated generally and is determined by how likely it is that a particular consequence would result from that behavior (Chorlton & Conner, 2012). In this

sense, attitudes might reflect how rational decision making is done by individuals (Vlassenroot et al., 2007). The literature showed that attitudes toward technology have a stronger influence on younger workers' decisions to use technology (Morris & Venkatesh, 2000). Hence, the characteristic of the sample may put forward attitude in the model. To conclude, from the difference of the models in two countries, it can be inferred that the social-reactive constructs regarding prototypes have greater importance in both intention and preference in Türkiye whereas the reasoned constructs, specifically attitude have greater importance preference, in Israel.

When looking whether the reasoned path or social reactive path is becoming important for driver acceptance of ISA, the beta weights of intention over willingness in predicting preference to use ISA showed that the reasoned path seems to be more important in Türkiye and Israel for all three types of ISA. Moreover, in both countries, the beta weights of willingness in predicting preference to use ISA tended to decrease as the control of the system increases. Consistently, the beta weights of willingness on intention were higher in the supportive and intervening types of ISA than in the informative type of ISA. Taken together, it can be inferred that the driver acceptance of ISA can be explained by the reasoned path rather than the social reactive path, and it becomes more important as the control of the system increases. Gibbons and colleagues (1998) argued that social reactive path would be more useful to explain risky behaviors. The results from traffic and transportation psychology studies are in agreement with this argue; willingness was found to be better predictor of risky behavior in traffic setting such as red light running (Tang et al., 2020) or speeding (Elliot et al., 2017) as compared to intention. Conversely, intention was found to be better predictor of safe behavior in traffic such as back seat belt use (Pei et al., 2023). The acceptance of ISA system will increase the traffic safety, the safety effectiveness of the ISA is increased as its control increases, the acceptance of it can be thought of a safe behavior. Therefore, focusing on the intention to use ISA is more useful to explain driver acceptance of ISA. In addition, willingness becomes an important predictor of intention to use of ISA as the control of the system increases, hence; willingness should take into consideration to increase the intention to use supportive and intervening types of ISA.

4.3. Implications

This study has significant implications to enhance driver acceptance of ISA both in Türkiye and Israel. The three types of ISA, especially supportive and intervening types of ISA, is not a standard equipment in vehicles in Türkiye and Israel. However, some new vehicles are becoming equipped with the informative type of ISA recently. Hence, introducing ISA to drivers is critical for acceptance.

The results showed that the reasoned path is more important in Türkiye and Israel for all three types of ISA. Hence, the focus should be on enhancing the intention to use ISA while introducing ISA. An individual's decision-making can be influenced by the given information which presented either gains or losses (Tversky & Kahneman, 1992). According to the prospect theory, an individual avoids risks when he/she is focused on gains rather than losses, known as framing hypothesis. From this point of view, when a message is given in terms of gains, the decision tends to be more cautious (Tversky & Kahneman, 1992). The messages promoting traffic safety encourages cautious behaviors (Millar & Millar, 2000). Consequently, messages framed in terms of gain may be more successful in promoting the safe behaviors than those framed in terms of losses in traffic context. Since ISA enhances road safety, the message given to introduce ISA should be focused on gains to enhance intention to use ISA.

When looking in detail to each country, the results showed that the prototype perceptions, both prototype similarity and favorability, are important predictors of intentions, willingness, and preference to use ISA in Türkiye. Therefore, in addition to intention, the focus should be on prototype perceptions rather than reasoned path constructs such as attitude or subjective norm in order to enhance driver acceptance of ISA. Therefore, the participation of people who are seen as favorable and similar by the society in the promotion of ISA may increase the acceptance of ISA by the drivers. In line with this suggestion, Blanton and Christie (2003) presented Deviation Regulation Theory (DRT) proposes that people choose either engaging or avoiding specific behaviors based on their perceptions of whether they will be evaluated positively or negatively by others. According to DRT, the likelihood of a

person's behavior is influenced by both base rates of a certain behavior and assessments of individuals who perform the behavior. Studies regarding DRT show that if the goal behavior is common, a message for behavioral change should be negatively framed by emphasizing the undesirable characteristics of someone who does not engage behavior. On the other hand, if the goal behavior is less common, a message for behavioral change should be positively framed by emphasizing the desirable characteristics of someone who engage behavior (Blanton & Crhistie, 2003). Taken together with the results of this study, the marketing strategies such as promotional advertisements framed positively may increase drivers' acceptance of ISA.

When looking specifically at Israel, the results showed that attitude is an important predictor of intentions, willingness, and preference to use ISA in Israel. In addition to that, PBC is another predictor of willingness and prototype favorability is another important predictor of preference to use informative type of ISA. Therefore, the focus should be on reasoned path constructs, especially attitude rather than social-reactive path constructs in order to enhance driver acceptance of ISA. In addition, focusing on prototype favorability may enhance the driver acceptance of informative type of ISA. Therefore, the marketing strategies such as promotional advertisements should focus on attitude change. The attitude of individuals may change when they receive new information from others or the media through direct interaction with the object (Triandis, 1971). The attitude change or formation can be framed by evaluative conditioning. Evaluative conditioning refers to the shifts in liking or disliking based on the paired stimuli (De Houwer, 2007). In evaluative conditioning, a conditioned stimulus, a neutral image, is repeatedly given alongside an unconditioned stimulus, an image either liked or disliked. This leads to a significant change in the evaluation of conditioned stimulus similar to the unconditioned stimulus (Walther et al., 2011). The studies showed that attitude toward a novel image paired with positive images are evaluated more positively than the ones paired with negatives (i.e. Olson & Fazio, 2001). Taken together, the ISA should be paired with positive images or items to enhance positive attitudes toward ISA in the marketing strategies such as promotional advertisements. In addition, similar to

Türkiye, taking into account people who are seen as favorable by the society in the promotion of informative type of ISA may enhance the driver acceptance in Israel.

4.4. Limitations and Suggestions for Future Studies

This study's limitations must be considered when evaluating the findings and designing future research. First, this study is a cross-sectional study, and therefore, the direction of causality cannot be definitely inferred. Consequently, the results need to be carefully interpreted.

Second, the utility of the models in explaining driver acceptance of ISA was examined in Israel and Türkiye. Although the results of this study provide basic understanding of the model differentiation between these two countries, this model should also be tested in different countries to understand how and why these models differ in different countries.

A third limitation refers to sampling in Israel and Türkiye. The participants' characteristics differed from each other. The Turkish sample was older and with a majority of men, whereas the Israeli sample was younger and with a majority of women. Therefore, age and gender were controlled in each analysis. Gender was found to have a small effect on drivers' willingness to use ISA; male drivers are less willing to use ISA as the system control increases in Türkiye whereas they are less willing to use the supportive type of ISA in Israel as compared to female drivers. Türkiye. However, it is known that speeding is common among young male drivers (de Winter & Dodou, 2010). Therefore, it is obvious that the young male drivers are less willing to use systems which may interfere with their speeding behavior. Yet, gender should be considered when deciding the target group to increase their willingness to use ISA types among these countries.

A fourth limitation concerns the measurement tools. The driver preference of each type of ISA was measured with a single item. Single item measurements have been used regarding ISA in previous studies (i.e. Warner et al., 2010; Ghadiri et al., 2013), however; multi item measurements may improve the strength of the results in future studies.

A further important limitation is that all measurement tools were self-report instruments. One of the issues regarding self-report is social desirability. The social desirability is most likely to occur when the instruments related to attitudes, social norms or behaviors, and it is mostly appeared when the participant can be easily identified (Grimm, 2010). Therefore, participants' anonymity was assured in this study to decrease social desirability. In addition, taken together with the previous limitation, future studies may use simulator to measure the driver preference of using ISA.

The final limitation is that the experience regarding ISA was not included in the models of this study. The studies in the literature showed that the experience with ISA results in higher driver acceptance (i.e., Katteler, 2005). Therefore, adding the experience into model or control may provide a better understanding of the results of this study.

4.5. Conclusion

Technological advancements to enhance traffic safety have become popular recently. Since the driver acceptance is a key factor for the utilization of these technologies. The current study examined how TPB and PWM explain the driver acceptance of ISA in Türkiye and Israel. Some similarities and differences among Turkish and Israeli drivers can be highlighted:

1) The drivers' intention, willingness, and preference to use informative type of ISA were highest, followed by supportive type of ISA, and the least were intervening type of ISA in both Türkiye and Israel.
2) The integrative model explained the highest variances in explaining the preference to use informative type of ISA in both Türkiye and Israel.
3) The PWM and the integrative models explained higher variances than TPB in explaining the preference to use supportive and intervening types of ISA in both Türkiye and Israel.

4) Intention was the strongest predictor of preference to use all types of ISA in both Türkiye and Israel
5) Attitude directly predicted the preference to use all types of ISA in Israel.
6) Prototype perceptions directly predicted the preference to use all types of ISA in Türkiye.

The current study is the first study to examine the utility of TPB and PWM and their integration in examining the driver acceptance of ISA. Furthermore, this study is the first study to compare the driver acceptance of ISA between Türkiye and Israel. Both similarities and differences between these two countries were emphasized. In addition, the results rely on two samples from different counties, of which size is statistically sufficient. It can be stated that this provides strong validation to integrative model. It also supports the results in terms of generalizability.

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APPDENDICES

A: APPROVAL OF THE METU HUMAN SUBJECTS ETHICS COMMITTEE

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Sayı: 28620816 /

14 NİSAN 2022

Konu : Değerlendirme Sonucu

Gönderen: ODTÜ İnsan Araştırmaları Etik Kurulu (İAEK)

İlgi : İnsan Araştırmaları Etik Kurulu Başvurusu

Sayın Türker ÖZKAN

Danışmanlığını yürüttüğünüz Berfin TÖRE'nin "Türkiye ve İsrail'de Akıllı Hız Adaptasyonu Sürücü Kabulünde Planlı Davranış Teorisi ve Prototip İstek Modelinin Rolünün Karşılaştırılması" başlıklı araştırması İnsan Araştırmaları Etik Kurulu tarafından uygun görülmüş ve **0180-ODTUİAEK-2022** protokol numarası ile onaylanmıştır.

Saygılarımızla bilgilerinize sunarız.

Prof.Dr. Mine MISIRLISOY
İAEK Başkan

B: INFORMED CONSENT FORM

Sayın Katılımcı,

Bu çalışma, Orta Doğu Teknik Üniversitesi, Trafik ve Ulaşım Psikolojisi Doktora Programı öğrencisi Berfin Töre tarafından Prof. Dr. Türker Özkan danışmanlığında ve Prof. Dr. Orit Taubman-Ben-Ari eş danışmanlığında yapılmaktadır. Çalışmanın amacı, sürücülerin araç içi teknolojileri kabulünü incelemektir.

Çalışmaya katılım tamamıyla gönüllülük esasına dayanmaktadır. Ankette, sizden kişisel kimlik belirleyici hiçbir bilgi istenmemektedir. Cevaplarınız tamamıyla gizli tutulacak ve sadece araştırmacılar tarafından değerlendirilecektir; kesinlikle hiçbir kişi ya da kurumla paylaşılmayacaktır. Elde edilecek bilgiler bilimsel yayımlarda kullanılacaktır

Anket, genel olarak kişisel rahatsızlık verecek soruları içermemektedir ve tamamlanması ortalama 10 dakika sürmektedir. Ancak, katılım sırasında sorulardan ya da herhangi başka bir nedenden ötürü kendinizi rahatsız hissederseniz cevaplama işini yarıda bırakabilirsiniz. Böyle bir durumda anket linkini kapatmanız yeterli olacaktır.

Lütfen anket sorularını dikkatli okuyunuz ve yanıtsız soru bırakmayınız. Araştırmanın güvenilir olabilmesi açısından soruları dikkatli ve içtenlikle cevaplamanız büyük önem taşımaktadır.

Çalışmayla ilgili daha fazla bilgi almak için Berfin Töre ile iletişim kurabilirsiniz.

Bu çalışmaya katıldığınız için şimdiden teşekkür ederiz.

Bu çalışmaya tamamen gönüllü olarak katılıyorum ve istediğim zaman yarıda kesip çıkabileceğimi biliyorum. Verdiğim bilgilerin bilimsel amaçlı yayımlarda kullanılmasını kabul ediyorum.

☐ Evet

☐ Hayır

C: DEMOGRAPHIC INFORMATION FORM

1. Yaşınız:_____

2. Cinsiyetiniz: □ Kadın □ Erkek

3. Çalışıyor musunuz? □ Evet □ Hayır

4. Öğrenci misiniz? □ Evet □ Hayır

5. Eğitim durumunuz

☐ İlkokul ☐ Ortaokul ☐ Lise ☐ Önlisans ☐ Lisans ☐ Yüksek Lisans ☐ Doktora

6. Aşağıdakilerden hangisi sosyoekonomik statünüzü tanımlar?

☐ Ortalamanın çok altı ☐ Ortalamanın altı ☐ Ortalama

☐ Ortalamanın Üstü ☐ Ortalamanın çok üstü

7. Ne kadar süredir ehliyet sahibisiniz? _____ Yıl

8. Geçen hafta yaklaşık olarak toplam kaç bin km araç kullandınız? _____ Bin kilometre

9. Geçen yıl yaklaşık olarak toplam kaç kilometre araç kullandınız? _____

Bin kilometre

10. Genel olarak, ne sıklıkla araç kullanırsınız?

☐ Hemen hemen her gün ☐ Haftada 3-4 gün ☐ Haftada 1-2 gün

☐ Ayda birkaç kez ☐ Çok nadir

11. Son üç yıl içerisinde küçük ya da büyüklüğüne bakmazsızın, nedeni ne olursa olsun, başınızdan geçen kaza sayısı kaçtır? _____

Bu kazaların kaç tanesi aktif (sizin bir araca yayaya veya nesneye çarptığınız kazalar) kaza idi?_____

Bu kazaların kaç tanesi pasif (bir aracın veya bir yayanın size çarptığı durumlar) kaza idi? _____

12. Son üç yıl içerisinde hız ihlali yüzünden kaç tane trafik cezası aldınız? _____

13. Arabanızda Sürücü yardım sistemi var mı?

☐ Evet ☐ Hayır

Kullanıyor musunuz?

☐ Evet ☐ Hayır

Hayır ise kullanmama nedeniniz nedir?

☐ Teknolojinin amacı veya işlevselliğini anlayamama

☐ Teknolojiye karşı güvensizlik

☐ Günlük kullanımının zor olması

☐ Diğer (lütfen açıklayınız): _____

14. Sürücü yardım sistemleri konusunda ne kadar deneyiminiz var?

☐ Düzenli olarak sürücü yardım sistemleri kullanıyorum

☐ Ara sıra sürücü yardım sistemlerini kullanırım

☐ Sürücü yardım sistemlerinin ne olduğunu biliyorum

☐ Sürücü destek sistemlerini daha önce duymuştum

☐ Daha önce sürücü destek sistemleri hakkında bir şey duymadım

D: INTELLIGENT SPEED ADAPTATION

AKILLI HIZ UYARLAMA (AHU)

Son 30 yıl boyunca, birbirinden farklı akıllı hız uyarlama sistemleri geliştirilmiştir. Bütün bu sistemler, sürücüye hız sınırına uyması konusunda yardımcı olmayı amaçlamasına rağmen, teknik çözümler birbirinden oldukça farklı gözükmektedir.

Akıl veren sistem

Sistem, kontrol panelindeki hızölçerin altında mevcut hız sınırını gösterir. Buna ek olarak, hız sınırının aşıldığı durumlarda, sistem sürücüyü yanıp sönen kırmızı bir ışıkla ve ses sinyalleriyle uyarır.

Destekleyici sistem

Sistem, kontrol panelindeki hızölçerin altında mevcut hız sınırını gösterir. Buna ek olarak, sistem hız sınırının üstündeki hızlarda gaz pedalına karşı-güç uygular. Şöyle ki, sürücünün, hız sınırını aşması için gaz pedalına normalden 3 ila 5 kat daha güçlü basması gerekir.

Müdahale eden sistem

Sistem, kontrol panelindeki hızölçerin altında mevcut hız sınırını gösterir. Buna ek olarak, sistem araçla etkileşime girerek sürücünün hız sınırını aşmasını imkânsız kılar.

E: SURVEY FORM

Akıl veren sistem

Sistem, kontrol panelindeki hızölçerin altında mevcut hız sınırını gösterir. Buna ek olarak, hız sınırının aşıldığı durumlarda, sistem sürücüyü yanıp sönen kırmızı bir ışıkla ve ses sinyalleriyle uyarır.

Bu sistem hakkında ne düşünüyorsunuz?

1	Yararlı	**O**	**O**	**O**	**O**	**O**	**O**	**O**	Yararsız
2	Hoş	**O**	**O**	**O**	**O**	**O**	**O**	**O**	Tatsız (Nahoş)
3	Kötü	**O**	**O**	**O**	**O**	**O**	**O**	**O**	İyi
4	Memnuniyet verici	**O**	**O**	**O**	**O**	**O**	**O**	**O**	Rahatsız edici
5	Etkili	**O**	**O**	**O**	**O**	**O**	**O**	**O**	Gereksiz
6	Sinir Bozucu	**O**	**O**	**O**	**O**	**O**	**O**	**O**	Sevimli
7	Yardım Edici	**O**	**O**	**O**	**O**	**O**	**O**	**O**	İşe yaramaz
8	İstenmeyen	**O**	**O**	**O**	**O**	**O**	**O**	**O**	istenen
9	uyarıcı	**O**	**O**	**O**	**O**	**O**	**O**	**O**	uyku getiren

Lütfen belirtilen tip AHU'yu düşünerek aşağıdaki maddeleri yanıtlayınız.	Kesinlikle Katılmıyorum						Kesinlikle Katılıyorum
Bu sistemi kullanmamı yakın arkadaşlarım onaylar.							
Bu sistemi kullanmamı ailem onaylar.							
Benim için önemli olan insanlar bu sistemi kullanmam gerektiğini düşünürler.							
Benim için önemli olan insanlar bu sistemi kullanmanın iyi olduğunu düşünürler.							
Sistemin kullanımı üzerinde kontrolüm var.							
Sistemi kullanmak için gerekli kaynaklara sahibim.							
Sistemi kullanmak için gerekli bilgiye sahibim.							
Sistemi kullanmak için gereken kaynaklar, fırsatlar ve bilgi göz önüne alındığında, sistemi kullanmak benim için kolaydır.							
Arabamda bu sistem varsa, sürüş sırasında sistemi kullanacağımı tahmin ediyorum.							
Sistemin mevcut olduğunu varsayarsak, araç kullanırken sistemi düzenli olarak kullanmayı düşünüyorum/niyet ediyorum.							
Sistem mevcutsa, araç kullanırken sistemi düzenli olarak kullanmayı planlıyorum.							

Lütfen belirtilen tip AHU'yu düşünerek aşağıdaki maddeleri yanıtlayınız.	Kesinlikle Hayır						Kesinlikle Evet
Genel olarak bu sistemi kullanan sürücülere ne kadar benziyorsunuz?							
Bu sistemi kullanan sürücülerin özellikleri sizin özelliklerinize benziyor mu?							
Şehir içi yollarda (hız sınırının 50 km/s olduğu yerlerde) araç kullanırken sistemi kullanmak ister miydiniz?							
Şehir dışı yollarda (hız sınırının 80 - 90 km/s olduğu yerlerde) araç kullanırken sistemi kullanmak ister miydiniz?							
Otoyollarda (hız sınırının 100 - 120 km/s olduğu yerlerde) araç kullanırken sistemi kullanmak ister miydiniz?							

Bu sistemi kullanan insanlar ile ilgili ne düşünüyorsunuz?

	Hiç						Oldukça
Akıllı							
Kendine güvenen							
Bağımsız							
Düşünceli							
Havalı							
Popüler							
Kafası karışmış							
Olgunlaşmamış							
Ben merkezci							
Dikkatsiz							
Sıkıcı							
Çekici olmayan							

Aracınızda bu tip AHU bulunuyor mu ?

Evet ☐ Hayır ☐

Evet ise ; Kullanıyor musunuz?

Evet ☐ Hayır ☐

Hayır ise:

	Kesinlikle Kullanmazdım	Büyük olasılıkla kullanmazdım	Az olasılıkla kullanmazdım	Bilmiyorum	Az olasılıkla kullanırdım	Büyük olasılıkla kullanırdım	Kesinlikle kullanırdım
Eğer aracınızda bu tip AHU olsaydı kullanmayı ne kadar tercih ederdiniz?							

Destekleyici sistem

Sistem, kontrol panelindeki hızölçerin altında mevcut hız sınırını gösterir. Buna ek olarak, sistem hız sınırının üstündeki hızlarda gaz pedalına karşı-güç uygular. Şöyle ki, sürücünün, hız sınırını aşması için gaz pedalına normalden 3 ila 5 kat daha güçlü basması gerekir.

Bu sistem hakkında ne düşünüyorsunuz?

1	sevimli	O	O	O	O	O	O	O	rahatsız edici
2	etkili	O	O	O	O	O	O	O	etkisiz
3	kullanışlı	O	O	O	O	O	O	O	kullanışsız
4	hoş	O	O	O	O	O	O	O	tatsız (nahoş)
5	yardım edici	O	O	O	O	O	O	O	işe yaramaz
6	memnuniyet verici	O	O	O	O	O	O	O	sinir bozucu
7	uyarıcı	O	O	O	O	O	O	O	uyku getiren
8	istenen	O	O	O	O	O	O	O	istenmeyen
9	hiç sıkıcı değil	O	O	O	O	O	O	O	son derece can sıkıcı

Lütfen belirtilen tip AHU'yu düşünerek aşağıdaki maddeleri yanıtlayınız.	Kesinlikle Katılmıyorum						Kesinlikle Katılıyorum
Bu sistemi kullanmamı yakın arkadaşlarım onaylar.							
Bu sistemi kullanmamı ailem onaylar.							
Benim için önemli olan insanlar bu sistemi kullanmam gerektiğini düşünürler.							
Benim için önemli olan insanlar bu sistemi kullanmanın iyi olduğunu düşünürler.							
Sistemin kullanımı üzerinde kontrolüm var.							
Sistemi kullanmak için gerekli kaynaklara sahibim.							
Sistemi kullanmak için gerekli bilgiye sahibim.							
Sistemi kullanmak için gereken kaynaklar, fırsatlar ve bilgi göz önüne alındığında, sistemi kullanmak benim için kolaydır.							
Arabamda bu sistem varsa, sürüş sırasında sistemi kullanacağımı tahmin ediyorum.							
Sistemin mevcut olduğunu varsayarsak, araç kullanırken sistemi düzenli olarak kullanmayı düşünüyorum/niyet ediyorum.							
Sistem mevcutsa, araç kullanırken sistemi düzenli olarak kullanmayı planlıyorum.							

Lütfen belirtilen tip AHU'yu düşünerek aşağıdaki maddeleri yanıtlayınız.	Kesinlikle Hayır						Kesinlikle Evet
Genel olarak bu sistemi kullanan sürücülere ne kadar benziyorsunuz?							
Bu sistemi kullanan sürücülerin özellikleri sizin özelliklerinize benziyor mu?							
Şehir içi yollarda (hız sınırının 50 km/s olduğu yerlerde) araç kullanırken sistemi kullanmak ister miydiniz?							
Şehir dışı yollarda (hız sınırının 80 - 90 km/s olduğu yerlerde) araç kullanırken sistemi kullanmak ister miydiniz?							
Otoyollarda (hız sınırının 100 - 120 km/s olduğu yerlerde) araç kullanırken sistemi kullanmak ister miydiniz?							

Bu sistemi kullanan insanlar ile ilgili ne düşünüyorsunuz?

	Hiç						Oldukça
Akıllı							
Kendine güvenen							
Bağımsız							
Düşünceli							
Havalı							
Popüler							
Kafası karışmış							
Olgunlaşmamış							
Ben merkezci							
Dikkatsiz							
Sıkıcı							
Çekici olmayan							

Aracınızda bu tip AHU bulunuyor mu ?

Evet☐ Hayır☐

Evet ise ; Kullanıyor musunuz?

Evet☐ Hayır☐

Hayır ise:

	Kesinlikle Kullanmazdım	Büyük olasılıkla kullanmazdım	Az olasılıkla kullanmazdım	Bilmiyorum	Az olasılıkla kullanırdım	Büyük olasılıkla kullanırdım	Kesinlikle kullanırdım
Eğer aracınızda bu tip AHU olsaydı kullanmayı ne kadar tercih ederdiniz?							

Müdahale eden sistem

Sistem, kontrol panelindeki hızölçerin altında mevcut hız sınırını gösterir. Buna ek olarak, sistem araçla etkileşime girerek sürücünün hız sınırını aşmasını imkânsız kılar.

Bu sistem hakkında ne düşünüyorsunuz?

1	sevimli	**O**	**O**	**O**	**O**	**O**	**O**	**O**	rahatsız edici
2	etkili	**O**	**O**	**O**	**O**	**O**	**O**	**O**	etkisiz
3	kullanışlı	**O**	**O**	**O**	**O**	**O**	**O**	**O**	kullanışsız
4	hoş	**O**	**O**	**O**	**O**	**O**	**O**	**O**	tatsız (nahoş)
5	yardım edici	**O**	**O**	**O**	**O**	**O**	**O**	**O**	işe yaramaz
6	memnuniyet verici	**O**	**O**	**O**	**O**	**O**	**O**	**O**	sinir bozucu
7	uyarıcı	**O**	**O**	**O**	**O**	**O**	**O**	**O**	uyku getiren
8	istenen	**O**	**O**	**O**	**O**	**O**	**O**	**O**	istenmeyen
9	hiç sıkıcı değil	**O**	**O**	**O**	**O**	**O**	**O**	**O**	son derece can sıkıcı

Lütfen belirtilen tip AHU'yu düşünerek aşağıdaki maddeleri yanıtlayınız.	Kesinlikle Katılmıyorum						Kesinlikle Katılıyorum
Bu sistemi kullanmamı yakın arkadaşlarım onaylar.							
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Sistem mevcutsa, araç kullanırken sistemi düzenli olarak kullanmayı planlıyorum.							

Lütfen belirtilen tip AHU'yu düşünerek aşağıdaki maddeleri yanıtlayınız.	Kesinlikle Hayır						Kesinlikle Evet
Genel olarak bu sistemi kullanan sürücülere ne kadar benziyorsunuz?							
Bu sistemi kullanan sürücülerin özellikleri sizin özelliklerinize benziyor mu?							
Şehir içi yollarda (hız sınırının 50 km/s olduğu yerlerde) araç kullanırken sistemi kullanmak ister miydiniz?							
Şehir dışı yollarda (hız sınırının 80 - 90 km/s olduğu yerlerde) araç kullanırken sistemi kullanmak ister miydiniz?							
Otoyollarda (hız sınırının 100 - 120 km/s olduğu yerlerde) araç kullanırken sistemi kullanmak ister miydiniz?							

Bu sistemi kullanan insanlar ile ilgili ne düşünüyorsunuz?

	Hiç						Oldukça
Akıllı							
Kendine güvenen							
Bağımsız							
Düşünceli							
Havalı							
Popüler							
Kafası karışmış							
Olgunlaşmamış							
Ben merkezci							
Dikkatsiz							
Sıkıcı							
Çekici olmayan							

Aracınızda bu tip AHU bulunuyor mu ?

Evet☐ Hayır☐

Evet ise ; Kullanıyor musunuz?

Evet☐ Hayır☐

Hayır ise:

	Kesinlikle Kullanmazdım	Büyük olasılıkla kullanmazdım	Az olasılıkla kullanmazdım	Bilmiyorum	Az olasılıkla kullanırdım	Büyük olasılıkla kullanırdım	Kesinlikle kullanırdım
Eğer aracınızda bu tip AHU olsaydı kullanmayı ne kadar tercih ederdiniz?							

F: CURRICULUM VITAE

Berfin TÖRE

Education

- **PhD**

  Middle East Technical University, Traffic and Transportation Psychology, 2017-2023, GPA: 4.00

  Thesis: The driver acceptance of intelligent speed adaptation systems in Turkey and
  Israel: The utility of theory of planned behavior and prototype willingness model
  (Supervisor: Prof. Dr. Türker Özkan, Co-Supervisor: Prof. Dr. Orit Taubman-Ben-Ari)

- **Master's Degree**

  Ege University, Clinical Psychology, 2014-2017, GPA:3.75/4.00

  Thesis: A preliminary research of developing cognitive behavioural treatment program for adolescents with attention deficit/hyperactivity disorder (ADHD). (Supervisor: Prof. Dr. Emine Oya Sorias)

  Ege University, Family Counselling, 2015-2017, GPA:3.89/4.00

  Project: The effect of the three-step-r parent education program on the parenting skills of the parents of first-grade children studying at a primary school in the district of Bornova. (Supervisor: Prof. Dr. Emine Oya Sorias)

- **Bachelor's degree**

  Middle East Technical University, Psychology, 2009-2014, GPA:3.66/4.00

  Georg August Universitat Göttingen, Germany, Psychology, (Exchange student), March 2012 - August, 2012

Awards & Scholarships

- PhD Sandwich Scholarship: Scholarship awarded by the Israeli Council for Higher Education for international doctoral students to do their research in Israel (2022).

Work Experiences

- **Instructor**
  Eskişehir Technical University, Psychological Counseling Unit, January 2020- ongoing
- **Visiting Research Fellow**
  Bar-Ilan University, Prof. Orit Taubman-Ben-Ari's Positive Family and Developmental Psychology Lab, Israel, February 2022 - June,2022
- **Clinical Psychologist**
  Eskişehir Tepebaşı Municipality, Health Affairs, February 2018- January 2020
- **Clinical Psychologist**
  Sonsuz Gelişim Psychological Counselling Center, Eskişehir, September 2017- January 2018

Publications

- **Dobrucalı, B.**, & Özkan, T. (2021). What is the role of narcissism in the relationship between impulsivity and driving anger expression?. *Transportation research part F: traffic psychology and behaviour*, *77*, 246-256.
- Şahin, E. E., & **Töre, B**. (2022). Fear of COVID-19 and subjective well-being: Sequential mediating role of cognitive flexibility and psychological resilience. *Psikiyatride Güncel Yaklaşımlar, 14*(Ek 1), 92-99.
- **Töre, B.**, Kaçan-Bibican, B., & Özkan, T. (2022) Sürücü Davranış ve Becerilerinin Kontrol Odağıyla İlişkisinin İki Farklı Ölçüm ile İncelenmesi. *Türk Psikoloji Yazıları, 25*(50), 37-50.
- **Töre, B.**, Navon-Eyal, M., & Taubman–Ben-Ari, O. (2023). Cross-Cultural Differences in Driving Styles: A Moderated Mediation Analysis Linking Forgivingness, Emotion Regulation Difficulties, and Driving Styles. *Sustainability, 15*(6), 5180.

Poster Presentations

- **Töre, B.**, Kaçan, B. & Özkan, T. (2022, October 13-16). Dürtüsellik ve öfkeli sürücü davranışları: Dominans analizi ile yordayıcı önemini belirleme. Poster Presentation at *21. Ulusal Psikoloji Kongresi*, İstanbul.
- Kaçan, B., Karcı, S., **Dobrucalı, B.** & Dinçal, D. (2014) Locus of control and driver behaviors. Poster Presentation at *5th Highway Traffic Safety Symposium,* Ankara.

Panel

- Özbek, P., Vatansever, Ç., **Töre, B.** & Özmeriç, D. (2022, October 13-16). Üniversitenin ilk yılında psikoloji temelli öğrenci destek programları [Panel Presentation]. 21. Ulusal Psikoloji Kongresi, İstanbul

G: TURKISH SUMMARY / TÜRKÇE ÖZET

Giriş

Dünya genelinde her yıl yaklaşık 1.35 milyon kişi trafik kazalarında hayatını kaybetmektedir (DSÖ, 2018). Bu kazaların en önde gelen nedeni aşırı hız olduğu (Bauernschuster ve Rekers, 2022; Hill vd., 2023), ve aşırı hızın birçok ülkede yaygın bir problem olduğu bildirilmektedir (Pires vd., 2020). Aşırı hızı engellemek için önerilen sistemlerden birisi akıllı hız uyarlama (AHU) sistemleridir. AHU, sürücü hız sınırını aştığında araç hızını düzenlemesi için sürücüyü uyaran bir sistemdir (Young vd., 2010). Bu sistemler geliştirilmiş olsa da henüz araçlarda standart bir donanım haline gelmemiştir.

Bu sistemlerin aşırı hız ile ilgili sorunları çözeceği düşünülse de, bu sistemlerin etkisini gösterebilmesi için sürücülerin bu sistemi kullanmaları önemlidir. Bundan dolayı, farklı ülkelerde sürücü kabulü çalışmaları başlamıştır. Bu sistemlerin kabulü, AHU türlerinden, coğrafi konumdan ve sürücülerin kişilik özelliklerinden etkilenmektedir (Fu vd., 2020). Bu faktörlerin yanı sıra sürücü kabulünü açıklamak için Planlı Davranış Teorisi (PDT) gibi teorik modeller de kullanılmıştır (Rahman vd., 2017). PDT'nin bu konudaki kullanılabilirliği alan yazında görülmesine rağmen, PDT'ye tepkisel yolu ekleyen Prototip İsteklilik Modeli (PİM) gibi modeller araç içi teknolojilerin sürücü kabulü konusunda çalışılmamıştır. Ayrıca bu iki modelin birleşimi bazı trafik psikolojisi çalışmalarında kullanılmıştır. Bu bilgiler ışığında bu çalışma, hem Türkiye'de hem de İsrail'de AHU sistemlerinin sürücü kabulünü açıklamada PDT, PİM ve birleşik modelin kullanılabilirliğini incelemeye odaklanmaktadır.

Akıllı Hız Uyarlama Sistemleri (AHU)

AHU, mevcut hız sınırını izlediği ve bu bilgiyi aracın maksimum hızını sınırlamak veya sürücüye geri bildirim sağlamak için kullanabileceği bir tür karmaşık sistemi

ifade eder (Carsten ve Tate, 2005). 3 tip AHU mevcuttur, bunlar; akıl veren, destekleyici ve müdahale eden tiplerdir. Akıl veren AHU, sürücüye görsel veya işitsel sinyalle mevcut hız sınırı hakkında geri bildirim verir. Destekleyici AHU, sürücü hız sınırından daha hızlı gitmeye çalıştığında gaz pedalı üzerindeki baskıyı artırarak hızlanmayı engeller. Sürücü, gaz pedalına daha sert basarak destekleyici sistemi devre dışı bırakabilir. Son olarak, müdahale eden AHU, yakıt enjeksiyonunu kısıtlayarak veya vites küçültmeyi gerektirerek hızlanmayı engeller; bu sistem sürücü tarafından devre dışı bırakılamaz (ETSC, 2005; Vlassenroot vd., 2007).

AHU Çalışmaları

AHU'nun ortaya çıkmasının ardından bu sistemlerin hız yapma davranışı açısından etkililiği dikkat çekmeye başlamıştır. Farklı ülkelerde hem gerçek deneyim çalışmaları hem de simülasyon çalışmaları yapılmıştır. Bu sistemlerin etkililiği çoğunlukla Avrupa ülkelerinde incelenmiştir. Hem saha hem de simülasyon çalışmaları, her üç AHU tipinin de aracın hızını etkili bir şekilde azalttığını göstermektedir (Várhelyi vd., 1998). Daha spesifik olarak, her üç AHU tipinin de farklı ülkelerde karayolunda ölüm ve yaralanmaları yaklaşık %20 azalttığı bildirilmiştir (van Loon ve Duynstee, 2001; Biding ve Ling, 2002; ETSC, 2019). Yapılan çalışmalar AHU'nun etkili bir trafik kazalarını önleme sistemi olduğunu gösterse de, sürücünün kabulü AHU'nun trafik kazalarını önlemesi için önemli bir konudur.

Sürücülerin AHU Kabulü Çalışmaları

Sürücü kabulü, sürücünün sistemi sürüşüne entegre etme niyeti olarak tanımlanmaktadır (Adell, 2010). Bununla birlikte, AHUgibi araç içi teknolojilerin gerçek kullanımını belirlemek genellikle zor olduğundan, sürücü kabulünün değerlendirilmesi bağlamında davranışsal niyet sıklıkla tek kriter olarak kullanılmaktadır (Rahman vd., 2017).

AHU kabulü çoğunlukla Avrupa ülkelerinde (örn. Biding ve Lind, 2002; Adell vd., 2008; Vlassenroot vd., 2011) yanı sıra ABD (Arhin vd., 2008), Malezya (Ghadiri vd.,

2013) ve Japonya'da (Matsuo vd., 2017) araştırılmıştır. Farklı ülkelerde yapılan bu çalışmalarının neredeyse tamamı, akıl veren sistemin ülkeler arasında en çok tercih edilen AHU tipi olduğunu göstermiştir. Ayrıca farklı ülkelerde yapılan çalışmalar, çoğunlukla akıl veren sistem kabul edilse de sürücülerin kabul düzeylerinin yaşadıkları ülkeye göre farklılık gösterdiğini göstermektedir. Bu farklılık hem yakın hem de uzak ülkelerde ortaya çıkmıştır. Danimarka'daki sürücülerin akıl veren sistemi kabul etme düzeyleri İsveç ve Norveç'tekilere göre daha fazladır (Eriksson ve Bjørnskau, 2012). Ayrıca Türkiye'deki sürücüler her üç AHU tipini de İsveç'tekilere göre daha fazla kabul etmektedir (Warner ve diğerleri, 2010).

Çalışmalar, sürücülerin kabulünün AHU tipleri ve ülkeler arasında farklılık gösterdiğini ortaya koysa da, bu çalışmalar yalnızca sürücülerin AHU sistemlerini kullanmayı tercih edip etmediğine odaklanmaktador. Bu sistemlerin kabul edilebilirliğini artırmak için sürücülerin kabulünün altında yatan faktörleri dikkate almak da çok önemlidir. Sürücü kabulünü etkileyen faktörleri incelemek için bazı psikososyal modeller kullanılmaktadır.

Teknoloji Kabulü ile İlgili Psikososyal Modeller

Planlı Davranış Teorisi (PDT)

PDT, gerçek davranışın öncülünün davranışsal niyet olduğunu ve davranışa yönelik tutumun, öznel normların ve algılanan davranışsal kontrolün (ADK), davranışsal niyet yoluyla gerçek davranışı etkilediğini öne sürmektedir (Ajzen, 1991). Davranışsal niyet, bir kişinin davranışı gerçekleştirmeye yönelik bilinçli bir plan veya kararını ifade eder (Conner ve Sparks, 2015). Kişinin davranışsal niyeti; kişinin o davranışa yönelik tutum, öznel norm ve ADK'sına bağlıdır. Tutumlar, bireyin davranışa yönelik genel değerlendirmesidir; öznel normlar ise bireyin, davranışı gerçekleştirmesi durumunda yakın çevresinden alacağı sosyal onay veya onaylanmama düzeyine ilişkin algısıdır (Ajzen ve Fishbein,1980). ADK, bireyin davranışı gerçekleştirmek için algıladıkları kontrol ve kendi kapasitelerine olan inancını ifade eder (Ajzen, 2020). ADK davranışı niyet yoluyla dolaylı olarak yordadığı gibi davranışı doğrudan da yordamaktadır (Conner ve Sparks, 2015).

PDT, aşırı hız yapma (Paris ve Van den Broucke, 2008) ve araç kullanırken mesajlaşma (Bazargan-Hejazi vd., 2017) gibi sürücü davranışlarını anlamak yaygın olarak kullanılmaktadır.

PDT'nin trafik güvenliği ile ilgili teknolojilerin sürücü kabulünü incelemek için kullanıldığı çalışmalar mevcuttur. Bu çalışmalarda genellikle otonom araçların sürücü kabulü incelenmiştir. İran'da yapılan bir çalışmada otonom araçların kabulünü açıklamada PDT dahil farklı modeller incelenmiştir (Rejali vd., 2023). Bu çalışmada İranlı sürücülerin otonom araç kullanmaya yönelik davranışsal niyeti açıklayan en iyi modelin PDT olduğu bildirilmiştir. PDT, davranışsal niyetteki varyansın %70.9'unu açıklamış, davranışsal niyetin en güçlü yordayıcısı öznel norm olarak belirlenmiştir. PDT aynı konu ile ilgili çalışmalarda Avustralya'da kullanılmıştır (Kaye vd., 2020), ve davranışsal niyetteki varyansın %67.8'ini açıkladığı bildirilmiş ve davranışsal niyetin en güçlü yordayıcısı tutumlar olarak belirlenmiştir. Daha geniş bir ölçekte, otonom araçların sürücü kabulünü incelemek için PDT Avustralya, Fransa ve İsveç'i içeren bir çalışmada kullanılmıştır (Kaye vd., 2020). Bu çalışmada Avustralya, Fransa ve İsveç'te PDT, davranışsal niyetteki varyansın sırasıyla %71,5, %57,9 ve %74,1'ini açıkladığı görülmektedir. Ayrıca tutum, her üç ülkede de davranışsal niyetin en güçlü yordayıcısı olarak bildirilmiştir (Kaye vd., 2020).

PDT ayrıca sürücülerin gelişmiş sürücü destek sistemlerini (GSDS) kabulü konusunda da incelenmiştir. PDT Tayvan'da sürücülerin temelatik sistemlerini kabulü (Chen ve Chen, 2009), Yunanistan'da navigaston sistemlerinin kabulü (Ntasiou vd., 2021) ve Amerika Birleşik Devletleri'nde genel gelişmiş sürücü destek sistemlerinin kabulünü (Rahman vd., 2017) incelemek amacıyla kullanılmıştır. Tüm çalışmalarda sürücünün bu sistemleri kullanma niyetinin en güçlü yordayıcısı tutum olarak bildirilmiştir.

PDT'nin incelendiği çalışmalarda AHU sistemlerine bakıldığında, Warner ve Aberg (2006), akıl veren sistemi kullanan İsveçli sürücülerle yaptıkları çalışmada PDT'yi kullanmışlardır. Tutum, öznel norm ve ADK, sürücülerin beyan ettiği hız davranışını yordarken, sürücülerin beyan ettiği hız davranışı ve öznel norm, sürücülerin akıl

veren sistem tarafından kaydediden hız davranışını yordamaktadır ve bunlar, kayıtlı hızlanmadaki varyansın %28'ini açıklamaktadır (Warner ve Aberg, 2006). Başka bir çalışmada ise PDT yapılarına ilişkin uzun vadeli AHU kullanma etkilerini incelenmiştir (Chorlton ve Conner, 2012). Bu çalışmada AHU kullanımı ile birlikte yalnızca destekleyici sistemleri uzun süreli kullanan sürücülerin aşırı hız yapma niyetinin önemli ölçüde azaldığı bildirilmiştir.

Mevcut çalışmalardan GSDS'lerin sürücü kabulünü açıklamada PDT'nin etkili olduğu yorumu yapılabilir. Genel olarak tutum, çoğu ülkede davranışsal niyetin en güçlü ve pozitif yordayıcısı gibi görünürken, diğer faktörlerin ülkeler arasında davranışsal niyet üzerinde farklı ve belirsiz etkileri olduğu söylenebilir.

Prototip İsteklilik Modeli (PİM)

PDT her ne kadar yaygın olarak kullanılsa da, davranışın önemli bir kısmını açıklamada eksik kalmaktadır (Elliot vd., 2017). Bu nedenle, hem gerekçeli hem de sosyal tepkisel karar almayı içeren bir modelin, davranışı belirlemek için PDT gibi yalnızca gerekçeli karar almayı içeren bir modelden daha yararlı olacağı düşünülmektedir.

Prototip İsteklilik Modeli (PİM, Gibbons vd., 1998), davranışı yordamak için iki yol içerir: biri gerekçeli karar almayı, diğeri ise daha sosyal tepkisel karar almayı yansıtır. Bu model, insanların spontane bir şekilde ortaya koyduğu davranışların daha iyi anlaşılmasını sağlamayı amaçlamaktadır. Trafikte olmak, sürekli değişen durumsal faktörlere bağlı olarak nasıl davranılacağı konusunda sıklıkla hızlı seçimler yapılmasını gerektiren oldukça zorlu bir durumdur (Elliott vd., 2015). Bu nedenle, PİM gibi farklı yollar içeren modellerin, sürücü davranışını tahmin etmede yalnızca tek bir yola odaklanan modellere göre daha iyi olabileceği düşünülmektedir.

PİM, davranışın hem davranışsal niyetler hem de davranışsal isteklilik tarafından birlikte belirlendiğini öne sürmektedir. Dolayısıyla davranışı açıklayan iki yol vardır: gerekçeli yol ve sosyal tepkisel yol. Gerekçeli yol, ADK dışında PDT'ye benzer: tutumlar ve öznel normlar davranışsal niyeti, davranışsal niyet ise davranışı yordar.

Sosyal tepkisel yol ise daha sezgisel bir süreçtir ve tutum ve öznel norma ek olarak, prototipler ve istekliliği içermektedir (Gibbons vd., 2021). Prototipler, kişinin belirli bir davranışı sergileyen tipik bir insana ait benzerlik ve olumluluk faktörlerinden oluşan imgeleridir. PİM, herkesin hedef davranışı sergileyen prototipine sahip olduğunu varsaymaktadır (Gibbons vd., 1995). Prototip olumluluğu bireylerin değerlendirmelerini, prototip benzerliği ise bireylerin prototipe benzerlikleri hakkındaki inançlarını ifade etmektedir (Elliot vd., 2017). Son yapı olan isteklilik, önceden bir plan olmaksızın uygun koşullar oluştuğunda davranışı gerçekleştirme eğilimini ifade eder (Gibbons vd, 1998). PİM'e göre sosyal tepkisel yol, istekliliğin tutumlar, öznel normlar ve prototip algıları tarafından belirlediğini öne sürmektedir. Prototiplere olan yüksek benzerlik ve olumluluk, davranışı gerçekleştirme isteğinin artmasına yol açar (Gibbons ve diğerleri, 1995).

PİM, alkollü araç kullanmak gibi riskli sürücü davranışlarını (Yadav ve diğerleri, 2021) ve belirsiz bölgelerde durmak gibi güvenli davranışları (Pagomenos ve diğerleri, 2023) anlamak için incelenmiştir. Ancak sürücünün teknolojiyi kabul etmesi için PİM'in etkinliği henüz araştırılmamıştır.

Birleşik Model

Trafik ve ulaşım psikolojisi çalışmalarında PDT ve PİM'in birleşimi kullanılmıştır. Bu çalışmalarda PDT ve PİM'in yanı sıra birleşik modeli de incelenmiştir.

Birleşik model yaya davranışlarını (Demir vd., 2019), kırmızı ışıkta geçme (Tang vd., 2020), arka koltukta emniyet kemeri takma (Pei ve diğerleri, 2023) ve agresif sürüş davranışlarını (Zhao vd., 2023) incelemek için kullanılmıştır. Bu çalışmaların sonuçları birleşik modelin ve PİM'in PDT'den daha yüksek varyans açıklama gücüne sahip olduğunu göstermiştir. Ayrıca birleşik model, aradaki fark istatistiksel olarak anlamlı olmasa bile, PİM'den biraz daha yüksek açıklama gücüne sahiptir. Bu model, çok sayıda çalışmada kullanılmasına rağmen araç içi teknolojilerin kabulü çalışmalarına henüz uygulanmamıştır.

Çalışmanın Amacı

AHU kabul çalışmalarının yapıldığı tüm ülkelerde akıl veren sistemin en çok tercih edildiği görülmektedir, ancak farklı ülkeleri karşılaştıran çalışmalar, Kuzey Afrika ülkeleri gibi coğrafi olarak birbirine yakın ülkeler (Eriksson ve Bjrnskau, 2012) ve Kuzey Avrupa ve Orta Doğu gibi coğrafi olarak uzak ülkeler (Warner ve diğerleri, 2010) arasında sürücü kabul düzeyinde farklılıklar olduğunu ortaya koymaktadır. Bu çalışmalar karayolu ölüm oranlarının daha yüksek olduğu ülkelerde sürücülerin AHU sistemlerini daha fazla kabul ettiğini göstermektedir. Bu çalışmalar aynı zamanda kişi başına düşen gayri safi milli geliri daha düşük olan ülkelerin, kişi başına düşen gayri safi milli geliri daha yüksek olan ülkelere göre AHU sistemlerini daha fazla kabul ettiğini göstermektedir. Ayrıca AHU kabulü, hız sınırlarının hem aynı olduğu hem de kırsal yollarda ve otoyollarda farklılık gösterdiği ülkeler arasında farklılık göstermektedir. Dolayısıyla ülke özelliklerindeki bu farklılıkların, sürücülerin AHU sistemlerini kabul etme derecesine etki edebileceği ileri sürülebilir. Bu iddiaya dayanarak, ülke karakteristik farklılıklarının AHU sistemleri kabulü üzerindeki etkisini anlamak için Türkiye ve İsrail seçilmiştir. Bu iki ülkenin seçilme nedenleri bu iki ülkenin de coğrafi olarak birbirine yakın olması, Türkiye'nin karayolu ölüm oranının İsrail'den daha yüksek olması, Türkiye'nin kişi başına düşen gayri safi milli gelirinin İsrail'den daha düşük olması ve Türkiye'de şehirlerarası yollarda ve otoyollarda hız limitlerinin İsrail'e göre daha yüksek olmasıdır.

AHU'nun güvenlik etkisine ilişkin çalışmalar fazlalaşıyor olsa da, sistemin etkinliğini en üst düzeye çıkarmak için sistemden en fazla yararlanacak sürücülere odaklanmak esastır (Hjälmdahl, 2003). Hız yapma davranışı genç sürücüler arasında yaygın bir sorundur (Perez vd., 2021; Horswill vd., 2022) ve bu sorun Türkiye (Bıçaksız vd., 2019) ve İsrail'deki (Sadia vd., 2018) genç sürücüler arasında da görülmektedir. Bu nedenle bu çalışmanın hedef örneklemini genç sürücüler oluşturmaktadır.

Yukarıdaki bilgiler ışığında bu çalışmanın ilk amacı, PDT, PİM ve birleşik modelin sürücülerin AHU kabulünü açıklamadaki etkinliğini incelemektir. İkinci amaç ise bu

modellerin etkinliklerinin Türkiye ve İsrail'de farklılaşıp farklılaşmadığını incelemektir.

Yöntem

Katılımcılar

Çalışmaya 359'u (%51,80) İsrail'den ve 334'ü (%48,20) Türkiye'den olmak üzere 693 sürücü katılmıştır. Katılımcılara sosyal medya aracılığıyla ulaşılmıştır. İsrailli sürücülerin ortalama yaşı 26,42 (*SS* = 4,13), Türk sürücülerin yaş ortalaması ise 29,29 (*SS* = 4,20) idir. İsrailli sürücülerin 8,16 yıldır (*SS* = 4,43) ve Türk sürücülerin ise 9,02 yıldır (*SS* = 4,48) ehliyet sahibi olduğu belirlenmiştir. İsrailli sürücülerin %62.1'i son 3 yılda kaza yapmazken, Türk sürücülerin %50'si son 3 yıldır kaza yapmadıklarını; İsrailli sürücülerin %90,3'ü ve Türk sürücülerin %62,6'sı son 3 yıl içerisinde hız aşımı cezası almadıklarını bildirmişlerdir.

Ölçüm Araçları

Demografik Bilgi Formu

Katılımcıların demografik bilgileri (yaş, cinsiyet vb.) ve sürüş geçmişleri (ehliyet sahibi oldukları yıl, kaza deneyimi ve cezalar) ve ayrıca araç içi teknoloji kullanımları hakkında bilgi elde etmek için kullanılmıştır.

PDT ve PİM Soru Formu

Her bir AHU tipi için veri elde etmek amacıyla 38 maddelik bir form tasarlanmıştır. Tüm maddeler 7'li Likert ölçeğine göre derecelendirilmiştir. Bu form bilgilendirici, destekleyici ve müdahale eden sistem için üç farklı bölümde sunulmuştur. Katılımcılar arasında standart bir anlayış oluşturmak için her bölümün başında sistem türlerinin tanımı katılımcılara verilmiştir. Tüm Cronbach alfa değerleri 0,75 ile 0,99 arasında değişmektedir ve bu da yüksek bir iç tutarlılığa işaret etmektedir.

Prosedür

Çalışma için Orta Doğu Teknik Üniversitesi Etik Kurulu'ndan ve Bar-Ilan Üniversitesi Kurumsal İnceleme Kurulu'ndan etik onay alınmıştır. Katılımcılara ulaşmak için uygun örneklem yöntemi kullanılmıştır. Ölçeğin Türkçe ve İbranice versiyonları Qualtrics linki ile katılımcılara ulaştırılmıştır.

Analizler

Veri toplama işleminden sonra, SPSS 26.0 programı kullanılarak her bir AHU tipi için değişkenler arasındaki ülke farklılıkları bağımsız örneklem t testi ile, örneklem içi farklılıklar ise tek yönlü ANOVA ile incelenmiştir.

Her bir AHU tipi için PDT, PİM ve birleşik modelin kullanılabilirliğini incelemek amacıyla, her ülke için EQS 10 programını kullanarak yapısal eşitlik modellemesi aracılığıyla yol analizi yapılmıştır. Ayrıca her bir AHU tipi için modellerin sürücü kabulünü açıklamadaki farklılıklarını incelemek için Hotelling t testi kullanılmıştır.

Sonuç

Temel Analizler

Korelasyon Analizi

Tüm AHU tipleri için, değişkenler arasındaki korelasyonlar hem Türk hem de İsrailli sürücüler için anlamlıdır.

Grup Karşılaştırmaları

Hem Türk hem de İsrailli sürücülerin akıl veren sistem için tutum, öznel norm, algılanan davranışsal kontrol, prototip benzerliği, prototip olumluluğu, niyet, isteklilik ve tercih puanları destekleyici ve müdahale eden sistem puanlarından daha

yüksek, destekleyici sistem puanları ise müdahale eden sistem puanlarından daha yüksektir.

Ülke farklılıklarına bakıldığında her üç AHU tipi için de Türk sürücülerin tutum ve öznel norm puanları İsrailli sürücülerinkinden daha yüksektir. Ayrıca iki ülkedeki sürücülerin algılanan davranışsal kontrol, prototip benzerliği ve prototip olumluluğu puanları her üç AHU tipi için de birbirinden farklılaşmamaktadır. Kullanma niyeti puanlarına bakıldığında, Türk sürücülerin destekleyici ve müdahale eden sistemlere dair kullanma niyeti puanlarının İsrailli sürücülerinkine göre daha yüksek olduğu görülmektedir. Kullanma isteği puanlarına bakıldığında ise İsrailli sürücülerin kullanma isteği puanları akıl veren sistem için Türk sürücülerinkinden yüksekken, Türk sürücülerin kullanma isteği puanlarının müdahale eden sistem için İsrailli sürücülerin puanlarından daha yüksek olduğu görülmektedir. Son olarak, kullanma tercihi puanlarına bakıldığında Türk sürücülerin kullanma tercihi puanlarının her üç AHU tipi için de İsrailli sürücülerin puanlarından daha yüksek olduğu görülmektedir.

Yol Analizi

Hem Türkiye hem İsrail için, her bir AHU tipi için ayrı ayrı PDT, PİM ve birleşik model yapısal eşitlik modellemesi kullanılarak test edilmiştir. Modellerin uyum endeksleri iki ülke için de Tablo 1'de verilmiştir.

Tablo 1. Test edilen modellerin Türkiye ve İsrail için model uyum endeksleri ve niyet, isteklilik ve tercihte açıklanan varyanslar

	χ^2 (df)	*p*	CFI	RMSEA	R^2 (Niyet)	R^2 (İsteklilik)	R^2(Tercih)
Akıl veren AHU							
Türkiye							
Modifiye PDT	0.14(1)	.72	1.00	.00	.477		.578
Modifiye PİM	6.63(3)	.08	.99	.06	.588	.485	.685
Modifiye Birleşik Model	4.90(4)	.30	.99	.026	.613	.485	.697

İsrail							
Modifiye PDT	3.39(1)	.07	.99	.082	.539		.695
Modifiye PİM	7.17(5)	.23	.99	.03	.664	.468	.747
Modifiye Birleşik Model	7.15(4)	.14	.99	.047	.672	.482	.759
Destekleyici AHU							
Türkiye							
Modifiye PDT	.08(1)	.77	1.00	.000	.669		.746
Modifiye PİM	4.39(4)	.36	1.00	.017	.786	.626	.791
Modifiye Birleşik Model	5.14(5)	.40	1.00	.009	.793	.626	.791
İsrail							
Modifiye PDT	.62(1)	.43	1.00	.000	.526		.763
Modifiye PİM	3.89(5)	.57	1.00	.000	.784	.553	.788
Modifiye Birleşik Model	1.90(6)	.93	1.00	.009	.790	.553	.788
Müdahale Eden AHU							
Türkiye							
Modifiye PDT	.003(1)	.96	1.00	.000	.692		.723
Modifiye PİM	2.72(3)	.44	1.00	.017	.788	.679	.770
Modifiye Birleşik Model	5.21(4)	.27	.99	.030	.798	.679	.771
İsrail							
Modifiye PDT	1.45(1)	.23	1.00	.036	.625		.771
Modifiye PİM	7.66(5)	.18	.99	.039	.823	.575	.787
Modifiye Birleşik Model	7.10(6)	.31	.99	.023	.823	.575	.787

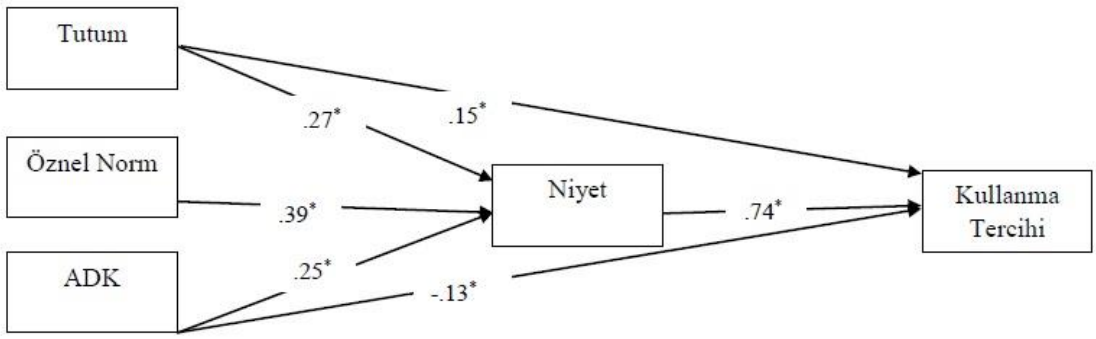
Not. CFI = Comparative Fit Index; RMSEA = Root Mean Squared Error Approximation.

Türkiye

Akıl Veren Sistem içim Yol Analizi

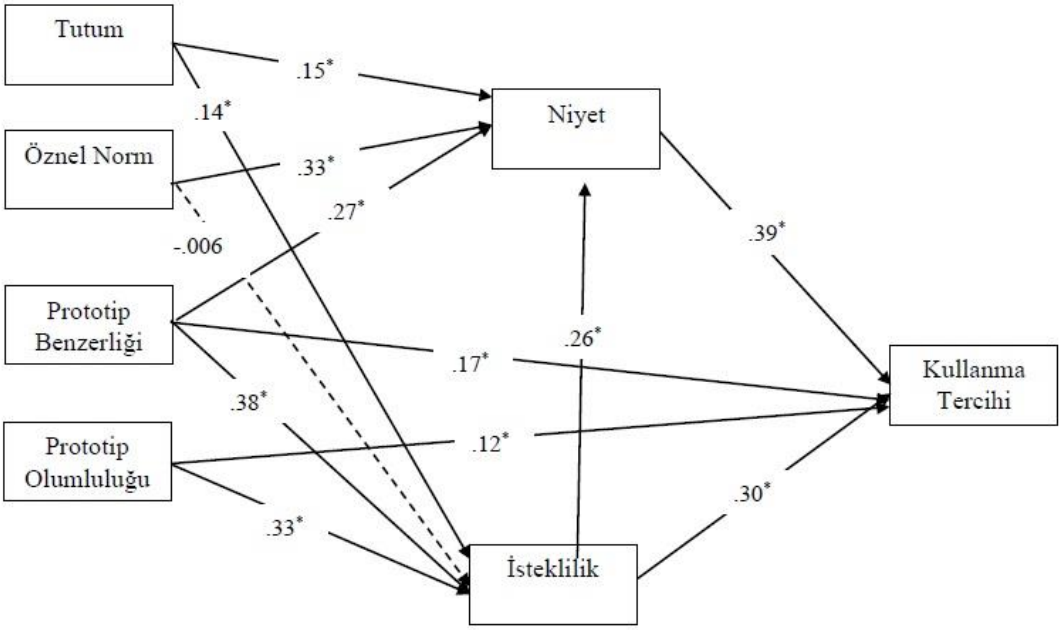
Standart PDT, PİM ve birleşik model veriye iyi uyum göstermemiştir. Bu yüzden, tüm modeller modifiye edilmiştir. Modifiye edilen tüm modeller veriye iyi uyum göstermiştir. Test edilen modifiye modeller ve standardize edilmiş beta değerleri figür 1,2, ve 3'te gösterilmiştir. Hem PİM'de hem de birleşik modelde kullanma tercihini yordayan en güçlü değişken niyettir.

Test edilen modellerin akıl veren sistem için sürücü kabulündeki varyansı açıklama konusundaki kullanılabilirlikleri Hotelling t testi ile karşılaştırılmıştır. Sürücülerin akıl veren sistemi kullanma tercihini en iyi açıklayan model birleşik modifiye edilmiş modeldir (R^2 = .697). Buna ek olarak PİM modifiye edilmiş model sürücülerin akıl veren sistemi kullanma tercihini (R^2 = .685) PDT modifiye edilmiş modelden (R^2 = .578) daha iyi açıklamaktadır.



Figür 1. Akıl veren AHU için PDT.

Not. Yaş, cinsiyet ve genel teknoloji kabulü kontrol edilmiştir.



Figür 2. Akıl veren AHU için PİM. Noktalı yollar anlamlı olmayan ilişkileri belirtmektedir.

Not. Yaş, cinsiyet ve genel teknoloji kabulü kontrol edilmiştir.

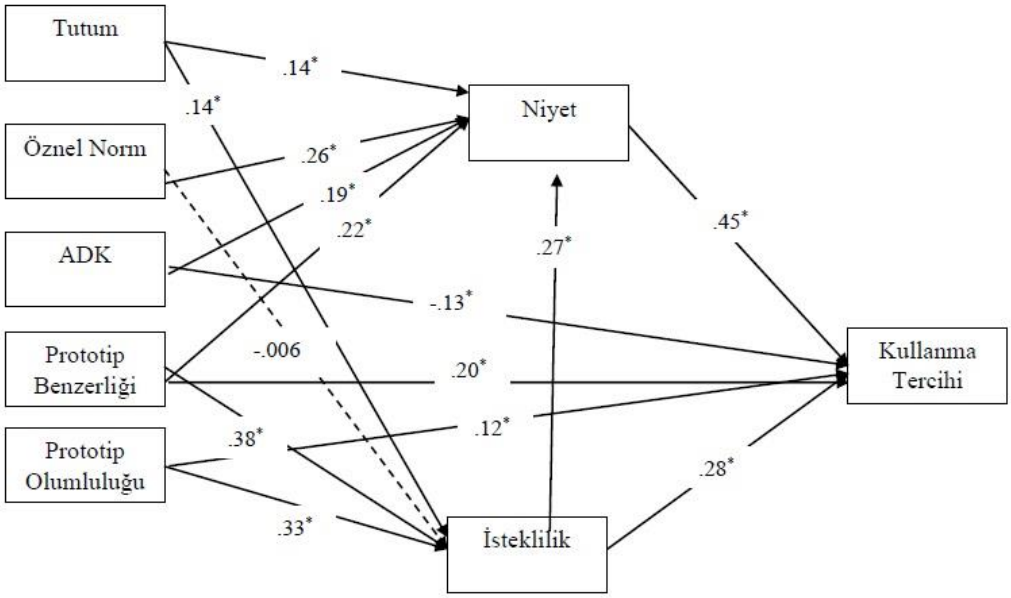


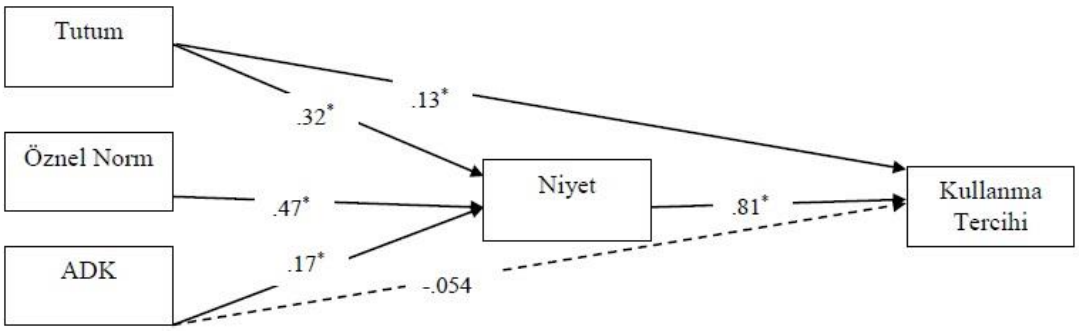
Figure 3. Akıl veren AHU için Birleşik model. Noktalı yollar anlamlı olmayan ilişkileri belirtmektedir.

Not. Yaş, cinsiyet ve genel teknoloji kabulü kontrol edilmiştir.

Destekleyici Sistem içim Yol Analizi

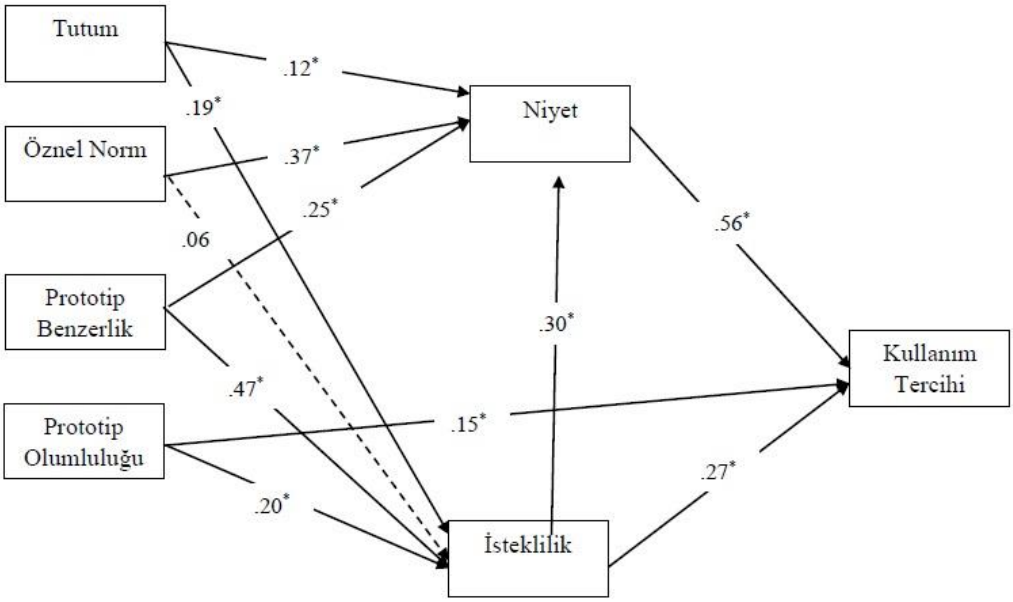
Standart PDT, PİM ve birleşik model veriye iyi uyum göstermemiştir. Bu yüzden, tüm modeller modifiye edilmiştir. Modifiye edilen tüm modeller veriye iyi uyum göstermiştir. Test edilen modifiye modeller ve standardize edilmiş beta değerleri figür 4, 5 ve 6'da gösterilmiştir. Hem PİM'de hem de birleşik modelde kullanma tercihini yordayan en güçlü değişken niyettir.

Test edilen modellerin destekleyici sistem için sürücü kabulündeki varyansı açıklama konusundaki kullanılabilirlikleri Hotelling t testi ile karşılaştırılmıştır. Sürücülerin destekleyici sistemi kullanma tercihini birleşik modifiye edilmiş model (R^2 = .791) ve PİM modifiye edilmiş model (R^2 = .791) PDT modifiye edilmiş modelden (R^2 = .746) daha iyi açıklamaktadır.



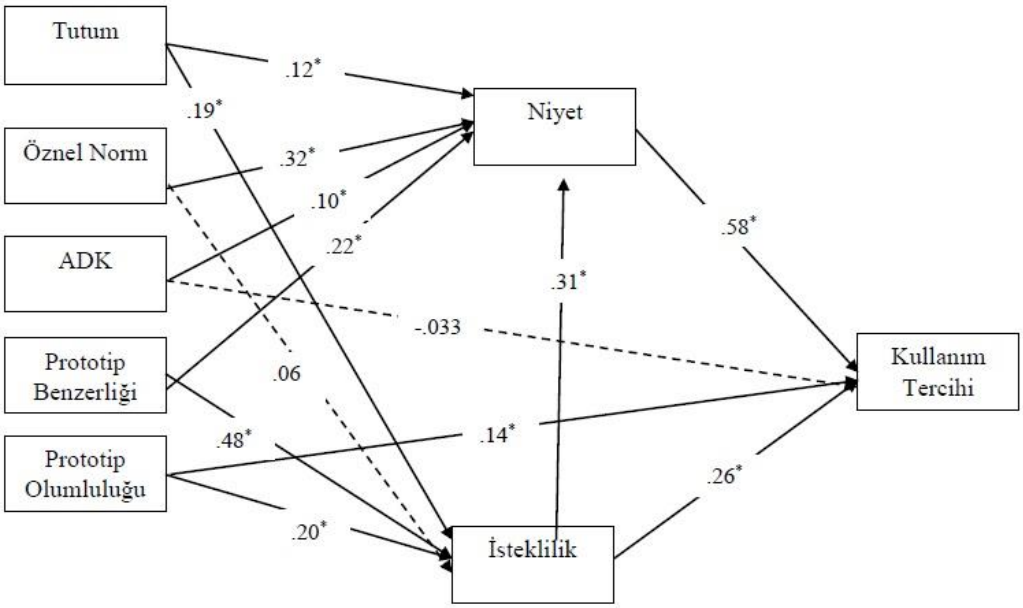
Figür 4. Destekleyici AHU için PDT.

Not. Yaş, cinsiyet ve genel teknoloji kabulü kontrol edilmiştir.



Figür 5. Destekleyici AHU için PİM. Noktalı yollar anlamlı olmayan ilişkileri belirtmektedir.

Not. Yaş, cinsiyet ve genel teknoloji kabulü kontrol edilmiştir.



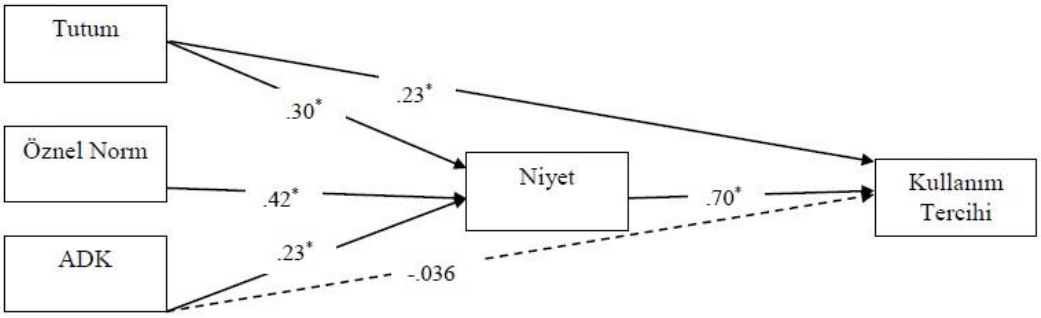
Figür 6. Destekleyici AHU için Birleşik model. Noktalı yollar anlamlı olmayan ilişkileri belirtmektedir.

Not. Yaş, cinsiyet ve genel teknoloji kabulü kontrol edilmiştir.

Müdahale Eden Sistem için Yol Analizi

Standart PDT, PİM ve birleşik model veriye iyi uyum göstermemiştir. Bu yüzden, tüm modeller modifiye edilmiştir. Modifiye edilen tüm modeller veriye iyi uyum göstermiştir. Test edilen modifiye modeller ve standardize edilmiş beta değerleri figür 7, 8 ve 9'da gösterilmiştir. Hem PİM'de hem de birleşik modelde kullanma tercihini yordayan en güçlü değişken niyettir.

Test edilen modellerin müdahale eden sistem için sürücü kabulündeki varyansı açıklama konusundaki kullanılabilirlikleri Hotelling t testi ile karşılaştırılmıştır. Sürücülerin müdahale eden sistemi kullanma tercihini birleşik modifiye edilmiş model (R^2 = .771) ve PİM modifiye edilmiş model (R^2 = .770) PDT modifiye edilmiş modelden (R^2 = .723) daha iyi açıklamaktadır.



Figür 7. Müdahale eden AHU için PDT. Noktalı yollar anlamlı olmayan ilişkileri belirtmektedir.

Not. Yaş, cinsiyet ve genel teknoloji kabulü kontrol edilmiştir.

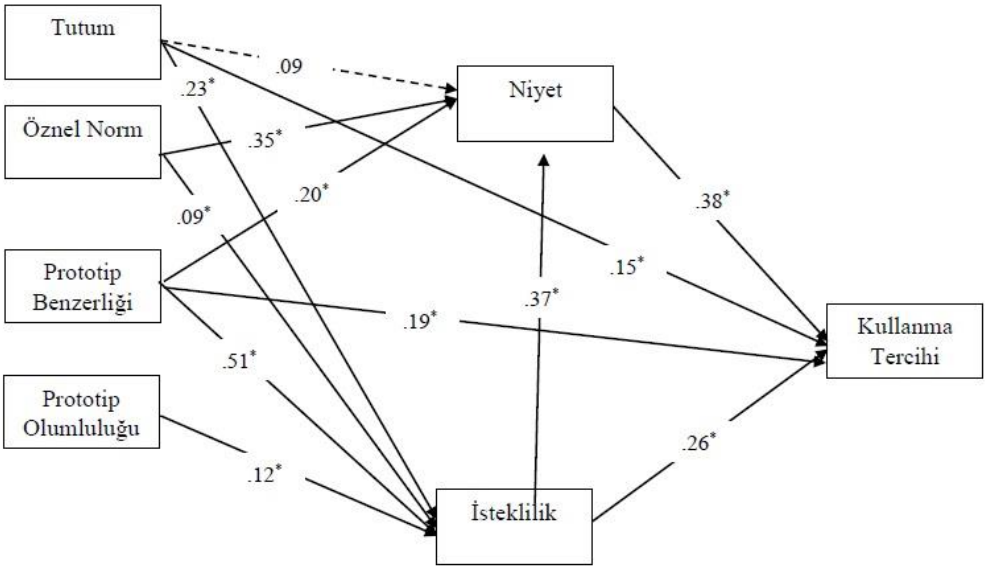


Figure 8. Müdahale eden AHU için PİM. Noktalı yollar anlamlı olmayan ilişkileri belirtmektedir.

Not. Yaş, cinsiyet ve genel teknoloji kabulü kontrol edilmiştir.

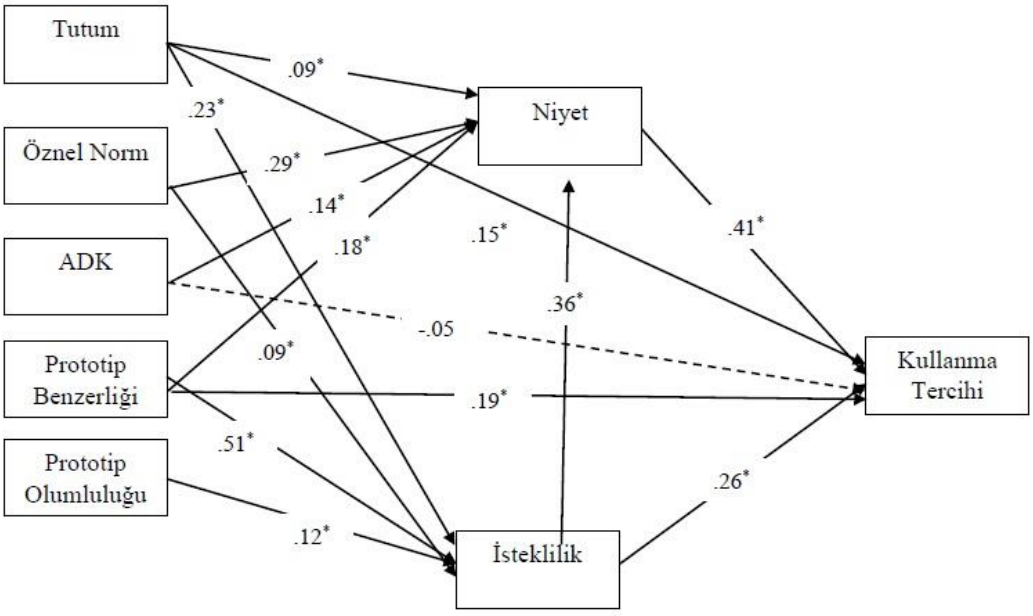


Figure 9. Müdahale eden AHU için Birleşik model. Noktalı yollar anlamlı olmayan ilişkileri belirtmektedir.

Not. Yaş, cinsiyet ve genel teknoloji kabulü kontrol edilmiştir.

Akıl Veren, Destekleyici ve Müdahale Eden Sistemlerde Sürücü Kabulünü Açıklamada Birleşik Modelin Kullanılabilirliğinin Karşılaştırılması

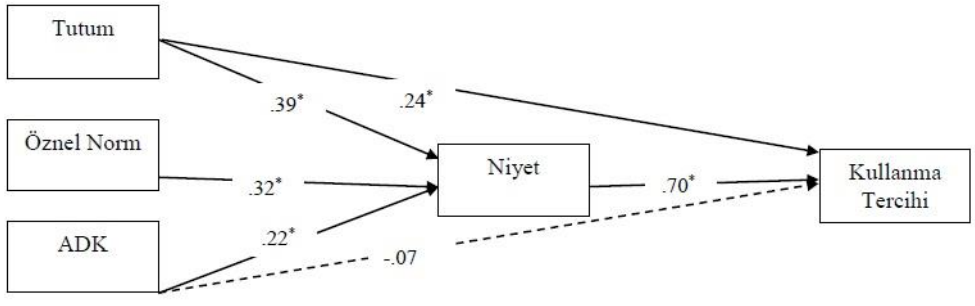
Birleşik modifiye edilmiş modelin Sürücülerin AHU sistemlerini kullanma tercihindeki açıkladıkları varyanslar karşılaştırıldığında, modelin destekleyici (R^2 = .791) ve müdahale eden (R^2 = .771) sistemleri kullanma tercihini akıl veren sisteme (R^2 = .697) göre daha iyi açıkladığı görülmektedir.

İsrail

Akıl Veren Sistem için Yol Analizi

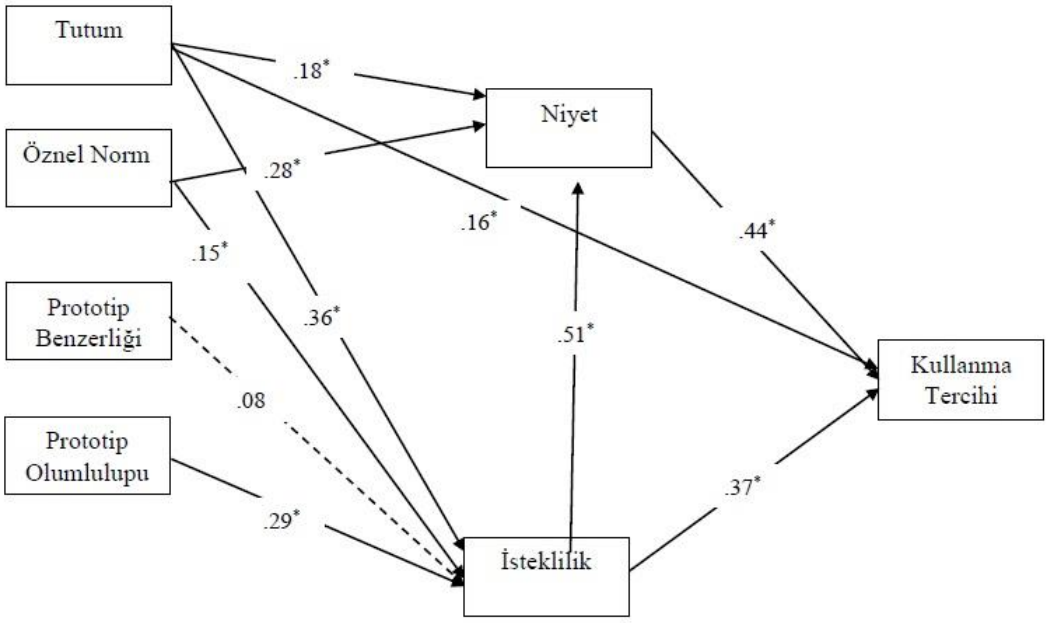
Standart PDT, PİM ve birleşik model veriye iyi uyum göstermemiştir. Bu yüzden, tüm modeller modifiye edilmiştir. Modifiye edilen tüm modeller veriye iyi uyum göstermiştir. Test edilen modifiye modeller ve standardize edilmiş beta değerleri figür 10,11, ve 12'de gösterilmiştir. Hem PİM'de hem de birleşik modelde kullanma tercihini yordayan en güçlü değişken niyettir.

Test edilen modellerin akıl veren sistem için sürücü kabulündeki varyansı açıklama konusundaki kullanılabilirlikleri Hotelling t testi ile karşılaştırılmıştır. Sürücülerin akıl veren sistemi kullanma tercihini en iyi açıklayan model birleşik modifiye edilmiş modeldir (R^2 = .759). Buna ek olarak PİM modifiye edilmiş model sürücülerin akıl veren sistemi kullanma tercihini (R^2 = .747) PDT modifiye edilmiş modelden (R^2 = .695) daha iyi açıklamaktadır.



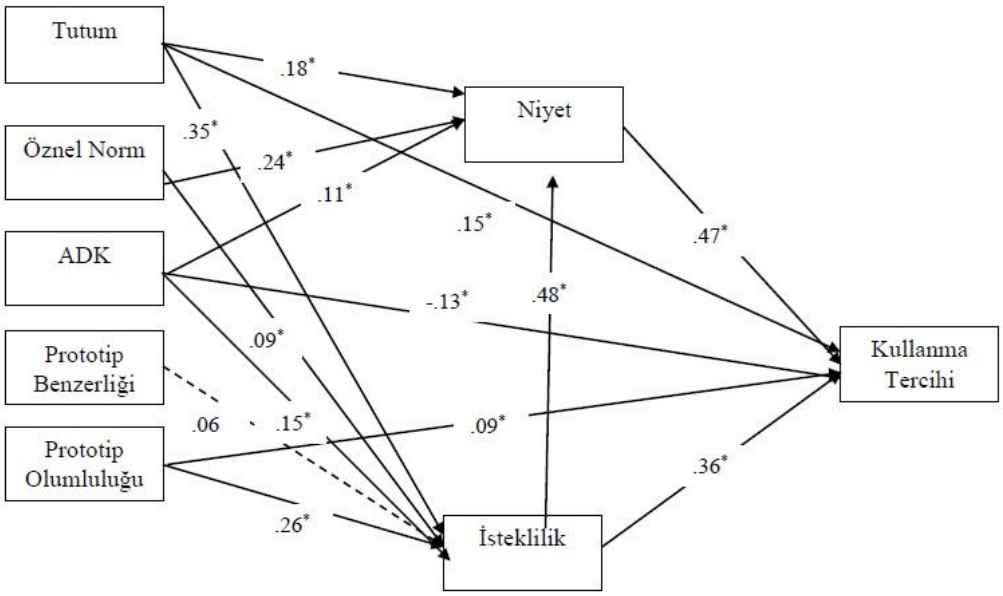
Figür 10. Akıl veren AHU için PDT. Noktalı yollar anlamlı olmayan ilişkileri belirtmektedir.

Not. Yaş, cinsiyet ve genel teknoloji kabulü kontrol edilmiştir.



Figür 11. Akıl veren AHU için PİM. Noktalı yollar anlamlı olmayan ilişkileri belirtmektedir.

Not. Yaş, cinsiyet ve genel teknoloji kabulü kontrol edilmiştir.



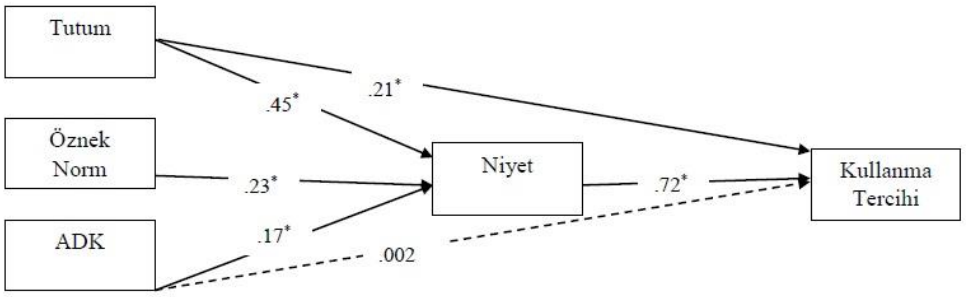
Figür 12. Akıl veren AHU için Birleşik model. Noktalı yollar anlamlı olmayan ilişkileri belirtmektedir.

Not. Yaş, cinsiyet ve genel teknoloji kabulü kontrol edilmiştir.

Destekleyici Sistem için Yol Analizi

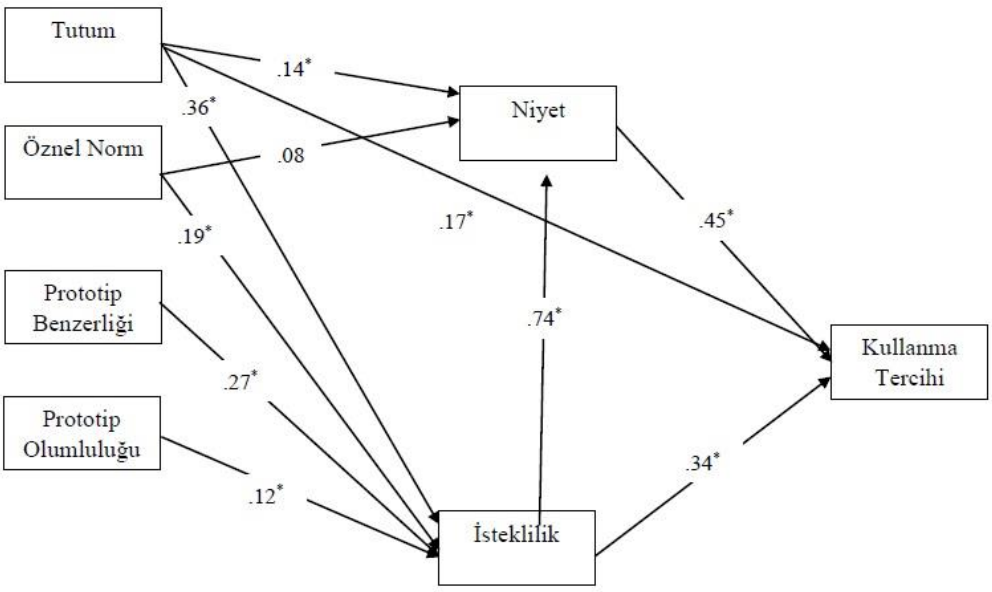
Standart PDT, PİM ve birleşik model veriye iyi uyum göstermemiştir. Bu yüzden, tüm modeller modifiye edilmiştir. Modifiye edilen tüm modeller veriye iyi uyum göstermiştir. Test edilen modifiye modeller ve standardize edilmiş beta değerleri figür 13, 14 ve 15'te gösterilmiştir. Hem PİM'de hem de birleşik modelde kullanma tercihini yordayan en güçlü değişken niyettir.

Test edilen modellerin destekleyici sistem için sürücü kabulündeki varyansı açıklama konusundaki kullanılabilirlikleri Hotelling t testi ile karşılaştırılmıştır. Sürücülerin destekleyici sistemi kullanma tercihini birleşik modifiye edilmiş model (R^2 = .788) ve PİM modifiye edilmiş model (R^2 = .799) PDT modifiye edilmiş modelden (R^2 = .763) daha iyi açıklamaktadır



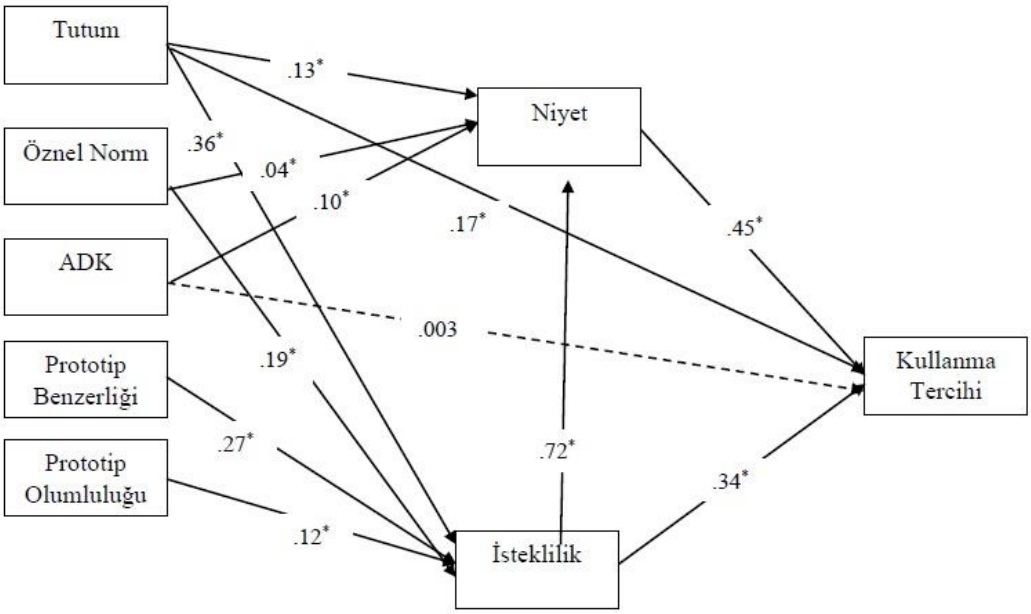
Figür 13. Destekleyici AHU için PDT. Noktalı yollar anlamlı olmayan ilişkileri belirtmektedir.

Not. Yaş, cinsiyet ve genel teknoloji kabulü kontrol edilmiştir.



Figür 14. Destekleyici AHU için PİM. Noktalı yollar anlamlı olmayan ilişkileri belirtmektedir.

Not. Yaş, cinsiyet ve genel teknoloji kabulü kontrol edilmiştir.



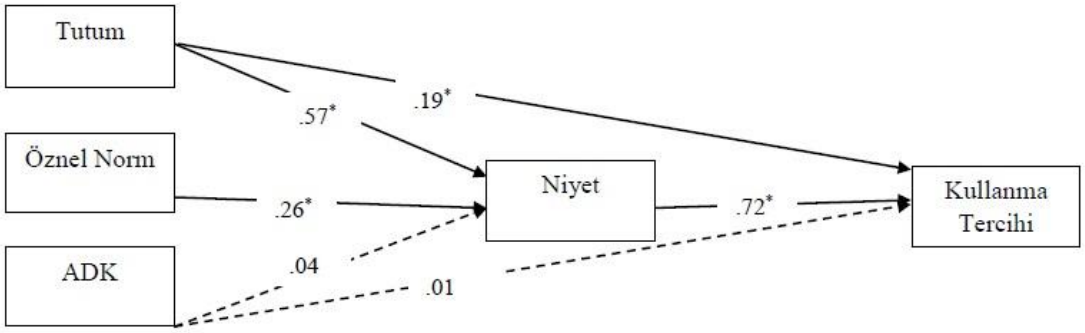
Figür 15. Destekleyici AHU için Birleşik model. Noktalı yollar anlamlı olmayan ilişkileri belirtmektedir.

Not. Yaş, cinsiyet ve genel teknoloji kabulü kontrol edilmiştir.

Müdahale Eden Sistem için Yol Analizi

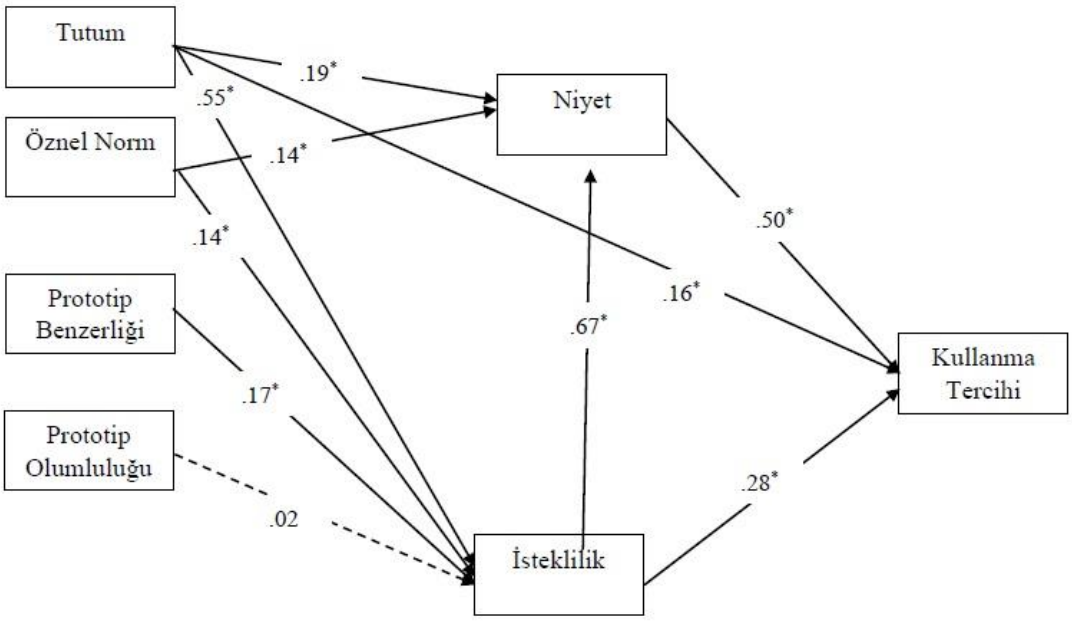
Standart PDT, PİM ve birleşik model veriye iyi uyum göstermemiştir. Bu yüzden, tüm modeller modifiye edilmiştir. Modifiye edilen tüm modeller veriye iyi uyum göstermiştir. Test edilen modifiye modeller ve standardize edilmiş beta değerleri figür 16, 17 ve 18'de gösterilmiştir. Hem PİM'de hem de birleşik modelde kullanma tercihini yordayan en güçlü değişken niyettir.

Test edilen modellerin müdahale eden sistem için sürücü kabulündeki varyansı açıklama konusundaki kullanılabilirlikleri Hotelling t testi ile karşılaştırılmıştır. Sürücülerin müdahale eden sistemi kullanma tercihini birleşik modifiye edilmiş model (R^2 = .787) ve PİM modifiye edilmiş model (R^2 = .787) PDT modifiye edilmiş modelden (R^2 = .771) daha iyi açıklamaktadır.



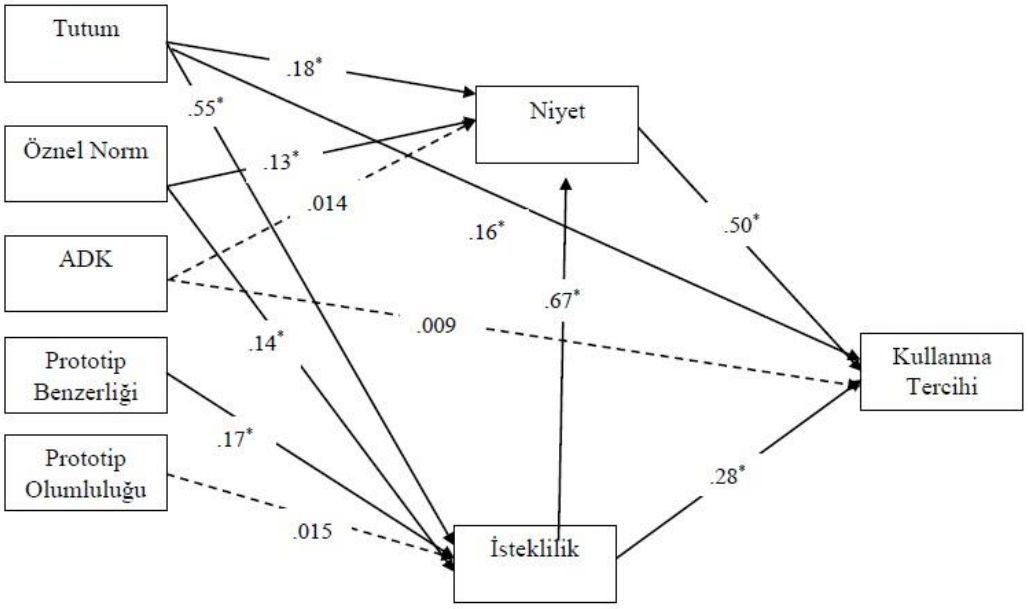
Figür 16. Müdahale Eden AHU için PDT. Noktalı yollar anlamlı olmayan ilişkileri belirtmektedir.

Not. Yaş, cinsiyet ve genel teknoloji kabulü kontrol edilmiştir.



Figür 17. Müdahale Eden AHU için PİM. Noktalı yollar anlamlı olmayan ilişkileri belirtmektedir.

Not. Yaş, cinsiyet ve genel teknoloji kabulü kontrol edilmiştir.



Figür 18. Müdahale Eden AHU için Birleşik model. Noktalı yollar anlamlı olmayan ilişkileri belirtmektedir.

Not. Yaş, cinsiyet ve genel teknoloji kabulü kontrol edilmiştir.

Akıl Veren, Destekleyici ve Müdahale Eden Sistemlerde Sürücü Kabulünü Açıklamada Birleşik Modelin Kullanılabilirliğinin Karşılaştırılması

Birleşik modifiye edilmiş modelin Sürücülerin AHU sistemlerini kullanma tercihindeki açıkladıkları varyanslar karşılaştırıldığında, modelin akıl veren (R^2 = .759), destekleyici (R^2 = .788) ve müdahale eden (R^2 = .794) sistemleri kullanma tercihini aynı derecede açıkladığı görülmektedir. Buradan modelin tahminleme gücünün tüm sistemler için aynı olduğu çıkarılabilir.

Model Testlerinin Özeti

Akıl veren sisteme dair sürücü kabulündeki varyansı açıklamak için her modelin etkinliği karşılaştırıldığında hem İsrail hem de Türkiye için akıl veren sistemin kullanma tercihindeki en yüksek varyansı birleşik modifiye edilmiş modelin açıkladığı bulunmuştur. Benzer şekilde hem PİM modifiye edilmiş hali hem de birleşik modifiye modelin, her iki ülkede de destekleyici ve müdahale eden sistemleri kullanma tercihinde en yüksek varyansı açıkladığı bulunmuştur.

Türkiye'de birleşik modifiye edilmiş model, akıl veren, destekleyici ve müdahale eden sistemleri kullanma tercihindeki varyansın sırasıyla %69.7, %79.1 ve %77.1'ini açıklamıştır. Sonuçlar, birleştirici modifiye edilmiş modelin, Türkiye'de destekleyici ve müdahale eden sistemlerin kullanılma tercihini akıl veren sistemi kullanma tercihine göre daha iyi açıkladığını göstermektedir.

İsrail'de birleşik modifiye edilmiş model, akıl veren, destekleyici ve müdahale eden sistemleri kullanma tercihindeki varyansın sırasıyla %75.9, %78.8 ve %78.7'sini açıklamıştır. Sonuçlar, ufak farklılıklar olsa da birleşik modifiye edilmiş modelin, İsrail'de akıl veren, destekleyici ve müdahale eden sistemlerin kullanılma tercihini açıklamada istatistiksel olarak birbirinden farklılaşmadığını göstermektedir.

Yukarıda birleşik modifiye edilmiş modelin açıkladıkları varyanslar her iki ülke için de bildirilmiştir. Açıklanan varyansların yüzde büyüklükleri birbirine yakın olsa da İsrail'de birleşik modifiye edilmiş modelin akıl veren ve müdahale eden sistemlerin

kullanma tercihini açıklamada daha etkili olduğu söylenebilir. Buna ek olarak, birleşik modifiye edilmiş modelin, Türkiye'de destekleyici sistemin kullanma tercihini açıklamada daha etkili olduğu söylenebilir.

Tartışma

Grup İçi Farklılıklar

Çalışmada kullanılan tüm değişkenler için hem Türk hem de İsrailli sürücülerin puanları akıl veren sistem için en yüksek, müdahale eden sistem için ise en düşük olarak bulunmuştur. Mevcut çalışmanın sonuçları önceki çalışmalarla uyumludur.

Alan yazındaki çalışmalar, sürücülerin, sürücü tarafından kapatılabilen araç teknolojilerine karşı daha olumlu tutumlara sahip olduğunu göstermiştir (Blythe ve Curtis, 2004). Spesifik olarak, müdahale eden sisteme göre akıl veren sisteme yönelik daha olumlu tutumlar ifade edilmiştir (Almqvist ve Towliat, 1993). AHU'ya ilişkin öznel norm, kişinin AHU kullanıp kullanmama konusunda hissettiği sosyal baskıyı ifade eder (van der Pas vd., 2008). Bu nedenle öznel norm, sosyal olarak yakın grupların AHU'ya bakış açısına göre belirlenebilir. Ayrıca, insanların prototip algıları yüksek olduğunda davranışı gerçekleştirme olasılıkları daha yüksektir. Bu açıdan bakıldığında sürücülerin kullanmayı tercih ettiği AHU tipinin onların tutumları, öznel normları ve prototip algılarıyla uyumlu olması gerekmektedir. Dolayısıyla bu çalışmada bulunan grup içi farklılıkların bu görüşle uyumlu olduğu söylenebilir.

Alan yazındaki çalışmalar sürücü kabul düzeyinin akıl veren sistem için en yüksek olduğunu göstermektedir; sistemin müdahale ve kontrol düzeyi arttıkça sürücülerin kullanma tercihi düşme eğilimi göstermektedir (Ryan, 2019). Ayrıca sürücüler, akıl veren sistemden daha az memnun olsalar da destekleyici sistem yerine akıl veren sistemi tercih etmektedir (Adell vd., 2008). Buna bağlı olarak özerklik arttıkça ADK azalmaktadır (Rödel vd., 2014). Sürücü, müdahale eden sistemli araçla verilen hız sınırını aşamaz, aracın hızını akıl veren sistemli araçla kontrol edebilir. Dolayısıyla

sürücülerin akıl veren sistem üzerinde daha fazla kontrole sahip olduklarını düşünmeleri bu sistemlerin doğasıyla uyumludur.

Ülkeler Arası Farklılıklar

Tüm AHU tipleri için Türk sürücülerin tutum ve öznel norm puanları İsrailli sürücülerden daha yüksek çıkarken, PBC ve prototip algıları açısından birbirlerinden farklılık göstermemektedir.

Tutum açısından bakıldığında, Türk sürücülerin tüm AHU tipleri için verilen sisteme karşı İsrailli sürücülere göre daha olumlu bir tutumları vardır. Alan yazında karayolu ölüm oranının ve kişi başına düşen gayri safi milli gelirin daha düşük olduğu ülkelerdeki sürücülerin otonom araçlara karşı daha olumlu tutuma sahip olduğu belirtilmiştir (Syahrivar vd., 2021). Benzer şekilde, karayolu ölüm oranının ve otoyol hız sınırlarının daha yüksek olduğu ve kişi başına düşen gayri safi milli gelirin daha düşük olduğu ülkelerdeki sürücüler, AHU sistemlerine karşı daha olumlu tutum içerisinde oldukları bildirilmiştir (Adell vd., 2008). Dolayısıyla bu çalışmanın tutuma ilişkin sonuçlarının alan yazınla uyumlu olduğu ve karayolun ölüm oranının yüksek olduğu, hız sınırlarının yüksek olduğu ve kişi başına düşen gayri safi milli gelirin düşük olduğu ülkelerde AHU'nun daha fazla olumlu görüldüğü yönündeki bulguları desteklediği yorumu yapılabilir. Bu durum, karayolun ölüm oranlarının yüksek olmasının, o toplumda trafik güvenliğini artıracak teknolojik uygulamalara yönelik daha olumlu bir yaklaşıma yol açabileceği düşüncesiyle açıklanabilir.

Çalışmanın sonuçları Türk sürücülerin verilen sistemi kullanma konusunda İsrailli sürücülere göre daha fazla sosyal onaya sahip olduklarını düşündüklerini göstermektedir. Öznel normlar arasındaki fark kültürden etkilenebilir. Toplumsal onay, toplulukçu toplumlarda bireyci toplumlara göre daha önemlidir. Toplumun özellikleri bireyin karar alma mekanizmalarını etkilemektedir. Hofstede'ye (2001) göre bireyci toplumlarda göre insanlar başkalarının görüşleriyle daha az ilgilenirler ve bunun sonucunda belirli bir davranışı gerçekleştirme konusunda daha az baskı hissederler. Toplulukçu boyutuna göre ise başkalarının düşünceleri daha ön plandadır ve bunun sonucunda kendileri için önemli olan davranışlardansa toplum için önemli

olan davranışları sergileme eğilimindedirler. Hosftede'nin bireycilik boyut puanları, İsrail'in bireyci ve toplulukçu toplumların bir karışımı olduğunu, Türkiye'nin ise toplulukçu bir toplum olduğunu göstermektedir (Hosftede, 2001). Dolayısıyla öznel normlara ilişkin sonuçlar kültürel farklılıklarla açıklanabilir. Bu, Türkiye'nin daha toplulukçu bir toplum olması nedeniyle öznel normun İsrail'e göre daha önemli hale geldiği şeklinde yorumlanabilir.

Tüm AHU tipleri için Türk ve İsrailli sürücüler arasında ADK ve prototip algıları birbirinden farklılaşmamaktadır. ADK ile ilgili sonuç AHU tiplerinin kontrol gücü ile açıklanabilir. Sistemin kontrolü arttıkça ADK'nın azaldığı bilinmektedir (Rödel ve ark., 2014). Bu nedenle, ADK ülke farklılıklarından ziyade sistemin kontrol düzeyiyle ilişkilendirilebilir. Prototiplere gelince, bu çalışma AHU'nun sürücü kabulünde prototiplerin rolünü inceleyen ilk çalışmadır. Dolayısıyla prototip algılarına ilişkin sonuçlar alan yazına benzeri görülmemiş bir katkı sağlamaktadır. Prototip algılar, insanların toplum içinde bu davranışları sergilemeleri halinde, başkaları tarafından bu davranışı yapan tipik bir kişi olarak görüleceğinin habercisi olarak yorumlanabilir. İlginç bir şekilde sonuçlar, Türk sürücülerin bu sistemlere karşı daha fazla sosyal onaya ve olumlu tutuma sahip olmasına rağmen, bu sistemlerinin tipik bir kullanıcısına ilişkin imajlarının İsrailli sürücülere benzer olduğunu göstermektedir.

Türk sürücülerin destekleyici ve müdahale eden sistemleri kullanma niyetleri İsrailli sürücülere göre daha yüksek iken iki ülkedeki sürücülerin akıl veren sistemi kullanma niyetleri benzerdir. Ayrıca İsrailli sürücülerin akıl veren sistemi kullanma istekliliği daha yüksekken, Türk sürücülerin müdahale eden sistemi kullanma istekliliği daha yüksek olup, iki ülkedeki sürücülerin destekleyici sistemi kullanma isteklilikleri benzerdir. Önceki çalışmalar, karayolu ölüm oranının daha yüksek ve kişi başına düşen gayri safi milli gelirin daha düşük olduğu ülkelerdeki sürücülerin ya yüksek düzeyde otonom araçlar kullanma niyeti içinde olduklarını ya da otonom araçlara sahip olmaya daha fazla ilgi gösterdiklerini göstermiştir (Schoettle ve Sivak, 2014; Kaye vd., 2020b). Dolayısıyla bu çalışmanın sonuçları, karayolu ölüm oranının yüksek olduğu ve kişi başına düşen gayri safi milli gelirin daha düşük olduğu ülkelerdeki sürücülerin, özellikle bu teknolojilerin kontrolü arttıkça, araç

teknolojilerini daha fazla kullanmaya niyetli olduğu fikrini desteklemektedir. Son olarak, Türk sürücülerin her üç sistem için de kullanma tercihi İsrailli sürücülere göre daha yüksektir. AHU'nun kabulüne ilişkin kültürler arası çalışmalar, kabul oranlarının, tahmini karayolu ölüm oranlarına, kişi başına düşen gayri safi milli gelire ve kırsal yollarda ve otoyollarda farklı hız sınırlarına göre ülkeler arasında farklılık gösterdiğini göstermektedir (örn. Warner vd.. 2010; Eriksson ve Bjørnskau, 2012). Dolayısıyla, bu çalışmanın sonucu daha önce yapılan çalışmalarla benzerlik göstermektedir.

Modellerin AHU Sürücü Kabulünü Yordayıcılığı

Sonuçlar, birleşik modelin hem Türkiye'de hem de İsrail'de akıl veren sistemi kullanma tercihindeki en yüksek varyansı açıkladığını göstemektedir. Ayrıca, hem PİM hem de birleşik modelin, Türkiye ve İsrail'de destekleyici ve müdahale eden sistemleri kullanma tercihinde en yüksek varyansı açıkladığı görülmektedir. PİM ile birleştirilmiş modelin açıklanan varyansları destekleyici ve müdahale eden sistemler için benzer olduğundan, bu bölümdeki farklılıkları açıklamak için birleşik model baz alınmıştır.

Sürücülerin AHU sistemlerini kabulünü açıklamada birleşik modelin yordayıcılığına bakıldığında, model İsrail'de akıl veren ve müdahale eden sistemleri kullanma tercihinde daha fazla varyans açıklarken, Türkiye'de destekleyici sistemi kullanma tercihinde biraz daha yüksek varyans açıklamaktadır. Benzer şekilde model, İsrail'de akıl veren ve müdahale eden sistemleri kullanma niyetinde daha fazla varyans açıklarken, Türkiye'de destekleyici sistemi kullanma niyetinde biraz daha yüksek varyans açıklamaktadır. Belirgin bir şekilde, model Türkiye'de tüm sistemleri kullanma isteğinde daha yüksek varyans açıklamaktadır. Bu durum, İsrail'e kıyasla Türkiye'de özellikle destekleyici ve müdahale eden sistemlerde sosyal tepkisel yolun ön plana çıktığı şeklinde yorumlanabilir.

İki ülke arasında birleşik modelde bazı farklar görülmektedir. Türkiye'de modelde prototip algıları ön plana çıkmaktadır. Hem prototip benzerliğinin hem de olumluluğun niyet, isteklilik ve davranışla ilişkilidir, ayrıca prototip benzerliği,

sağlık çalışmalarındaki prototip olumluluğuyla karşılaştırıldığında sağlığı koruyucu davranışla daha güçlü ilişkiler gösterdi (van Lettow vd., 2016). Bu, birleşik modelde prototip benzerliğinin rolünü açıklayabilir. AHU kullanımının trafik kazalarını, ölümleri ve yaralanmaları azaltacağı varsayıldığından sağlığı koruyucu bir davranış olarak değerlendirilebilir. Bu aynı zamanda Türkiye'de AHU kullanma istekliliğini yordamada prototip benzerliğinin beta ağırlıklarının prototip olumluluğuna göre daha yüksek olmasını da açıklamaktadır. Buradan hareketle, Türk sürücülerin prototipin benlik imajına benzer olması durumunda, prototipin ne kadar olumlu görüldüğüne bakılmaksızın davranışı gerçekleştirebilecekleri önerilebilir. Birleşik modelde İsrail'de tutum öne çıkmaktadır. Alan yazında tutumun ihlal ve hata gibi davranışları olumsuz yönde yordadığı gösterilmiştir (Lucidi vd., 2019). Çalışmalar, teknolojiye yönelik tutumların genç çalışanların teknolojiyi kullanma kararları üzerinde daha güçlü bir etkiye sahip olduğunu göstermektedir (Morris ve Venkatesh, 2000). Dolayısıyla örneklemin özelliği modelde tutumu ön plana çıkarmış olabilir.

Sürücünün AHU'yu kabullenmesi için gerekçeli yolun mu yoksa sosyal tepkisel yolun mu önemli hale geldiğine bakıldığında, AHU kullanma tercihini tahmin etmede gerekçeli yolun Türkiye ve İsrail'de her üç sistem için de daha önemli göründüğünü gösterdi. Üstelik her iki ülkede de, AHU kullanma tercihini yordama konusunda istekliliğin beta ağırlıkları, sistemin kontrolü arttıkça azalma eğilimindedir. Benzer bir şekilde, niyeti yordama konusunda istekliliğin beta ağırlıkları, destekleyici ve müdahale eden sistemlerde, akıl veren sisteme göre daha yüksektir. Birlikte ele alındığında, AHU'nun sürücü kabulünün sosyal reaktif yoldan ziyade gerekçeli yolla açıklanabileceği ve sistemin kontrolü arttıkça bunun daha da önemli hale geldiği sonucuna varılabilir. Gibbons ve arkadaşları (1998), sosyal tepkisel yolun riskli davranışları açıklamada daha yararlı olacağını ileri sürmüşlerdir. Alan yazındaki çalışmalarda da istekliliğin kırmızı ışıkta geçmek (Tang vd., 2020) veya hız yapmak (Elliot vd., 2017) gibi riskli davranışların niyete kıyasla daha iyi bir yordayıcısı olduğu bulunmuştur. Tersine, niyetin trafikte arkada emniyet kemeri kullanımı gibi güvenli davranışların daha iyi yordayıcısı olduğu bulunmuştur (Pei ve diğerleri, 2023). AHU sisteminin kabul edilmesi trafik güvenliğini artıracaktır, dolayısıyla sürücülerin AHU sistemini kullanması güvenli bir davranış olarak düşünülebilir. Bu nedenle, niyete odaklanmak, sürücünün AHU kabulünü açıklamak

için daha faydalı olacaktır. Ayrıca sistemin kontrolü arttıkça isteklilik, niyetin önemli bir yordayıcısı haline gelmektedir; dolayısıyla, destekleyici ve müdahale eden sistemleri kullanma niyetini artırmak için istekliliğin dikkate alınması gerekir.

Katkılar

Çalışmanın sonuçları hem Türkiye'de hem de İsrail'de AHU'nun sürücü kabulünü artırmaya yönelik önemli çıkarımlara sahiptir. Şu anda AHU her iki ülkede de standart donanım değildir, bu nedenle; AHU'nun topluma tanıtılması, AHU'nun yayılması ve kullanımının arttırılması için sürücünün kabulü açısından ilk kritik noktadır.

Her iki ülkede de sürücü kabulünü açıklarken gerekçeli yol ön plana çıkmaktadır. Bu nedenle, AHU'yu tanıtırken, kullanma niyetinin arttırılmasına vurgu yapılmalıdır. Bir bireye sağlanan bilgilerin kazançlara ya da kayıplara odaklanması, kişilerin karar verme süreci üzerinde etkili olabilir (Tversky ve Kahneman, 1992). Beklenti teorisi, bir bireyin kazançlara daha fazla odaklandığında risk alma olasılığının daha düşük olduğunu belirtmektedir. Bu teoriye göre, bir mesaj kazançlar üzerinden ifade edildiğinde insanların temkinli kararlar verme olasılığı daha yüksektir (Tversky ve Kahneman, 1992). Bu teori trafik güvenliği araştırmalarına uygulanmış ve trafik güvenliğini teşvik eden mesajların sürücüleri dikkatli davranmaya teşvik ettiği bulunmuştur (Millar ve Millar, 2000). Birlikte ele alındığında, AHU tanıtılırken kayıplar yerine kazançlar bağlamında sunulan mesajların kullanılması gerekmektedir.

Türk sürücülerin AHU kullanma tercihini tahmin etmede prototip algıları daha önemlidir. Bu dikkate alındığında, toplum tarafından olumlu ve benzer görülen bireylerin AHU tanıtımlarında yer alması durumunda sürücü kabulü artabilir. Belirli davranışı gerçekleştiren bireyin değerlendirmeleri, bireyin o davranışı gerçekleştirme olasılığını etkilemektedir (Blanton ve Christie, 2003). Eğer hedef davranış yaygın değilse, davranış değişikliğine yönelik mesaj, davranışı gerçekleştiren kişinin arzu edilen özelliklerini vurgulayarak olumlu bir şekilde çerçevelenmelidir (Blanton ve Cristie, 2003). Bu çalışmanın sonuçlarıyla birlikte ele alındığında, olumlu

çerçevelenen tanıtım reklamları gibi pazarlama stratejileri, sürücülerin AHU kabulünü artırabilir.

İsrail'de tutum, AHU kullanma tercihini tahmin etmede daha önemlidir. Bu nedenle, AHU'nun sürücü kabul edilebilirliğini arttırmak için tutum üzerine vurgu yapılmalıdır. Bir kişi nesneyle doğrudan deneyim yoluyla başkalarından veya medyadan yeni bilgi aldığında tutumu değişebilir (Triandis, 1971). Olumlu görüntülerle eşleştirilen yeni görüntülere yönelik tutumlar, olumsuz görüntülerle eşleştirilenlere göre daha olumlu değerlendirilmektedir (Olson ve Fazio, 2001). Birlikte ele alındığında, tanıtım reklamları gibi pazarlama stratejilerinde AHU'ya yönelik olumlu tutumları artırmak için AHU olumlu görseller veya öğelerle eşleştirilmelidir.

Sınırlılıklar

Bu çalışmanın belirli sınırlılıkları bulunmaktadır. Öncelikle veriler öz bildirim araçları kullanılarak toplanmıştır. Sosyal istenirliğin, tutumlar, sosyal normlar veya davranışlar incelendiğinde veya katılımcının kolayca belirlenebildiği durumlarda ortaya çıkma olasılığı daha yüksektir (Grimm, 2010). Bu sorunun üstesinden gelmek için katılımcılar anonim tutulmuştur. İkinci olarak sürücü tercihi tek bir madde ile değerlendirilmiştir. Her ne kadar önceki ISA çalışmalarında tek maddeli ölçüm kullanılmış olsa da (örn. Warner vd., 2010), çok maddeli ölçüm sonuçların gücünü artırabilir. Üçüncüsü, bu çalışmadaki modellere AHU deneyimi eklenmemiştir. AHU deneyiminin daha yüksek sürücü kabulüyle sonuçlandığı gösterilmiştir (örn. Katteler, 2005). Bu nedenle deneyimin modele veya kontrole eklenmesi bu çalışmanın sonuçlarının daha iyi anlaşılmasını sağlayabilir.

Sonuç

Bu çalışmada Türk ve İsrailli sürücüler arasındaki bazı benzerlikler ve farklılıklar vurgulanabilir:

1) Her iki ülkede de sürücülerin akıl veren sistemi kullanma niyeti, isteği ve tercihi en yüksek, müdahale eden sistemde ise en düşüktür.

2) Birleşik model her iki ülkede de akıl veren sistemi kullanma tercihinde yüksek varyansı açıklamıştır.
3) PİM ve birleşik model, her iki ülkede de destekleyici ve müdahale eden kullanılma tercihide PDT'den daha yüksek varyans açıklamıştır.
4) Niyet, her iki ülkede de tüm AHU tiplerini kullanma tercihinin en güçlü yordayıcısıdır.
5) Tutum, İsrail'de tüm AHU tiplerini kullanılma tercihini doğrudan yordamaktadır.
6) Prototip algıları, Türkiye'de tüm AHU tiplerini kullanılma tercihini doğrudan yordamaktadır.

Mevcut çalışma, PDT, PİM ve birleşik modelin AHU'nun sürücü kabulünü incelemede kullanıldığı için çalışmadır. Ayrıca bu çalışma, Türkiye ile İsrail arasında AHU'nun sürücü kabulünü karşılaştıran ilk çalışmadır. Çalışmada iki ülke arasındaki benzerlikler ve farklılıklar vurgulanmıştır. Ayrıca sonuçlar, farklı ülkelerden toplanmış ve istatistiksel olarak yeterli büyüklükte olan örnekleme dayanmaktadır. Bunun birleştirici model için güçlü bir geçerlilik sağladığı söylenebilir. Bu durum genellenebilirlik açısından da sonuçları desteklemektedir.

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