DEVELOPING THE PERCEPTION OF RISKY SITUATIONS SCALE FOR PEDESTRIANS (PRSS-P) AND EXPLORING ITS RELATIONSHIP WITH PEDESTRIAN BEHAVIORS UNDER THE MODERATING EFFECTS OF ATTITUDES

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ABSTRACT

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Pedestrian safety research has long been constrained by the absence of a context-sensitive measure of pedestrians' risk perception, leaving a major conceptual and methodological gap. This thesis addresses that void by introducing the Perception of Risky Situations Scale for Pedestrians (PRSS-P), the first tool designed to systematically capture the diverse risks pedestrians face in everyday walking. The scale provides a robust, pedestrian-specific measure for both research and practical applications.

In addition, the study contributes theoretically by integrating attitudes into a moderated framework that clarifies how risk perception translates into behavior. Although attitudes are recognized predictors, their role in shaping the link between perceived risk and pedestrian behavior remains underexplored. Accordingly, this research had two aims: (1) to develop and validate the PRSS-P for comprehensive

representation of pedestrian risk, and (2) to examine how attitudes toward traffic rules and other road users moderate the relationship between perceived risk and behaviors (violations, lapses, aggressive, and positive behaviors).

Grounded in qualitative interviews, the PRSS-P emerged as a reliable, multidimensional 40-item scale (α = .97) with three coherent dimensions: Pedestrian-Related (α = .93), Driver-Related (α = .89), and Infrastructure-Related (α = .87) Risk Perception. Moderation analyses confirmed that attitudes significantly shaped the impact of perceived risk on behavior. Rule scepticism and critical views often amplified maladaptive outcomes, while cooperative orientations were linked to safer conduct. Overall, the findings underline both the investigative utility of the PRSS-P and the importance of attitudinal contexts, suggesting that effective interventions should combine infrastructural improvements with targeted attitude-based strategies.

Keywords: pedestrian behaviors, risk perception, attitudes toward other road users, attitudes toward traffic rules

ÖZ

YAYALAR İÇİN RİSKLİ DURUM ALGISI ÖLÇEĞİNİN (PRSS-P) GELİŞTİRİLMESİ VE RİSKLİ DURUM ALGISI İLE YAYA DAVRANIŞLARI ARASINDAKİ İLİŞKİNİN TUTUMLARIN DÜZENLEYİCİ ETKİSİ ALTINDA İNCELENMESİ

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Yaya güvenliği araştırmaları, yaya risk algısını bağlama duyarlı bir şekilde ölçebilecek özel bir aracın eksikliği nedeniyle kavramsal ve yöntemsel açıdan uzun süredir önemli bir boşluk barındırmaktadır. Bu tez, bu eksikliği gidererek Yayalar İçin Riskli Durum Algısı Ölçeği'ni (PRSS-P) tanıtmaktadır. Günlük yürüyüşlerde karşılaşılan çeşitli riskleri sistematik biçimde yakalayan bu ölçek, araştırma ve uygulamalar için güçlü ve yayalar özelinde bir ölçüm aracı sunmakta, trafik psikolojisine önemli bir katkı sağlamaktadır.

Bunun yanı sıra çalışma, risk algısının davranışa nasıl dönüştüğünü açıklığa kavuşturan bir düzenleyici çerçevesi içinde, tutumları entegre ederek teorik bir katkı da sunmaktadır. Tutumların davranışın yordayıcıları olduğu bilinmekle birlikte, algılanan risk ile yaya davranışları arasındaki ilişkiyi nasıl şekillendirdikleri yeterince araştırılmamıştır. Bu doğrultuda araştırmanın iki amacı olmuştur: (1)

PRSS-P'nin geliştirilmesi ve doğrulanarak yayaların risk algısını kapsamlı biçimde temsil etmesi, (2) trafik kurallarına ve diğer yol kullanıcılarına yönelik tutumların, algılanan risk ile yaya davranışları (ihlaller, dalgınlıklar, saldırgan ve olumlu davranışlar) arasındaki ilişkiyi nasıl koşulladığını incelemek.

Nitel görüşmelere dayalı olarak geliştirilen PRSS-P, üç boyutlu yapısıyla güvenilir bir ölçek olarak ortaya çıkmıştır: Yayalarla İlişkili Risk Algısı (α = .93), Sürücülerle İlişkili Risk Algısı (α = .89) ve Altyapıyla İlişkili Risk Algısı (α = .87). Düzenleyici analizleri, tutumların risk algısının davranış üzerindeki etkisini anlamlı biçimde şekillendirdiğini göstermiştir. Trafik kurallarına yönelik şüphecilik ve diğer yol kullanıcılarına yönelik eleştirel bakış açısı çoğunlukla olumsuz davranışları artırırken, işbirlikçi eğilimler daha olumlu davranışlarla ilişkilendirilmiştir. Bulgular, PRSS-P'nin tanısal açıdan işlevselliğini ve tutumların rolünü vurgulamakta; etkili çözümler için altyapısal düzenlemeler ile tutuma dayalı hedeflenmiş stratejilerin bütünleştirilmesi gerektiğini göstermektedir.

Anahtar Kelimeler: yaya davranışları, risk algısı, diğer yol kullanıcılarına dair tutumlar, trafik kurallarına dair tutumlar

To my sanity…

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CHAPTER 1

GENERAL INTRODUCTION

1.1. Introduction

Despite global advances in vehicle safety technologies, road infrastructure, and policy enforcement, road traffic accidents remain a major public health concern. The World Health Organization (WHO, 2023) reports that road traffic crashes claim more than 1.3 million lives annually worldwide. Among road users, pedestrians face disproportionate risks, accounting for approximately 23% of all traffic fatalities despite their minimal contribution to traffic volume (WHO, 2023). This vulnerability is not distributed evenly across the globe. In low- and middle-income countries, pedestrian fatality rates are disproportionately high, often due to poor infrastructure (e.g., lack of sidewalks or safe crossings), inadequate enforcement of traffic laws, and unsafe road user behavior, such as speeding and distracted driving (WHO, 2018; Peden et al., 2004). However, even in developed urban contexts, pedestrians continue to face significant risks, especially in environments dominated by car-centric design and weak pedestrian prioritization (Litman & Fitzroy, 2025).

Recent statistics indicate that in Türkiye, pedestrians make up a considerable proportion of traffic-related deaths, especially within city environments (TÜİK, 2024). This underscores the disproportionate danger pedestrians face in Türkiye's traffic system. As highlighted by Aşırdizer et al. (2025), the fatality rate among injured pedestrians (38.0‰) is significantly higher than that of drivers (22‰) and passengers (15‰). This indicates that being on foot during a motor vehicle accident increases the likelihood of death.

When considering that 76.2% of all traffic accident-related injuries and fatalities in the past decade were recorded in urban areas (TÜİK, 2024), walking in urban

Türkiye can hardly be regarded as a safe mode of mobility. Although national campaigns and legal reforms have aimed to raise awareness and enforce pedestrian prioritizing laws, the desired decrease in pedestrian casualties have not been fully achieved (T.C. İçişleri Bakanlığı [Turkish Ministry of Interior], 2021). These patterns highlight that infrastructural and legal measures, while necessary, are not sufficient on their own.

While systemic and psychological models have advanced our understanding of traffic safety specifically based on drivers and driving safety, their application to pedestrians has been comparatively limited. Pedestrians face unique challenges that distinguish them from other road users. Unlike vehicle occupants, they lack structural safeguards such as crumple zones or seatbelts, making them highly susceptible to injury or death even in moderate-speed collisions (Tefft, 2013). This makes them one of the most exposed and under-protected groups in the traffic system. Road infrastructures are frequently designed to facilitate the movement of motorized vehicles, often at the expense of pedestrian safety and convenience (OECD, 2000; Šucha et al., 2021), which further exacerbates this physical vulnerability.

Beyond their physical vulnerability, pedestrian mobility often takes place in poorly lit or inadequately marked areas, along discontinuous sidewalks, or at crossing points that are unclear or insufficient (Foreman et al., 2024). These infrastructural shortcomings increase exposure to danger and make walking a cognitively demanding and uncertain task, particularly for children, older adults, and individuals with disabilities (Yannis et al., 2020). Moreover, societal and institutional frameworks have historically prioritized vehicle efficiency over pedestrian welfare (Verlinghieri, 2024). For instance, the widespread criminalization of jaywalking often shifts responsibility onto individuals rather than addressing structural deficiencies in the built environment (Abebe et al., 2024).

Although advanced protective technologies and vehicle design improvements have significantly enhanced driver and passenger safety, such innovations have not translated into equivalent protections for those on foot (Hussain et al., 2019). Pedestrians remain largely excluded from traffic safety innovations and urban

planning decisions, both in terms of infrastructure investment and research focus (Rhoads et al., 2023). Together, these physical, infrastructural, and policy-level shortcomings constitute a complex system of disadvantage for pedestrians.

Understanding the structural and systemic factors that make pedestrians vulnerable is essential; however, these external risks also interact with behavioral patterns that shape safety outcomes (Balk et al., 2014). Pedestrian behavior plays a critical role in determining how individuals navigate traffic environments, interpret risk, and respond to ambiguous or unsafe conditions. These responses depend heavily on cognitive processes such as attention to identify and act upon relevant information (Schwebel et al., 2012). Understanding how human factors and psychological processes influence traffic safety is therefore essential to improve traffic safety and pedestrian safety, specifically.

1.2. Human Factors and Traffic Safety

From the mid-20th century onward, traffic safety strategies increasingly relied on engineering and systemic measures. William Haddon's (1980) matrix of pre-crash, crash, and post-crash countermeasures provided one of the first structured frameworks for integrating vehicle design, infrastructure, and human behavior into prevention efforts. This systems-oriented perspective marked a paradigm shift from blaming individual road users toward reducing risks through environmental and design solutions. Building on these foundations, later models such as Sweden's Vision Zero (Tingvall & Haworth, 1999) and the Dutch Sustainable Safety approach (Wegman & Aarts, 2006) advanced the idea of creating more tolerating traffic environments that anticipate human error and minimize its consequences. These initiatives emphasized not only crash avoidance but also survivability, recognizing that while human mistakes are inevitable, serious injury and death should not be. Complemented by global assessments of safety interventions (Elvik & Vaa, 2004; WHO, 2018), this trajectory established the Safe System paradigm, where road safety is treated as an integrated outcome of road users, vehicles, infrastructure, and policies operating in interaction. Today, traffic safety is increasingly framed through the Safe System approach, which emphasizes the interaction and shared

responsibility of all elements of the system (OECD/ITF, 2008; Larsson & Tingvall, 2013). Nevertheless, the classification and definition of human factors in driving have remained largely unchanged. Rather than losing relevance, these human factors have become more visible and valuable within the system perspective, since understanding human limitations and capabilities is essential for designing resilient traffic environments.

Human factors in traffic safety have historically been examined through driving, where two fundamental dimensions are distinguished: driver behaviors and driver skills (Elander et al., 1993). Behavior refers to what road users typically do in traffic their choices, habits, and tendencies, whereas skills describe what they can do in terms of perceptual, cognitive, and motor capacity. While behavior reflects patterns of action shaped by motivation, attitudes, and situational context, skills represent performance capacity that develops through training and experience (Oppenheim & Shinar, 2011). This distinction has guided decades of traffic psychology research and remains fundamental for understanding how errors and unsafe acts arise, as well as for distinguishing between deliberate, habitual actions and performance limitations.

1.2.1. Driver Behaviors

Building on the works of Rasmussen (1982, 1997), whose models emphasized that accidents stem not only from individual error but from the interaction of human performance and system constraints, early psychological research on driver behavior flourished. Driver behavior refers to the observable actions and tendencies that road users bring into traffic situations, including both positive and aberrant forms of conduct. One of the most influential frameworks for classifying unsafe behavior is Reason's (1990) typology, which distinguishes between slips, lapses, mistakes, and violations. Slips are unintended execution failures despite correct intentions, such as pressing the wrong button or stepping into traffic by accident. Lapses denote failures of memory or attention, such as forgetting to look both ways. Mistakes arise when planned actions are based on incorrect mental models, while violations refer to intentional departures from established rules, such as jaywalking or running a red light, which often result not from recklessness but from learned social norms,

pressure, or flawed problem-solving. By introducing this typology, Reason (1990) defined the behavioral part of human factors and helped shift safety research away from blaming individuals toward understanding how environment, design, and cognition interact to result in error.

This typology provided the foundation for the Driver Behavior Questionnaire (DBQ; Reason et al., 1990), which operationalized aberrant acts into measurable categories. Subsequent studies have confirmed the DBQ's factor structure across cultures, with some refinements such as distinguishing ordinary violations from aggressive violations (Lawton et al., 1997). The robust evidence linking violations in particular to crash involvement underscores that behavior is not simply random error but a patterned outcome of psychological, motivational, and contextual influences (Parker et al., 1995). Following effort for expanding the framework to include positive driver behaviors (Özkan & Lajunen, 2005) evidenced that driver behaviors are not only the aberrant ones. Positive drivers were defined as individuals who display courteous, prosocial, and rule-abiding behaviors in traffic, such as patience, politeness, and attentiveness toward other road users, and characterized as not necessarily being directly related to driving safety at first (Özkan & Lajunen, 2005). However, the following work on the redefinition of the concept showed that, positive drivers are multidimensional in nature and could be related to improved road safety outcomes, such as fewer violations, lower aggression, and reduced crash involvement, as well as prosocial interaction with other road users, sustainable mobility practices, and safer traffic performance overall (Doğan et al. 2011; Nandavar et al. 2019; Öz et al., 2014; Yılmaz et al. 2022; Yılmaz & Öz, 2025).

1.2.2. Driver Skills

The second component of human factors in driving, driving skills, refers to drivers' performance capacity across different tasks, such as manoeuvring, hazard detection, and timely decision-making (Elander et al., 1993; Michon, 1985). Skills depend on a driver's actual knowledge, accumulated experience, and information-processing abilities (Summala, 1996). Unlike behaviors, which represent choices and tendencies, skills reflect the upper bound of performance a driver can achieve in a given

situation. A central tool for measuring driving skills is the Driver Skill Inventory (DSI) (Lajunen & Summala, 1995). The DSI distinguishes between two domains. First perceptual–motor skills, which include technical abilities such as steering, braking, and vehicle handling. Second safety skills, which encompass strategies for crash avoidance and broader orientations toward safe driving (Martinussen et al., 2014).

The DSI has been validated and applied across multiple cultural contexts, including studies in Europe and Türkiye (Warner et al., 2014; Sümer et al. 2006). Beyond self-report questionnaires, relationships between skill and behavior have also been explored through experimental approaches, including driving simulators and naturalistic driving studies (Erkuş & Özkan, 2019). The DSI has been one of the most widely applied instruments in the context of examining the relationship between perceived skills and driving behavior, with research spanning various driver groups.

For instance, it has been used to investigate the accuracy of young male drivers' self-assessments of their driving competence (Martinussen et al., 2017) and to examine the links between organizational safety climate, driver behaviors, and performance in professional drivers (Öz et al., 2013). More recently, Üzümcüoğlu et al. (2021) applied the DSI to driving instructors, showing that driving skills mediated the relationship between organizational safety strategies and driver behaviors. Taken together, these studies illustrate that the DSI is not only a psychometric measure of self-perceived driving competence but also a versatile framework that has been validated across novice, professional, and instructor populations, thereby demonstrating its broad relevance for understanding how perceived skills intersect with safety-related outcomes.

Together, the distinction between behavior (style) and skill (performance) forms a central axis in traffic psychology. This framework, developed in the driver-focused literature, has shaped much of traffic psychology. Yet, as the following section illustrates, its influence has remained disproportionately centred on drivers, while pedestrians despite their vulnerabilities have often been overlooked.

1.3. From Drivers to Pedestrians

Developments such as the Safe System Approach and Safety-II thinking (Dekker, 2011; Hollnagel, 2014) which argue that safety emerges from systems designed to accommodate human variability and absorb errors without catastrophic consequences, also laid the foundations for a shift in research approaches and agendas. These models emphasize building resilient systems in which the inevitability of error does not result in fatal outcomes. Over the years, research on human factors in traffic has broadened beyond a narrow focus on driver performance to encompass a wider range of road-user groups and contextual variables.

Skills, errors, and behaviors have been investigated not only among private car drivers but also in professional drivers, motorcyclists, cyclists, and pedestrians, reflecting the growing recognition that traffic safety is a shared responsibility across the system (Öz et al., 2014; Abdulwahid et al., 2022; Useche et al., 2023). In parallel, theoretical and technological advances reshaped how safety was conceptualized and studied: systems perspectives, driving-simulator studies, naturalistic driving methods, and the integration of intelligent transport systems provided new tools for understanding behavior in complex environments (Wynne et al., 2019).

However, despite these theoretical and practical advances, many traffic systems still implicitly prioritize vehicle flow, treating roads primarily as spaces for cars rather than walkable environments (Liu et al., 2021). This is evident in how safety and efficiency are often evaluated through metrics such as driver delay or level of service, rather than pedestrian comfort or delay (Job & Mbugua, 2020). A Safe System perspective on child pedestrians further shows that young road users face risk domains poorly addressed by traditional models (Cloutier et al., 2022). Similarly, global reviews indicate that pedestrian-specific infrastructure and policy interventions remain limited in scope and impact (Sanganaikar & Mulangi, 2024).

Taken together, these systemic and psychological frameworks highlight how traffic safety has historically centred on drivers and vehicle occupants. Considering their unique vulnerabilities and risk conditions, there is a clear need for a deeper

understanding of human factors in pedestrian safety. In this thesis, pedestrian behavior is treated as the central human factor of interest, both as a source of risk and as a potential pathway to safer mobility. By shifting the analytical focus from drivers to pedestrians, the study contributes to extending traffic psychology into a domain that has often been underrepresented, despite its critical importance.

1.4. Pedestrian Behaviors

Given pedestrians' unique vulnerabilities, researchers have developed specialized tools to assess their behavioral patterns. In the early stages of traffic psychology, the focus on human factors naturally cantered on drivers. As the primary operators of fast and heavy vehicles, drivers were regarded as the main agents of risk, and their errors were considered the most immediate causes of crashes (Haddon, 1980; Michon, 1985). Within this context, traffic psychology concentrated on classifying driver errors and violations. Foundational work by Reason (1990) introduced a distinction between slips and lapses (unintentional memory and execution failures), mistakes (planning errors), and violations (deliberate deviations), forming the basis for the Driver Behavior Questionnaire (DBQ) (Reason et al., 1990). Later research expanded on these frameworks, incorporating additional categories such as aggressive behaviors (Lawton et al., 1997) and positive behaviors that promote safety and cooperation (Özkan & Lajunen, 2005). These frameworks, originally developed for drivers, paved the way for examining pedestrian conduct in similarly structured ways.

In response to the growing need to understand pedestrian behavior, several researchers have developed pedestrian-specific assessment tools, most of which are based on self-report measures. Unlike vehicle users, pedestrians have limited physical protection and must navigate complex, often vehicle-dominated settings without the structural and technological safeguards found in modern vehicles (Tefft, 2013; OECD, 2000; Šucha et al., 2021; Yannis et al., 2020). This makes their behavior (e.g., how they assess risks, make decisions, respond to other road users, or engage with infrastructure) a key determinant of both their safety and broader traffic system dynamics (Yoon et al., 2025). To better understand these behaviors, researchers started creating assessment tools to pinpoint strengths and weaknesses.

One of the earliest attempts was the development of the Pedestrian and Traffic Behavior Questionnaire (PBQ) (Moyano Díaz, 1997), which adapted the logic of the DBQ and included concepts from the Theory of Planned Behavior (Ajzen, 1991) to their study. The TPB explains *behavior* as a function of *attitudes*, *social norms,* which refers to the perceived social pressure from important others to perform or not perform the behavior, and *perceived control*, which means the individual's belief about how easy or difficult it is to perform the behavior. In turn together shape *behavioral intentions* (Conner & Armitage, 1998). Applied in this way, the PBQ was designed to capture pedestrians' intentional and unintentional errors. Later, Moyano-Díaz (2002) used the questionnaire to assess road users' attitudes toward different types of violations. Subsequently, Elliott and Baughan (2004) later created the Adolescent Road User Behavior Questionnaire (ARBQ), targeting risk-taking tendencies in younger populations. In France, Granié and colleagues (2013) developed the Pedestrian Behavior Scale (PBS), which became one of the most comprehensive tools for assessing adult pedestrian conduct. The PBS framework included four domains: *transgressions* (deliberate rule-breaking, violations in a sense), *lapses* (unintentional errors), *aggressive behaviors* (interpersonal hostility), and *positive behaviors* (safety-enhancing actions).

In Türkiye, research on pedestrian behavior has increasingly mirrored global developments, particularly in the use of structured self-report instruments, as well as use theoretical frameworks. One of the earliest efforts was made by Yıldırım (2007), who adapted Moyano-Díaz's Pedestrian and Traffic Behavior Questionnaire (PBQ) for the Turkish context to investigate the influence of individual values on pedestrian conduct. Rather than focusing solely on religious values, this adaptation examined broader personal and cultural dimensions shaping behavior. Later, Nordfjærn and Şimşekoğlu (2013) translated PBS (Granié et al., 2013) into Turkish but reported a three-factor structure, namely violations, lapses, and aggressive behaviors, excluding the positive behavior dimension. Their study highlighted the influence of cultural values on pedestrian attitudes and behaviors. A subsequent re-adaptation was conducted by Demir (2017), who validated the full four-dimensional structure of the PBS, including positive behaviors, for use in Türkiye. Drawing upon the *Theory of Planned Behavior* (Ajzen, 1991) and *the Prototype Willingness Model* (Gibbons et

al., 1998), Demir's findings highlighted that pedestrian behavior may not always be fully rational or planned. Instead, pedestrians often act in response to immediate situational cues, social norms, or affective states, rather than long-term intentions or rule-based reasoning.

In addition to the development of measurement tools, numerous studies have investigated the demographic, environmental, and psychological determinants of pedestrian behavior. Age and gender are among the most consistently examined variables (San-Juan-Escudero., 2025; Granié et al., 2013; Wang et al., 2022). Younger pedestrians and males tend to report higher rates of risky behaviors such as violations and aggressive actions, while older individuals and females are generally more cautious and exhibit more positive behaviors (Moyano-Díaz, 2002; Qu et al., 2016; Useche et al., 2021). Environmental conditions such as poor infrastructure, inadequate lighting, or adverse weather have also been shown to influence pedestrian decision-making, often increasing the likelihood of risky crossings or inattentive walking (Azık et al., 2021; Hamed, 2001; Yagil, 2000). On the psychological side, attitudes toward rules, traffic norms, and other road users are important predictors of behavioral patterns (Evans & Norman, 2003; Demir 2017), while several research has explored the role of values (Solmazer et al., 2020; Budak & Özkan, 2025), and impulsivity (Zhou et al., 2009).

These findings collectively support a multidimensional view of pedestrian behavior that integrates internal dispositions with external constraints, suggesting that interventions targeting pedestrian safety should be sensitive to both psychological and contextual variables. Within this framework, risk perception emerges as a particularly critical construct, since it represents the psychological mechanism through which environmental and social factors are interpreted and acted upon. Just as studies on drivers have consistently shown that perceived risk strongly shapes decisions and compliance (e.g., Rundmo & Iversen, 2004; Deery, 1999), research on pedestrians also underscores that understanding how risk is perceived is essential for explaining safety-related behavior (Holland & Hill, 2007; Rankavat & Gupta, 2023). For this reason, investigating risk perception from conceptual and empirical point of view in pedestrian safety has critical value.

1.5. Risk Perception in Relation to Pedestrians' Safety

Risk perception is commonly defined as people's subjective judgments about the likelihood and severity of harm in a given context (Deery, 1999). While early approaches treated these judgments as largely rational evaluations, subsequent work has shown that they reflect a synthesis of cognitive appraisal, affective responses, and contextual cues (Sjöberg, 1998; Slovic, 1987). This plurality has fuelled long-standing debates about what "risk perception" actually is and how it should be modelled. Cognitive perspectives emphasize probability and consequence assessments, the role of controllability and familiarity, and well-known biases (e.g., unrealistic optimism), whereas affect-forward views highlight rapid, somatic "risk-as-feelings" responses that may dominate deliberation under time pressure or uncertainty (Rundmo, 1996; Loewenstein et al., 2001). On the other hand, findings and reviews from social and cultural perspectives stress how norms, values, and institutional contexts shape what is seen as risky in the first place, with cross-national surveys revealing systematic differences in tolerance for rule-bending versus strict compliance (Furian et al., 2016; Meesmann et al., 2025; Varet et al. 2021).

These conceptual disagreements surface clearly in theories of behavior regulation. *Risk Homeostasis Theory* (Wilde, 1982) argues that people seek to maintain a target level of risk and adjust their actions when safety conditions improve or deteriorate. Closely related, *Risk Compensation Theory* (Peltzman, 1975) and Adams' (1995) notion of risk *thermostats* propose that safety interventions may be offset by compensatory behaviors, such as inattentive walking or crossing against signals, if they do not change the individual's underlying tolerance for risk. In contrast, *Zero-Risk Theory* (Näätänen & Summala, 1974) suggests that road users typically act as though they face no risk until a salient hazard emerges, with the subsequent *Threat-Avoidance Model* (Summala, 1996) highlighting the role of direct, immediate cues such as an approaching vehicle in triggering corrective action. Fuller's (2005) *Risk Allostasis Theory* further refines these accounts by conceptualizing risk as a balance between task difficulty and perceived capability, suggesting that pedestrians calibrate their vigilance and caution based on situational demands and confidence in their ability to cope. Beyond these cognitive frameworks, other models emphasize

affective and motivational dimensions. Loewenstein et al.'s (2001) *risk-as-feelings* approach illustrates how emotions can dominate over rational calculation in moment-to-moment decisions, while Protection Motivation Theory (Rogers, 1975) underscores the importance of beliefs in the efficacy of protective behaviors, such as waiting for a pedestrian signal, in shaping safety choices.

Traffic psychology has historically operationalized risk perception through driver-focused studies, linking perceived crash likelihood, hazard appraisal, and optimism bias with behaviors such as speeding, drink-driving, seat-belt use, and distraction (Iversen & Rundmo, 2011). Well-known findings include optimism bias ('I am less at risk than the average driver'), miscalibrations of skill and control, and situation-dependent shifts in perceived danger influencing compliance or violation tendencies (Moen & Rundmo, 2006; Svenson, 1981; Näätänen & Summala, 1974; Wilde, 1982). Recent work continues to confirm these dynamics: Măirean et al. (2022) showed that optimism bias and illusion of control drive risky choices through their effect on perceived risk, while Zhang et al. (2024) demonstrated that low risk perception ability delays hazard-response decisions.

Beyond drivers, research on other vulnerable road users has emphasized different domains of perceived risk. For cyclists, interaction risks such as unsafe overtaking with insufficient clearance, hitting or nearly hitting an opening car door, and junction conflicts, together with infrastructure quality, shape protective strategies like route choice or use of conspicuity aids, while sensation seeking and personality traits sometimes emerge as correlates (Louro et al., 2023; Prince et al., 2025). Among motorcyclists, risk perception has been studied in relation to optimism bias, speed choice, and risk-taking under varied traffic conditions (Chou et al., 2025; Rutter et al., 1998). Large-scale surveys such as the ESRA project further illustrate that cultural and systemic factors influence perceived risk, with cross-national differences observed in how hazards are appraised and how concerns about road safety vary across demographic groups and across different road user types (Furian et al., 2016; Meesmann et al., 2025).

Empirical studies further demonstrate the importance of risk perception for pedestrian behavior (Holland & Hill, 2007; Rosenbloom et al., 2015; Rankavat &

Tiwari, 2016). Pedestrian perceptions are shaped by cognitive biases such as the availability heuristic. For example, pedestrians who frequently see crashes at intersections may overestimate their likelihood, while overconfidence can lead individuals to believe they are personally less vulnerable, encouraging unsafe behaviors like mid-block crossing (Rankavat & Gupta, 2023; Poudel-Tandukar et al., 2007). Such biases can lead pedestrians to underestimate risks in familiar environments or overestimate their ability to avoid danger, even when objective hazards are present (Yu et al., 2020). Research shows that individuals often rely on subjective heuristics, such as overestimating their walking speed or underestimating vehicle distance, which can lead to unsafe crossing decisions despite knowledge of traffic rules (Oxley et al., 2005; Rankavat & Tiwari, 2016). Risk perception also evolves dynamically, shaped by prior experiences, cultural norms, and observations of others' behavior in traffic (Dinh et al., 2020; Rosenbloom et al., 2004). Moreover, perceived urgency or habitual exposure can override recognition of objective danger, prompting pedestrians to take shortcuts through unsafe crossings (Sisiopiku & Akin, 2003).

Debates persist about whether risk perception is primarily a rational, cognitive evaluation or is more strongly shaped by emotions, heuristics, and social norms. While foundational theories such as *Risk Homeostasis Theory* emphasize its role in balancing behavior (Wilde, 1982), models like the *risk-as-feelings* perspective highlight how emotions can distort rational decision-making (Loewenstein et al., 2001). These tensions in decision-making are particularly salient for pedestrians, who often face unpredictable environments and lack formal behavioral scripts. A research confirms this by evidencing that emotional states such as sadness or happiness alter pedestrians' risk appraisal and crossing decisions (Herrero-Fernández et al., 2016). Other studies indicate that worry and fear influence pedestrian behavior in complex ways; for example, fear may promote safer decision-making in high-risk situations, yet in lower-risk contexts it can lead to hesitation or inefficiency (Kummeneje & Rundmo, 2019; Wang et al., 2022). Taken together, these theories and findings highlight that risk perception is neither a static trait nor a purely rational evaluation, but a context-sensitive process that underpins everyday pedestrian decision-making (Zhou et al., 2009, Cœugnet et al., 2019, Tom & Granié, 2011). For

pedestrians, who often lack protective infrastructure or act without strict behavioral scripts, understanding risk perception is particularly critical. Risk perception not only shapes compliance with traffic rules but also conditions how individuals interpret ambiguous or unsafe conditions, thereby influencing whether they choose safer or riskier courses of action in real time. These interpretations, however, are themselves can be shaped by attitudes, which filter how risks are appraised and acted upon.

1.6. Attitudes in Relation to Pedestrian's Safety

While risk perception provides a lens through which pedestrians interpret situational hazards, it does not arise in isolation or determine the outcomes solely. Rather, it is embedded within broader cognitive and social constructs, most notably attitudes, which shape how risk is appraised, internalized, and acted upon (Ajzen, 1991; Iversen & Rundmo, 2011). Attitudes are enduring psychological tendencies that reflect individuals' evaluations, positive or negative, toward objects, people, behaviors, or abstract concepts (Petty et al., 2007).

In the context of traffic safety, they are among the most studied psychological predictors of deliberate behavior, reflecting individuals' evaluations, beliefs, and emotional orientations toward specific aspects of the traffic environment (Eagly & Chaiken, 1993; Forward, 2009). The role of attitudes has been extensively documented in driver-related contexts such as speeding, seat belt use, or rule compliance, where they strongly predict risky or safe behaviors (Kweon & Kockelman, 2010; Iversen & Rundmo, 2011). Attitudes influence not only the threshold at which individuals perceive a situation as dangerous, but also how they choose to respond to it. For example, a pedestrian who views traffic rules as flexible may interpret a red light as a negotiable barrier rather than a strict safety boundary, thereby recalibrating their perception of risk in that moment (Kim et al., 2024). In this way, attitudes serve as a foundational mechanism that interacts with, and often precedes, the perception of risk (Hossain et al., 2024; Dinh et al., 2020).

Across diverse cultural contexts, researchers have consistently explored how pedestrians' attitudes shape their behavior in traffic environments. An extensive

cross-cultural study affirmed that attitudes, particularly those concerning traffic norms and perceptions of enforcement play a central role in pedestrian safety outcomes across different countries (Yannis et al., 2020). In Vietnam, Dinh et al. (2020) demonstrated that positive attitudes toward road safety and infrastructure significantly predicted compliant crossing behavior. In Greece, Papadimitriou et al. (2012) found that young pedestrians with permissive attitudes toward rule violations were more likely to engage in risky crossing behaviors. In Bangladesh, Pasha et al. (2015) observed that negative evaluations of infrastructure were linked with frequent violations and unsafe walking habits. These examples illustrate how attitudes can either amplify or buffer the translation of perceived risk into actual behavior.

Additional studies highlight the more specific ways in which attitudinal dimensions influence risk-related decisions. People often judge themselves as safer and more compliant than others, attributing greater risk to other road user, an effect documented across multiple traffic contexts (Useche et al., 2022). For instance, Chung (2019) found that elderly pedestrians in China who maintained favourable views toward direct street crossing, despite their reduced perceptual timing abilities, were more likely to make unsafe decisions. Attitudes also extend to modern challenges such as distracted walking. Hou et al. (2021) and Lennon et al. (2017) showed that supportive attitudes toward mobile phone use while walking strongly predicted intentions to cross while distracted.

Cross-national comparisons further reveal that the behavioral relevance of risk perception and safety attitudes can vary considerably across cultural contexts. In a study comparing Turkish and Norwegian road users, Şimşekoğlu et al. (2012) reported that Turkish participants exhibited higher levels of perceived risk, but these perceptions were not significantly related to actual safety behaviors or attitudes. By contrast, stronger associations were observed in the Norwegian sample. The authors argue that in traffic environments characterized by weak enforcement and prevalent informal norms, perceived risk alone may not be sufficient to alter behavior, highlighting the need to consider traffic climate and cultural context when modelling psychological influences on road safety. While international research demonstrates the importance of attitudes, studies in Türkiye remain limited. Early work by

Nordfjærn and Şimşekoğlu (2013), adapting a driver-focused scale, found that pedestrian attitudes were associated with both risk perception and self-reported behavior, supporting the relevance of cognitive models like the Theory of Planned Behavior (Ajzen, 1991). Building on this, Serin et al. (2018) developed the Pedestrian Attitudes Scale, showing that negative attitudes toward traffic rules and other road users predicted greater rule violations and attentional errors. These findings underline the importance of context-sensitive psychological measures in understanding pedestrian safety. Nevertheless, research in Türkiye remains scarce and methodologically fragmented, reinforcing the need for more systematic investigations (Aktaş et al., 2025).

Although a substantial body of research has investigated attitudes within pedestrian safety studies, often under the framework of the Theory of Planned Behavior (TPB; Ajzen, 1991), this literature is marked by theoretical and methodological inconsistencies. Meta-analyses and reviews confirm that while the TPB is the most widely applied model in traffic behavior research, its implementation in pedestrian contexts is uneven. Some studies operationalize its constructs differently, others extend the model with additional variables, and many apply it without robust validation (Zainal et al., 2023; de Souza et al., 2024). These inconsistencies complicate efforts to synthesize findings or generalize conclusions.

While the TPB provides a strong foundation for examining intentional behavior, the present study adopts a broader perspective by situating attitudes within a moderated framework that integrates risk perception and declared pedestrian behaviors. In doing so, it seeks to clarify the role of attitudinal processes without being confined to a single theoretical model. This perspective builds directly toward the aims of the thesis, where attitudes are not only examined as independent predictors of pedestrian behavior but also as potential moderators of how risk perception translates into everyday traffic decisions.

1.7. The Aim of the Present Study

The preceding sections have outlined key constructs and variables in pedestrian safety research, from physical vulnerabilities to psychological mechanisms. In

summary, this chapter has highlighted a multilayered understanding of pedestrian safety by reviewing the systemic, psychological, and behavioral dimensions that shape outcomes in traffic environments. While pedestrians remain structurally vulnerable and often underserved in both infrastructure design and safety policy, their behavior, shaped by individual risk perception and attitudes, plays a critical role in navigating everyday hazards (Bendak et al., 2021; Yannis et al., 2020). Previous research has identified key psychological predictors of pedestrian behavior, including rule flexibility, perceptions of enforcement, evaluations of infrastructure, and attitudes toward other road users (Soathong et al., 2022; Lennon et al., 2017; Serin et al., 2018). However, these constructs have often been measured using adapted instruments originally designed for drivers or generalized traffic contexts, limiting their ecological validity and contextual sensitivity in pedestrian-specific settings (Elliott & Baughan, 2004; Demir, 2017; Granié et al., 2013; Nordfjærn & Şimşekoğlu, 2013; Serin et al., 2018). As a result, critical aspects of pedestrian decision-making, such as how individuals interpret physical infrastructure or navigate shared spaces with drivers and other road users, remain underexamined or inconsistently captured. Furthermore, although risk perception has long been recognized as a central factor in traffic safety, only a few studies have directly addressed how pedestrians subjectively assess risky situations in dynamic, real-world contexts (Liu et al., 2021; Ngueutsa & Kouabenan, 2017).

The present study addresses these conceptual and methodological gaps by bringing together three main variables being related to pedestrian safety under two main aims:

1) It aims to conceptualize and measure pedestrian risk perception in a systematic and context-sensitive manner, ensuring that the diversity of risky situations encountered in everyday walking is adequately represented for the first time. That is, this study aimed to develop a risk perception scale for pedestrians in order to understand the structure of this critical concept for this specific group of road users.

2) In the present study, it is aimed to examine how multidimensional risk perception relates to pedestrian behavior, including violations, lapses, aggressive actions, and positive behaviors under the moderating role of

attitudes, particularly attitudes toward traffic rules and other road users, in shaping how risk perception translates into behavioral outcomes

By integrating these objectives, the thesis extends theoretical work on traffic psychology by situating attitudes and risk perception jointly within a framework for explaining pedestrian behavior (Ajzen, 1991; Iversen & Rundmo, 2011; Dinh et al., 2020). This approach not only builds on established cognitive and attitudinal models but also responds to repeated calls for more context-sensitive psychological tools in pedestrian safety research (Demir, 2017; Granié et al., 2013; Serin et al., 2018).

CHAPTER 2

STUDY 1: DEVELOPMENT OF "THE PERCEPTION OF RISKY SITUATIONS SCALE FOR PEDESTRIANS (PRSS-P)"

2.1. Introduction

Risk perception is widely acknowledged as a key psychological construct for explaining safety-relevant behavior in traffic settings. However, in pedestrian research its measurement remains fragmented and inconsistently operationalized. Existing studies frequently rely on generic traffic safety questionnaires or adapt instruments originally developed for drivers, thereby overlooking the distinct hazards and decision contexts that pedestrians face (Elliott & Baughan, 2004; Rundmo & Iversen, 2004; Gehlert et al., 2014). Other studies use very limited item sets sometimes only a handful of questions to index "perceived safety," which constrains reliability and weakens the interpretability of findings (Nasrudin et al., 2020; Pasha et al., 2015). As a result, the literature lacks a comprehensive, pedestrian-specific instrument that can validly capture how pedestrians experience and appraise risk in diverse, real-world situations.

A growing body of qualitative and cross-national evidence underscores why context must be central to measurement. Pedestrian risk perceptions are shaped not only by the objective presence of hazards, but also by local cultural norms, patterns of law enforcement, and features of the built environment (Katopola et al., 2022; Villaveces et al., 2012; Kummeneje & Rundmo, 2019; López-Lambas et al., 2023). Large-scale surveys such as ESRA show substantial variation across countries and demographic groups in both the salience and appraisal of traffic risks, indicating that risk perception is socially and systemically embedded (Furian et al., 2016; Meesmann et al., 2025). At the micro-level, empirical work on crossing interactions demonstrates

that perceived safety is influenced by drivers' yielding and attentiveness, as well as by design elements that structure pedestrian–vehicle negotiations (Zafri et al., 2022). Together, these findings suggest that instruments must speak the language of local situations, including infrastructural cues, temporal pressures, social signals, and enforcement climates, if they are to represent pedestrian risk perception adequately.

Despite these insights, current tools often transpose driver-oriented constructs to pedestrian settings, assume uniformity of risk cues across environments, and offer narrow coverage of situational variations such as multilane arterials, shared spaces, night-time visibility, phone distraction, or group influence. This raises the risk of construct underrepresentation and context bias (Herrero-Fernández et al., 2016; Papadimitriou et al., 2016). In turn, theoretical models linking risk perception to pedestrian behaviors, and to related determinants such as attitudes, cannot be tested with sufficient precision, and interventions informed by such evidence may target wrong levers or wrong contexts.Against this background, Study 1 was conceived as a qualitative investigation designed to ground measurement in the realities of pedestrian experience. The study employed semi-structured interviews to elicit how pedestrians describe, categorize, and evaluate risky situations they encounter in everyday mobility. This approach allows the research to (a) surface situational detail that is often lost in highly structured survey items, (b) capture the language and appraisals pedestrians use spontaneously, and (c) map the range and structure of risky scenarios across different urban contexts. Conducted within the conditions of Türkiye's traffic environment, the study pays particular attention to infrastructural design, signalization and crossing opportunities, driver–pedestrian dynamics, informal norms, and enforcement experiences that together frame local risk appraisals.The primary objective of Study 1 was therefore to document the spectrum of context-specific risky situations and to identify the cognitive–affective cues pedestrians use when appraising these situations. A second objective was to translate these insights into a conceptually organized item pool that represents the breadth of pedestrian risks with sufficient elaboration to support subsequent quantitative refinement. In practical terms, this entails generating possible items that reflect realistic, ecologically grounded situations (e.g., multilane crossing gaps, obstructed sightlines, driver non-yielding, crowd-induced crossing, night visibility, time

pressure, phone distraction), along with appraisal language that resonates with pedestrians lived experience. By positioning validity and contextual fit at the centre of instrument development, Study 1 addresses two recurring limitations in the literature: the tendency to model pedestrian risk perception through imported constructs and over-generalized items, and the tendency to ignore systemic and infrastructural variability that recalibrates risk judgments across contexts (Elliott & Baughan, 2004; Gehlert et al., 2014; Nasrudin et al., 2020; Pasha et al., 2015; Katopola et al., 2022; López-Lambas et al., 2023). The resulting item pool rooted in authentic experiences and expressed in pedestrians' own terms, is aimed to provide a defensible foundation for the subsequent quantitative refinement and validation reported in later chapters.

2.2. Method

To investigate pedestrians' perceptions of risk in real-world contexts and to ensure that the developed measurement tool would be grounded in authentic experiences, this study employed a qualitative design using semi-structured interviews. Such interviews are widely recommended in exploratory phases of scale development because they provide both the structure necessary for comparability across participants and the flexibility to capture unanticipated insights (Creswell & Poth, 2018; Yıldırım & Şimşek, 2021). This approach allowed the researcher to probe participants lived experiences in traffic, explore nuanced interpretations of risk, and generate ecologically valid content for subsequent quantitative testing. Combining literature-driven themes with emergent patterns from the interviews ensured that the analysis reflected both established theoretical constructs and context-specific factors. The methodological choices were guided by best practices in scale development (Boateng et al., 2018), which emphasize the value of qualitative inputs, expert review, and iterative refinement in generating valid, contextually relevant instruments.

2.2.1. Participants

A total of 25 participants were recruited for the qualitative phase. Snowball sampling was used to ensure diversity in age, gender, educational background, and walking

habits. All participants were regular pedestrians with varying exposure to urban traffic environments. Four interviews were excluded due to poor audio quality, off-topic content, or communication difficulties, yielding 21 interviews for analysis (male = 11, female = 10; age range = 18–36 years, M = 23.62). This sample was considered sufficient because thematic saturation was reached, no new themes emerged in later interviews (Guest et al., 2006; Yıldırım & Şimşek, 2021).

2.2.2. Procedures

The semi-structured interview protocol was developed through a multi-step process designed to ensure theoretical grounding and contextual relevance. This helped identify common hazardous situations, behavioral patterns, and conceptual dimensions and items relevant to pedestrians. Ethical approval for the study was obtained from the Middle East Technical University Human Subjects Ethics Committee (HSEC; see Appendix A). Participants were recruited through convenience sampling (Etikan et al., 2015) between February and March 2024. This method was chosen for its practicality in accessing a range of participants who were readily available while still allowing for demographic diversity. Interviews were conducted face-to-face, either in public urban settings (e.g., streets, parks) or within the university environment, depending on the participant's preference and availability. Each interview lasted approximately 15–30 minutes and was audio-recorded with the participant's verbal consent. Before the interviews, participants were informed about the purpose of the study, assured that their responses would remain anonymous, and reminded of their right to withdraw at any poin without consequence (Orb et al., 2001).

2.2.3. Measurement

Demographic data were collected to aid interpretation, including age, sex, education level, driver's license ownership and active driving status, accident and near-miss history, primary modes and purposes of transport, average daily walking time, walking preferences, and self-reported compliance with traffic rules (see Table 1). In order to reach the final version of the interview form, an initial draft of open-ended questions was prepared based on several sources.

Table 1. Demographic characteristics of 21 participants included in interviews.

No	Age	Sex	Education	Primary Mode	Purpose of use of Transport	W. Amount	Walking Time of the Day	Walking Purpose	Comp. (%)
1	19	M	Undergraduate	PT	To reach uni	30	Mornings and afternoons	Between PT and destination	80
2	21	M	Undergraduate	PT	To commute / leisure	60	Mornings and afternoons	Leisure time	80
3	24	F	Undergraduate	PT	To reach uni and work	60	Afternoons	Between PT and destination	65
4	18	M	Undergraduate	PT	To reach uni / leisure	60	Noons	To reach uni / leisure	90
5	22	F	Undergraduate	PT	To reach uni / leisure	45	Noons and afternoons	To reach uni / leisure	70
6	36	M	Master's student	PT	To commute	30	Mornings and afternoons	To reach work	60
7	24	F	Master's student	PT	To commute	30	Mornings and afternoons	To reach work and home	70
8	27	M	Master's student	Personal car	To commute	40	Evenings	Leisure	80
9	18	F	Undergraduate	PT	To reach uni / leisure	120	Mornings and afternoons	To reach uni / leisure	75
10	34	M	Doctoral student	PT	To reach work and home	30	Mornings and afternoons	To reach work and home	100
11	22	M	Undergraduate	Personal car	To reach uni and home	45	Noons and afternoons	To reach uni and home	75
12	22	M	Undergraduate	PT	To reach uni and home	30	Noons and afternoons	Between PT and destination / leisure	75
13	34	F	Doctoral student	Personal car	To reach work and home	90	Noons and afternoons	Leisure	80
14	23	M	Undergraduate	Personal car	To reach uni and home	40	Mornings and noons	To reach classrooms and home	90
15	18	F	Undergraduate	PT	To reach uni	60	Mornings and afternoons	To reach uni and home	75
16	18	F	Undergraduate	PT	To reach uni and home	60	Mornings and evenings	To reach uni, classrooms and home	75
17	27	F	Doctoral student	Walking	Leisure time act.	45	Mornings and afternoons	Leisure time act.	85
18	25	F	Master's student	PT	To commute and leisure	40	Mornings and afternoons	To reach work and leisure	80
19	21	M	Undergraduate	Walking	To reach classrooms and cafeteria	60	Noons and afternoons	To reach classrooms and cafeteria	90
20	22	M	Undergraduate	Walking	To reach classrooms and leisure	150	Mornings and afternoons	To reach classrooms, leisure	85
21	21	F	Undergraduate	Walking	To reach classrooms and cafeteria	60	Noons and afternoons	To reach classrooms and cafeteria	75

Note. PT = public transportation, uni = university, act. = activity, w.amount = average daily walking amount reported, Comp. (%) = of compliance with traffic rules

First, the researcher's own field observations in Ankara and on the Middle East Technical University (METU) campus provided examples of risky behaviors and infrastructural deficiencies not always captured in the literature, ensuring that local realities would be represented.

Second, several aspects risk perception from frameworks and several studies has been implemented into questions to understand evaluations, feelings, and thought of participants about risks in traffic environment (Fuller, 2005; Gehlert et al., 2014; Loewenstein et al., 2001; Rundmo, 1996). Finally, elaborative discussion made with the thesis advisors to finalize the list of questions. This draft was piloted with two volunteer pedestrians to assess clarity, cultural appropriateness, and logical flow, after which minor adjustments were made, such as simplifying wording and reordering questions for better narrative progression. The final version of the interview form consisted of nine demographic questions and fourteen experience-based questions. These ranged from broad conceptual prompts: such as "What does being a pedestrian mean to you?" and "What does pedestrian priority mean to you?", to specific probes about safety and precautions, for example, "Can you describe a recent situation in which you felt unsafe while walking?" and "Do you take any precautions against the risks posed by dangerous situations as a pedestrian?"(for full list see Appendix B).

2.3. Results

In analysing the interview data for item development, a multi-stage analysis process was conducted. All transcripts were read line by line to capture initial impression, with short descriptive labels attached to segments of text that reflected risks, feelings, or behaviors (see Table 2). For instance, statements such as "drivers don't look at the crosswalk" were coded as driver inattention, while remarks like "I feel invisible as a pedestrian" were coded as lack of priority. As coding progressed, similar codes were grouped into broader categories, and these categories were then refined into themes that captured recurring patterns across participants. To ensure clarity, categories were reorganized when overlaps emerged, and each theme was named to reflect its central organizing idea.

Table 2. Interviews' results in codes and example quotes

Questions	Descriptive Labels	Example Quotes
1) "What does it mean to be a pedestrian according to you? What comes to mind when you think of a pedestrian?"	A person providing transportation without a vehicle / walking person (N = 14)	"A pedestrian is simply someone moving on foot, not using any vehicle." (P5)
	The most vulnerable/disadvantaged in traffic (N = 4)	"Pedestrians are the weakest in traffic; they have no protection." (P9)
	Requires being careful (N = 2)	—
	Seen as difficulty (N = 1)	"I think it is a troublesome thing, feels like a burden." (P18)
2) "Do you comply with the traffic rules? Can you define it as percentages?"	Yes, generally obey (80–90%) (N = 12)	"I try to follow all rules as much as I can, most of the time I do." (P11)
	Try to obey / as much as possible (70–75%) (N = 4)	—
	Less obedient as a pedestrian / conditional obedience (N = 3)	—
3) "To what extent do you think the rules ensure pedestrian safety?"	Rules are sufficient if applied/obeyed (N = 8)	"If everyone followed them, it's enough." (P3)
	Not sufficient / do not ensure safety (N = 7)	"It doesn't ensure, especially outside campus." (P14)
	Provides safety (conditionally) (N = 5)	"It ensures if both sides obey." (P13)
4) "How safe do you feel as a pedestrian?"	Not feeling very safe (N = 8)	"It doesn't feel safe outside ODTÜ, I feel vulnerable." (P18)
	Generally safe (N = 6)	"I feel safe, but I need to be extra careful at crosswalks." (P12)
5A) "What does the concept of 'pedestrian priority' mean to you?"	Pedestrian's right-of-way, especially at crosswalks/intersections (N = 11)	"At zebra crossings, pedestrians should be the first to pass." (P15)
	Priority for non-vehicle owners/vulnerable road users (N = 2)	—
	No real meaning in Türkiye (N = 2)	"On paper it exists, but in real life here it's meaningless." (P5)
	Never heard of it (N = 2)	—

Table 2. (continued)

“	Descriptive Labels	Example Quotes
5B) “How much do you feel prioritized as a pedestrian?”	Do not feel prioritized (N = 15)	“There are times when I throw myself on the road … to teach drivers…” (P13)
	Feel prioritized within campus, but less so outside (N = 4)	“In campus yes, but in the city not really.” (P15)
	Feel always prioritized (N = 1)	—
6) “What kind/how are situations dangerous in traffic?”	Drivers' carelessness/intolerance/not obeying rules (N = 15)	“Drivers consider themselves superior to pedestrians.” (P6),
	Pedestrians' carelessness (N = 3)	—
	Motorcycles/scooters (N = 4)	“Motorcycles suddenly appearing on the sidewalk.” (P10)
	Lack of infrastructure (N = 3)	—
7) What risks do these dangerous situations you previously mentioned carry?”	Accidents/collision (N = 10)	“Collisions happen in a split second.” (P15)
	Injury/physical harm (N = 10)	“Even a small hit can hurt badly.” (P2)
	Death/fatal outcomes (N = 8)	“One bad hit and you could die.” (P10)
	Psychological/mental harm (N = 3)	—
	Financial/material damage (N = 3)	—
8) “If you were in/were to be in such a risky situation, what feelings would you experience?”	Fear/anxiety (N = 10)	“I always feel anxious near speeding cars.” (P2)
	Anger/frustration (N = 6)	“Frustration at how careless people is.” (P9)
	Helplessness (N = 5)	—
	Sadness (N = 2)	—
9) If you were in/were to be in such a risky situation, which thoughts would cross your mind?”	Consequences/aftermath Survival/what to do (N = 6)	“I’d think about the injuries I might get.” (P8)
	Survival/what to do (N = 5)	“How can I get out of the way fast?” (P14)
	Thoughts about family/loved ones (N = 3)	—
	Who to blame (N = 5)	—

Table 2. (continued)

Questions	Descriptive Labels	Example Quotes
10) “As a pedestrian, do you take any precautions against the risks posed by dangerous situations? What do you do?”	A) Yes: take precautions (Patience (N = 4), checking (N = 11), following rules (N = 5), awareness (N =3))	“I always scan the road before stepping in.” (P10), “If I see a car coming, I walk faster.”, (P7) “I don’t use my phone while crossing.” (P15)
	B) No active precautions (N = 4)	-
11) “What should generally be considered for safer road use in traffic?”	Adherence to traffic rules (N = 11)	“I try my best to follow rules; there is not much else to do!” (P19)
	Education/awareness campaigns (N = 4)	“Awareness programs could change behaviors.” (P2)
	Infrastructure improvements (N = 4)	“More pedestrian bridges and underpasses.” (P15)
	Addressing social/cultural issues (N = 3)	“Respect for pedestrians should be part of our culture.” (P3)
	Better enforcement (N = 2)	—
	Caution (N = 2)	—
12) “What should pedestrians generally pay attention to for safer road use?”	Adherence to pedestrian rules (N = 10)	“Cross at designated places.” (P7)
	Awareness of surroundings (N = 5)	“Keep an eye on the traffic flow.” (P10)
	Avoiding distractions (N = 4)	—
	Wearing visible clothing (especially at night) (N = 2)	—
13) “What is the most positive event you have ever experienced as a pedestrian in traffic?”	Drivers giving way/stopping (N = 10)	“Once a driver stopped and waved me across.” (P8)
	Being given a ride/hitchhiking (N = 2)	—
	No specific positive event (N = 3)	—
14) “What is the most negative event you have ever experienced as a pedestrian in traffic?”	Near-misses/close calls/minor injuries (N = 13)	“A car missed me by just a meter.” (P7)
	Being verbally abused/confronted by drivers (N = 3)	“Someone swore at me in traffic.” (P5)
	No specific negative event (N = 5)	“Can’t think of anything negative.” (P16)
	Vehicles driving too fast near them	—

Themes were reviewed for coherence and distinctiveness, clarified around their central ideas, and then reported with representative participant quotes to link them directly to the scale development process. Four overarching themes emerged. The first, Disempowerment, captured perceptions of vulnerability and lack of priority in traffic, with codes such as “the most vulnerable,” “do not feel prioritized,” and “being a pedestrian means helplessness.” The second theme, Sources of Risk, emphasized drivers’ inattention as the primary danger, but also included infrastructural shortcomings and self-induced risks, reflected in codes like “lack of infrastructure” and “pedestrian carelessness.” The third, Reactions to Risk, cantered on emotional and cognitive responses, including fear, anxiety, and post-event rumination. Finally, the theme of Compliance and Safety Practices highlighted attitudes toward rules and strategies for navigating hazards, illustrated by codes such as “rules are sufficient if applied,” “pedestrian right-of-way violations,” and “checking carefully.” (see Table 3).

Table 3. Thematic evaluations of the interviews results

Themes	Example Codes	Example Quotas
Disempowerment	“The most vulnerable”, “Do not feel prioritized”, “Being pedestrian means helplessness”.	"Drivers consider themselves superior to pedestrians." (P1) “I feel not valued as a pedestrian” (P2) “I don’t feel prioritized; this road is vehicle road not ours.” (P12)
Sources of Risk	“Drivers' carelessness”, “Drivers' intolerance”, “Excessive speed on roads”	“Driver’s inattention is the biggest danger” P(11) “Excessive speeding, and driving under influence is dangerous” (P15)
Reactions to Risk	“Fear”, ”Anxiety”, ”Figuring out what to do after”	“I feel unsafe of course, and anger” (P3) , “I get panicked, think about death” P(7), “I get extremely anxious and annoyed.1 (P16)
Compliance and Safety Practices	“Rules are sufficient if applied”, “Checking carefully”.	“If you follow rules, but most people don’t” (P4), “Rules are okay, but people take initiatives.” P(6), “Even if I am at zebra crossing, I must wait and let them pass”. (P7)

The item pool was generated from multiple sources in line with established guidelines for scale construction (Boateng et al., 2018). First, themes and codes from the interviews, as well as direct quotations directly informed 20 items, many of which reflected driver–pedestrian interactions, infrastructural shortcomings, and feelings of vulnerability, particularly in uncontrolled environments. Example items that are derived from interviews were: “Insufficient promotion of the pedestrian priority concept, leading to problems at crosswalks”, “The general traffic environment being aggressive and tense”, and “Taxi drivers exhibiting dangerous driving styles”. Second, policy and regulatory documents contributed formalized safety expectations, including the Turkish Highway Traffic Safety Strategy Plan 2021–2030 (15 items), the U.K. Highway Code (7 items), and the U.S. Highway Code (3 item). Examples from policy and regulatory documents were: “Inadequate infrastructure for elderly and disabled pedestrians (auditory/visual signals, tactile paving, ramps)”, “Pedestrians attempting to cross from unsafe points to catch public transport vehicles”, and “Insufficient pedestrian safety education”. Third, an extensive literature review on pedestrian behavior, traffic safety, and risk perception was conducted, drawing on both international and Turkish sources (Elliott & Baughan, 2004; Papadimitriou et al., 2017; Pasha et al., 2015; Yılmaz & Öz, 2023) further contributing 20 items (e.g., Elliott & Baughan, 2004; Pasha et al., 2015; Nasrudin et al., 2020, etc.). Example items that are derived from literature review were: “Pedestrians attempting to cross under the assumption that “the approaching vehicle will stop anyway” and “Pedestrians behaving carelessly under the assumption that others don’t follow the rules either”.

Forth, the researcher’s personal experiences and field observations contributed eight items, particularly those reflecting culturally specific behaviors and emotional reactions to traffic situations. Examples from personal experiences and field observations are: “Pedestrians attempting to cross under the assumption that “the approaching vehicle will stop anyway”, “Children and young people spending time on or near the roadway (playing ball/tag, skateboarding/rollerblading, socializing, racing, etc.)”, and “Pedestrians walking on the road due to physical obstacles (narrow sidewalks, street vendors, etc.)”. Finally, consultations were held with three academic experts in traffic and transportation psychology evaluated the thematic

scope of the questions and verify the language fit to relevant study framework. Additionally, elaborative discussions with the advisors held.

This process produced an initial set of 73 items (see Appendix C for the full list in the original Turkish). Following item generation, a multi-stage expert review process was conducted to ensure content validity and cultural appropriateness (Haynes et al., 1995). First, both thesis advisors reviewed the items for theoretical alignment, clarity, and redundancy. Second, three doctoral-level researchers specializing in traffic and transportation psychology evaluated the items' relevance to four hypothesized dimensions of pedestrian risk perception, suggesting reclassification or refinement where needed. Third, three Turkish language education experts reviewed the items for grammatical clarity, accessibility, and linguistic precision. Based on feedback from these stages, 13 items were removed due to redundancy, low relevance, or poor conceptual fit, resulting in a final scale of 60 items (see Appendix D for the full list in the original Turkish).

2.4. Discussion

The analysis conducted in Study 1 revealed that pedestrian risk perception is a multidimensional construct shaped by an interplay of driver-related risks, environmental and infrastructural hazards, and situational or social factors. Participants' accounts demonstrated that these categories are not perceived in isolation; rather, they interact dynamically within the lived experience of walking in diverse traffic environments.

Driver-related risks emerged as the most immediate and salient threat in participants' narratives. Speeding, red-light violations, and inattentive turning were frequently cited, with many participants describing near-miss experiences as pivotal moments that heightened their future vigilance. This aligns with previous research showing that direct interactions with vehicles strongly influence risk perception (Katopola et al., 2022; Parajuli et al., 2025). Some participants also described that inconsistent or delayed driver yielding made it difficult to anticipate safe crossing moments, a perception supported by experimental findings showing that drivers' yielding

behavior strongly shapes pedestrians' crossing comfort and sense of safety (Zafri et al., 2022).

Environmental and infrastructural factors were described both as amplifiers and mitigators of perceived risk. Poor lighting, obstructed sidewalks, and the absence of designated crossings were particularly salient for women and older adults, who linked these conditions to feelings of vulnerability during night-time walking. Conversely, participants highlighted that certain infrastructure improvements, such as pedestrian islands or raised crosswalks could reduce anxiety, although some admitted becoming less attentive in these "safer" zones, reflecting patterns predicted by Risk Homeostasis Theory (Wilde, 1982). These findings reinforce the argument that infrastructure influences not only objective safety but also the subjective judgments that shape pedestrian behavior (Hashemiparast et al., 2017; Guo et al., 2022).

Situational and social dimensions further enriched the complexity of pedestrian risk perception. Participants' sense of safety often varied depending on time of day, crowd density, and familiarity with the area. Several reported that in familiar neighbourhoods, they were less cautious and more likely to engage in risky crossings (Rundmo & Iversen, 2004), a pattern paralleling the *normalization of risk* effect observed in other traffic safety contexts (Kaviani et al. 2021). Cultural familiarity also played a role: migrant pedestrians and those less familiar with local traffic norms described greater uncertainty, particularly in interpreting drivers' intentions or signal phases, echoing earlier findings by Villaveces et al. (2012) and Kummeneje and Rundmo (2019).

Perhaps the most striking finding of Study 1 was the near absence of self-referential risk (pedestrian-related) acknowledgment as a distinct category. While participants readily identified driver behaviors, environmental shortcomings, and socio-cultural influences as sources of danger, they rarely recognized their own inattentiveness, violations, or risk-taking as potential contributors to risky situations. This absence of self-referential risk framing mirrors a broader conceptual tendency to treat pedestrians primarily as passive recipients of risk rather than active agents within the

traffic system (Papadimitriou et al., 2017; Kummeneje & Rundmo, 2019). Safety regulations and enforcement practices often reinforce this framing by focusing on either pedestrian rule compliance or motorist obligations, leaving limited space for the idea that pedestrians can actively contribute to unsafe conditions through inattentiveness, noncompliance, or overconfidence. Recognizing this gap, the PRSS-P intentionally incorporates items that address pedestrian-related risks, ensuring that the instrument captures the full spectrum of potential hazard sources, including those originating from pedestrian behavior itself."

Taken together, these theoretical dimensions indicated that pedestrian risk perception cannot be adequately captured through single-item measures or scales borrowed from driver-focused research (Elliott & Baughan, 2004; Gehlert et al., 2014). The qualitative evidence here supports a more comprehensive approach that incorporates multiple domains of risk, contextualized within the pedestrian's immediate environment and broader socio-cultural setting. Furthermore, the variability in how similar hazards were interpreted, sometimes as minor inconveniences, other times as serious threats, highlights the subjective nature of risk appraisal and its sensitivity to personal, situational, and cultural factors.

By systematically documenting a broad spectrum of risky situations through in-depth interviews, Study 1 directly addresses a methodological gap in the literature, where qualitative studies on pedestrian safety have tended to focus narrowly on specific settings or behaviors (Hashemiparast et al., 2017; López-Lambas et al., 2023). These findings informed the development of the Perception of Risky Situations Scale for Pedestrians (PRSS-P), ensuring that item content reflects both the diversity of hazards pedestrians encounter and the contextual factors that shape their interpretation including the often-overlooked dimension of pedestrian-related.

CHAPTER 3

MAIN STUDY: EXAMINING THE RELATIONSHIPS BETWEEN RISK PERCEPTION, ATTITUDES, AND PEDESTRIAN BEHAVIORS

3.1. Introduction

The literature has shown that individual differences in risk perception play a pivotal role in shaping road user behaviors (Jing et al., 2022). Pedestrians who perceive traffic situations as more hazardous tend to adopt more cautious strategies, whereas those with a lower perception of risk may engage in violations, lapses, or aggressive behaviors (Salducco et al., 2022). However, this relationship is not linear. Empirical findings suggest that attitudes toward traffic rules and other road users do more than merely co-exist with risk perceptions; they can mediate or moderate how perceived risk translates into pedestrian behavior (Holland & Hill, 2007; Ulleberg & Rundmo, 2003). For instance, in a comprehensive study involving over 800 Vietnamese road users, safer attitudes toward traffic safety partially mediated the relationship between perceived traffic risk and pedestrian behavior, indicating that even when risk was recognized, attitudinal stance toward safety norms influenced whether this perception translated into action (Dinh et al., 2020). Likewise, less safety-oriented attitudes toward road norms significantly predicted a higher incidence of risky pedestrian behaviors, such as violations, lapses, and aggression (Liu et al., 2021).

Emerging research also emphasizes the influence of social context in pedestrian decision-making. Pelé et al. (2017) explored how pedestrians use social cues, especially in risky situations like road crossings, and how cultural context shapes reliance on others' behavior. Additionally, Zhao et al. (2024) demonstrated that in virtual reality scenarios involving automated vehicle interactions, pedestrians' crossing decisions were strongly shaped by the behaviors of those nearby, especially

in novel or uncertain traffic situations. Overall, the evidence suggests that while individual differences in risk perception are central to explaining pedestrian safety outcomes, their behavioral impact is shaped by attitudinal orientations toward rules and other road users as well as by the immediate social and cultural context, underscoring that risk perception does" not operate in isolation but interacts dynamically with broader psychological and situational factors in determining pedestrian decision-making.

In addition to individual and social factors, the quality and design of pedestrian infrastructure exert a substantial influence on safety-related behavior. Poorly maintained or inadequately designed facilities, such as faded or misplaced crossings, obstructed sidewalks, and insufficient signal timing, have been linked to higher rates of unsafe pedestrian actions (Budzyński et al., 2021). Such deficiencies may alter the perceived legitimacy of certain behaviors, with pedestrians sometimes viewing rule violations as practical adaptations to suboptimal environments (Pollack et al., 2014). For example, insufficient crossing opportunities can prompt pedestrians to cross mid-block, while narrow or obstructed walkways can lead to encroachment into vehicular lanes. These patterns underscore the need to view pedestrian decision-making within a broader environmental context, where infrastructure shortcomings interact with individual attitudes and risk perceptions to shape behavior (Yang et al., 2025).

Prior research also highlights the importance of sociodemographic and exposure-related variables in understanding pedestrian behavior. Factors such as age, gender, and socio-economic status have been shown to influence both risk perception and the likelihood of engaging in risky behaviors (Granié, 2009; Holland & Hill, 2007). Similarly, walking frequency, duration of daily exposure to traffic, and prior accident or near-miss experiences are associated with differences in vigilance and compliance (Fuller et al., 2013; Makizako et al., 2018; Yannis et al., 2020).

Despite the growing interest in pedestrian safety, there remains a lack of a validated, multidimensional instrument to specifically measure pedestrians' perceptions of risky situations (Rod et al., 2023). Existing work often relies on unidimensional or limited number of indicators that fail to capture the breadth of risks encountered in

pedestrian environments (Nasrudin et al. 2020; Pasha et al. 2015). This gap limits both the theoretical understanding of pedestrian safety and the development of targeted interventions.

Building on the qualitative findings and item development described in the previous chapter, the next stage of this research focused on establishing the validity of the newly developed Perception of Risky Situations Scale for Pedestrians (PRSS-P) and situating it within the broader psychological framework of pedestrian safety. The main study set out to examine whether the scale captured a coherent factor structure, and to explore how its dimensions of perceived risk related to self-reported pedestrian behaviors: violations, lapses, aggressive, and positive behaviors. Beyond mapping these associations, the study also investigated whether pedestrians' attitudes toward traffic rules and other road users shaped the strength or direction of these relationships. In this way, the main study not only tested the psychometric robustness of the PRSS-P but also evaluated its explanatory power for understanding pedestrian safety in real-world contexts.

3.2. Method

Given the objectives of Study 2, this section outlines the methodological approach adopted to address the research aims. It begins by describing the study design and participant recruitment process, followed by a detailed overview of the instruments employed, including the Perception of Risky Situations Scale for Pedestrians (PRSS-P) and the Pedestrian Attitudes Scale. The subsequent subsections explain the procedures for data collection and present the analytical strategies used to evaluate the factor structure of the PRSS-P, examine its associations with self-reported pedestrian behaviors, and test the moderating effects of attitudes toward traffic rules and other road users.

3.2.1. Participants

For the data collection process of the main study, 402 participants were recruited of whom 243 of them were female (60.4 %) and 319 (39.6 %) of them were male. An a

priori power analysis was conducted using G*Power 3.1 (Faul et al., 2009) for multiple regression (F tests; "Linear multiple regression: Fixed model, R^2 deviation from zero"). Following Cohen's (1988) guidelines, effect size in regression is expressed as f^2, where small = .02, medium = .15, and large = .35. In line with effect sizes commonly observed in social and behavioral sciences and still considered consequential in behavioral contexts (Funder & Ozer, 2019), a conservative small-to-medium effect size of $f^2 = .06$ was assumed. With parameters set at $\alpha = .05$, desired power = .95, and a model including 7 predictors, the required sample size was N = 372. The final sample of N = 402 therefore exceeded this threshold, providing sufficient statistical power (> .95) for detecting the hypothesized effects. Age of the participants ranged between 18 and 76 (M = 26.78, SD = 9.69). Concerning income level information, 69 participants had below average income levels (17.1 %), 242 participants had average (61.2 %), and finally, 87 of them had above average income levels (21.6 %). Majority of participants were high school graduate (N = 253, 62.9 %), 112 of them had bachelor's (27.9 %), 29 of them had master's (7.2 %), and finally 7 of them had doctoral degrees (1.7 %). Only 1 participant was a primary school graduate (0.2 %). About driving licences ownerships, 286 (71.1 %) participants owned it but the rest of them did not own currently (N = 116 , 28.9 %). Years of drivers' licence ownership ranged from 0 to 50 years. (M = 5.49, SD = 8.19). In terms of accident history, 347 participants, luckily, never had any (86.3 %), 32 of them had only accident (8 %), 12 of them had two (8 %), 9 of them had three (3 %), 1 of them had four (0.2 %), and finally, 1 of them had five accidents in the last three years (0.2 %). On the other hand, while only 102 participants never had any near-miss incidents in the last three years, range of near-miss incidents were between 0 to 40 (M = 3.63, SD = 5.40). The demographics of the sample is presented in Table 4.

3.2.2. Procedures

Prior to data collection, ethical approval was obtained from the Human Subjects Ethics Committee at Middle East Technical University (HSEC; see Appendix E). The study used convenience sampling due to the ease of reaching participants (Orb et al., 2001).

Table 4. Demographic characteristics of participants in main study

Variable	n	%	M	SD	Range	Variable	n	%	M	SD	Range
Gender						**Driver's Licence Ownership**					
Female	243	60.4				Yes	286	71.1			
Male	159	39.6				No	116	28.9			
Age			26.78	9.69	18–76	**Years of Licence Ownership**			5.49	8.19	0.-50
Income Level						**Accident History (last 3 Years)**					
Belove Average	69	17.1				None	347	86.3			
Average	242	61.2				1 accident	32				
Above Average	87	21.6				2 accidents	12				
Education Level						3 accidents	9				
Primary School	1	0.2				4 accidents	1	0.2			
High School	253	62.9				5 accidents	1	0.2			
Bachelor's	112	27.9				**Near-miss History (last 3 years)**			3.63	5.40	
Master's	29	7.2				None	102	25.4			
Doctoral	7	1.7									

Note. M = Mean; SD = Standard Deviation

All questionnaires were transferred to the online platform Limesurvey and distributed through a link shared via email and social media, as well as via an instant messaging service. Additionally, participants were recruited through the Sona System, a research participation pool and track system managed by the METU Department of Psychology. To recruit participants, researcher prepared pocket-sized cards containing a printed QR code that linked directly to the online survey and distributed them randomly to pedestrians across the university campus.

All participants were provided with an informed consent form (see Appendix F) outlining the study's purpose and contact details for further information. Participation was completely voluntary, and individuals were informed of their right to withdraw at any time or if they felt uncomfortable. Confidentiality and anonymity were guaranteed, and all data were collected solely for scientific use

3.2.3. Measurements

In this present study, various of instruments have been employed. These were the Demographic Information Form, the Pedestrian Behavior Scale, the Pedestrian Attitudes Scale, and finally, the newly developed Perception of Risky Situation Scale for Pedestrians.

3.2.3.1. The Demographic Information Form

Participants were asked to complete a demographic information form (see Appendix G), which included questions regarding their sex, age, education level, income level, driver's licence ownership, years of holding a driver's license, accident and near-miss incident history of the last 3 years. In addition to the general demographic information used in most traffic research, in this study due to the centralized focus on the pedestrians as road users, there were several questions included concerning participants' exposure to traffic environment as a pedestrian. There were three questions where participants asked to consider following statement "Based on the time you spend in traffic as a pedestrian, rate it between 0 and 100 by dragging the slider." Then pinpointed their answers on a percentile slider. The questions were 1)

"To what extent do you define yourself as a pedestrian?", 2) "To what extent do you feel safe when you are in a traffic environment as a pedestrian?", and 3) "To what extent are the roads you use while walking sufficient (useful, durable) in terms of infrastructure features (traffic signs, pedestrian crossings, sidewalks, etc.)?" (see Appendix G).

Additionally, participants were asked about their walking habits and preferences. For this purpose, three additional questions were added. The first question of the second section was: 1) "What is the main purpose of you walking?". Participants were to choose from multiple answers (e.g. exercise, leisure walk, commuting) ". The second question of the second section was: 2) "How many minutes do you walk on average in a day?". This was an open-ended question. The last and the third question of the second section was: 3) "What time of the day do you usually walk the most?". The answers for the questions were listed as 2-hour long intervals and participants were allowed to choose only one (see Appendix G).

3.2.3.2. The Pedestrian Behaviors Scale (PBS)

For the investigation of pedestrian behavior, the Turkish adaptation of the Pedestrian Behaviors Scale (PBS, Granié et al., 2013), by Demir (2017) is utilized (see Appendix H). The scale consists of 20 items and a high reliability score (α = .84). Since the scale is previously validated in Turkish samples, the existing four factor structure was used. Participants answered their frequencies of doing given behaviors on a 7-point Likert scale (1 = never – 7 = always). The four factors include: 1) *violations* (α= .89), which are acts of intentional breaches of traffic rules and safety norms (e.g., To save time I cross diagonally.), 2) *lapses* (α = .86) referring to unintentional errors or failures in attention, memory, or decision-making that lead to unsafe situations (e.g., I forget to check the road when I think of something else.), 3) *aggressive behaviors* (α = .85), which are verbal or physical acts towards other road users to display hostility and impatience (e.g., When I get angry with a driver, I hit their car.), and 4) *positive behaviors* (α = .67), which are acts of consideration and care towards other road users to create ease in that situation (e.g., I give way to pedestrians I encounter). Higher scores reflect increased behavioral inclinations,

reported prevelance of that behaviors, and lower scores means to opposite, less behaviors reported to be performed.

3.2.3.3. The Pedestrian Attitudes Scale (PAS)

Pedestrians' attitudes were measured using the *Pedestrian Attitudes Scale* (PAS) developed by Serin et al. (2018) (see Appendix I). The PAS was originally validated in a Turkish sample and consists of 21 items, each rated on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Since the scale is previously validated in Turkish samples, the existing two factor structure was used. The overall internal consistency of the scale was satisfactory (α = .78), and the scale comprises two distinct subscales. First of them is called *Attitudes Towards Other Road Users* (α = .87): This subscale assesses individuals' evaluations of the behaviors of other road users, particularly drivers with 14 items (e.g., *"I think drivers always think they are right in traffic"*). Higher scores reflect a heightened sensitivity to injustices experienced in traffic settings and a critical perspective toward others' irresponsible behaviors. Individuals scoring high on this dimension tend to believe that pedestrians are not treated with sufficient respect and report being more careful and responsible in their own pedestrian behavior. Second on is called *Attitudes Towards Traffic Rules* (α = .80): This subscale evaluates the extent to which individuals perceive traffic rules and safety norms as necessary or relevant with 7 items (e.g., *"Not using crossings does not endanger my safety"*). High scores on this subscale indicate a more flexible and skeptical approach toward pedestrian traffic rules. Respondents with high scores are more likely to believe that adherence to traffic rules can be situational and subject to personal judgment, rather than being inherently required for safety.

3.2.3.4. The Perception of Risky Situations Scale for Pedestrians (PRSS-P)

After a thorough inquiry supported by qualitative research, an extensive literature review, evaluation of advisors and experts feedback and suggestions, the PRSS-P (see Appendix G for the version used in the data collection process) was developed and validated in this study to better understand pedestrians' perceptions of risky

situations (α = .97). The scale consists of 40 statements describing risky situations, grouped into three dimensions: “Pedestrian-Related Risk Perception”, “Driver-Related Risk Perception”, and “Infrastructure-Related Risk Perception”.

Statements were presented to participants using a 5-point Likert-type scale (“1 = none”, “2 = low”, “3 = moderate”, “4 = high”, “5 = extreme”). All participants evaluated each item three times based on the following three components:

1) The *frequency* of encountering the situation.
2) The *likelihood* that the situation would cause an accident.
3) The *severity* of possible consequences if such an accident occurred.

Higher scores in all three dimensions indicate that situations are perceived as riskier and should be avoided. “Pedestrian-Related Risk Perception” dimension consisted of 20 items (α = .93), including items #1 to #20, concentrating on behaviors or states of pedestrians themselves (e.g., “Pedestrians not checking for vehicles coming from both ways while crossing.”). “Driver-Related Risk Perception” dimension contained 11 items (α = .89), including items #21 to #31, reflecting risky driver behaviors (e.g., “Drivers speeding excessively.”). “Infrastructure-Related Risk Perception” dimension included 9 items (α = .87), including items #32 to #40, focusing on infrastructural shortcomings (e.g., “Pavements not being sufficiently illuminated.”).

3.2.3.4.1. Three-Tiered Risk Evaluation Method for the PRSS-P

In the current study, the three-tiered risk evaluation approach was adapted from the Fine–Kinney Risk Analysis Method (Fine, 1971; Kinney & Wiruth, 1976), a well-established technique in occupational safety and risk management. Each PRSS-P item described a potentially hazardous situation in pedestrian traffic environments, and participants’ evaluations along the three parameters, frequency, likelihood, and severity were multiplied to produce a risk perception index value for each item. Higher index values represent greater perceived risk. For each participant, the risk perception index values were calculated separately for each item. This adaptation offers several advantages for pedestrian safety research.

First, it operationalizes risk perception as a multidimensional judgment, capturing not only how often hazards occur but also their likelihood of causing harm and the severity of potential consequences. Second, it transforms subjective evaluations into quantifiable indices, thereby enabling statistical analysis and facilitating comparisons across individuals and groups. Finally, by grounding the assessment in a recognized safety evaluation framework, it enhances methodological rigor and supports interdisciplinary relevance. Although originally developed for engineering and workplace safety, the Fine–Kinney method has been discussed as adaptable for behavioral and psychological contexts, provided careful calibration to the new domain (Birgören, 2017). In this study, its use bridges the gap between traditional safety science and contemporary traffic psychology, offering a structured and replicable approach to quantifying pedestrian risk perception.

3.3. Results

For the present study, the results are presented in five main sections. The first section provides general information about the sample and data, along with the computation of the risk perception index derived from participant responses. The second section focuses on the factor structure of the newly developed Perception of Risky Situations Scale for Pedestrians (PRSS-P), detailing the item selection process, factor extraction, and reliability analyses of the finalized scale. In the third section, descriptive statistics are reported for all major study instruments, including demographics and pedestrian's traffic exposure, risk perception, pedestrian behaviors, attitudes. The fourth section presents bivariate correlation analyses among key variables of interest. Lastly, the main analyses section includes bivariate correlation and mediation analyses to explore the predictive and explanatory relationships between risk perception (pedestrian-related, driver-related, and infrastructure-related), attitudes (toward traffic rules and toward other road users), and various pedestrian behaviors (violations, lapses, aggressive behaviors, and positive behaviors).

3.3.1. Sample and the Data

The online survey was distributed to a total of 659 individuals. However, 257 participants did not complete the questionnaire and were excluded from the dataset.

Following this exclusion, the remaining data were examined, and no substantial anomalies (outliers) or missing patterns requiring correction or cleaning were observed. Subsequently, the scales which had been previously adapted to Turkish and used in similar samples, were coded according to their established factor structures.

3.3.2. Factor Structure of the RPSS-P

To examine the underlying structure of the Perception of Risky Situations Scale for Pedestrians (PRSS-P), an Exploratory Factor Analysis (EFA) was conducted using Principal Axis Factoring with Direct Oblimin rotation.

To achieve a more interpretable and theoretically coherent solution, the number of factors was initially constrained to four. The initial analysis suggested 4 factors with eigenvalues greater than 1.00, explaining 48.42% of the total variance. Inspection of the scree plot also supported a 4-factor solution. However, one of the extracted factors failed to retain any item with a meaningful loading (above the suppression threshold of .30) and thus was deemed non-substantive. The analysis was then repeated by specifying a 3-factor solution, with the maximum number of iterations increased to 100 to ensure the convergence of the solution. Further items with factor loadings below .30, or with substantial cross-loadings, were removed from further analysis. The proceeding analysis revealed that in the final 3-factor structure, factor explained 47.38% of the total variance.

Sampling adequacy and factorability of the correlation matrix were confirmed prior to the EFA. The Kaiser-Meyer-Olkin (KMO) value was .96, indicating excellent adequacy for factor analysis (Kaiser, 1974). Bartlett's Test of Sphericity was significant ($\chi^2(1081) = 10252.15$, $p < .001$), supporting the suitability of the data for factor analytic procedures.

During the first iteration of item reduction, 16 items were removed due to low communalities, weak factor loadings, or problematic cross-loadings. A second iteration led to the removal of three additional items based on similar criteria. The

resulting three-factor solution showed improved statistical performance and interpretability. However, further inspection revealed that four additional items (Items 5, 25, 3, and 37, in the 60-item version of the list) did not align with the theoretical content of the factors on which they had loaded. For instance, items addressing infrastructure-related issues were statistically grouped under pedestrian-related risk, and vice versa. Although these items met statistical criteria, they were excluded to preserve conceptual consistency and ensure the validity of subscale interpretations (see Table 5 for a complete list of removed items).

In total, 20 items were removed across all stages of the analysis (low communalities, weak factor loadings, cross-loadings, and theoretical inconsistency), resulting in a final version of the PRSS-P consisting of 40 items distributed across three coherent factors. Factor 1, *Pedestrian-Related Risk Perception* (20 items, $\alpha = .93$), represented risky behaviors, attitudes, or lapses in judgment specific to pedestrians. Factor 2, *Driver- Related Risk Perception* (11 items, $\alpha = .89$), reflected dangerous or negligent behaviors by motor vehicle drivers, motorcyclists, or e-scooter users. Factor 3, *Infrastructure-Related Risk Perception* (9 items, $\alpha = .87$), encompassed environmental deficiencies and urban design elements that increase pedestrian vulnerability. The final three-factor structure was judged to be both statistically robust and conceptually meaningful (see Table 6 for the final factor structure).

3.3.3. Descriptive Statistics of Measurements

In this section descriptive statistics of data collected from the measurements will be presented. First of all, data from the demographic questions related to pedestrians' traffic exposure and walking preferences will be detailed. Then the results of the other measurements: The Perception of Risky Situation Scale for Pedestrians (PRSS-P), The Pedestrian Behaviors Scale (PBS), The Pedestrian Attitudes Scale (PAS).

3.3.3.1. Descriptive Statistics for the Exposure as Pedestrian Form

Participants' exposure to traffic environments as pedestrians was assessed using a brief questionnaire consisting of two parts.

Table 5. Items removed from the PRSS-P during factor analysis for statistical or conceptual reason

Deleted items	Factor 1	Factor 2	Factor 3
Item deleted for cross-loading			
The inattentive or careless riding styles of e-scooter, electric bicycle, or motorcycle users.	.50	-.32	
Pedestrians attempting to cross the street outside of designated crosswalks.	.48	-.34	
Pedestrians walking under the influence of alcohol or drugs.	.43		.34
Pedestrians failing to notice vehicles exiting places like parking lots or garages.	.40		.33
Pedestrians attempting to pass in front of or behind moving heavy vehicles or construction machinery.	.37		.36
Drivers' general disregard for pedestrians.		-.57	.33
Drivers not slowing down when approaching pedestrian crossings or signalized intersections.		-.57	.45
Drivers failing to yield to pedestrians at crosswalks.		-.45	.34
Motorcycle riders using pedestrian paths.	.36	-.43	
Pedestrians attempting to cross the street diagonally.	.45		.32
Pedestrians' insufficient knowledge of traffic rules.	.37		.32
Pedestrians attempting to board or exit a bus before it has come to a complete stop.	.32		.33
Item deleted because of not being loaded to any factors			
Children being left unsupervised or not kept under control while crossing the street.			
Pedestrian walkways being temporarily closed or lacking safety measures during construction or maintenance projects.			
Inadequate infrastructure features for elderly and disabled pedestrians (e.g. audible/visual traffic signals, tactile paving, and ramps)			
The use of electric scooters, bicycles, and similar vehicles on sidewalks.			
Item deleted because of not suitable for the content			
The absence of barriers that would prevent pedestrians from crossing at unsafe points along wide and busy roads.			
Lack of accessibility to pedestrian overpasses and underpasses.			
The absence of pedestrian overpasses or underpasses on wide and busy roads.			
Pedestrians stepping onto the road to pass people who are standing or walking slowly on the sidewalk.			

Note. Factor loadings < .30 were suppressed in the SPSS output, Factor Names: Factor 1 = "Pedestrian-related Risk Perception"; Factor 2 ="Driver-related Risk Perception" Factor 3 = Infrastructure-related Risk Perception".

Table 6. Item loadings of the PRSS-P from principal axis factoring with oblimin rotation

Items	Factor 1	Factor 2	Factor 3
Pedestrians crossing from dangerous points instead of using crosswalks to catch public transport.	.83		
Pedestrians behaving carelessly under the assumption that others also ignore rules.	.75		
Pedestrians crossing by relying solely on traffic lights without ensuring vehicles have stopped.	.73		
Pedestrians attempting to cross at the nearest point to save time.	.73		
Pedestrians acting carelessly due to the belief that traffic rules are unnecessary or ineffective.	.71		
Pedestrians being less cautious in familiar environments.	.66		
Pedestrians not complying with traffic rules.	.65		
Pedestrians perceiving overpasses and underpasses as tiring or time-wasting.	.62		
Pedestrians crossing the street assuming vehicles will stop for them.	.59		
Pedestrians being distracted (e.g., using phones, listening to music, talking).	.52		
Pedestrians crossing on red or in undesignated areas because “others do it too”.	.48		
Pedestrians failing to check both directions when crossing.	.47		
Pedestrians running while crossing or walking in traffic.	.46		
Pedestrians weaving between vehicles in congested traffic.	.46		
Lack of enforcement for pedestrian traffic violations.	.47		
Insufficient education on pedestrian safety.	.46		
Pedestrians attempting to cross where their view is obstructed.	.36		
Pedestrians walking along highways, motorways, or tunnels.	.32		
Pedestrians walking on the road due to physical barriers (e.g., narrow sidewalks, vendors).	.32		
Children or youth spending time near or on roadways (play games, skating/rolling).	.31		
Factor Reliabilities	.93	.89	.87

Note. Factor Names: Factor 1 = “Pedestrian-related Risk Perception”; Factor 2 =“Driver-related Risk Perception” Factor 3 = Infrastructure-related Risk Perception”.

Table 6. (continued)

Items	Factor 1	Factor 2	Factor 3
Drivers not complying with traffic rules.		.84	
Drivers speeding excessively.		.75	
Motorcyclists not complying with traffic rules.		.64	
The traffic environment being generally aggressive or tense.		.62	
Drivers ignoring traffic signals, signs, or road markings.		.61	
Insufficient enforcement or penalties for rule-violating drivers.		.59	
Drivers being distracted (e.g., loud music, phone use, conversation).		.57	
Taxi drivers having aggressive driving styles.		.55	
Problems at crosswalks due to poor public understanding of pedestrian priority.		.42	
Drivers turning without signalling.		.42	
Drivers driving under the influence of alcohol or drugs.		.32	
Pedestrian crossings lacking clear markings or "yield to pedestrian" signage.			.65
Poor infrastructure (e.g., sidewalks, crossings, signals, lighting).			.62
Inadequate lighting on pedestrian paths.			.59
Lack of 30 km/h speed limits in critical areas (e.g., school or hospital zones).			.55
Insufficient signage at intersections or road splits.			.55
Crosswalks on multi-lane roads being too wide to cross in one attempt.			.50
Drivers parking on sidewalks or crosswalk ramps.			.49
Insufficient speed limit signs for drivers.			.44
Pedestrians not wearing visible or reflective clothing at night.			.43
Factor Reliabilities	.93	.89	.87

Note. Factor Names: Factor 1 = “Pedestrian-related Risk Perception”; Factor 2 =“Driver-related Risk Perception” Factor 3 = “Infrastructure-related Risk Perception”.

The first part included three visual analogue scale (0–100 slider) questions capturing self-perceptions and experiences: (1) *To what extent do you define yourself as a pedestrian?* (*M* = 73.59, *SD* = 25.50), (2) *To what extent do you feel safe when you are in a traffic environment as a pedestrian?* (*M* = 46.31, *SD* = 23.09), and (3) *To what extent are the roads you use while walking sufficient (useful, durable) in terms of infrastructure features such as traffic signs, pedestrian crossings, and sidewalks?* (*M* = 44.91, *SD* = 23.73).

The second part addressed walking habits and preferences. Participants reported their *average walking time per day***,** which ranged from 0 to 200 minutes (*M* = 55.87, *SD* = 36.77), and selected their main *purpose for walking* from multiple-choice options. The majority walked for commuting purposes (63.2%), followed by leisure walks (15.4%), exercise/health (10.4%), and other purposes such as shopping or walking between public transport connections . Finally, participants identified *the time of day they walked most frequently*, with the most common intervals being 17.00–19.00 (16.7%), 15.00–17.00 (17.7%), and 19.00–21.00 (22.1%), suggesting that pedestrian activity peaked in the late afternoon and early evening hours.

3.3.3.2. Descriptive Statistics for the RPSS-P the PBS, and the PAS

This section presents the descriptive statistics of the main psychological measures used in the study, including subscales from the PRSS-P (Perception of Risky Situations Scale for Pedestrians) which were to a) *Pedestiran Related Risk Perception*, b) *Driver Related Risk Perception*, and c) *Infrastructure Related Risk Perception*, the PBS (Pedestrian Behavior Scale) which were *Violations*, *Lapses*, *Aggressive Behaviors*, and *Positive Behaviors*. The subscales of the PAS (Pedestrian Attitudes Scale) were *Attitudes Towards Other Road Users* and *Attitudes Towards Traffic Tules*.

For each variable, the number of items, means, standard deviations, minimum and maximum scores, and Cronbach's alpha reliability coefficients were calculated. Within the PRSS-P, participants reported moderate levels of perceived risk across different sources. Since the PRSS-P is a newly developed scale, additidional

evalutations of items with highest mean will be done. First, *pedestrian-related risk perception* (*M* = 57.19, *SD* = 22.08). Item means in this factor ranged from moderate to slightly high, indicating that while pedestrian behaviors were recognized as potential risk factors, they were perceived as less threatening than driver-related risks. Items such as Risk13: "Pedestrians attempting to cross at the nearest point to save time." and Risk21: "Pedestrians behaving carelessly under the assumption that others also ignore rules." were among the more highly rated, suggesting these represent particularly salient risky pedestrian actions in the public's view. Second, *driver-related risk perception* (*M* = 72.73, *SD* = 24.47). Items in this dimension received the highest mean scores overall, with *Risk59*: "Drivers speeding excessively.", *Risk50*: "Motorcyclists not complying with traffic rules.", and *Risk45*: "The traffic environment being generally aggressive or tense." clearly standing out (all above 80). This finding indicates that participants consistently viewed drivers as the most significant source of threat in pedestrian-related traffic contexts. Finally and third, *the infrastructure-releted risk perception* (*M* = 46.43, *SD* = 23.24). This dimension received the lowest mean scores across all three dimensions. While items such as *Risk42*: "Inadequate lighting on pedestrian paths." and *Risk53*: "Pedestrians not wearing visible or reflective clothing at night." were rated slightly higher within this group, the relatively lower average suggests participants perceived environmental and infrastructural issues as less immediately hazardous than human behaviors and risk caused by other road users. Among these, drivers were perceived as the highest source of risk, indicating that participants viewed driver behavior as the most prominent threat in pedestrian-related traffic situations. The internal consistency of the three subscales was high (α = .93, .89, and .87, respectively).

Concerning the Pedestrian Behavior Scale, the mean scores indicated moderate to low engagement in risky behaviors such as *violations* (*M* = 3.13, *SD* = 1.21), *lapses* (*M* = 1.94, *SD* = 1.13), and *aggressive behaviors* (*M* = 1.88, *SD* = 1.15). In contrast, pedestrians' *positive behaviors* had a high mean score (*M* = 4.62, *SD* = 1.07). The internal consistency of the subscales ranged from acceptable to high (α = .67 to .89). Regarding attitudes, participants scored relatively high on *attitudes toward other road users* (*M* = 4.23, *SD* = .50) and more moderate on *attitudes toward traffic rules* (*M* = 2.63, *SD* = .74). Both subscales showed satisfactory internal reliability (α = .87

and .80, respectively). The descriptive statistics of the three main measures in the main study are shown in table (see Table 7).

Table 7. Descriptive statistics of the main measures

Study Variables	*N*	Mean	*SD*	Minimum	Maximum	Item #	*α*
the PRSS-P							
Pedestrian	402	57.19	22.08	8.40	125.00	20	.93
Drivers	402	72.73	24.47	6.27	125.00	11	.89
Environment	402	46.43	23.24	1.11	125.00	9	.87
the PBS							
Violations	402	3.13	1.21	1.00	7.00	8	.89
Lapses	402	1.94	1.13	1.00	6.25	4	.86
Agg. beh.	402	1.88	1.15	1.00	6.50	4	.85
Pos. beh.	402	4.62	1.07	1.00	7.00	4	.67
the PAS							
Att. others	402	4.23	.50	1.43	5.00	14	.87
Att. traff. rules	402	2.63	.74	1.00	5.00	7	.80

NOTE: Agg. = aggressive; Pos. = positive; beh. = behaviors; Att. = attitudes; traff. = traffic; α = Cronbach's alpha.

3.3.4. Bivariate Correlation Analyses

This section presents the results of bivariate Pearson correlation analyses conducted to examine the relationships among the main variables of the study, including demographic variables, pedestrian-related attitudes, perceived risk dimensions, and pedestrian behavior types. The purpose of this analysis was to explore how these variables are interrelated within the broader framework of pedestrian safety. The findings help to clarify the patterns of association between individual differences and self-reported behavioral tendencies in traffic environments. The results are presented in Table 8, only statistically significant ones are discussed in the following sections.

Age was significantly and negatively correlated with *education* ($r = .55$, $p < .01$), *walking minutes (*$r = –.16$, $p < .01$), *pedestrian identification* ($r = –.23$, $p < .01$), and *violations* ($r = –.33$, $p < .01$). *Education* also showed significant negative correlations

with *walking minutes* ($r = –.13$, $p < .01$), *pedestrian identitification* ($r = –.22$, $p < .01$), and *lapses* ($r = –.10$, $p < .05$), while being positively associated with *aggressive behavior* ($r = .19$, $p < .05$). Socioeconomic status (*SES*) was not significantly related to most psychological or behavioral variables, though it was weakly and negatively associated with *near-miss experiences* ($r = –.11$, $p < .05$) and *lapses* ($r = –.12$, $p < .05$).

Among risk-related constructs, *pedestrian-related risk perception* were positively associated with *attitudes toward other road users* ($r = .28$, $p < .01$), *driver-related risk perception* ($r = .72$, $p < .01$), and *infrastructure related risk perception* ($r = .78$, $p < .01$), but negatively correlated with *pedestrian safety perception* ($r = –.25$, $p < .01$) and *perceived infrastructure condition* ($r = –.15$, $p < .01$). *Driver-related risk perception* was also significantly correlated with *attitudes toward other road users* ($r = .48$, $p < .01$) and *positive behavior* ($r = .21$, $p < .01$), while being negatively associated with *perceived pedestrian safety* ($r = –.30$, $p < .01$) and *perceived infrastructure condition* ($r = –.21$, $p < .01$).

Among pedestrians' behavioral constructs, *violation behaviors* showed a strong positive association with *attitudes toward traffic rules* ($r = .62$, $p < .01$) and were also positively correlated with *lapses* ($r = .39$, $p < .01$) and *aggressive behavior* ($r = .32$, $p < .01$). *Lapses* were significantly related to *aggressive behavior* ($r = .41$, $p < .01$) and *attitudes toward traffic rules* ($r = .30$, $p < .01$). *Positive behaviors* were positively associated with *attitudes toward other road users* ($r = .26$, $p < .01$) and *driver-related risk perception* ($r = .21$, $p < .01$) and negatively correlated with *walking minutes* ($r = –.12$, $p < .05$) and *lapses* ($r = –.11$, $p < .05$).

Lastly, *attitudes toward other road users* were positively associated with *pedestrian-related risk perception* ($r = .28$, $p < .01$), *driver-related risk perception* ($r = .48$, $p < .01$), and *positive behaviors* ($r = .26$, $p < .01$), while negatively associated with *lapses* ($r = –.24$, $p < .01$). *Attitudes toward traffic rules* correlated significantly with all three negative pedestrian behaviors: *violations* ($r = .62$, $p < .01$), *lapses* ($r = .30$, $p < .01$), and *aggressive behaviors* ($r = .27$, $p < .01$), highlighting the potential role of rule-related attitudes in unsafe behavioral tendencies.

Table 8. Bivariate correlation matrix of all interest variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Age	-																	
2. Education	.55**	-																
3. S.E.S.	.02	.03	-															
4. Acc.	-.02	-.01	-.07	-														
5. Near-miss	-.10*	.00	-.11*	.20**	-													
6. W. Mins.	-.16**	-.13**	-.05	.09	.11*	-												
7. Pds. Ident.	-.23**	-.22**	-.24**	.00	.13**	.21**	-											
8. Pds. Safety	-.03	-11*	.07	-.11*	-.25**	-01.	.12*	-										
9. Infr. Cond.	-.01	-.07	-.02	-.10	-.22*	-.02	.14**	.45**	-									
10. Pds. R.P.	.00	.06	.-02	.06	.13*	.02	.06	-.25**	-.15**	-								
11. Dri. R.P.	-.06	.02	.01	.04	.18**	.01	.06	-.30**	-.21**	.72**	-							
12. Infr. R.P.	.04	.07	.00	.08	.09	-.01	.08	-.23**	-.21**	.78**	.67**	-						
13. Vio.	-.33**	-.20**	.05	-.03	.06	.01	.11*	.20**	-.02	-.08	-.03	-.02	-					
14. Lapses	-.16**	-.10*	-.12*	.03	-.02	.08	.10	.03	.01	-.02	-.15**	.01	.39**	-				
15. Agg. Beh.	-.04	.19*	.05	.00	.02	.02	-.11*	-.04	.09	-.02	-.07	-.09	.32**	.41**	-			
16. Pos. Beh.	.09	.06	-.03	-.03	.04	-.12*	-.05	-.04	.03	.11*	.21**	.03	-.05	-.11*	-.11*	-		
17. A. Other	.00	.00	-.01	.02	.09	-.09	.05	-.11*	-.04	.28**	.48**	-.04	-.02	-.24**	-.14**	.26**	-	
18. A. Rules	-28**	-.10*	.03	.00	.03	.01	.04	.22**	.02	-.21**	-.13**	.02	.62**	.30**	.27**	-.07	.06	-

Note. * Correlation significant at the .05 level (2-Tailed). **Correlation significant at the .01 level (2-Tailed).
S.E.S. = socio-economic status, Acc. = accident history,W. Mins. = walking minutes, Pds. = pedestrian, Ident. = identification, Infr. = infrastructure, Cond. = perceived condtion, Pds. R.P. = pedestrian-related risk perception, Dri. R.P. = driver-related risk perception, Infr. R.P. = infrastructure-related risk perception, Vio = Violations, Agg. = aggressive, Beh. = behaviors, Pos. = positive, A. Other = attitudes toward other road users, A. Rules = Attitudes toward traffic rules

The correlation analyses revealed several meaningful patterns. Younger participants and those with lower *education* tended to report more *violations* and *lapses*, whereas older participants showed fewer *violations*. *Pedestrian-related risk perception* increased together with critical *attitudes toward other road users*, as well as with both *driver-related* and *infrastructure-related risk perceptions*; however, it decreased when participants felt higher *pedestrian safety perception* or rated *infrastructure condition* as sufficient. Similarly, higher *driver-related risk perception* was associated with stronger critical attitudes toward other road users and with more frequent *positive pedestrian behaviors*, while it declined as *pedestrian safety perception* and *infrastructure condition* increased. *Infrastructure-related risk perception* showed a comparable pattern: participants who perceived more infrastructural risks also reported higher *pedestrian-related* and *driver-related risk perceptions* but tended to feel less *pedestrian safety* and evaluate the *infrastructure condition* less positively. *Attitudes toward traffic rules* were closely tied to behaviors. Sceptical or flexible *attitudes toward traffic rules* were linked to more *violations*, *lapses*, and *aggressive behaviors*, By contrast, critical *attitudes toward other road users* were related to higher *pedestrian-related* and *driver-related risk perception* and to more *positive pedestrian behaviors*, while they corresponded with fewer *lapses*.

3.3.5. The Moderation Analyses: Investigating the Relationship Between Risk Perception, Attitudes and Behaviors

To investigate whether the relationship between risk perception and pedestrian behaviors differs depending on different types and levels of pedestrians' attitudes, a series of moderation analyses were conducted using Hayes' PROCESS Macro Model 1 (Hayes, 2018). In the analyses, pedestrian risk perception was treated as the independent variable, examined through its three distinct dimensions: *pedestrian-related*, *driver-related*, and *infrastructure-related risk perceptions*.

As seen in Table 9, each dimension was analyzed separately in relation to four outcome variables: violations, lapses, aggressive behaviors, and positive behaviors. Attitudes toward traffic rules and attitudes toward other road users were included as moderators in each analysis.

Table 9. The model summaries of the moderation analyses

	Dependent Variables							
	Violations		Lapses		Aggressive B.		Positive B.	
Models	*F*(7,394)	R^2	*F*(7,394)	R^2	*F*(7,394)	R^2	*F*(7,394)	R^2
1. Pedestrian-related Risk P. × Attitudes Toward Traffic R.	42.66**	.43						
2. Infrastructure-related Risk P. × Attitudes Toward	43.07**	.43						
3. Pedestrian-related Risk P. × Attitudes Toward Other RUs			6.61**	.10				
4. Driver-related Risk P. × Attitudes Toward Other RUs			6.48**	.10				
5. Driver-related Risk P. × Attitudes Toward Traffic R.			8.77**	.13				
6. Infrastructure-related Risk P. × Attitudes Toward Traffic R.			8.01**	.12				
7. Driver-related Risk P. × Attitudes Toward Other RUs					6.14**	.10		
8. Infrastructure-related Risk P. × Attitudes Toward Traffic R.					9.11**	.14		
9. Pedestrian-related Risk P. × Attitudes Toward Other RUs							6.92**	.11
10. Driver-related Risk P. × Attitudes Toward Other RUs							6.97**	.11
11. Infrastructure-related Risk P. × Attitudes Toward Other RUs							7.07**	.11

Note. P. = perception, R. = rules, RUs = road users, Beh. = behaviors, ** = $p < .001$

Prior to the analyses, all continuous predictor and moderator variables were mean-centered to reduce multicollinearity and facilitate interpretation. Sex, age, education level, and average daily walking time were included as covariates in all models. Each analysis assessed the significance of the full model, main effects, interaction terms, and conditional effects to determine whether the impact of perceived risks on pedestrian behavior varied depending on participants' attitudinal profiles.

3.3.5.1. Moderating role of Attitudes in the Relationship Risk Perception and Violations

Two significant interaction models investigate the relationship between risk perception and violations under the moderation of attitudes.

First, *pedestrian-related risk perception* and *violations* were investigated under the effects of individuals' *attitudes toward traffic rules*. Furthermore, under which levels of *attitudes toward traffic rules*, the association between *pedestrian-related risk perception* and *violation behaviors* differentiated was also under the inquiry.

The model summary indicated that the model fitted for this moderated association, and 43% of the variation in the dependent variable was explained by the independent variable, $F(7, 394) = 42.66$, $R^2 = .43$, $p < .001$.

Although the direct effect of *pedestrian-related risk perception* on *violations* was marginally non-significant, $b = –0.013$, $SE = 0.007$, $t = –1.84$, $p = .066$, *attitudes toward traffic rules* significantly predicted increased *violations*, $b = 0.53$, $SE = 0.17$, $t = 3.05$, $p = .002$. Crucially, the interaction between *risk perception* and *rule attitudes* was significant, $b = 0.0066$, $SE = 0.0026$, $t = 2.49$, $p = .013$, indicating a moderation effect.

The Johnson-Neyman point occurred at a moderator score of 2.64 (51% of the sample), indicating that for individuals with moderate to high levels of attitudes toward traffic rules, perceived pedestrian-related risk significantly predicted increased violation behaviors. This analysis reveals a nuanced interaction between

pedestrian-related risk perception and their underlying beliefs about traffic rules. Specifically, pedestrians who view traffic rules as flexible or context-dependent (high scores on the attitudes toward traffic rules dimension) are more likely to report increased violations when they perceive greater risks (see Figure 1).

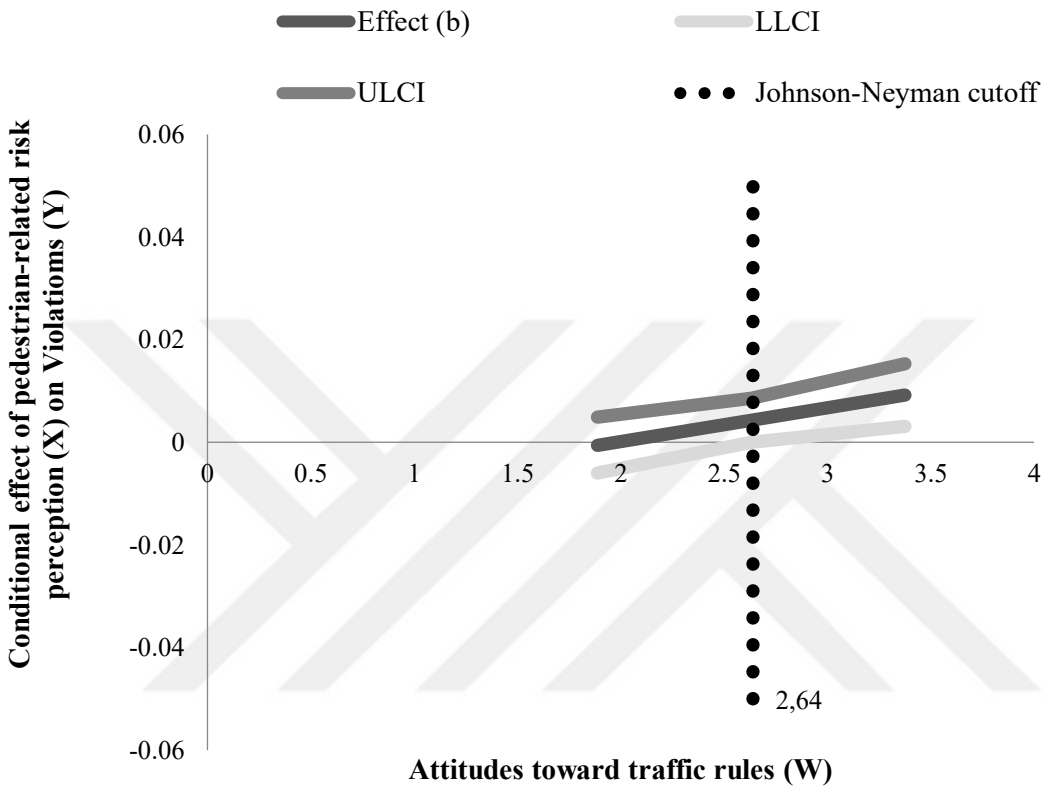

Figure 1. The conditional effect of pedestrian-related risk perception on violations as a function of attitudes toward traffic rules.

The interaction plot further shows that the highest violations occurred when both pedestrian-related risk perception and scepticism toward traffic rules were high, whereas the lowest violations occurred when risk perception was low and trust in traffic rules was strong (see Figure 2).

In the second interaction, another moderation analysis tested whether the relationship between *infrastructure-related risk perception* and *violation*s differs depending on individuals' attitudes toward traffic rules. Furthermore, under which levels of attitudes toward traffic rules, the association between infrastructure-related risk perception and violations differentiated was also under the inquiry. The following

variables were centred prior to analysis attitudes toward traffic rules and infrastructure-related risk perception. The model summary indicated that the model fitted for this moderated association, and 43% of the variation in the dependent variable was explained by the independent variable, $F(7, 394) = 43.07$, $p < .001$, $R^2 = .43$, $p < .001$. *Infrastructure-related risk perception* significantly predicted *violations*, $b = -0.0137$, $SE = 0.0066$, 95% CI [−0.0268, −0.0007], $t = -2.07$, $p = .039$, and *attitudes toward traffic rules* were also a significant predictor, $b = 0.57$, $SE = 0.14$, 95% CI [0.29, 0.85], $t = 4.04$, $p < .001$.

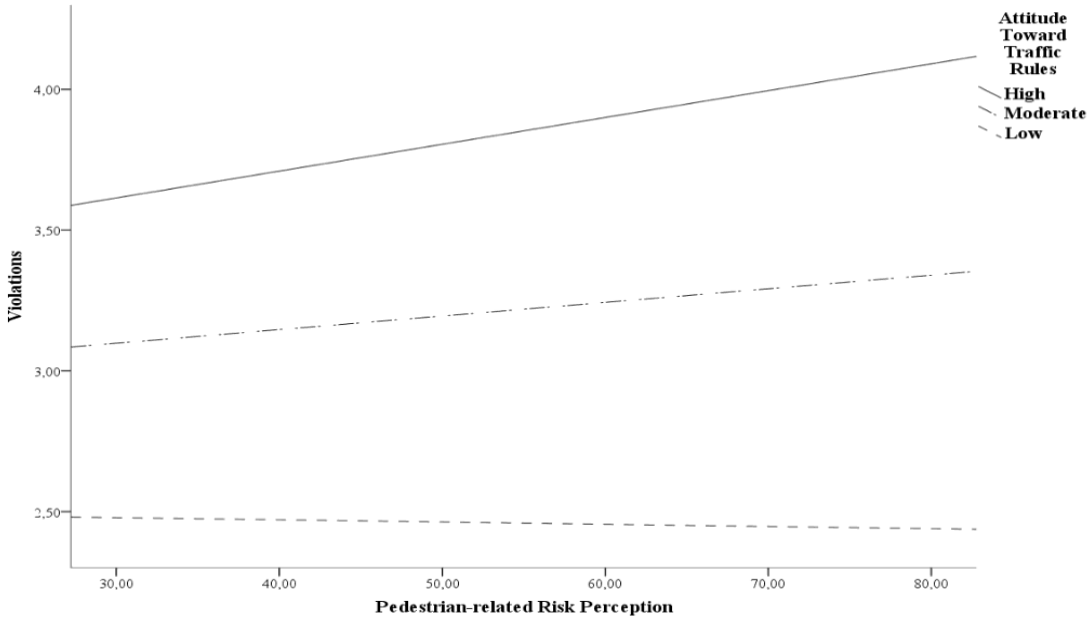

Figure 2. Interaction between pedestrian-related risk perception and attitudes toward traffic rules for violations.

The interaction between *infrastructure-related risk perception* and *attitudes toward traffic rules* was significant, $b = 0.0066$, $SE = 0.0024$, 95% CI [0.0019, 0.0113], $t = 2.75$, $p = .006$, indicating a moderation effect. Conditional effects analysis revealed that the effect of *infrastructural risk* on *violations* was non-significant at low levels of *attitudes toward traffic rules*, $b = -0.0015$, $SE = 0.0028$, 95% CI [−0.0069, 0.0040], $t = -0.53$, $p = .594$. However, the relationship was significant at moderate levels, $b = 0.0042$, $SE = 0.0021$, 95% CI [0.0001, 0.0082], $t = 2.03$, $p = .043$, and became stronger at high levels of *attitudes toward traffic rules*, $b = 0.0089$, $SE = 0.0028$, 95% CI [0.0034, 0.0144], $t = 3.17$, $p = .002$.

The Johnson-Neyman analysis revealed that the conditional effect of perception of infrastructure-related risks on pedestrian violations became statistically significant when attitudes toward traffic rules exceeded a value of 2.69 (51% of the sample). These results suggest that for pedestrians with higher scores on attitudes toward traffic rules which means higher scepticism toward traffic rules, higher perception of infrastructure-related risks are associated with greater violation behaviors perpetrated by pedestrians. Conversely, those with lower scores on attitudes toward traffic rules, were less influenced by environmental hazards in their behavioral responses (see Figure 3).

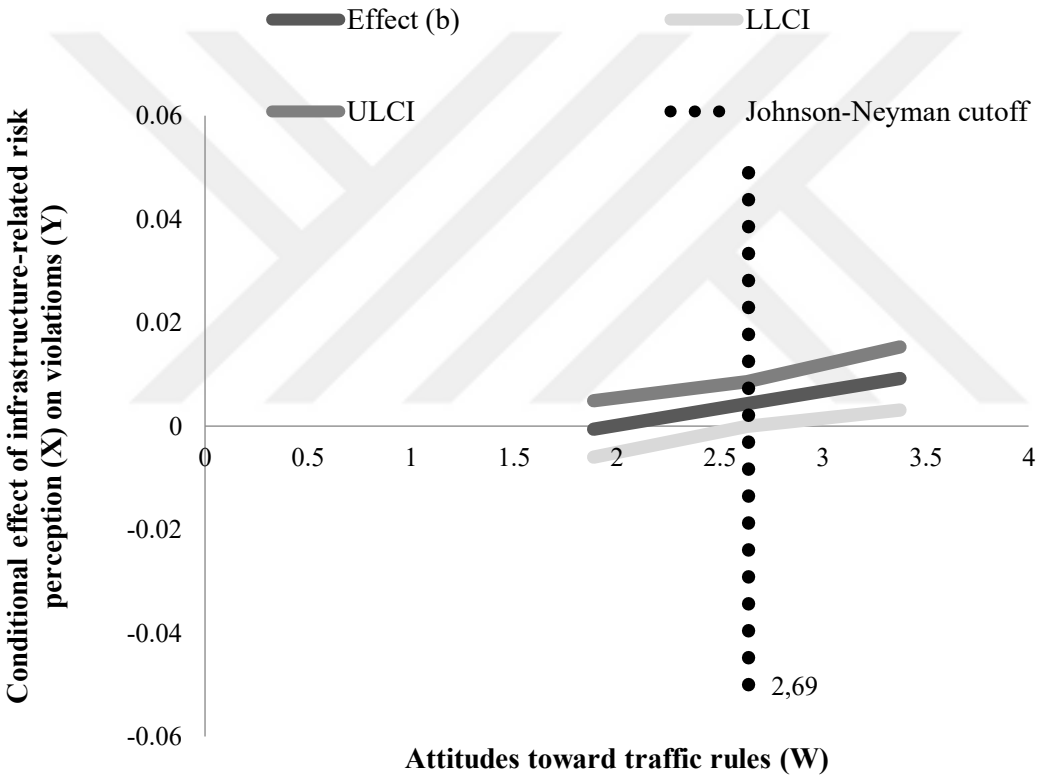

Figure 3. The conditional effect of infrastructure-related risk perception on violations as a function of attitudes toward traffic rules.

The interact plot further illustrates that the highest violations occurred when both infrastructure-related risk perception and sceptic attitudes toward traffic rules were high, whereas the lowest violations occurred when infrastructure-related risk perception was low and trusting attitudes towards traffic rules were strong (see Figure 4).

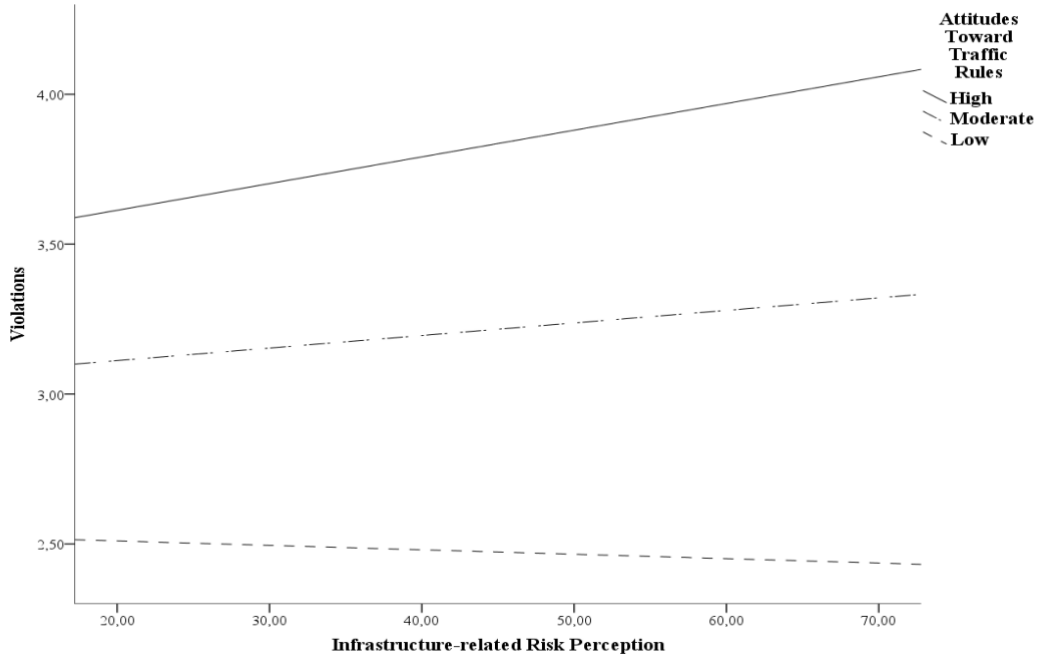

Figure 4. Interaction between infrastructure-related risk perception and attitudes toward traffic rules for violations.

3.3.5.2. Moderating role of Attitudes in the Relationship between Risk Perception and Lapses

First, the association between *pedestrian-related risk perceptio*n and pedestrian *lapses* varied as a function of individuals' *attitudes toward other road users*, a moderation analysis was conducted. The predictor variable was *pedestrian-related risk perception*, the dependent variable was *lapses*, and the moderator was *attitudes toward other road users*. The overall model was significant, $F(7, 394) = 6.61$, $p < .001$, with an R^2 of .11, indicating that 10.5% of the variance in *lapses* was explained by the model. *Pedestrian-related risk perception* significantly predicted *lapses* ($b = –0.039$, $SE = 0.017$, $t = –2.29$, $p = .023$, 95% CI [–0.073, –0.006]), and *attitudes toward other road users* were also a significant predictor ($b = –1.113$, $SE = 0.248$, $t = –4.48$, $p < .001$, 95% CI [–1.601, –0.625]). The interaction between *pedestrian-related risk perception* and *attitudes toward other road users* was statistically significant ($b = 0.010$, $SE = 0.004$, $t = 2.46$, $p = .014$, 95% CI [0.002, 0.018]).

To probe the interaction, conditional effects were examined. At low levels of *attitudes toward other road users* (–1 SD), the effect of *pedestrian-related risk*

perception on *lapses* was significant and negative (b = –0.025, SE = 0.012, t = –2.19, p = .029, 95% CI [–0.048, –0.003]). At moderate levels (mean), the effect was non-significant (b = 0.003, SE = 0.003, t = 1.04, p = .299, 95% CI [–0.002, 0.008]). At high levels (+1 SD), the effect was significant and positive (b = 0.007, SE = 0.003, t = 2.17, p = .031, 95% CI [0.001, 0.013]).

The Johnson–Neyman analysis revealed that the effect of *pedestrian-related risk perception* on *lapses* was statistically significant when *attitudes toward other road users* were below 2.53 (0.5% of the sample) or above 4.60 (23% of the sample). This suggests that the relationship between *risk perception* and *lapses* reverses depending on one's *attitudes*: among those with more critical *attitudes*, greater perceived *risk* is associated with fewer *lapses*, whereas among those with more trusting *attitudes*, greater perceived *risk* is associated with more *lapses* (see Figure 5).

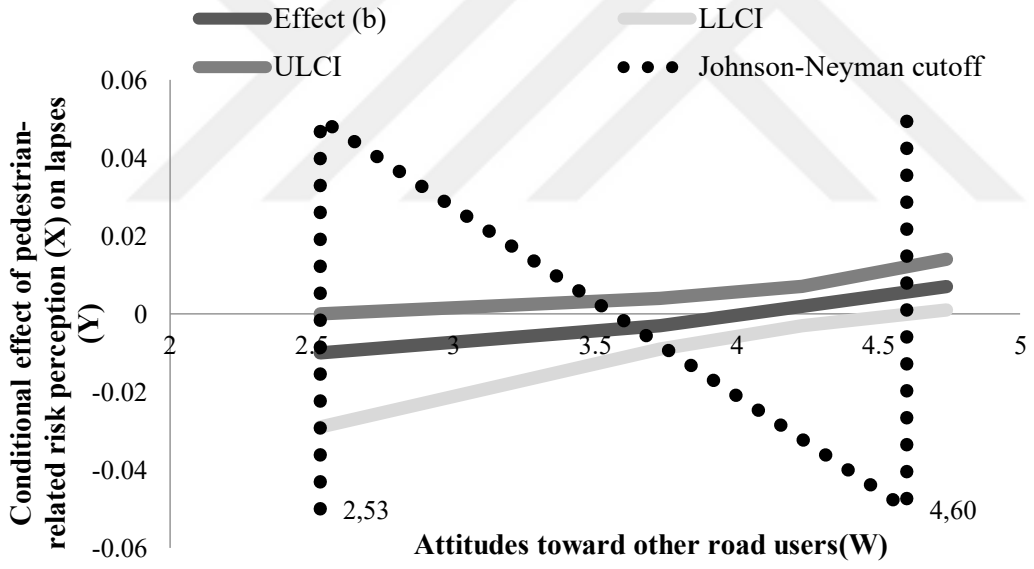

Figure 5. The conditional effect of pedestrian-related risk perception on lapses as a function of attitudes toward other road users.

The interaction plot further shows that the highest *lapses* were observed when both *pedestrian-related risk perception* and criticism *toward other road users* were high, whereas the lowest *lapses* were observed when *risk perception* was high but *attitudes toward other road users* were low (see Figure 6).

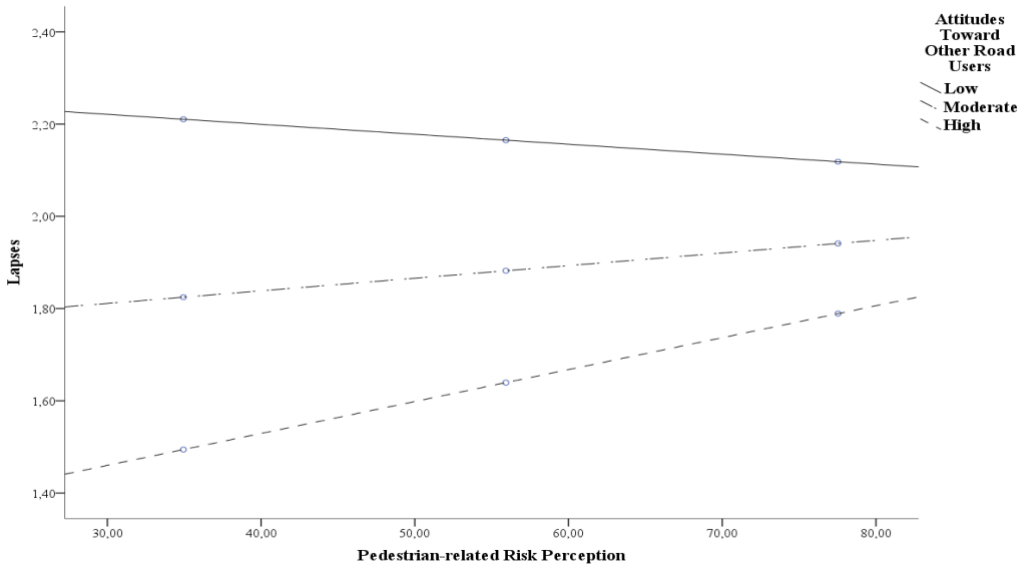

Figure 6. Interaction between pedestrian-related risk perception and attitudes toward other road users for lapses.

Second, to investigate whether the association between *driver-related risk perception* and *lapses* varied as a function of individuals' attitudes toward other road users, a moderation analysis was conducted. The predictor variable was *driver-related risk perception*, the dependent variable was *lapses*, and the moderator was *attitudes toward other road users.* The overall model was significant, $F(7, 394) = 6.48$, $p < .001$, explaining 10% of the variance in *lapses* ($R^2 = .10$). *Driver-related risk perception* significantly and negatively predicted *lapses* ($b = -0.037$, $SE = 0.016$, $t = -2.35$, $p = .020$, 95% CI [−0.068, −0.006]), indicating that individuals who perceived higher *risk* from *drivers* reported fewer *lapses*. *Attitudes toward other road users* also emerged as a significant negative predictor ($b = -1.014$, $SE = 0.277$, $t = -3.67$, $p < .001$, 95% CI [−1.558, −0.470]), such that those with more critical views of *other road users* (i.e., higher scores) reported fewer *lapses*.

The interaction term between *driver-related risk perception* and *attitudes toward other road users* was significant ($b = 0.008$, $SE = 0.004$, $t = 2.19$, $p = .029$, 95% CI [0.001, 0.016]), suggesting that *attitudes toward other road users* moderate the relationship between perceived *driver-related risk perception* and *lapses*.

Conditional effects analysis revealed that for individuals who held more critical *attitudes toward other road users* (–1 SD), higher perceived *driver-related risk* was

associated with significantly fewer *lapses* ($b = -0.025$, $SE = 0.011$, $p = .017$, 95% CI [−0.046, −0.005]). This negative relationship weakened at moderate levels of the *moderator*, though still statistically significant ($b = -0.006$, $SE = 0.003$, $p = .037$, 95% CI [−0.012, −0.0004]). At high levels of the *moderator* (+1 SD), the effect was no longer significant ($b = 0.001$, $SE = 0.003$, $p = .669$, 95% CI [−0.005, 0.007]). Johnson–Neyman analysis indicated that the conditional effect of *driver-related risk perception* on *lapses* became non-significant at *attitudes toward other road users* values exceeding 3.86, which corresponds to approximately the 20th percentile of the sample. In other words, the buffering effect of *risk perception* against *lapses* was most evident among *pedestrians* who held more critical views of *other road users*. (see Figure 7).

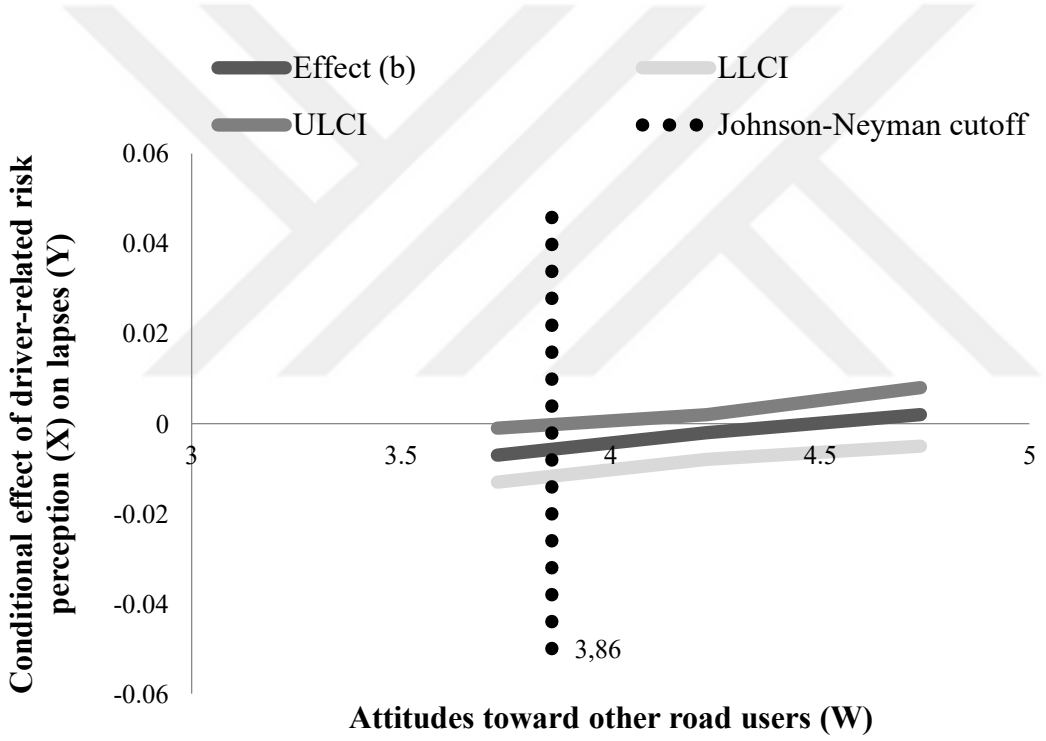

Figure 7. The conditional effect of driver-related risk perception on lapses as a function of attitudes toward other road users.

These findings suggest that the relationship between perceived *risk* posed by *drivers* and *pedestrian lapses* is contingent upon interpersonal *attitudes* in traffic. Specifically, individuals with more sceptical or vigilant *attitudes toward other road users* may be more likely to internalize perceived threats and adjust their behaviors to avoid mistakes. In contrast, those who trust or are less critical of *others* may not

show the same adaptive behavioral reduction in *lapses* when perceiving higher *driver-related risks*. The interaction plot further illustrates that the highest *lapses* were observed when *driver-related risk perception* was high and criticism toward *other road users* was also high, whereas the lowest *lapses* were observed when *driver-related risk perception* was high but *attitudes toward other road users* were low (see Figure 8).

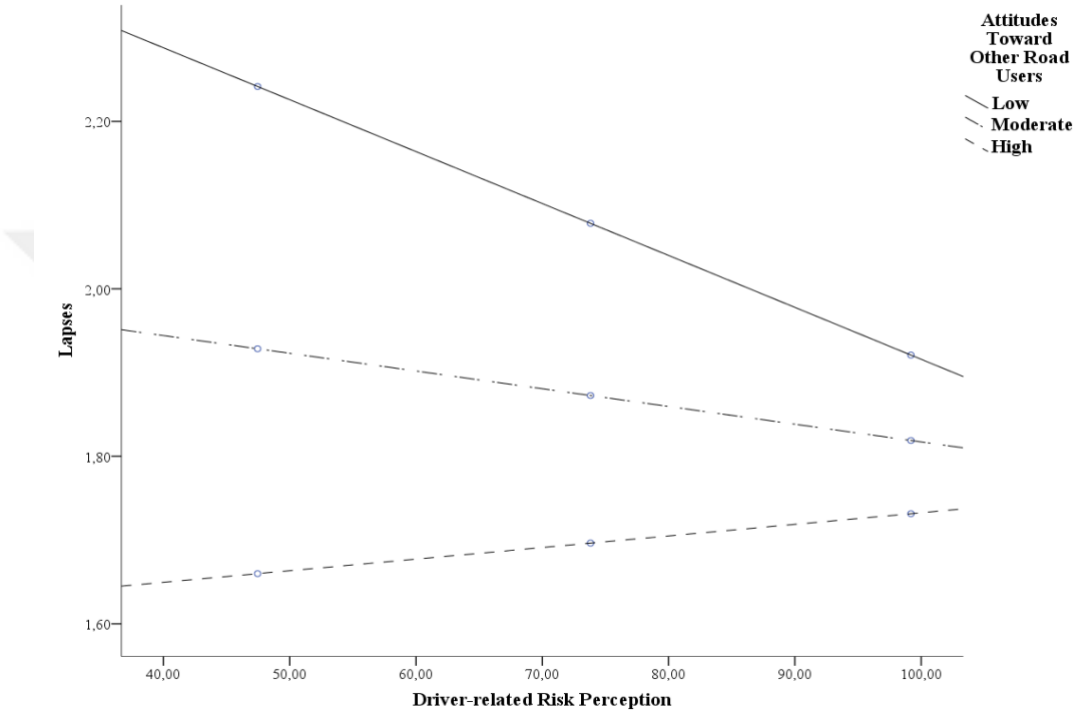

Figure 8. Interaction between driver-related risk perception and attitudes toward other road user for lapses.

Third, to investigate whether the association between *driver-related risk perception* and *pedestrian lapses* varied as a function of individuals' *attitudes toward traffic rules*, a moderation analysis was conducted. The *predictor variable* was *driver-related risk perception*, the *dependent variable* was *lapses*, and the *moderator* was *attitudes toward traffic rules*.

The overall model was significant, $F(7, 394) = 8.77$, $p < .001$, with an R^2 of .13, indicating that 13.5% of the variance in *lapses* was explained by the model. The main effect of *driver-related risk perception* was not statistically significant (b = 0.01, SE = 0.01, t = 1.24, p = .22, 95% CI [–0.01, 0.03]). *Attitudes toward traffic*

rules had a significant positive association with *lapses* (b = 0.87, SE = 0.23, t = 3.86, p < .001, 95% CI [0.43, 1.31]). The interaction between *driver-related risk perception* and *attitudes toward traffic rules* was statistically significant (b = –0.006, SE = 0.003, t = –2.10, p = .037, 95% CI [–0.01, –0.0004]). To probe the interaction, conditional effects were examined. At low levels of *attitudes toward traffic rules* (–1 SD), the effect of *driver-related risk perception* on *lapses* was non-significant (b = –0.001, SE = 0.003, t = –0.42, p = .68, 95% CI [–0.01, 0.005]). At moderate levels (mean), the effect was significant (b = –0.006, SE = 0.002, t = –2.88, p = .004, 95% CI [–0.01, –0.002]). At high levels (+1 SD), the effect was even stronger (b = –0.011, SE = 0.003, t = –3.40, p < .001, 95% CI [–0.02, –0.005]). The Johnson–Neyman analysis revealed that the effect of *driver-related risk perception* on *lapses* became statistically significant when *attitudes toward traffic rules* exceeded a value of 2.40, which corresponds to approximately 65% of the sample (see Figure 9).

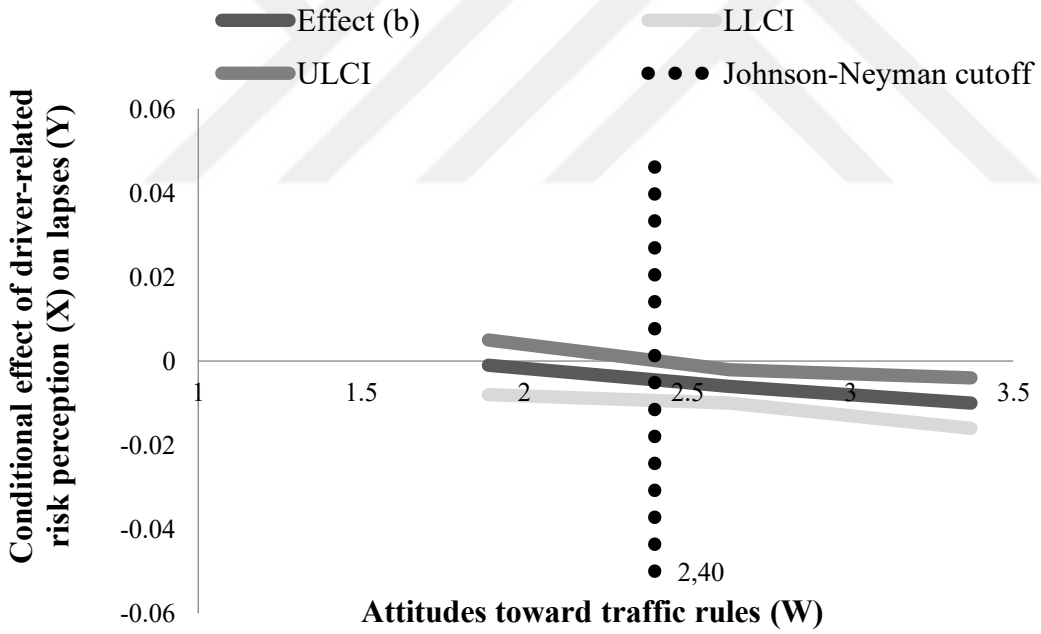

Figure 9. The conditional effect of driver-related risk perception on lapses as a function of attitudes toward traffic rules.

This indicates that among *pedestrians* with more sceptical views of *traffic rules*, greater *driver-related risk perception* is linked to fewer *lapses*, suggesting a protective effect of *risk perception* under such conditions. The interaction plot

further shows that the highest *lapses* were observed when *driver-related risk perception* was low and sceptic *attitudes toward traffic rules* were high, whereas the lowest *lapses* were observed when *driver-related risk perception* was high and *rule trust* was strong (low on *attitudes toward traffic rules*) (see Figure 10).

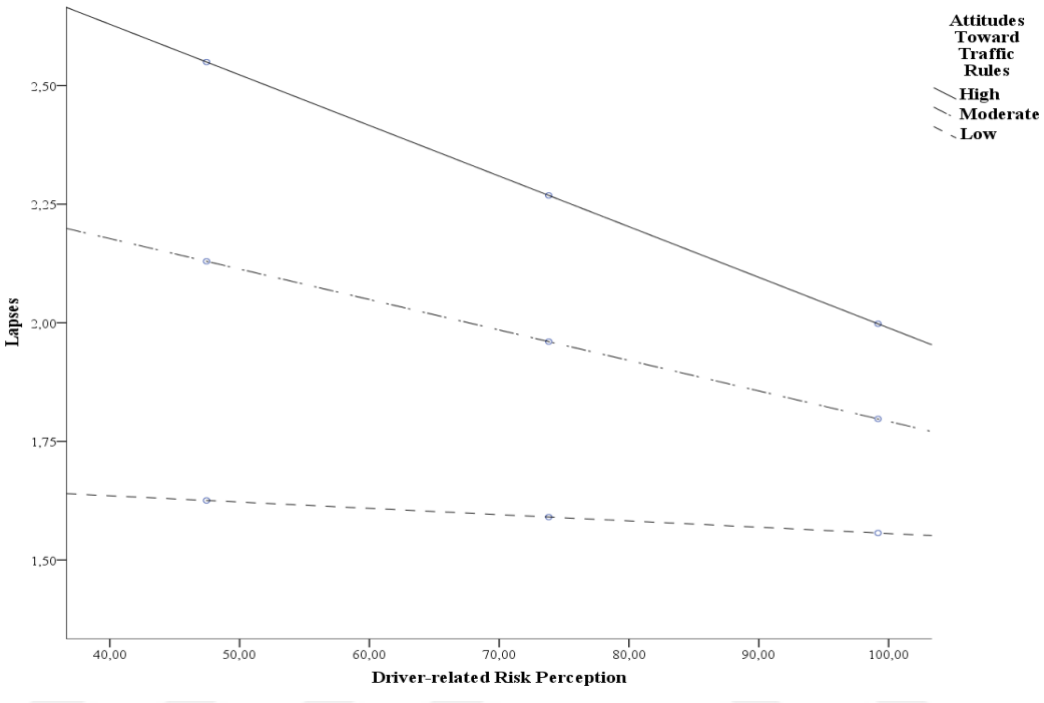

Figure 10. Interaction between driver-related risk perception and attitudes toward traffic rules for lapses.

Forth, to examine whether the relationship between *infrastructure-related risk perception* and pedestrian *lapses* was moderated by individuals' *attitudes toward traffic rules*, a moderation analysis was conducted. The predictor variable was *infrastructure-related risk perception*, the dependent variable was *lapses*, and the moderator was *attitudes toward traffic rules*. The overall model was statistically significant, $F(7, 394) = 8.01$, $p < .001$, with an R^2 of .12, indicating that 12% of the variance in *lapses* was explained by the model. The main effect of *infrastructure-related risk perception* was not significant, $b = –0.01$, $SE = 0.01$, $t = –1.46$, $p = .15$, 95% CI [–0.03, 0.004].

Attitudes toward traffic rules also did not show a significant main effect, $b = 0.17$, $SE = 0.16$, $t = 1.02$, $p = .31$, 95% CI [–0.15, 0.49]. However, the interaction between

infrastructure-related risk perception and *attitudes toward traffic rules* was significant, $b = 0.006$, $SE = 0.003$, $t = 2.07$, $p = .039$, 95% CI [0.0003, 0.0113]. To interpret the interaction, conditional effects were examined at different levels of *attitudes toward traffic rules*. At low levels of the moderator (–1 SD), the effect of *infrastructure-related risk perception* on *lapses* was not significant, $b = –0.0005$, $SE = 0.0032$, $p = .874$. At the mean level, the effect was marginal, $b = 0.0044$, $SE = 0.0024$, $p = .064$. At high levels of *attitudes toward traffic rules* (+1 SD), the effect became statistically significant, $b = 0.0086$, $SE = 0.0033$, $p = .009$, 95% CI [0.0021, 0.0150].

The Johnson–Neyman analysis identified a threshold value of 2.77 on attitudes toward traffic rules. Specifically, the effect of infrastructure-related risk perception on lapses was non-significant when attitudes toward traffic rules were below this value. Once attitudes exceeded 2.77 (43% of the sample), the relationship became statistically significant and positive, indicating that higher perceptions of infrastructural risk were associated with increased lapses among pedestrians. Moreover, the effect size strengthened as attitudes toward traffic rules became more sceptical or situational, suggesting that scepticism toward rules amplifies the behavioral impact of perceived infrastructural hazards (see Figure 11).

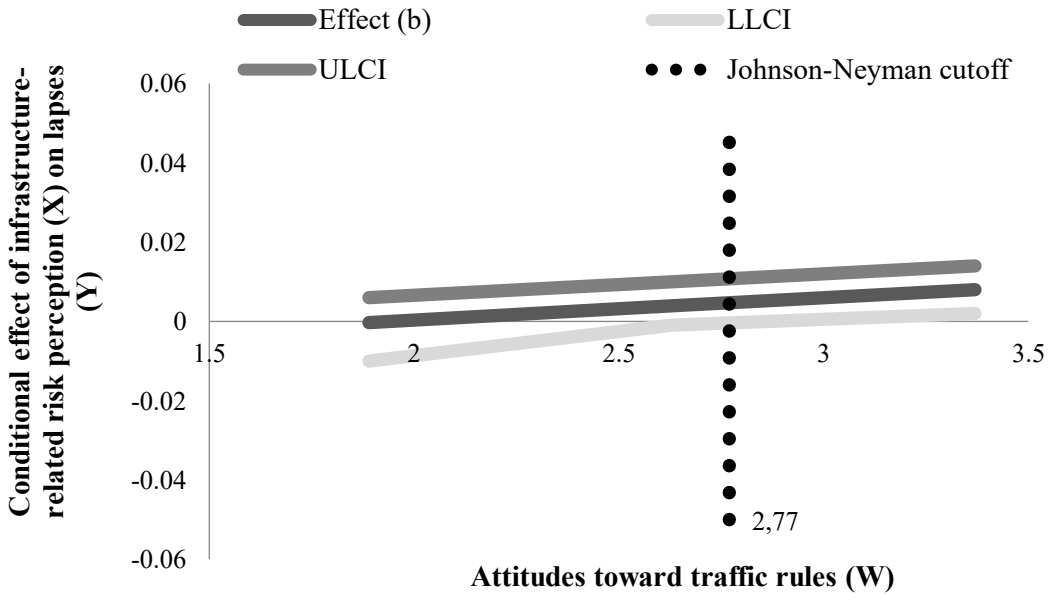

Figure 11. The conditional effect of infrastructure-related risk perception on lapses as a function of attitudes toward traffic rules.

The interaction plot further indicates that the highest *lapses* were observed when both *infrastructural risk perception* and sceptic attitudes toward traffic rules were high, whereas the lowest *lapses* were observed when *infrastructural risk perception* was low and trusting *attitudes toward traffic rules* was strong (see Figure 12).

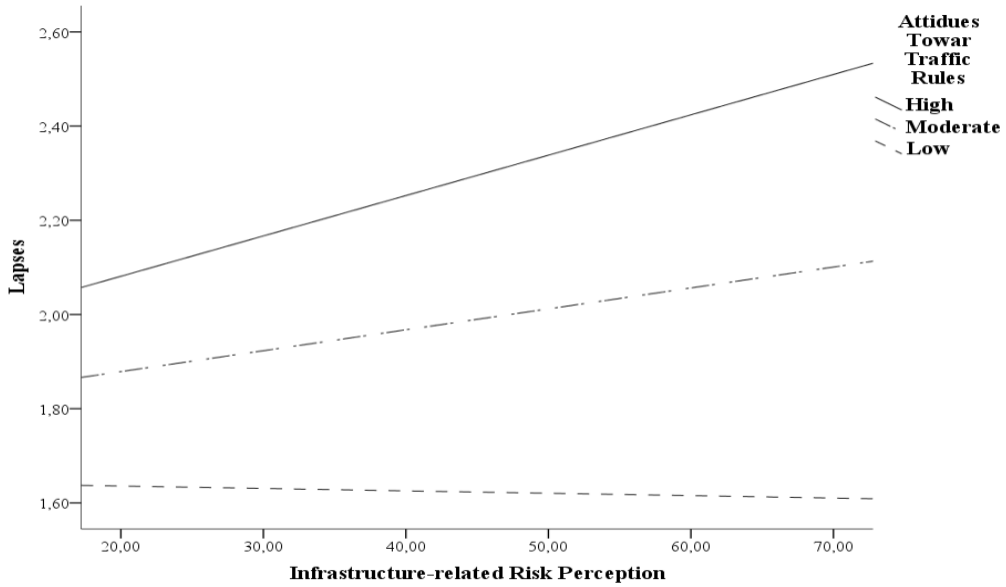

Figure 12. Interaction between infrastructure-related risk perception and attitudes toward traffic rules for lapses.

3.3.5.3. Moderating role of Attitudes in the Relationship between Risk Perception and Aggressive Behaviors

First, to investigate whether the association between *driver-related risk perception* and *aggressive* behaviors varied as a function of individuals' *attitudes toward other road users*, a moderation analysis was conducted. The predictor variable was *driver-related risk perception*, the dependent variable was *aggressive behaviors*, and the moderator was *attitudes toward other road users*. The overall model was significant, $F(7, 394) = 6.14$, $p < .001$, with an R^2 of .10, indicating that 10% of the variance in *aggressive behaviors* was explained by the model.

Driver-related risk perception did not significantly predict *aggressive behaviors* ($b = 0.0004$, $SE = 0.0026$, $t = 0.16$, $p = .869$, 95% CI [–0.005, 0.006]), nor did *attitudes toward other road users* reach statistical significance ($b = –0.216$, $SE = 0.127$, $t = –$

1.70, p = .089, 95% CI [–0.466, 0.033]). However, the interaction between *driver-related risk perception* and *attitudes toward other road users* was statistically significant (b = 0.0087, SE = 0.0038, t = 2.28, p = .023, 95% CI [0.0012, 0.0161]).

To probe this interaction, conditional effects were examined. At low levels of *attitudes toward other road users* (–1 SD), the effect of *driver-related risk perception* on *aggressive behaviors* was non-significant (b = –0.0035, SE = 0.0030, p = .253). At moderate levels (mean), the effect remained non-significant (b = 0.0009, SE = 0.0026, p = .739). At high levels (+1 SD), the effect remained non-significant (b = 0.0046, SE = 0.0033, p = .163), although trending positive. The Johnson-Neyman technique revealed that the effect of *driver-related risk perception* on *aggressive behaviors* became statistically significant only when *attitudes toward other road users* were below 3.01, which corresponds to approximately 4% of the sample. This suggests that only individuals who hold strongly negative views of *other road users* (high scores on this dimension) tend to exhibit fewer *aggressive behaviors* as their perception of *driver-related risk perception* increases. For the majority of participants, however, this relationship was not statistically meaningful (see Figure 13).

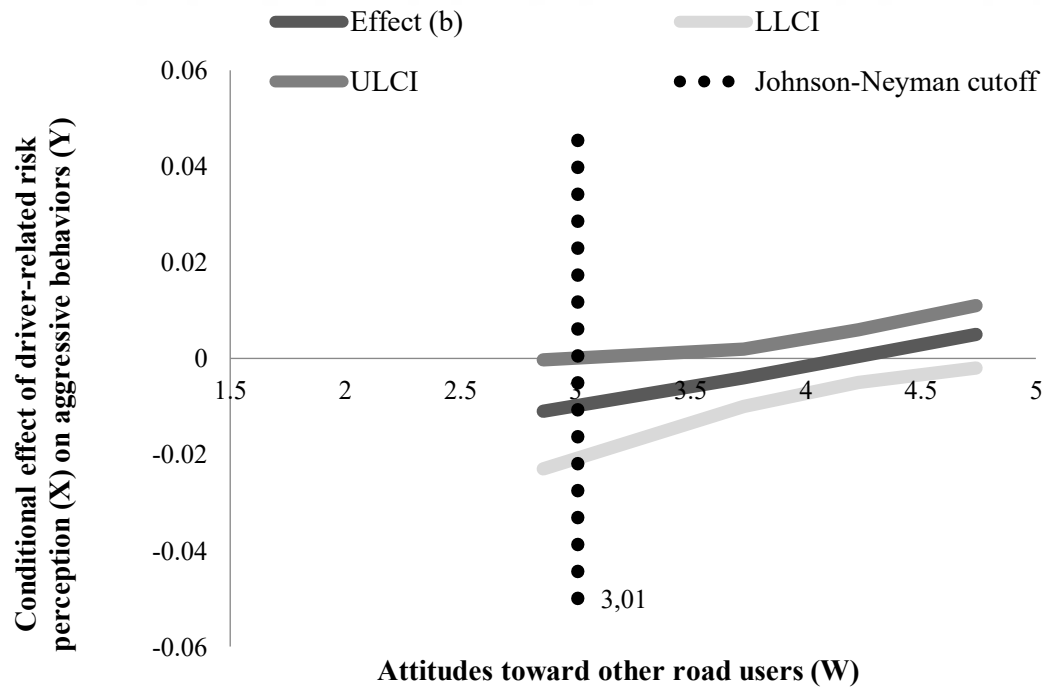

Figure 13. Interaction between driver-related risk perception and attitudes toward other road users for aggressive behaviors.

The interaction plot further illustrates that the highest *aggressive behaviors* were observed among pedestrians with *high criticism toward other road users*, regardless of their *perceived driver-related risk*, whereas the lowest *aggressive behaviors* were observed when *risk perception* was high and *criticism of other road users* was low (see Figure 14).

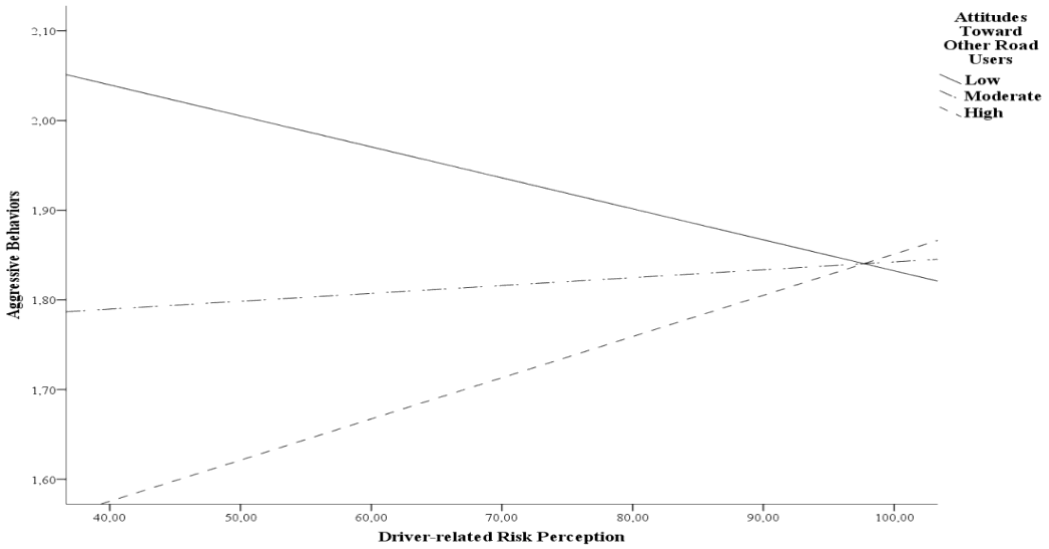

Figure 14. The conditional effect of driver-related risk perception on aggressive behaviors as a function of attitudes toward other road users.

Second, to investigate whether the association between *infrastructure-related risk perception* and *aggressive behaviors* varied as a function of individuals' *attitudes toward traffic rules*, a moderation analysis was conducted.

The predictor variable was *infrastructure-related risk perception*, the dependent variable was aggressive behavior, and the moderator was attitudes toward traffic rules. The overall model was significant, $F(7, 394) = 9.11$, $p < .001$, with an R^2 of .14, indicating that 14% of the variance in *aggressive behaviors* was explained by the model.

The main effect of *infrastructure-related risk perception* was not statistically significant, $b = –0.01$, $SE = 0.01$, $t = –1.44$, $p = .15$, 95% CI [–0.03, 0.00]. *Attitudes toward traffic rules* were also non-significant, $b = 0.07$, $SE = 0.17$, $t = 0.40$, $p = .69$, 95% CI [–0.26, 0.39]. However, the interaction between *infrastructure-related risk*

perception and *attitudes toward traffic rules* was statistically significant, $b = 0.006$, $SE = 0.003$, $t = 2.16$, $p = .031$, 95% CI [0.001, 0.012].

To probe the interaction, conditional effects were examined. At low levels of *attitudes toward traffic rules* (–1 SD), the effect of *infrastructure-related risk perception* on *aggressive behavior* was non-significant, $b = 0.0001$, $SE = 0.003$, $t = 0.02$, $p = .98$, 95% CI [–0.01, 0.01]. At moderate levels (mean), the effect was significant, $b = 0.005$, $SE = 0.002$, $t = 2.19$, $p = .029$, 95% CI [0.001, 0.010]. At high levels (+1 SD), the effect became stronger, $b = 0.010$, $SE = 0.003$, $t = 2.93$, $p = .004$, 95% CI [0.003, 0.016].

The Johnson-Neyman analysis identified a threshold value of 2.62 for *attitudes toward traffic rules*. The effect of *infrastructure-related risk perception* on *aggressive behaviors* became statistically significant when *attitudes toward traffic rules* exceeded this value, which corresponds to approximately 51% of the sample. This indicates that more sceptical or situational views of traffic rules amplify the effect of infrastructural risk on aggressive tendencies, behaviourally (see Figure 15).

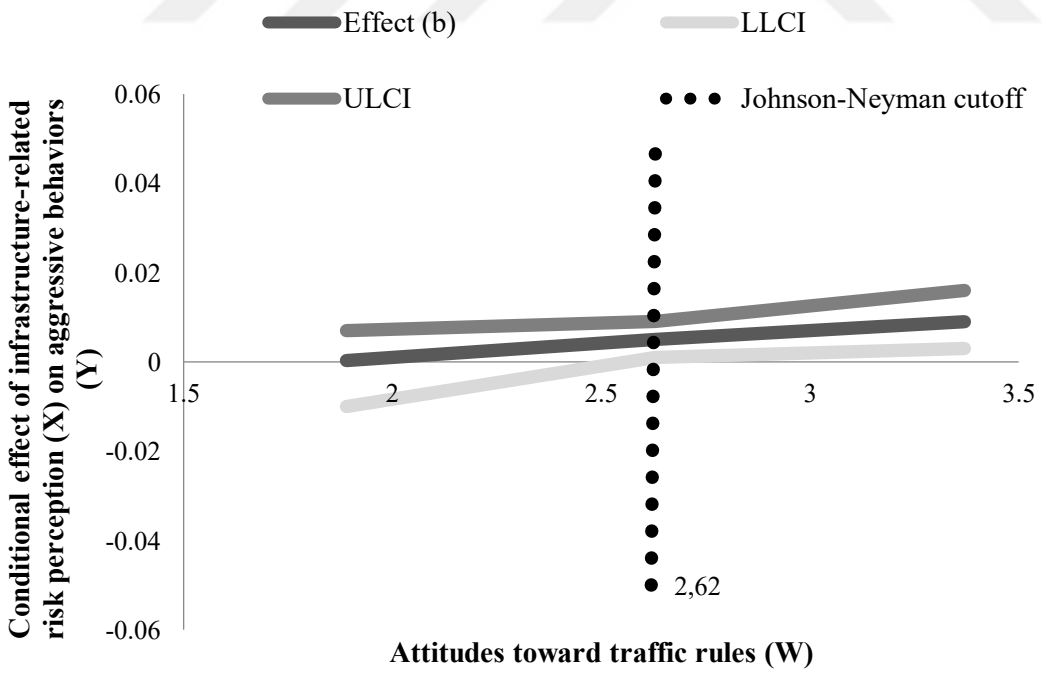

Figure 15. The conditional effect of infrastructure-related risk perception on aggressive behaviors as a function of attitudes toward traffic rules.

The interaction plot further demonstrates that the highest *aggressive behaviors* were observed when both *infrastructure-related risk perception* and scepticism *toward traffic rules* were high, whereas the lowest *aggressive behaviors* was observed when *infrastructure-related risk perception* was low and trust in *traffic rules* was strong (see Figure 16).

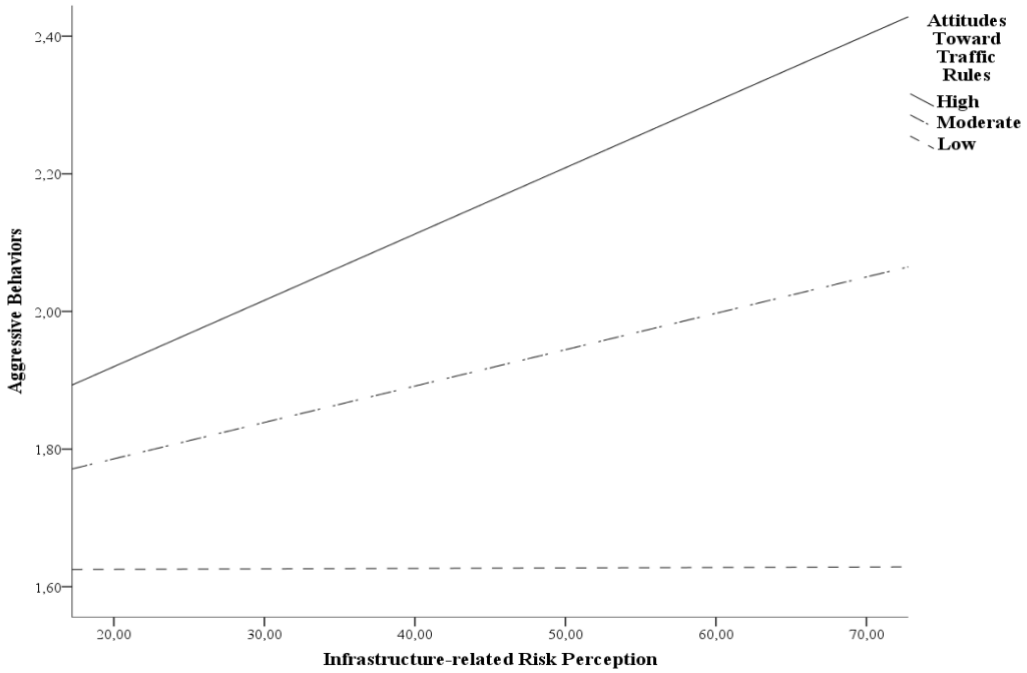

Figure 16. Interaction between infrastructure-related risk perception and attitudes toward traffic rules for aggressive behaviors.

3.3.5.4. Moderating role of Attitudes in the Relationship between Risk Perception and Positive Behaviors

To investigate whether the association between *pedestrian-related risk perception and positive behaviors* varied as a function of *attitudes toward other road users,* a moderation analysis was conducted. The overall model was significant, $F(7, 394) = 6.92$, $p < .001$, with an R^2 of .11, indicating that 11% of the variance in *positive pedestrian behaviors* was explained by the model. *Pedestrian-related risk perception* significantly predicted *positive behaviors* ($b = 0.052$, $SE = 0.016$, $t = 3.20$, $p = .002$, 95% CI [0.020, 0.084]), as did *attitudes toward other road users* ($b = 1.16$, $SE = 0.23$, $t = 4.95$, $p < .001$, 95% CI [0.700, 1.622]).

The interaction between *pedestrian-related risk perception* and *attitudes toward other road users* was statistically significant ($b = -0.012$, $SE = 0.004$, $t = -3.07$, $p = .002$, 95% CI [−0.019, −0.004]). To probe the interaction, conditional effects were examined. At low levels of *attitudes toward other road users* (−1 SD), *pedestrian-related risk perception* significantly predicted greater *positive behaviors* ($b = 0.035$, $SE = 0.011$, $p = .001$, 95% CI [0.014, 0.057]). At moderate levels (mean), the effect was non-significant ($b = 0.002$, $SE = 0.003$, $p = .342$, 95% CI [−0.003, 0.007]). At high levels (+1 SD), the effect was also non-significant and slightly negative ($b = -0.003$, $SE = 0.003$, $p = .393$, 95% CI [−0.009, 0.003]).

The Johnson-Neyman analysis indicated that the effect of *pedestrian-related risk perception* on positive behavior was statistically significant when *attitudes toward other road users* were below 4.05, which includes approximately 30% of the sample. This suggests that the relationship between *risk perception* and *positive pedestrian behavior* is strongest among individuals who hold more *critical attitudes toward other road users*. Among those who trust *other road users* more, *risk perception* appears to have little influence on positive behaviors (see Figure 17).

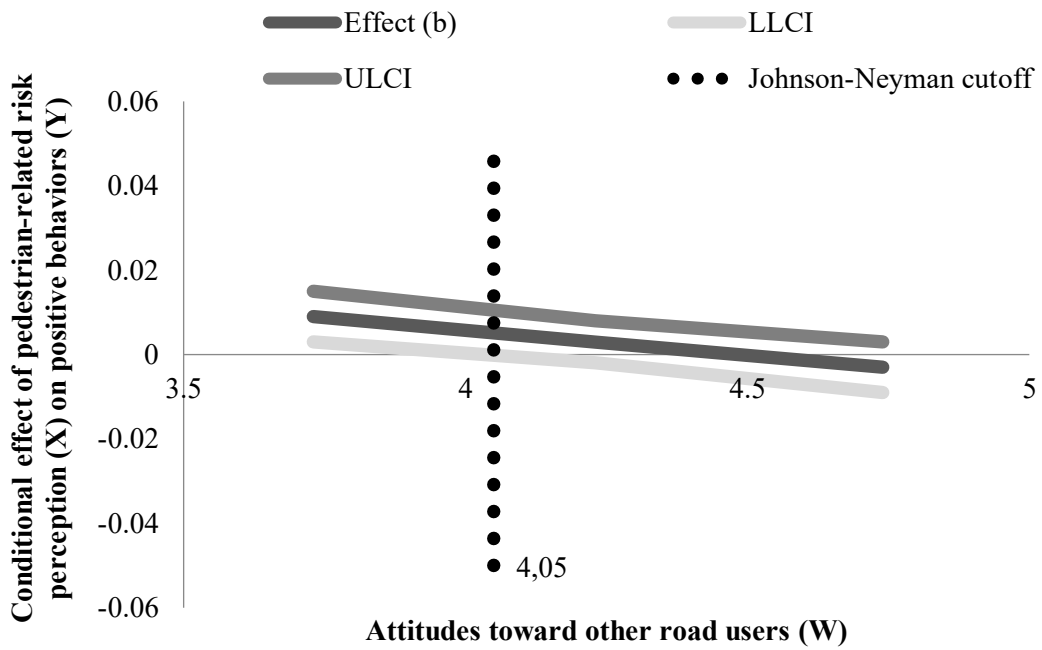

Figure 17. The conditional effect of pedestrian-related risk perception on positive behaviors as a function of attitudes toward other road users.

The interaction plot further shows that the highest *positive behaviors* were observed when *pedestrian-related risk perception* was high and criticism *toward other road users* was low, whereas the lowest *positive behaviors* were observed when *risk perception* was low and criticism *toward other road users* was high (see Figure 18).

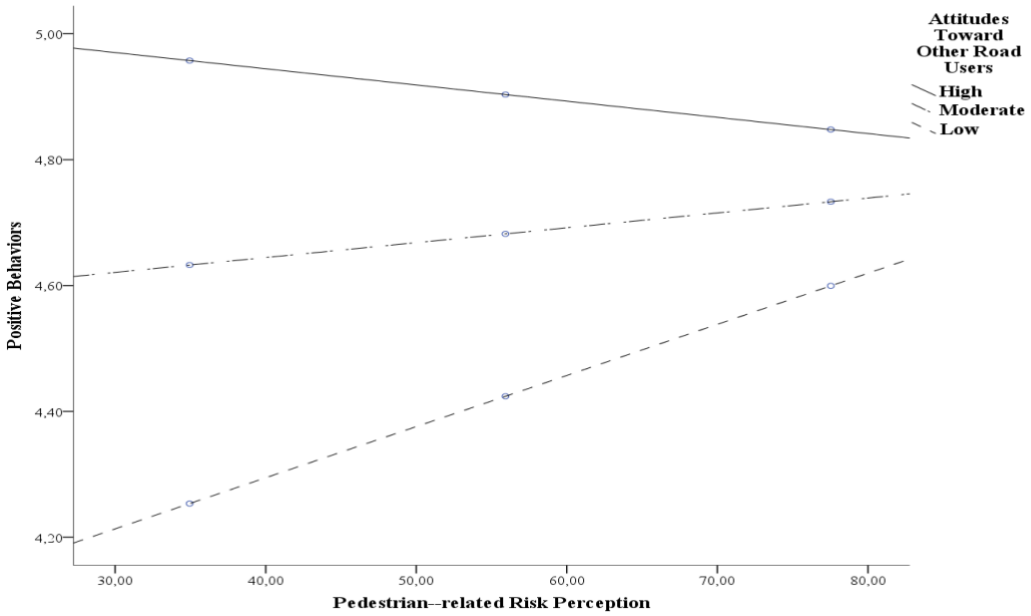

Figure 18. Interaction between pedestrian-related risk perception and attitudes toward other road users for positive behaviors.

Next, to examine whether the relationship between *driver-related risk perception* and *positive pedestrian behavior* was moderated by individuals' *attitudes toward other road users*, a moderation analysis was conducted. The independent variable was *driver-related risk perception*, the dependent variable was *positive pedestrian behavior*, and the moderator was *attitudes toward other road users*.

The overall model was significant, $F(7, 394) = 6.97$, $p < .001$, with an R^2 of .11, indicating that 11% of the variance in *positive behaviors* was explained. *Driver-related risk perception* was positively associated with *positive behaviors*, $b = 0.04$, $SE = 0.01$, $t = 2.73$, $p = .007$, 95% CI [0.01, 0.07]. *Attitudes toward other road users* were also a significant positive predictor, $b = 0.98$, $SE = 0.26$, $t = 3.77$, $p < .001$, 95% CI [0.47, 1.49]. Importantly, the interaction term was statistically significant, $b = –0.0084$, $SE = 0.0035$, $t = –2.39$, $p = .017$, 95% CI [–0.0153, –0.0015].

To probe the interaction, conditional effects of *driver-related risk perception* were examined across levels of *attitudes toward other road users*. At low levels of the moderator (–1 SD), the effect of *driver-related risk perception* on *positive behaviors* was significant and positive, $b = 0.029$, $SE = 0.01$, $p = .0042$. At the mean level, the effect was still significant, $b = 0.0167$, $SE = 0.0053$, $p = .0016$. However, at high levels (+1 SD), the effect diminished and became non-significant, $b = 0.0011$, $SE = 0.0030$, $p = .723$.

For pedestrians scoring below 4.27 on attitudes toward other road users (44% of the sample), the effect of *driver-related risk perception* on *positive behaviors* was significant and positive. This means that *perceiving higher risk from drivers* was associated with more frequent *positive pedestrian behaviors*. For those scoring above 4.27 (56% of the sample), the conditional effect was non-significant. Among individuals with highly critical attitudes toward other road users, greater *driver-related risk perception* no longer predicted differences in *positive pedestrian behavior* (see Figure 19).

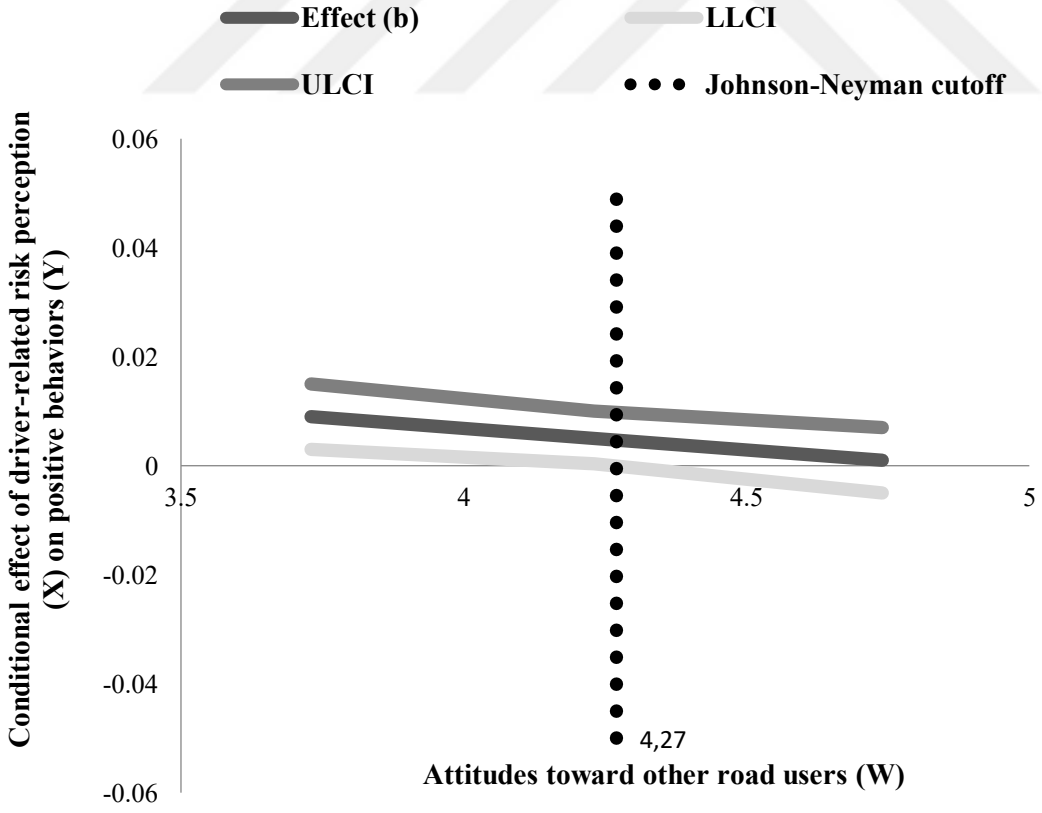

Figure 19. The conditional effect of driver-related risk perception on positive behaviors as a function of attitudes toward other road users .

The interaction plot demonstrates that the highest *positive behaviors* were observed when *driver-related risk perception* was high and *toward other road users* was low, whereas the lowest *positive behaviors* were observed when both driver-related risk perception and criticism *toward other road users* were high (see Figure 20).

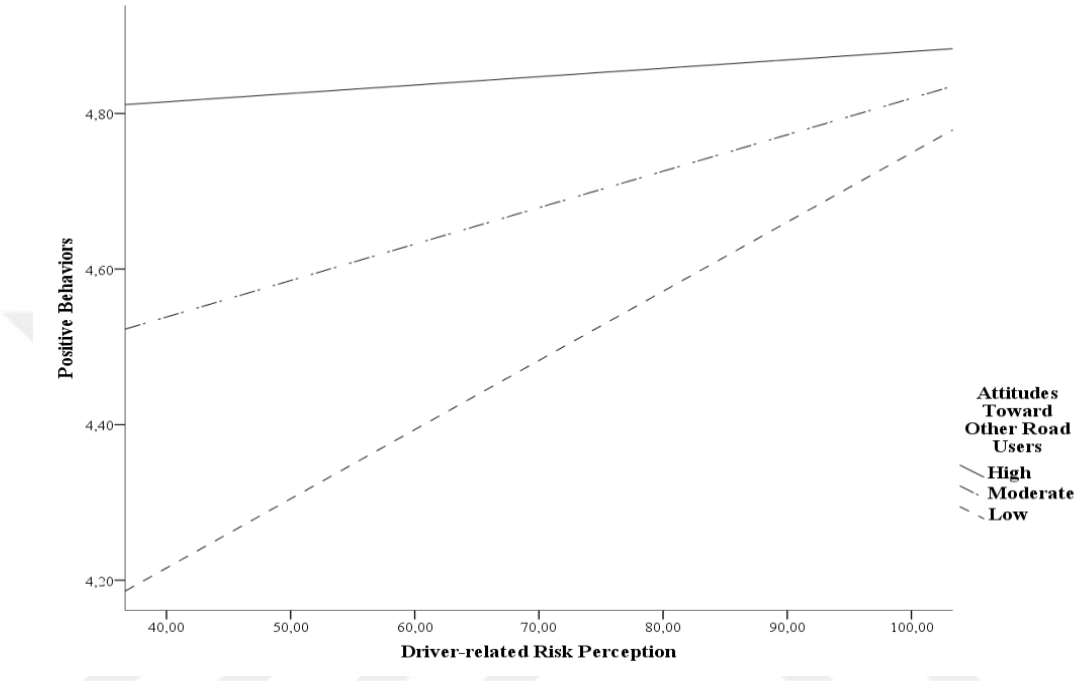

Figure 20. Interaction between driver-related risk perception and attitudes toward other road users for positive behaviors.

Finally, a model tested whether the relationship between *infrastructure-related risk perceptio*n and *positive behaviors* was moderated by *attitudes toward other road users*. The overall model was significant, $F(7, 394) = 7.07$, $p < .001$, with an R^2 of .11, indicating that 11% of the variance in positive pedestrian behavior was explained. *Infrastructure-related risk perception* was a significant positive predictor of *positive behaviors*, $b = 0.06$, $SE = 0.02$, $t = 3.39$, $p = .001$, 95% CI [0.02, 0.09]. *Attitudes toward other road user*s were also a significant predictor, $b = 1.16$, $SE = 0.21$, $t = 5.53$, $p < .001$, 95% CI [0.75, 1.57]. The interaction between *infrastructure-related risk perception* and *attitudes toward other road* users was statistically significant, $b = –0.0134$, $SE = 0.0040$, $t = –3.39$, $p = .001$, 95% CI [–0.0212, –0.0056]. To explore the interaction, conditional effects were analysed across levels of *attitudes toward other road users*. At low levels of the moderator (–1 SD), the effect

of *infrastructure-related risk perception* on *positive behaviors* was significant and positive, $b = 0.039$, $SE = 0.012$, $p = .001$. At the mean level, the effect remained significant, $b = 0.0168$, $SE = 0.0053$, $p = .002$. However, at high levels (+1 SD), the effect turned negative and became significant, $b = –0.0084$, $SE = 0.0035$, $p = .017$.

The Johnson–Neyman analysis identified two thresholds for *attitudes toward other road users*: 3.97 and 4.81. The conditional effect of *infrastructure-related risk perception* on *positive behaviors* was statistically significant for individuals below 3.97 (25% of the sample) and again for those above 4.81 (10% of the sample).

This indicates a crossover interaction. Among pedestrians with more *critical views of other road users* (high scores), *perceiving higher infrastructure-related risks* was linked to greater engagement in *positive pedestrian behaviors*. Interestingly, a similar pattern re-emerged among those with very *highly trusting attitudes* (low scores). For the majority of the sample, however (between 3.97–4.81, 65% of the sample), the relationship was not statistically significant (see Figure 21).

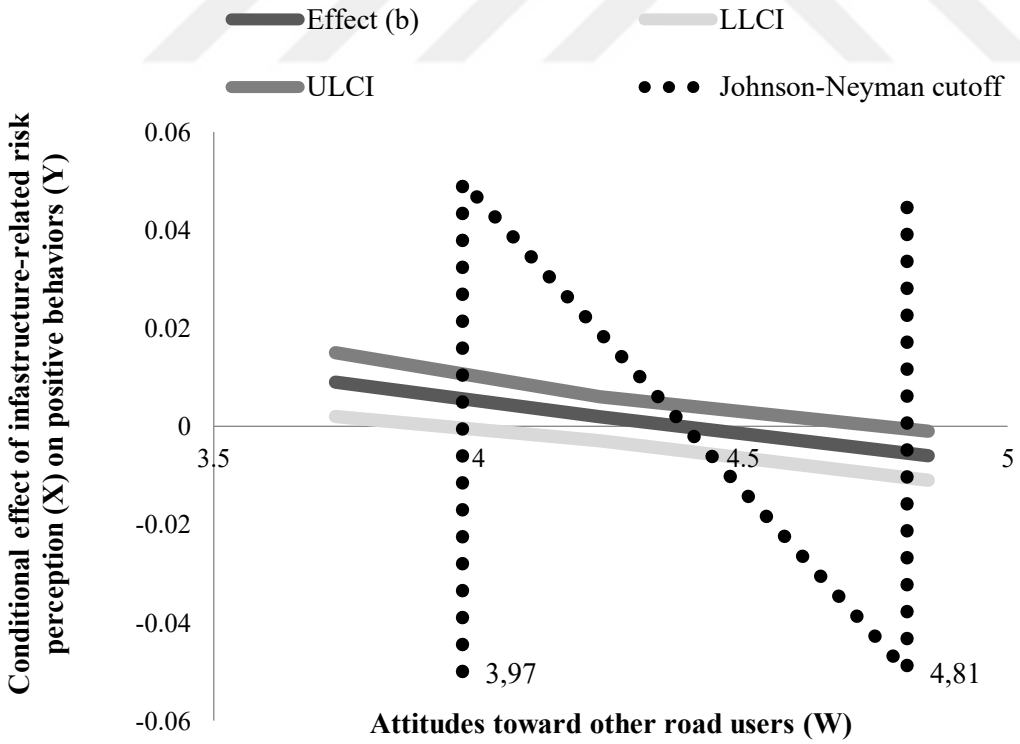

Figure 21. The conditional effect of infrastructure-related risk perception on positive behaviors as a function of attitudes toward other road users.

The interaction plot further illustrates that the highest *positive behaviors* were observed when *infrastructure-related risk perception* was high and criticism *toward other road users* was low, whereas the lowest *positive behaviors* were observed when both *infrastructural risk perception* and *attitudes toward other road users* were high (see Figure 22).

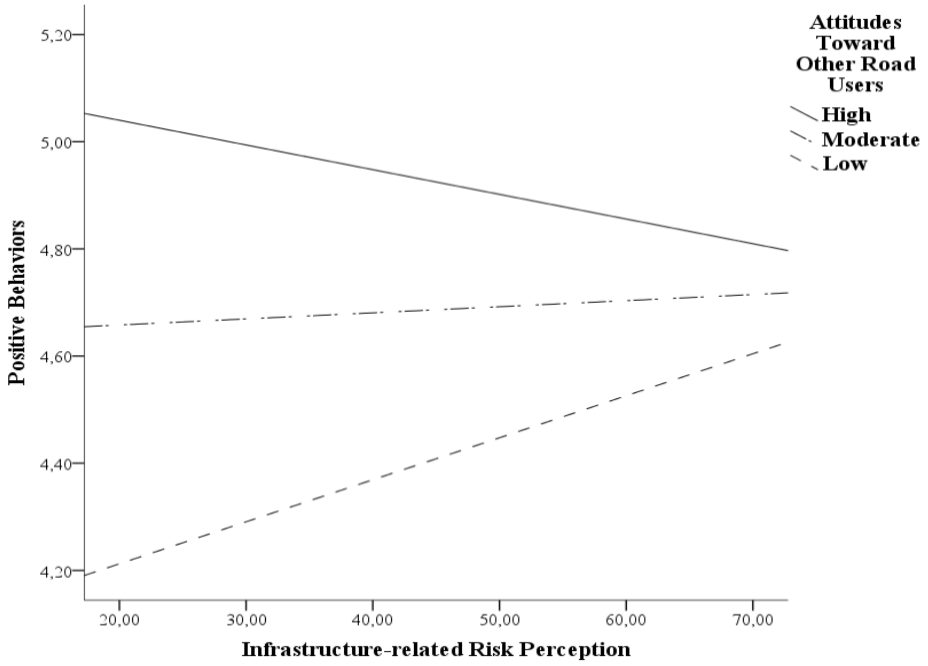

Figure 22. Interaction between infrastructure-related risk perception and attitudes toward other road users for positive behaviors.

In addition to the significant models reported above, several moderation analyses did not yield statistically significant interaction effects. Specifically, when examining the moderating roles of *attitudes toward traffic rules* and *attitudes toward other road users* on the relationships between different types of risk perception (*pedestrian-, driver-*, and *infrastructure-related*) and pedestrian behaviors (*violations*, *lapses*, *aggressive behaviors*, *and positive behaviors*), no significant moderation was found in the following analyses. In these cases, either the overall model fit was not statistically significant ($p > .05$) or the interaction term did not reach significance ($p > .05$). These findings suggest that the effect of perceived risk on pedestrian behavior did not vary as a function of the examined attitudes. As such, moderation was not supported, and no further probing of conditional effects was conducted.

One analysis predicting violations from *pedestrian-related risk perception*, moderated by *attitudes toward other road users*, yielded a significant overall model, R^2 = .15, $F(7, 394) = 10.34$, $p < .001$. However, the interaction term was not statistically significant ($p = .90$), indicating that *attitudes toward other road users* did not moderate the relationship. An analysis predicting *lapses* from *pedestrian-related risk perception*, moderated by *attitudes toward traffic rules*, also yielded a significant overall model, $R^2 = .11$, $F(7, 394) = 6.97$, $p < .001$, but the interaction term was non-significant ($p = .68$). Similarly, the analysis predicting *aggressive behaviors* from *pedestrian-related risk perception* with *attitudes toward traffic rules* as a moderator yielded a significant overall model, $R^2 = .12$, $F(7, 394) = 8.08$, $p < .001$, but no significant interaction ($p = .30$). The same outcome was observed when the moderator was *attitudes toward other road users* ($R^2 = .09$, $F(7, 394) = 5.65$, $p < .001$; interaction $p = .27$). The model predicting *positive behaviors* from *pedestrian-related risk perception*, moderated by *attitudes toward traffic rules*, had a significant overall fit ($R^2 = .03$, $F(7, 394) = 2.06$, $p < .05$), but the interaction term remained non-significant ($p = .56$).

Analyses involving *driver-related risk perception* showed similar patterns. In one, violations were predicted from *driver-related risk perception* moderated by *attitudes toward traffic rules*, with a significant model fit ($R^2 = .42$, $F(7, 394) = 41.03$, $p < .001$), but the interaction term was not significant ($p = .44$). Another model predicting violations with *attitudes toward other road users* also showed a significant model ($R^2 = .15$, $F(7, 394) = 10.29$, $p < .001$), but no significant moderation ($p = .99$). Likewise, *aggressive behaviors* were predicted from *driver-related risk perception* with *attitudes toward traffic rules* as a moderator ($R^2 = .12$, $F(7, 394) = 7.95$, $p < .001$), yet the interaction was not significant ($p = .30$). *Positive behaviors*, too, were significantly predicted by *driver-related risk* ($R^2 = .07$, $F(7, 394) = 4.20$, $p < .001$), but the interaction with *attitudes toward traffic rules* was not significant ($p = .36$).

For *infrastructure-related risk perception*, one model predicting *positive behaviors* using *attitudes toward other road users* as a moderator had a significant overall fit ($R^2 = .07$, $F(7, 394) = 4.20$, $p < .001$), but no moderation effect ($p = .36$). Another

predicting *lapses* from *infrastructure-related risk* moderated by *attitudes toward other road users* also showed a significant model (R^2 = .11, F(7, 394) = 6.83, p < .001), but the interaction term was marginal (p = .07), falling short of significance.

A third model predicted *aggressive behaviors* from *infrastructure-related risk* perception, moderated by *attitudes toward other road users* (R^2 = .10, F(7, 394) = 6.07, p < .001), but the interaction term was not significant (p = .51).

Finally, an analysis predicting *positive behaviors* from *infrastructure-related risk perceptio*n moderated by *attitudes toward traffic rules* did not yield a significant overall model (R^2 = .03, F(7, 394) = 1.49, p = .168). Therefore, the moderation hypothesis was not supported.

A summary of the significant moderation models containing, the outcome variable, the specific type of risk perception, the moderating attitudinal factor, the statistical significance of the interaction term, the Johnson–Neyman regions of significance, and the percentage of the sample falling above or below the identified thresholds.

To facilitate interpretation, the interaction pattern is also described by highlighting the conditions under which the highest and lowest levels of the outcome behaviors were observed (see Table 10). In this way, the table provides a concise synthesis of all interaction effects, complementing the detailed model-by-model reporting in the text and allowing readers to compare how different dimensions of risk perception interact with distinct attitudinal profiles to predict violations, lapses, aggressive behaviors, and positive behaviors.

3.4. Discussion

This chapter discusses the main findings of the study in light of the existing literature and the theoretical frameworks outlined earlier. It interprets the results from the factor structure analysis, bivariate correlations, and moderation analyses, highlighting their implications for understanding pedestrian risk perception and behavior.

Table 10. Summary of significant moderation models (Risk Perception × Attitudes → Pedestrian Behaviors)

Risk Perception Type (X)	Moderator (W): Attitudes toward	Outcome (Y) Behaviors	Interaction Pattern	Johnson-Neyman (J–N) Region
Pedestrian-related	Traffic Rules	Violations	Highest: High PedRisk × High Rule Skepticism; Lowest: Low PedRisk × Strong Rule Trust	> 2.64 (~52%)
Infrastructure-related	Traffic Rules	Violations	Highest: High InfraRisk × High Rule Skepticism; Lowest: Low InfraRisk × Strong Rule Trust	> 2.69 (~51%)
Pedestrian-related	Other Road Users	Lapses	At High PedRisk → Reversal: High Criticism → Fewer lapses; High Trust → More lapses	< 2.53 (~50%) / > 4.60 (~23%)
Driver-related	Traffic Rules	Lapses	Highest: Low DrvRisk × High Rule Skepticism; Lowest: High DrvRisk × Strong Rule Trust	> 2.40 (~65%)
Driver-related	Other Road Users	Lapses	Highest: High DrvRisk × High Criticism; Lowest: High DrvRisk × Low Criticism	≤ 3.86 (~20%)
Infrastructure-related	Traffic Rules	Lapses	Highest: High InfraRisk × High Rule Skepticism; Lowest: Low InfraRisk × Strong Rule Trust	> 3.13 (~38%)
Driver-related	Other Road Users	Aggressive Behaviors	Effect only among extreme criticists: Higher DrvRisk → Fewer aggressive acts	< –1.22 (~4%)
Infrastructure-related	Traffic Rules	Aggressive Behaviors	Highest: High InfraRisk × High Rule Skepticism; Lowest: Low InfraRisk × Strong Rule Trust	> 2.62 (~51%)
Pedestrian-related	Other Road Users	Positive Behaviors	Highest: High PedRisk × Low Criticism; Lowest: Low PedRisk × High Criticism	< 4.05 (~30%)
Driver-related	Other Road Users	Positive Behaviors	Highest: High DrvRisk × Low Criticism; Lowest: High DrvRisk × High Criticism	< 4.27 (~44%)
Infrastructure-related	Other Road Users	Positive Behaviors	Crossover: High InfraRisk → More positives at Low Criticism, but fewer at High Criticism	< 3.97 (~75%) / > 4.81 (~10%)

Note. Percentages indicate the proportion of the sample above or below the Johnson–Neyman threshold where the conditional effect of risk perception on the outcome becomes statistically significant.

PedRisk = Pedestrian-related risk perception, DrvRisk = Driver-related risk perception, InfraRisk = Infrastructure-related risk perception

3.4.1. Discussion on the Factor Structure of the PRSS-P

The factor analysis conducted in the main study yielded a three-factor solution for the PRSS-P, representing *pedestrian-related*, *driver-related*, and *infrastructure-related risk perception*. This structure was both statistically robust and conceptually consistent with the theoretical framework developed in the qualitative phase of the research. The emergence of these three dimensions aligns closely with the thematic categories identified in Study 1, driver-related risks, environmental and infrastructural hazards, and situational/social interaction risks, thus demonstrating strong convergence between qualitative insights and quantitative evidence.

This dimension received the highest mean scores overall, with specific items like "Drivers speeding excessively," "Motorcyclists not complying with traffic rules," and "The traffic environment being generally aggressive or tense" standing out as particularly salient hazards. This outcome is consistent with prior research that highlights how pedestrian risk perception is strongly shaped by anticipated hazards stemming from drivers, especially in situations involving non-compliance or excessive speed (Rosenbloom et al., 2015). For example, studies have shown that direct interactions with vehicles are pivotal in influencing a pedestrian's sense of risk and vigilance (Yu et al., 2020). Furthermore, risk perception acts as a meaningful predictor of pedestrian travel choices and reactive attentiveness (Yu et al., 2020), and empirical evidence confirms that pedestrians experience heightened perceived risk when drivers do not yield as expected, with driver attentiveness and yielding behavior significantly influencing pedestrian crossing safety (Zafri et al., 2022).

The development of the PRSS-P in the main study revealed that self-induced risks, such as unsafe crossing or inattention, constitute a coherent and measurable dimension. This finding is particularly significant because existing tools and public discourse have often overlooked or lacked explicit recognition of these pedestrian-related risks as a distinct category. The PRSS-P addresses this gap by intentionally incorporating items that capture the full range of potential hazard sources, including those originating from pedestrians' own behaviors, forming a specific factor labelled "Pedestrian-Related Risk Perception".

This finding aligns with broader evidence indicating that individual road user behavior significantly influences safety outcomes. For instance, Balk et al. (2014) emphasize that external risks in traffic environments interact with individuals' behavioral patterns, thereby shaping safety outcomes. Furthermore, Salducco et al. (2022), have documented various pedestrian behaviors (e.g. crossing outside designated areas, ignoring traffic signals, or using mobile phones while walking), that are known to elevate accident risk, also highlighted that pedestrians with lower perceptions of risk are more likely to engage in violations, lapses, or aggressive behaviors, underscoring the direct link between individual behavior and safety outcomes.

The final findings from the PRSS-P indicated that *infrastructure-related risk perception*, while forming a reliable and distinct factor, were perceived by participants as less immediately hazardous than other types of risks. Specifically, the "Infrastructure-related Risk Perception" dimension received the lowest mean scores among all three measured dimensions. This dimension includes items describing issues such as inadequate lighting on pedestrian paths, poorly marked crosswalks, or insufficient speed limit signs for drivers. This finding aligns with system-based safety perspectives, which emphasize environmental conditions and infrastructure as key elements of traffic safety (Wegman & Arts, 2006). Road environments are often designed primarily for motorized vehicles, sometimes compromising pedestrian safety and convenience (WHO, 2018). Furthermore, Infrastructural deficiencies such as poor lighting, obstructed sidewalks, and the absence of designated crossings can heighten risk exposure and shape pedestrian decision-making (Šucha et al., 2021). Moreover, infrastructure influences not only objective safety but also perceived safety, as features like pavement quality, crossing design, flashing beacons, and connected-vehicle applications can alter pedestrians' subjective risk judgments (Guo et al., 2022; Fonseca et al., 2025).

One notable mention in this dimension is the item mentioning proper clothing on poor lighting conditions (Pedestrians not wearing light/bright/reflective clothing during nighttime walks). Although this initially appears to reflect a personal choice, its grouping within the infrastructure related risk dimension suggests that participants

may perceive it as a compensatory response to environmental hazards, particularly poor visibility or inadequate street lighting. Although drivers often misjudge the limits of their own vision and fail to adjust speed accordingly, pedestrians also commonly overestimate how visible they are, mistakenly believing that if they can see an oncoming vehicle, the driver must also be able to see them (Karsch et al., 2012). In other words, not wearing reflective clothing may reflect the challenge posed by infrastructural shortcomings. This interpretation is further supported by evidence demonstrating that retroreflective clothing, especially when positioned on moving joints such as ankles and knees, substantially improves drivers' ability to detect and recognize pedestrians in low-light environments (Sayer & Mefford, 2004).

3.4.2. The Relationships between Study Variables

The Bivariate Correlation Analysis conducted in the main study examined the interrelationships among key constructs, including demographic variables, pedestrian-related attitudes, perceived risk dimensions, and various types of self-reported pedestrian behaviors. This analysis was a crucial step in fulfilling the main study's objective of exploring how the dimensions of the newly developed PRSS-P relate to self-reported pedestrian behaviors, namely violations, lapses, aggressive behaviors, and positive behaviors.

Demographic variables demonstrated several notable relationships with pedestrian behaviors. *Age* was negatively associated with *education*, *daily walking time*, *pedestrian identity*, and *violations*. This suggests that older individuals tend to walk less, identify less as pedestrians, and commit fewer *violations*. Similar age-related declines in risky behavior have been documented in previous traffic safety research, often linked to reduced mobility exposure and heightened risk aversion (Granié, 2009; Useche et al., 2021). *Education* was inversely related to *walking minutes* and *lapses* but showed a small positive correlation with *aggressive behavior*. This pattern is somewhat consistent with findings that education effects on safety are not uniformly protective and may vary depending on contextual and cultural factors (Nordfjærn & Şimşekoğlu, 2013). *Socioeconomic status* exhibited weak negative associations with *near-miss experiences* and *lapses*, suggesting limited influence on

the psychological or behavioral variables measured in this study. This aligns with broader findings indicating that SES-related disparities in road safety are not uniform across all populations and tend to diminish in older age groups (Graham et al., 2005).

The behavioral subscales also demonstrated meaningful interrelationships. *Violations* correlated positively with *lapses* and *aggressive behaviors*, reflecting the clustering of unsafe behaviors within individuals, a tendency described in the human error framework proposed by Reason et al. (1990). *Positive behaviors* were associated with more *critical attitudes toward other road users* and *higher perceived driver-related risk perception* but inversely related to *lapses* and daily walking time. This suggests that individuals exhibiting more safety-oriented behaviors may be more attuned to hazards posed by drivers, consistent with research showing that perceived risk from motorized traffic can reinforce protective pedestrian practices (Zafri et al., 2022).

Attitudinal variables showed strong relationships with behavior. *Attitudes toward traffic rules* were positively correlated with *violations*, *lapses*, and *aggression*, supporting earlier work linking more flexible or sceptical orientations toward rules with increased unsafe behaviors (Serin et al., 2018). In contrast, more critical *attitudes toward other road users* were positively correlated with *positive behaviors,* as well as *pedestrian-related and driver-related risk perception*, and negatively with *lapses*. This pattern is in line with findings that individuals who critically evaluate others' road behavior tend to perceive greater risk in traffic, possibly reflecting enhanced hazard awareness (Useche et al., 2022).

The three PRSS-P perceived risk dimensions, *pedestrian-related*, *driver-related*, and *infrastructure-related risk perceptions*, were all strongly intercorrelated, indicating a general sensitivity to hazards across domains. *Pedestrian-* and *driver-related* risk *perceptions* were both positively related to more *critical attitudes toward other road* users and negatively related to *perceived pedestrian safety* and *perception infrastructure condition. Driver-related risk perception* was also positively associated with *positive behaviors*. This suggests that perceiving greater hazard from drivers may encourage more adaptive behavior. The finding that perceived *driver-*

related risk perception is linked with more positive behaviors is supported by evidence that pedestrians who recognize higher hazard are more attentive and responsive in traffic contexts (Yu et al., 2020).

Overall, the correlation results reinforce investigating the central role of attitudes in shaping pedestrian safety-related behavior. They also confirm that higher *perceived risk* is linked with adaptive (e.g. *positive behaviors*) responses, particularly regarding drivers. However, a general link with maladaptive (e.g. *aggressive behaviors*) responses was not supported by the data. These associations provided the foundation for the subsequent moderation analyses, which explored whether attitudinal factors condition the relationship between perceived risks and pedestrian behaviors.

3.4.3. Evaluating the Results of Moderation Analyses

The moderation analyses in the main study were designed to investigate whether the relationship between perceived risks (*pedestrian-*, *driver-*, and *infrastructure-related*) in the traffic environment and self-reported pedestrian behaviors (*violations*, *lapses* vary depending on individuals' *attitudes toward traffic rules* and *other road users*. Building upon the scale development and correlation analyses presented in the previous sections, this stage of the research aimed to examine the conditions under which perceived risks translate into either adaptive or maladaptive pedestrian behaviors. Out of 24 tested models, 11 yielded statistically significant results, highlighting distinct patterns in how attitudinal orientations interact with risk perceptions to influence behavior.

3.4.3.1. Moderating role of Attitudes in the Relationship between Risk Perception and Violations

Across models predicting *violations*, *attitudes toward traffic rules* conditioned the influence of *risk perception*. In the model with *pedestrian-related risk perception* moderated by *attitudes toward traffic rules*, the analysis explained 43% of the variance. Stronger scepticism toward rules showed a direct positive association with violations, and the interaction was significant: when rule scepticism was low (i.e.,

stronger rule adherence), *pedestrian-related risk perception* bore no relation to violations, whereas at moderate and high levels of *attitudes toward traffic rules*, higher *perceived pedestrian-related risk* predicted more frequent *violations*. This pattern is compatible with compensation accounts in which perceived necessity under risk legitimizes noncompliance (Peltzman, 1975; Adams, 1995) and with evidence that permissive safety attitudes accompany a higher propensity to bend regulations (Iversen & Rundmo, 2011).

A parallel result emerged when *infrastructure-related risk perception* was combined with *attitudes toward traffic rules*: the model again explained 43% of the variance, both predictors showed positive main effects, and the interaction indicated that *infrastructure-related risk perception* was unrelated to violations at low *attitudes toward traffic rules* but positively related at moderate/high scepticism, consistent with the idea that perceived infrastructural deficiencies (e.g., inadequate crossings, obstructed sidewalks, poor signal timing) can be taken as justifications for adaptive violations (Budzyński et al., 2021). No significant moderation effect was observed for driver-related risk perception on violations.

3.4.3.2. Moderating role of Attitudes in the Relationship between Risk Perception and Lapses

For *lapses*, both *interpersonal* and *rule-related attitudes* shaped how different risk domains translated into unintentional errors. In the model with *pedestrian-related risk perception* moderated by *attitudes toward other road users*, the analysis explained 10% of the variance and yielded a significant interaction: among participants with more *critical views of others*, higher *pedestrian-related risk perception* was associated with more *lapses*, whereas among those with more trusting views it predicted fewer *lapses*, a pattern compatible with attentional load accounts in demanding environments (Schwebel et al., 2012).

When *driver-related risk perception* was moderated by *attitudes toward other road users*, the model again explained 10% of the variance; both predictors were negatively associated with *lapses*, and the interaction showed that higher *driver-*

related risk perception predicted fewer *lapses* under critical views (high levels of attitudes toward other road users) , an effect that weakened at moderate criticism and disappeared under trusting views.

The next model explained 13.5% of the variance, when *driver-related risk perception* moderated by *attitudes toward traffic rules*,: rule scepticism (high levels of attitudes toward traffic rules) related positively to *lapses*, the main effect of *driver-related risk perception* was non-significant, and the interaction indicated that at moderate/high *scepticism*, higher *driver-related risk predicted* fewer *lapses*, with the protective effect strengthening as scepticism increased (Reason, 1990; Iversen & Rundmo, 2011; Yagil, 2000).

Finally, for *infrastructure-related risk perception* moderated *by attitudes toward traffic rules*, the model explained 12% of the variance; although neither main effect was significant, the interaction showed that at *high rule scepticism*, higher *infrastructure-related risk perception* was associated with more *lapses*, whereas no relation emerged at low or moderate scepticism—consistent with attentional demands in hazardous or unpredictable settings (Kim et al., 2024).

3.4.3.3. Moderating role of Attitudes in the Relationship between Risk Perception and Aggressive Behaviors

Moderation findings for *aggressive behaviors* were selective. In the model combining *driver-related risk perception* with *attitudes toward other road users*, the analysis explained 10% of the variance. Main effects were non-significant, but the interaction indicated a narrow conditional pattern: only a small subgroup (~4%) with highly negative views of *other road users* showed a positive association between higher *driver-related risk* perception and *aggressive behaviors*; for the majority, the association was not significant (Wickens et al., 2013).

In the model with *infrastructure-related risk perception* and *attitudes toward traffic rules*, the analysis explained 14% of the variance. Although main effects were non-significant, the interaction revealed that at moderate/high *scepticism*, higher

infrastructure-related risk perception predicted more *aggressive behavior*—a pattern consistent with assertive or confrontational strategies observed in constrained pedestrian environments when facilities are absent or obstructed (Bayomi et al., 2022). No significant moderation was observed for pedestrian-related risk perception and aggression.

3.4.3.4. Moderating role of Attitudes in the Relationship between Risk Perception and Positive Behaviors

Positive behaviors were also dependent on interpersonal attitudes. For *pedestrian-related risk perception* moderated by attitudes toward other road users, the model explained 11% of the variance; the interaction showed that under more trusting views, higher *pedestrian-related risk perception* predicted more *positive behaviors*, while the association was slightly negative and non-significant under *critical views of other road users* (Pelé et al., 2017; Zhao et al., 2024).

When *driver-related risk perception* was combined with *attitudes toward other road users*, the model again explained 11% of the variance; both predictors had positive main effects, and the interaction indicated that higher *driver-related risk perception* predicted more *positive behavior* at low/average levels of *criticism*, but this effect disappeared under highly *critical views*.

Finally, in the model with *infrastructure-related risk perception* moderated by attitudes toward other road users, the analysis explained 11% of the variance; both predictors were positively related to *positive behavior*, and a crossover interaction emerged: at low/moderate *criticism* higher *infrastructure-related risk perception* predicted more *positive behaviors*, whereas at high criticism it predicted fewer *positive behaviors* (Öztürk & Farrelly, 2025; Zafri et al., 2022).

3.5. Critical Remarks

This study has some methodological limitations that should be considered. First, data collection relied on self-reported measures, which are vulnerable to social

desirability bias (Paulhus, 1991). This bias, defined as the tendency to provide socially acceptable rather than entirely truthful responses (Grimm, 2010), may have influenced participants' answers. Although the online format reduced direct researcher–participant contact, which can amplify such bias (Grimm, 2010), it cannot be completely ruled out.

And second, although the sample size was sufficient, the use of a snowball sampling technique and the cross-sectional nature of the data collection limit the generalizability of the findings. Future research should employ more diverse sampling strategies and longitudinal designs to enhance representativeness and strengthen causal interpretations.

3.6. Implications of the Study and Recommendations of the Future Studies

The present study contributes to pedestrian safety research by introducing the Perception of Risky Situations Scale for Pedestrians (PRSS-P), a multidimensional tool that captures risk perceptions in three key domains: driver-related, pedestrian-related, and infrastructure-related risks. By identifying these domains and validating the scale's structure, the study provides a foundation for examining how risk perceptions interact with attitudinal and behavioral factors. This has direct implications for road safety interventions, as targeting domain-specific risk perceptions may enhance the design and effectiveness of behavior-change strategies.

From a practical standpoint, the PRSS-P can be integrated into traffic safety campaigns, educational programs, and urban planning processes. This is particularly relevant for contexts like Türkiye, where pedestrian safety interventions have historically emphasized infrastructural solutions, despite evidence that psychological factors play a critical role in risk-related decisions such as values, preferences, and attributions of risk (Budak & Özkan, 2025; Çınar et al., 2022; Fındık et al., 2025). In practice, interventions could further focus on modifying perceived risks associated with driver behaviors, promoting self-protective pedestrian practices, or advocating for infrastructural improvements in high-risk areas. The scale's refined structure also enables policymakers and safety specialists to tailor interventions to specific settings, including university campuses, dense urban centers, and rural road networks.

In terms of theoretical contribution, the findings reinforce the view that risk perception is not a uniform construct but a context-sensitive psychological factor that can moderate the link between attitudes and behaviors. Our findings support the view that risk perception functions as a proximal psychological influence on behavior, consistent with socio-cognitive models such as the Theory of Planned Behavior (Ajzen, 1991) and broader pedestrian-focused applications and reviews of TPB (Moyano-Díaz et al., 2002; de Souza et al., 2024). The Prototype Willingness Model (PWM; Gibbons, et al., 1998; Gerrard et al., 2008) which emphasizes reactive, non-deliberative decision-making processes grounded in mental images or social prototypes, is particularly relevant for understanding behaviors such as pedestrian violations and has been applied in pedestrian context (Demir et al., 2019; Hou et al., 2025). Future research could incorporate PWM-based constructs alongside risk perception measures to better capture these reactive processes or even explore an integrated framework linking risk perception with prototype-driven decision-making pathways. Given that the PRSS-P captures multiple dimensions of perceived risk, including driver-, pedestrian-, and infrastructure-related factors, it could serve as a valuable foundation for operationalizing the "risk perception" component within such an integrated PWM-based model.

Although the present study established the factorial structure of the PRSS-P through exploratory procedures, a valuable direction for future research is to extend this process with confirmatory factor analysis (CFA) on independent samples. Employing CFA would provide stronger evidence for construct validity and ensure the stability of the factor solution. Future validation studies of the PRSS-P are therefore recommended to incorporate confirmatory techniques in line with psychometric best practices.

An important implication of this research is that perception of the traffic environment and its behavioral consequences are not universal but shaped by cultural and contextual factors (Özkan & Lajunen, 2011). The present study, conducted within a specific national and institutional context, highlights how attitudes toward rules and other road users interact with perceived risks. However, evaluations and perception of traffic environment research ,namely "traffic climate", consistently shows that

perceptions of safety, rule compliance, and responsibility differ across societies, reflecting broader cultural norms and enforcement practices (Chu et al., 2019; Öztürk et al., 2022; Üzümcüoğlu et al., 2020). This suggests that the mechanisms identified here may vary in strength or even direction when applied to different cultural settings.

Future research should therefore explore the PRSS-P's applicability in diverse demographic and cultural contexts to assess its cross-cultural validity. Longitudinal studies could investigate how risk perceptions evolve over time and in response to changes in the traffic environment. Additionally, combining the PRSS-P with behavioral observation methods would provide a more comprehensive understanding of how perceived risks translate into actual pedestrian behavior. Further qualitative inquiry post-validation could also help refine item content and ensure the scale remains relevant in changing traffic and infrastructural landscapes.

CHAPTER 4

GENERAL CONCLUSION

This thesis examined pedestrian safety as a process shaped by system design, human cognition, and social context. Across three chapters, it explored how risk perception and attitudes influence pedestrian behavior, beginning with a theoretical overview (Chapter 1), continuing with the qualitative process which providing foundation for the development of the Perception of Risky Situations Scale for Pedestrians (PRSS-P) (Chapter 2), and testing how perceived risks and attitudes combine to predict pedestrian behaviors (Chapter 3). By focusing on pedestrians, the study extends traffic psychology beyond its traditional driver-centred orientation (Reason et al., 1990; Parker et al., 1995) and shows that risk perception is not a straightforward protective factor, but one whose effects depend on attitudes toward rules and other road users (Holland & Hill, 2007; Dinh et al., 2020).

First chapter reviewed the foundations of traffic psychology, from system-based approaches such as Haddon's matrix, Vision Zero, and Sustainable Safety (Haddon, 1980; Tingvall & Haworth, 1999; Wegman & Aarts, 2006), to human-factor frameworks that classify unsafe acts as slips, lapses, mistakes, and violations (Reason, 1990) as well as driver skills (Elander et al., 1993). These models established why human factors matter and provided a basis for analysing pedestrian behavior. Risk perception was introduced as a central construct with reference to Risk Homeostasis, Zero-Risk, and Risk Allostasis theories (Wilde, 1982; Näätänen & Summala, 1974; Fuller, 2005), which explain how people balance safety and risk in real time. Attitudes were positioned as a key filter through which risk is interpreted and enacted (Ajzen, 1991; Iversen & Rundmo, 2011).

The second chapter addressed a gap in the literature by generating item pool for the structuring a pedestrian-specific risk perception scale. Earlier research had often

relied on driver-based or overly general measures (Elliott & Baughan, 2004; Rundmo & Iversen, 2004), limiting their usefulness for understanding pedestrian realities. To overcome this, qualitative data were collected through semi-structured interviews with 21 participants, which revealed recurring patterns of perceived risks arising from pedestrians themselves, from drivers, and from infrastructure. These findings informed the creation of a 60-item initial pool for the PRSS-P, ensuring that the instrument captured the multidimensional and context-sensitive nature of pedestrian risk further extends prior work on measuring pedestrian behavior and its determinants (Granié et al., 2013; Serin et al., 2018).

Chapter 3 used the PRSS-P to examine how perceived risks interact with attitudes to predict four behavioral outcomes: *violations*, *lapses*, *aggression*, and *positive behaviors*. The final validated form of the PRSS-P was a 40-item scale comprising three coherent dimensions: *Pedestrian-Related Risk Perception* (20 items) *Driver-Related Risk Perception* (11 items), and *Infrastructure-Related Risk Perception* (9 items). A core finding of the analyses was that higher perceived risk does not uniformly produce safer choices. When combined with sceptical attitudes toward traffic rules, greater perceived risk predicted more *violations*, consistent with risk-compensation perspectives (Peltzman, 1975; Adams, 1995). In contrast, trusting attitudes toward other road users allowed perceived risk (all three dimensions) to translate into cooperative, safety-enhancing behavior (Pelé et al., 2017; Zhao et al., 2024). For *lapses*, patterns were mixed: perceived risk reduced unintentional errors for some attitudinal profiles but increased them for others, likely reflecting differences in attention demands and cognitive load in challenging settings (Reason, 1990; Schwebel et al., 2012). *Aggressive behaviors* were most evident when perceptions of infrastructural risk coincided with scepticism toward traffic rules, suggesting that some aggression reflects frustration with systemic shortcomings rather than inherent hostility (Bayomi et al., 2022; Ersan et al., 2019; Ersan et al., 2020; Zhang et al., 2016). *Positive behaviors*, meanwhile, emerged most strongly when perceived risk was paired with interpersonal trust, indicating that social trust enables risk awareness to be channelled into prosocial, cooperative action (Pelé et al., 2017; Zhao et al., 2024). Interpreted by outcome, the contributions can be summarized as follows: *violations* illustrate an “adaptive noncompliance” dynamic,

where perceived risk legitimizes strategic rule-breaking under conditions of rule scepticism; *lapses* reveal that risk perception can function as either a cognitive burden or a prompt for vigilance depending on attitudes; *aggressive behaviors* shows how frustration with hazards and weak rule legitimacy can fuel confrontational responses; and *positive behaviors* demonstrate that risk awareness alone is insufficient unless reinforced by trust in others. Taken together, these findings clarify when and why greater risk perception leads to safer pedestrian choices, and when it does not.

Methodologically, the PRSS-P offers researchers and practitioners a diagnostic tool to differentiate perceived risks rooted in pedestrians, drivers, and infrastructure. This specificity supports targeted interventions: for example, campaigns that address driver-related threats, programs that reduce pedestrian inattention and rule flexibility, and planning decisions that remedy infrastructure deficits that amplify risk and provoke adaptive noncompliance. Because many prior measures were not designed for pedestrians (Elliott & Baughan, 2004; Rundmo & Iversen, 2004), the scale's pedestrian-specific content is a substantive advance for both basic and applied work.

Practically, the results suggest integrated strategies that pair environmental change with attitudinal work. Infrastructure that reduces objective hazard should be complemented by efforts that increase the perceived legitimacy and usefulness of rules and that foster cooperative norms among road users. Communications that emphasize fairness, reciprocity, and mutual predictability may strengthen the link between perceived risk and positive behavior, while acknowledging contexts where adaptive deviations occur (Papadimitriou et al., 2012; Yannis et al., 2020). The PRSS-P can support needs assessments, segmentation, and evaluation by identifying which risk domains are most salient in a given setting.

The thesis also opens several paths for future research. Unexpected patterns, such as perceived risk predicting more violations under strong rule scepticism, call for closer study of when noncompliance is an adaptive adjustment rather than simply unsafe conduct (Pollack et al., 2014; Varet et al., 2021). The mixed findings for lapses point to the value of examining attention, workload, and interpersonal evaluations in real

traffic situations (Useche et al., 2022). Naturalistic observation, instrumented field studies, and virtual-reality paradigms can test these processes under controlled but ecologically rich conditions (Zhao et al., 2024). Finally, confirmatory validation of the PRSS-P with diverse samples, and its integration into intervention trials, would strengthen its utility and generalizability.

In conclusion, this thesis contributes to traffic psychology by developing a reliable, pedestrian-specific measure of risk perception and demonstrating that its effects on behavior are conditioned by attitudes toward rules and other road users. By integrating system, psychological, and social perspectives, it offers a more complete account of pedestrian safety and highlights actionable directions for policy and practice (Ajzen, 1991; Hollnagel, 2014; Yannis et al., 2020). The present study showed that for the sustainable gains to be obtained, not only the well-known safer infrastructures and consistent enforcement is needed, but also attention to the attitudinal and perceptual filters through which pedestrians read the traffic environment and choose how to act are required.

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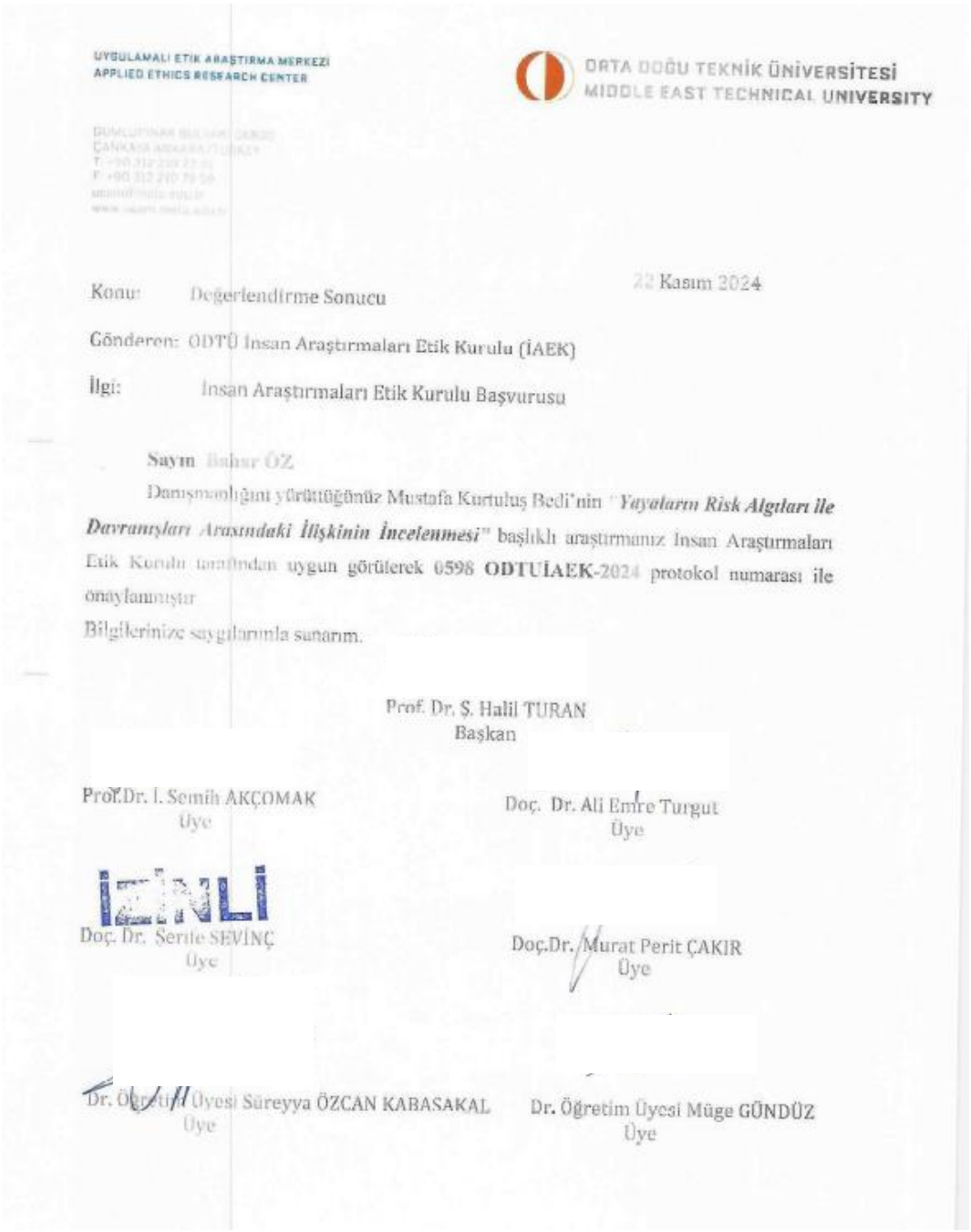
APPENDICES

A. ETHICAL APPROVAL FOR INTERVIEWS



UYGULAMALI ETİK ARAŞTIRMA MERKEZİ
APPLIED ETHICS RESEARCH CENTER

ORTA DOĞU TEKNİK ÜNİVERSİTESİ
MIDDLE EAST TECHNICAL UNIVERSITY

22 Kasım 2024

Konu: Değerlendirme Sonucu

Gönderen: ODTÜ İnsan Araştırmaları Etik Kurulu (İAEK)

İlgi: İnsan Araştırmaları Etik Kurulu Başvurusu

Sayın Bahar ÖZ

Danışmanlığını yürüttüğünüz Mustafa Kurtuluş Bedi'nin "*Yayların Risk Algıları ile Davranışları Arasındaki İlişkinin İncelenmesi*" başlıklı araştırmanız İnsan Araştırmaları Etik Kurulu tarafından uygun görülerek 0598 **ODTUİAEK**-2024 protokol numarası ile onaylanmıştır.

Bilgilerinize saygılarımla sunarım.

Prof. Dr. Ş. Halil TURAN
Başkan

Prof. Dr. İ. Semih AKÇOMAK
Üye

Doç. Dr. Ali Emre Turgut
Üye

Doç. Dr. Serife SEVİNÇ
Üye

Doç.Dr. Murat Perit ÇAKIR
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Dr. Öğretim Üyesi Süreyya ÖZCAN KABASAKAL
Üye

Dr. Öğretim Üyesi Müge GÜNDÜZ
Üye

B. LIST OF INTERVIEW QUESTIONS (IN TURKISH)

Demografik Soruları

1) Kaç yaşındasınız?
2) Cinsiyet?
3) Eğitim durumunuz nedir?
4) Ehliyetiniz var mı? - Varsa kaç yıldır?
5) Aktif olarak araç kullanıyor musunuz? Evetse kaç yıldır, ne sıklıkta?
6) Daha önce hiç trafik kazası yaşadınız mı? Anlatır mısınız? (Detaylar: zaman, mekan, yol kullanıcısı rolleri, kimin sorumluluğu vs.)
7) Normal bir günde ulaşımınızı genel olarak ne şekilde sağlarsınız? (Yaya, özel araç, bisiklet, toplu taşıma vs.)
   - Birden fazla yöntem söylenirse hangisini ne amaçla ne zaman kullanıyor?
8) Genellikle ne amaçla yürürsünüz? (İşe gitmek, spor, eğlence vs.)
9) Günde ortalama olarak ne kadar süre ve günün hangi saatlerinde yürürsünüz?

Yaya Güvenliği ve Risk Algısı Mülakat Soruları

1) Yaya olmak sizce ne demektir? Yaya deyince aklınıza ne geliyor?
2) Trafik kurallarına uyar mısınız? Ne ölçüde?
3) Sizce kurallar yayaların güvenliği ne ölçüde sağlıyor?
4) İçinde bulunduğunuz trafik ortamını düşündüğünüzde, yaya olarak kendinizi ne kadar güvenli hissediyorsunuz?
5) Sizce "yaya önceliği kavramı" ne anlam ifade ediyor? Siz yaya olarak ne kadar öncelikli hissediyorsunuz?
6) Kendinizi yaya olarak düşündüğünüzde, trafik ortamı ne gibi riskler barındırır?
7) Trafikte genel olarak riskli gördüğünüz şeyler/durumlar nelerdir?

8) Riskli gördüğünüz böyle bir durumda kaldığınızda/kalsanız ne gibi duygular hissedersiniz?
9) Riskli gördüğünüz böyle bir durumda kaldığınızda/kalsanız aklınızdan hangi düşünceler geçer?
10) Yaya olarak, tehlikeli durumların oluşturacağı risklere karşı kendiniz herhangi bir önlem alıyor musunuz? Neden? Nasıl?
11) Daha güvenli bir yol kullanımı için trafikte genel olarak nelere dikkat etmek gerekir?
12) Daha güvenli bir yol kullanımı için yayaların genel olarak nelere dikkat etmesi gerekir?
13) Yaya olarak trafikte başınızdan geçen en olumlu olay nedir anlatır mısınız?
14) Yaya olarak trafikte başınızdan geçen en olumsuz olay nedir anlatır mısınız?

C. INITIAL 73-ITEM POOL OF THE PERCEPTION OF RISKY SITUATIONS SCALE FOR PEDESTRIANS

No.	MADDELER
1.	Araç sürücülerinin alkol ve madde etkisi altındayken trafiğe çıkmaları
2.	Otopark, garaj gibi yerlerden çıkan araçların fark edilmemesi
3.	Geniş ve işlek caddelerde üst veya alt geçitlerin olmaması
4.	Otobüs duraklarında, otobüs durmadan yola inilmesi, otobüse binmeye ya da otobüsten inmeye çalışılması
5.	Geniş ve işlek caddelerde güvensiz noktalardan geçiş yapmayı durduracak parmaklıkların olmaması
6.	Çocuk ve gençlerin araç yolunda oyun oynaması (top, kaykay, yakalamaca vb.)
7.	Araç sürücülerinin yaya geçitlerinde yayalara yol vermemesi
8.	Trafik ışıklarında, araçların durduğundan emin olmadan sadece ışıklara güvenerek karşıdan karşıya geçilmesi
9.	Araçların kaldırımlara park ettiği yerlerde araç yolundan yürünmesi
10.	Araç sürücülerinin yaya geçitlerine veya ışıklı kavşaklara yaklaşırken yavaşlamaması
11.	Şehirlerarası karayolları, otoyollar ve tüneller gibi yerlerde yürünmesi
12.	Araçlar için belirtilen hız sınırlandırması işaretlerinin yetersiz olması
13.	Fiziki engellerden ötürü (dar kaldırım, park eden araç, esnaf, vb.) araç yolundan yürünmesi
14.	Gece yürüyüşlerinde hayvan ya da tekin olmayan insanlarla karşılaşılması
15.	Zaman kazanmak için bulduğu ilk fırsatta karşıdan karşıya geçmeye çalışılması
16.	Araç sürücülerinin yayaları önemsememesi
17.	Yaşadığım bölge, tanıdık çevre düşüncesiyle daha dikkatsiz davranılması
18.	Kontrol edilemeyen şeylerin olması (kötü şans, kader)
19.	Elektrikli motor, bisiklet ve e-scooter gibi araçların kaldırımları kullanması
20.	Hareket eden ağır vasıtalara ve iş makinelerine önünden ya da arkasında geçmeye çalışılması

21.	Alkol veya madde etkisi altındayken yürünmesi
22.	Yayaların trafik kurallarına uymaması
23.	Engelli ve yaşlı yayalar için gerekli altyapı özelliklerinin (sesli ve görsel trafik belirteçleri, yürüme bantları, rampalar) yetersiz olması
24.	Başkalarının kurallara uymadığı gerekçesiyle dikkatsiz davranılması
25.	Yaya güvenliği konusundaki eğitimlerin yetersiz olması
26.	Toplu taşıma araçlarına yetişmek için yaya geçitleri yerine tehlikeli noktalardan geçmeye çalışılması
27.	Trafik kurallarının yaya güvenliğini sağlamadığı ve gereksiz bulunması yüzünden dikkatsiz davranılması
28.	Üst ve alt geçitlerin erişim kolaylığının olmaması
29.	Esnaf ve işletmecilerin kaldırımları işgal etmesi sebebiyle araç yolundan yürünmesi
30.	Bebek arabası ile giderken, yolu kontrol etmeden yola ilk önce bebek arabasını indirmek
31.	Yayalara yeşil yanmadığı halde, gelen araçlara kırmızı yandığı için karşıdan karşıya geçmeye çalışılması
32.	Araç sürücülerinin sinyal vermeden dönüş yapmaya çalışması
33.	Araç zaten durur düşüncesiyle karşıya geçmeye çalışılması
34.	Kavşak ve yol ayrımlarındaki trafik işaretlemelerinin yetersiz olması
35.	Yolda veya karşıdan karşıya geçerken koşulması
36.	Trafiğin sıkışık, araçların yavaş ilerlediği yerlerde araçların arasından karşıdan karşıya geçilmesi
37.	Araç sürücülerinin trafik işaretlemelerini (tabela, ışık, yol belirteçleri vb.) dikkate almaması
38.	Yayaların dikkatsizliği ve dalgınlığı (kulaklıkla yüksek sesli müzik dinleme, telefonla ilgilenmek, yanındakiyle konuşmak vb.)
39.	Trafik kurallarına uymayan yayalar için trafik cezalarının olmaması
40.	Yaya geçitlerinde karşıdan karşıya geçerken her iki yönden de gelen araçların kontrol edilmemesi
41.	Taksi sürücülerinin tehlikeli sürüş tarzlarına sahip olması
42.	Çok şeritli yollardaki yaya geçitlerinin gereğinden fazla geniş olması
43.	Kaldırım olmadığı ya da dar olduğu yerlerde tek sıra halinde yürünmemesi
44.	Altyapı özelliklerinin (kaldırım, yaya geçitlerinin, trafik işaretlendirmeleri, vb.)

	yetersiz olması
45.	Başkaları yapıyor diye kırmızı ışıkta veya yaya geçidi olmayan yerlerden karşıya geçmeye çalışılması
46.	Hız sınırının 30 km/s olduğu bölgelerin (okul, hastane, yaşam alanları vb.) yetersiz olması
47.	Yaya önceliği kavramının ve gerekliliklerinin bilinmemesi
48.	Yaya yollarının yeterince iyi ışıklandırılmaması
49.	Yaya geçit boyalarının veya yaya geçitlerindeki "önce yaya" işaretlerinin yeterince belirgin olmaması
50.	Üst ve alt geçitlerin yorucu ve zaman kaybettirici olarak algılanması
51.	Trafik ortamının genel olarak saldırgan ve gergin olması
52.	Yaya geçitleri dışındaki yerlerden karşıdan karşıya geçilmesi
53.	Araç yolunda yürümek zorunda kalındığında gelen aracın yönüne karşı yürünmemesi
54.	Çocukların karşıdan karşıya geçerken yalnız bırakılması, kontrol altında tutulmaması
55.	Karşıdan karşıya çaprazlama geçilmesi
56.	Gece yürürken ışıklandırılmış yolların ve yaya geçitlerinin kullanılmaması
57.	Fosil yakıt kullanan motorlu araçların kirlilik yaratması
58.	Araç sürücülerinin dikkatsizliği (yüksek sesle müzik dinlemek, telefonla ilgilenmek, yanındakiyle konuşmak vb.)
59.	Araç sürücülerinin aşırı hız yapması
60.	Yaya önceliği kavramının yeterince iyi tanıtılmaması, uygulamalar konusunda sorunlar yaşanması
61.	Yaya geçitlerinde trafik kurallarını ihlal eden araç sürücülerinin yeterince iyi kontrol edilmemesi
62.	Gece yürüyüşlerinde açık renkli, parlak, ışık yansıtabilir kıyafetlerin giyilmemesi
63.	Trafik kuralları bilgisinin yetersiz olması
64.	Trafikte bulunan motorlu araç sayısının fazla olması
65.	Kaldırımların olmadığı yerlerde araç yolundan yürünmesi
66.	Motosiklet sürücülerinin yaya yolunda araç sürmeleri
67.	Yayaların, görüş açısının engellendiği yerlerde karşıya geçmeye çalışması.
68.	Araç sürücülerinin yaya geçitlerinde, kaldırımlarda, kaldırım rampalarında park

	etmesi ya da bekleme yapması
69.	Araç sürücülerinin trafik kurallarına uymaması
70.	Yaya geçitlerinde gelen aracın olup olmadığını kontrol etmeden yola inilmesi
71.	Arkadaş baskısı, meydan okuma gibi sebepler yüzünden güvensiz davranışlarda bulunulması
72.	Motosiklet sürücülerinin trafik kurallarına uymaması
73.	İnşaat, onarım projeleri sırasında yaya yollarının geçici olarak kaldırılması veya daraltılması

D. 60- ITEM POOL OF THE PERCEPTION OF RISKY SITUATIONS SCALE FOR PEDESTRIANS AFTER INITIAL REFINEMENT

NO	MADDELER
1.	Araç sürücülerinin alkol ve madde etkisi altındayken trafiğe çıkmaları
2.	Yayaların, otopark/garaj gibi yerlerden çıkan araçları fark edememesi
3.	Geniş ve işlek caddelerde üst veya alt geçitlerin olmaması
4.	Yayaların, otobüs durmadan otobüse binmeye veya otobüsten inmeye çalışması
5.	Geniş ve işlek caddelerde güvensiz noktalardan geçiş yapmayı durduracak parmaklıkların lmaması
6.	Çocuk ve gençlerin araç yolunda veya yakınında zaman geçirmesi (top/yakalamaca oynama, kaykay/paten binme, sosyalleşme, yarış vb.)
7.	Araç sürücülerinin yaya geçitlerinde yayalara yol vermemesi
8.	Yayaların, araçların durduğundan emin olmadan, sadece trafik ışıklarına güvenerek karşıdan karşıya geçmeye çalışması
9.	Araç sürücülerinin yaya geçitlerine veya ışıklı kavşaklara yaklaşırken yavaşlamaması
10.	Yayaların, şehirlerarası karayolları, otoyollar ve tüneller gibi yerlerde yürümesi
11.	Araçlar için belirtilen hız sınırlandırması işaretlerinin yetersiz olması
12.	Yayaların, fiziki engellerden ötürü (dar kaldırım, esnaf, vb.) araç yolundan yürümesi
13.	Yayaların, zaman kazanmak için en yakın noktadan karşıdan karşıya geçmeye çalışması
14.	Araç sürücülerinin yayaları önemsememesi
15.	Yayaların, kendi yaşadıkları ve bildikleri bölgelerde daha dikkatsiz davranması
16.	Elektrikli motor, bisiklet ve e-scooter gibi araçların kaldırımlarda kullanılması
17.	Yayaların, hareket eden ağır vasıtaların ve iş makinelerinin önünden ya da arkasından geçmeye çalışması
18.	Yayaların, alkol veya madde etkisi altındayken yürümesi
19.	Yayaların trafik kurallarına uymaması
20.	Engelli ve yaşlı yayalar için gerekli altyapı özelliklerinin (sesli ve görsel trafik belirteçleri, yürüme bantları, rampalar) yetersiz olması
21.	Yayaların, başkaları da kurallara uymuyor varsayımı ile dikkatsiz davranması
22.	Yaya güvenliği konusundaki eğitimlerin yetersiz olması

23.	Yayaların, toplu taşıma araçlarına yetişmek için yaya geçitleri yerine tehlikeli noktalardan geçmeye çalışması
24.	Yayaların, trafik kurallarının yaya güvenliğini sağlamadığı veya gereksiz bulunması varsayımıyla dikkatsiz davranması
25.	Üst ve alt geçitlerin erişim kolaylığının olmaması
26.	Araç sürücülerinin sinyal vermeden dönüş yapmaya çalışması
27.	Yayaların, gelen araç zaten durur varsayımı ile karşıya geçmeye çalışması
28.	Kavşak ve yol ayrımlarındaki trafik işaretlemelerinin yetersiz olması
29.	Yayaların, yolda veya karşıdan karşıya geçerken koşması
30.	Yayaların, trafiğin sıkışık, araçların yavaş ilerlediği yerlerde araçların arasından karşıdan karşıya geçmesi
31.	Araç sürücülerinin trafik işaretlemelerini (tabela, ışık, yol belirteçleri vb.) dikkate almaması
32.	Yayaların dikkatsizliği ve dalgınlığı (kulaklıkla yüksek sesli müzik dinleme, telefonla ilgilenmek, yanındakiyle konuşmak vb.)
33.	Trafik kurallarına uymayan yayalar için trafik cezalarının uygulanmaması
34.	Yayaların, karşıdan karşıya geçerken her iki yönden de gelen araçları kontrol etmemesi
35.	Taksi sürücülerinin tehlikeli sürüş tarzlarına sahip olması
36.	Çok şeritli yollardaki yaya geçitlerinin tek seferde geçilemeyecek ölçüde geniş olması
37.	Yayaların, kaldırımlarda duran veya yavaş yürüyen kişileri geçmek için yola inmesi
38.	Altyapı özelliklerinin (kaldırım, yaya geçitlerinin, trafik işaretlendirmeleri ve ışıklandırılmaları, vb.) yetersiz olması
39.	Yayaların, diğer yayalar yapıyor diye kırmızı ışıkta veya yaya geçidi olmayan yerlerden karşıya geçmeye çalışması
40.	Okul ve hastane çevreleri, şehir merkezleri gibi yerlerde hız sınırının 30 km/s olmaması
41.	E-skuter, elektrikli bisiklet/motosiklet kullanıcılarının dikkatsiz sürüş tarzları
42.	Yaya yollarının yeterince iyi ışıklandırılmaması
43.	Yaya geçit boyalarının veya yaya geçitlerindeki "önce yaya" işaretlerinin yeterince belirgin olmaması
44.	Yayaların, üst ve alt geçitleri yorucu ve zaman kaybettirici olarak düşünmesi
45.	Trafik ortamının genel olarak saldırgan ve gergin olması
46.	Yayaların, yaya geçitleri dışındaki yerlerden karşıdan karşıya geçmeye çalışması
47.	Çocukların karşıdan karşıya geçerken yalnız bırakılması, kontrol altında tutulmaması
48.	Yayaların, karşıdan karşıya çaprazlama geçmeye çalışması
49.	Araç sürücülerinin dikkatsizliği ve dalgınlığı (yüksek sesle müzik dinlemek, telefonla

	ilgilenmek, yanındakiyle konuşmak vb.)
50.	Araç sürücülerinin aşırı hız yapması
51.	Yaya önceliği kavramının yeterince iyi tanıtılmaması sebebiyle yaya geçitlerinde sorunlar yaşanması
52.	Trafik kurallarını ihlal eden sürücülerin yeterince iyi denetlenmemesi, trafik cezalarının uygulanmaması
53.	Yayaların, gece yürüyüşlerinde açık renkli/parlak/ışık yansıtabilir kıyafetler giymemesi
54.	Yayaların, trafik kuralları bilgisinin yetersiz olması
55.	Motosiklet sürücülerinin yaya yolunda araç kullanmaları
56.	Yayaların, görüş açısının engellendiği yerlerde karşıya geçmeye çalışması.
57.	Araç sürücülerinin yaya geçitlerinde, kaldırımlarda veya kaldırım rampalarında park etmesi
58.	Araç sürücülerinin trafik kurallarına uymaması
59.	Motosiklet sürücülerinin trafik kurallarına uymaması
60.	İnşaat/onarım projeleri sırasında, yaya yollarının geçici olarak kapatılması veya güvenlik önlemi alınmaması

E. ETHICAL APPROVAL FOR MAIN STUDY

UYGULAMALI ETİK ARAŞTIRMA MERKEZİ
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13 MART 2024

Konu: Değerlendirme Sonucu

Gönderen: ODTÜ İnsan Araştırmaları Etik Kurulu (İAEK)

İlgi: İnsan Araştırmaları Etik Kurulu Başvurusu

Sayın Bahar Öz

Danışmanlığını yürüttüğünüz Mustafa Kurtuluş Bedi'nin "***Yayaların Trafikteki Risk Algısı***" başlıklı araştırmanız İnsan Araştırmaları Etik Kurulu tarafından uygun görülerek 0129-ODTUİAEK-2024 protokol numarası ile onaylanmıştır

Bilgilerinize saygılarımla sunarım.

Prof. Dr. Ş. Halil TURAN
Başkan

Prof.Dr. İ. Semih AKÇOMAK
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Üye

F. INFORMED CONSENT FORM

Bu çalışma, ODTÜ Psikoloji Bölümü yüksek lisans öğrencilerinden Mustafa Kurtuluş Bedi tarafından yürütülen, ODTÜ Psikoloji Bölümü'nden Prof. Dr. Bahar Öz danışmanlığında ve Polis Akademisi Trafik Enstitüsü'nden Dr. Öğr. Üyesi Derya Azık Özkan eş danışmanlığında yürütülen bir araştırmadır.

Çalışmanın Amacı Nedir?

Bu çalışmanın amacı, trafikte riskli görülebilecek durumların yayalar tarafından nasıl algılandığını ve bu risk algısının; tutum ve kişilik gibi diğer değişkenlerle birlikte yayaların davranışlarına (hata, ihlal, saldırgan ve olumlu davranışlar) ne ölçüde etki ettiğini anlamaya çalışmaktır.

Bize Nasıl Yardımcı Olmanızı İsteyeceğiz?

Gönüllü katılımcılardan kendilerine sunulan çevrimiçi anketi cevaplamaları istenmektedir. Anketin cevaplanması ortalama olarak 15-20 dakika sürmektedir. İsim ve kimlik bilgileriniz sizden istenmeyecektir. **Ankette sağlanan bilgiler yalnızca araştırma amaçlı olarak kullanılacak ve araştırma yürütücüleri dışında hiç kimse ile paylaşılmayacaktır**.

Sizden Topladığımız Bilgileri Nasıl Kullanacağız?

Çalışmaya katılım tamamıyla gönüllülük temelinde olmalıdır. Cevaplarınız tamamen gizli tutulacak ve sadece araştırmacılar tarafından değerlendirilecektir. Sizden elde edilecek bilgiler diğer katılımcıların bilgileriyle beraber toplu halde değerlendirilecek ve bilimsel yayımlarda kullanılacaktır. Sizinle ilgili bilgiler eşleştirildikten sonra kesinlikle kimlik bilgileriniz tutulmayacak, **elde edilen tüm veriler anonim olarak saklanacaktır**.

Katılımınızla İlgili Bilmeniz Gerekenler:

Anket, genel olarak kişisel rahatsızlık verecek sorular içermemektedir. Ancak, katılım sırasında sorulardan ya da herhangi başka bir nedenden ötürü kendinizi rahatsız hissederseniz cevaplama işini yarıda bırakıp çıkmakta serbestsiniz.

Araştırmayla İlgili Daha Fazla Bilgi Almak İsterseniz:

Bu çalışmaya katıldığınız için şimdiden teşekkür ederiz. Çalışma hakkında daha fazla bilgi almak için Mustafa Kurtuluş Bedi ile iletişim kurabilirsiniz. Çalışmanın sonunda sizi biraz daha bilgilendirmek amacıyla "katılım sonrası bilgilendirme formu" sunulmaktadır.

Yukarıdaki bilgileri okudum ve bu çalışmaya tamamen gönüllü olarak katılıyorum.

□ **Evet** □ **Hayır**

G. DEMOGRAPHIC IFORMATION FORM

Demografik Bilgi Formu

1. Yaşınız: 2. Cinsiyetiniz: Erkek ☐ Kadın

3. Aşağıdakilerden hangisi sosyo- ekonomik statünüzü tanımlar?

Alt ☐ Ortanın altı ☐ Orta ☐ Ortanın Üstü Üst

4. Eğitim durumunuz:

İlkokul mezunu _____ Ortaokul mezunu _____

Lise mezunu _____ Önlisans/Lisans mezunu _____

Yüksek lisans mezunu _____ Doktora mezunu _____

5. Ehliyetiniz var mı? Hayır Evet

6. Kaç yıldır ehliyet sahibisiniz? _____ yıl

7. Son üç yılda kaç kez yaya olarak kaza geçirdiniz? (Hafif kazalar dâhil)
_____ kez

8. Son üç yılda kaç kez yaya olarak neredeyse kaza geçireceğiniz (kazaya ramak kala anlar) anlar yaşadınız? (Hafif kazalar dâhil) _____ kez

Trafikte Yaya Olarak Maruziyet Bilgileri

Aşağıda **trafik ortamında** geçirdiğiniz süre boyunca yaptığınız **yürüyüşlerle** ilgili bazı sorular bulunmaktadır. Lütfen sorulara olabildiğince net cevaplar veriniz.
(**Yayalar**: sokaklar, kaldırımlar ve yaya geçitleri gibi çeşitli ortamlarda çoğunlukla yürüyerek seyahat eden bireylerdir.)

1) Kendinizi ne ölçüde (yüzdelik olarak) **yaya olarak** tanımlarsınız?

2) Trafik ortamında yaya olarak bulunduğunuz zamanlarda **kendinizi ne ölçüde** (yüzdelik olarak) **güvende** hissediyorsunuz?

3) Bir günde, **ortalama kaç dakika** yürürsünüz?

4) Günün hangi **saatlerinde** yürümeyi tercih ediyorsunuz?

5) Temel yürüyüş **amacınız** nedir**?**

- Egzersiz, sağlık amaçlı - Alışveriş - Gezinti (boş zaman aktiviteleri)

- İşe/okula/eve giderken - Toplu taşıma araçları değiştirirken -Diğer

6) Yürüdüğünüz veya günlük kullandığınız yolları düşündüğünüzde **altyapı özellikleri yaya güvenliği ve rahatlık** açısından ne ölçüde (yüzdelik olarak) yeterlidir?

H. YAYA DAVRANIŞ ÖLÇEĞİ

		Hiçbir Zaman	Nadiren	Arada Sırada	Bazen	Sıkça	Çoğu Zaman	Her Zaman
1.	Zaman kazanmak için yolu çapraz geçerim.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2.	Yaya geçidi 50 metre kadar yakın olsa bile yaya geçidi kullanmadan karşıya geçerim.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3.	Yayalara kırmızı yansa bile karşıdan karşıya geçerim.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4.	Taşıtlara hala yeşil yanarken karşıdan karşıya geçerim.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
5.	Park etmiş arabaların arasından karşıya geçerim	**1**	**2**	**3**	**4**	**5**	**6**	**7**
6.	Yaya geçidinden karşıya geçmeye başlayıp zaman kazanmak için çapraz devam ederim.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
7.	Trafik sıkışıkken arabaların arasından karşıya geçerim.	1	2	3	4	5	6	7
8.	Arkadaşlarımla yürürken ya da önümden yavaş yürüyen yayayı geçmek için taşıt yolundan yürürüm.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
9.	Başka bir şey düşündüğüm zamanlarda karşıya geçerken yola bakmayı unuturum.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
10.	Yolun karşısındaki birine yetişmek için karşıya geçerken yola bakmayı unuturum.	**1**	**2**	**3**	**4**	**5**	**6**	**7**

Yaya olarak aşağıda belirtilen davranışları ne sıklıkla yapıyorsunuz?

11.	Birileriyle yürürken karşıdan karşıya geçtiğimde yola bakmadan karşıya geçerim.	1	2	3	4	5	6	7
12.	Trafiğe dikkat etmeden bir sürü sokak ve kavşak geçtiğimi fark ederim.	**1**	**2**	**3**	**4**	**5**	**6**	**7**

13.	Başka bir yol kullanıcısına kızar (yaya, sürücü, bisikletli vb.) ona hakaret ederim.	1	2	3	4	5	6	7
14.	Başka bir yol kullanıcısına kızar (yaya, sürücü, bisikletli vb.) ve ona bağırırım.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
15.	Başka bir yol kullanıcısına kızar (yaya, sürücü, bisikletli vb.) ve ona el hareketi yaparım.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
16.	Sürücülere sinirlenir ve arabalarına vururum.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
17.	Yol hakkı bende olduğu halde, eğer arkasında başka araç yoksa arabaya yol veririm.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
18.	Yanımda başka yayalar olduğu zaman, karşılaştığım yayaları rahatsız etmemek için tek sıra yürürüm.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
19.	Karşı karşıya geldiğim yayalara durarak yol veririm.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
20.	Diğer yayaları rahatsız etmemek için kaldırımın sağ tarafından yürürüm.	**1**	**2**	**3**	**4**	**5**	**6**	**7**

I. THE PEDESTRIAN ATTITUDES SCALE

Lütfen aşağıdaki cümlelere ne kadar katılıp katılmadığınızı 1(Kesinlikle Katılmıyorum) ile 5 (Kesinlikle Katılıyorum) aralığında işaretleyiniz.

Her bir soru için cevap seçenekleri:

"1 = Kesinlikle Katılmıyorum", "2 = Katılmıyorum", "3 = Ne Katılıyorum Ne Katılmıyorum", "4 = Katılıyorum", "5 = Kesinlikle Katılıyorum"

		Kesinlikle Katılmıyorum	**Katılmıyorum**	**Ne Katılıyorum Ne Katılmıyorum**	**Katılıyorum**	**Kesinlikle Katılıyorum**
1.	Sürücülerin yağışlı havalarda hızı azaltmadan geçerek yayalara su sıçratması beni kızdırır.	**1**	**2**	**3**	**4**	**5**
2.	Trafik kurallarına uymayan sürücüler trafiği tehlikeye atar.	**1**	**2**	**3**	4	**5**
3.	Yürürken diğer yayalara çarpmamaya özen gösteririm.	**1**	**2**	**3**	4	**5**
4.	Araçların, kaldırım gibi yayaların kullanımına ayırılan yerlere park edilmesi beni sinirlendirir.	**1**	**2**	**3**	4	**5**
5.	Sürücülerin trafikte hep kendilerini haklı gördüklerini düşünüyorum.	**1**	**2**	**3**	4	**5**
6.	Yavaş yürüyen birinin arkasından yürümektense hızımı artırıp önüne geçerim.	**1**	**2**	**3**	**4**	**5**

7.	Trafik ortamında yürürken telefonumla ilgilenmek gelebilecek tehlikeleri fark etmemi zorlaştırır.	**1**	**2**	**3**	**4**	**5**
8.	Trafikte sürücülerin yayalara gereken saygıyı gösterdiğini düşünmüyorum.	**1**	**2**	**3**	**4**	**5**
9.	Kontrolsüz bir şekilde yola çıkan bir yaya gördüğümde endişelenirim.	**1**	**2**	**3**	**4**	**5**
10.	Araç sürücüleri trafik ortamında, yayalardan çok diğer araçlara dikkat ediyor.	**1**	**2**	**3**	**4**	**5**
11.	Sürücülerin kendilerini trafiğin hâkimi olarak gördüğünü düşünüyorum.	**1**	**2**	**3**	**4**	**5**
12.	Grup halinde yürüyerek benim yürümemi engelleyen kişilere sinirlenirim.	**1**	**2**	**3**	**4**	**5**
13.	Trafik ortamında yürürken, kulaklıkla müzik dinlemek tehlikeleri fark etme ihtimalimi azaltır.	**1**	**2**	**3**	**4**	**5**
14.	Karşıdan karşıya geçmek için beklerken, yol vermeyen araç sürücülerine sinirlenirim.	**1**	**2**	**3**	**4**	**5**
15.	Karşıdan karşıya geçerken, gelen araç yeterince uzaksa ışıklara ve/veya yaya geçitlerine ihtiyaç duymam.	**1**	**2**	**3**	**4**	**5**
16.	Acelemin olduğu durumlarda yaya trafik düzenleyicilerini (ışıklar, geçitler vs.) kullanmayı önemsemem.	**1**	**2**	**3**	**4**	**5**
17.	Eğer dikkatli olursam hareket halindeki araçların arasından karşıya geçmek tehlikeli olmaz.	**1**	**2**	**3**	**4**	**5**
18.	Yaya geçitlerini kullanmamak can güvenliğimi tehlikeye atmaz.	**1**	**2**	**3**	**4**	**5**
19.	Üst/Alt geçitleri kullanmak bana zaman kaybettirir.	**1**	**2**	**3**	**4**	**5**
20.	Kaldırımlar kalabalık olduğunda, yola inerek ilerlemenin tehlikeli olduğunu düşünmüyorum.	**1**	**2**	**3**	**4**	**5**
21.	Yol boşken, trafik ışıklarının yayalar için yeşile dönmesini beklemeden karşıdan karşıya geçmek benim için tehlike yaratmaz.	**1**	**2**	**3**	**4**	**5**

J. THE PERCEPTION OF RISKY SITUATION SCALE FOR PEDESTIRANS IN TURKISH

Aşağıdaki ifadelerde trafikte karşılaşabileceğiniz, tehlikeli sayılabilecek bazı durumlar ve davranışlar yer almaktadır. Lütfen her bir ifadeyi dikkatle okuyup, belirtilen durumları ve davranışları trafikteki yaşantılarınız temelinde, sunulan ölçeklere göre değerlendiriniz. Doğru veya yanlış değerlendirme bulunmamaktadır, önemli olan değerlendirmenin sizin yaşantınızı yansıtmasıdır.

1 = Hiç, 2 = Az, 3 = Orta, 4 = Çok, 5 = Aşırı

ÖRNEK İŞARETLEME TASLAĞI (Buraya riskli durum yazılmaktadır. Her durum için işaretleme tekrarlanacaktır.)

Her satır için bir işaretleme yapınız.	**1 = Hiç**	**2 = Az**	**3 = Orta**	**4 = Çok**	**5 = Aşırı**
Karşılaşma Sıklığı					
Kazaya Sebebiyet Olasılığı					
Olası Kaza Sonucu					

Karşılaşma Sıklığı: cümledeki durum veya davranışlarla trafik ortamında ne sıklıkla karşılaştığınızı değerlendiriniz.

Kazaya Sebebiyet Olasılığı: cümledeki durum veya davranışların, kaza ya da ramak kala olaya sebebiyet verme olasılığını değerlendiriniz.

Olası Kaza Sonucu: cümledeki durum veya davranışlar sebebiyle meydan gelebilecek kazanın sonuçlarının ne ölçüde olabileceğini değerlendiriniz.

Her bir cümle için olası cevap seçenekleri:

1 = Hiç 2 = Az 3 = Orta 4 = Çok 5 = Her zaman

1.	Yayaların, toplu taşıma araçlarına yetişmek için yaya geçitleri yerine tehlikeli noktalardan geçmeye çalışması.
2.	Yayaların, başkaları da kurallara uymuyor varsayımı ile dikkatsiz davranması.
3.	Yayaların, araçların durduğundan emin olmadan, sadece trafik ışıklarına güvenerek karşıdan karşıya geçmeye çalışması.
4.	Yayaların, zaman kazanmak için en yakın noktadan karşıdan karşıya geçmeye çalışması.
5.	Yayaların, trafik kurallarının yaya güvenliğini sağlamadığı veya gereksiz bulunması varsayımıyla dikkatsiz davranması.
6.	Yayaların, kendi yaşadıkları ve bildikleri bölgelerde daha dikkatsiz davranması.
7.	Yayaların trafik kurallarına uymaması.
8.	Yayaların, üst ve alt geçitleri yorucu ve zaman kaybettirici olarak düşünmesi.
9.	Yayaların, gelen araç zaten durur varsayımı ile karşıya geçmeye çalışması.
10.	Yayaların dikkatsizliği ve dalgınlığı (kulaklıkla yüksek sesli müzik dinleme, telefonla ilgilenmek, yanındakiyle konuşmak vb.).
11.	Yayaların, diğer yayalar yapıyor diye kırmızı ışıkta veya yaya geçidi olmayan yerlerden karşıya geçmeye çalışması.
12.	Yayaların, karşıdan karşıya geçerken her iki yönden de gelen araçları kontrol etmemesi.
13.	Yayaların, yolda veya karşıdan karşıya geçerken koşması.
14.	Yayaların, trafiğin sıkışık, araçların yavaş ilerlediği yerlerde araçların arasından karşıdan karşıya geçmesi.
15.	Trafik kurallarına uymayan yayalar için trafik cezalarının uygulanmaması.
16.	Yaya güvenliği konusundaki eğitimlerin yetersiz olması.
17.	Yayaların, görüş açısının engellendiği yerlerde karşıya geçmeye çalışması.
18.	Yayaların, şehirlerarası karayolları, otoyollar ve tüneller gibi yerlerde yürümesi.
19.	Yayaların, fiziki engellerden ötürü (dar kaldırım, esnaf, vb.) araç yolundan yürümesi.
20.	Çocuk ve gençlerin araç yolunda veya yakınında zaman geçirmesi (top/yakalamaca oynama, kaykay/paten binme, sosyalleşme, yarış vb.)
21.	Araç sürücülerinin trafik kurallarına uymaması.
22.	Araç sürücülerinin aşırı hız yapması.
23.	Motosiklet sürücülerinin trafik kurallarına uymaması.
24.	Trafik ortamının genel olarak saldırgan ve gergin olması.
25.	Araç sürücülerinin trafik işaretlemelerini (tabela, ışık, yol belirteçleri vb.) dikkate almaması.
26.	Trafik kurallarını ihlal eden sürücülerin yeterince iyi denetlenmemesi, trafik cezalarının uygulanmaması.
27.	Araç sürücülerinin dikkatsizliği ve dalgınlığı (yüksek sesle müzik dinlemek, telefonla ilgilenmek, yanındakiyle konuşmak vb.).
28.	Taksi sürücülerinin tehlikeli sürüş tarzlarına sahip olması.
29.	Yaya önceliği kavramının yeterince iyi tanıtılmaması sebebiyle yaya geçitlerinde sorunlar yaşanması.
30.	Araç sürücülerinin sinyal vermeden dönüş yapmaya çalışması.

31.	Araç sürücülerinin alkol ve madde etkisi altındayken trafiğe çıkmaları.
32.	Yaya geçit boyalarının veya yaya geçitlerindeki "önce yaya" işaretlerinin yeterince belirgin olmaması.
33.	Altyapı özelliklerinin (kaldırım, yaya geçitlerinin, trafik işaretlendirmeleri ve ışıklandırılmaları, vb.) yetersiz olması.
34.	Yaya yollarının yeterince iyi ışıklandırılmaması.
35.	Okul ve hastane çevreleri, şehir merkezleri gibi yerlerde hız sınırının 30 km/s olmaması.
36.	Kavşak ve yol ayrımlarındaki trafik işaretlemelerinin yetersiz olması.
37.	Çok şeritli yollardaki yaya geçitlerinin tek seferde geçilemeyecek ölçüde geniş olması.
38.	Araç sürücülerinin yaya geçitlerinde, kaldırımlarda veya kaldırım rampalarında park etmesi.
39.	Araçlar için belirtilen hız sınırlandırması işaretlerinin yetersiz olması.
40.	Yayaların, gece yürüyüşlerinde açık renkli/parlak/ışık yansıtabilir kıyafetler giymemesi.

K. THE PERCEPTION OF RISKY SITUATIONS SCALE FOR PEDESTRIANS (IN ENGLISH)

The following statements describe certain situations and behaviors in traffic that may be considered dangerous. Please read each statement carefully and evaluate the situations and behaviors based on your own traffic experiences, using the scales provided. There are no right or wrong answers; what matters is that your evaluation reflects your own experiences.

1 = Not at all, 2 = A little, 3 = Moderate, 4 = Much, 5 = Extremely

SAMPLE MARKING TEMPLATE (A risky situation is written here. The marking will be repeated for each situation.)"

Provide a response for each item for each scales.	**1 = Not at all**	**2 = A little**	**3 = Moderate**	**4 = Much**	**5 = Extremely**
Frequency (of situation X, Y, Z...)					
Likelihood of Causing an Accident (of situation X, Y, Z...)					
Seriousness of Possible Accident Outcome X, Y, Z...)					

No.	**Statements.**
1.	Pedestrians attempting to cross from dangerous points instead of crosswalks to catch public transport.
2.	Pedestrians acting carelessly on the assumption that others do not follow the rules either.
3.	Pedestrians trying to cross the street by relying only on traffic lights, without ensuring that vehicles have stopped.

4.	Pedestrians attempting to cross from the nearest point to save time.
5.	Pedestrians acting carelessly under the assumption that traffic rules do not ensure pedestrian safety or are unnecessary.
6.	Pedestrians behaving more carelessly in areas they know well or live in.
7.	Pedestrians not complying with traffic rules.
8.	Pedestrians considering overpasses and underpasses as tiring and time-consuming.
9.	Pedestrians attempting to cross the street assuming that approaching vehicles will stop.
10.	Pedestrian inattentiveness and distraction (e.g., listening to loud music with headphones, using a phone, talking with someone while walking).
11.	Pedestrians crossing during a red light or at undesignated places because other pedestrians are doing so.
12.	Pedestrians failing to check both directions for oncoming vehicles while crossing.
13.	Pedestrians running while walking on the road or crossing the street.
14.	Pedestrians crossing between vehicles in congested traffic where cars are moving slowly.
15.	Lack of enforcement of traffic penalties for pedestrians who violate rules.
16.	Insufficient education on pedestrian safety.
17.	Pedestrians attempting to cross in places where their field of vision is blocked.
18.	Pedestrians walking on intercity highways, motorways, or in tunnels.
19.	Pedestrians walking on the roadway due to physical barriers (e.g., narrow sidewalks, shop displays).
20.	Children and adolescents spending time on or near the roadway (e.g., playing ball/tag, skateboarding/rollerblading, socializing, racing).
21.	Drivers not complying with traffic rules.
22.	Drivers speeding excessively.
23.	Motorcyclists not complying with traffic rules.
24.	The general traffic environment being aggressive and tense.
25.	Drivers ignoring traffic signs (e.g., signs, lights, road markings).
26.	Insufficient monitoring and enforcement of penalties for drivers who violate

	traffic rules.
27.	Driver inattentiveness and distraction (e.g., listening to loud music, using a phone, talking with passengers).
28.	Taxi drivers exhibiting dangerous driving styles.
29.	Insufficient promotion of the pedestrian priority concept, leading to problems at crosswalks.
30.	Drivers attempting to turn without signalling.
31.	Drivers entering traffic under the influence of alcohol or substances.
32.	Pedestrian crosswalk markings or “yield to pedestrians” signs not being sufficiently visible.
33.	Inadequate infrastructure features (e.g., sidewalks, crosswalks, traffic signage, lighting).
34.	Pedestrian walkways not being sufficiently illuminated.
35.	Absence of a 30 km/h speed limit in areas such as school zones, hospital areas, and city centers.
36.	Insufficient traffic signs and markings at intersections and junctions.
37.	Pedestrian crossings on multi-lane roads being too wide to be crossed in a single attempt.
38.	Drivers parking on pedestrian crossings, sidewalks, or curb ramps.
39.	Insufficient signage for speed limits for vehicles.
40.	Pedestrians not wearing light/bright/reflective clothing during nighttime walks.

L. TURKISH SUMMARY / TÜRKÇE ÖZET

BÖLÜM 1: GENEL GİRİŞ

1.1. Giriş ve Trafik Güvenliğine Genel Bakış

Küresel ölçekte trafik kazaları, araç güvenliği teknolojileri ve yol altyapısındaki ilerlemelere rağmen ciddi bir halk sağlığı sorunu olmaya devam etmektedir. Dünya Sağlık Örgütü (WHO, 2023) verilerine göre, her yıl dünya genelinde 1,3 milyondan fazla insan trafik kazaları nedeniyle hayatını kaybetmekte ve bu ölümlerin yaklaşık dörtte birini yayalar oluşturmaktadır. Türkiye'de de benzer bir tablo söz konusudur ve dahası TÜİK (2024) verileri ve araştırmalar, kent içi kazalarda yaya ölümlerinin yüksek oranda olduğunu ve yaralı yayaların ölüm oranının sürücülere ve yolculara kıyasla önemli ölçüde daha yüksek olduğunu göstermektedir (Aşırdizer vd., 2025). Son on yılda trafik kazalarına bağlı yaralanma ve ölümlerin yaklaşık %76,2'sinin şehir içinde gerçekleşmesi (TÜİK, 2024), kentsel alanlarda yaya olmanın güvenli bir hareketlilik biçimi olmaktan uzak olduğunu vurgulamaktadır.

20. yüzyılın ortalarından itibaren trafik güvenliği stratejileri, William Haddon'ın (1980) çerçevesi ve oluşturduğu matris ve sonrasında geliştirilen "Vizyon Sıfır" (Tingvall & Haworth, 1999) gibi sistem odaklı modellerle büyük ölçüde mühendislik çözümlerine dayanmıştır ve iyileşmelere yol açmıştır. Bu yaklaşımlar, güvenlik paradigmasını bireysel suçlamadan sistem düzeyinde risk azaltmaya doğru kaydırmıştır. Paralel olarak, psikoloji alanındaki erken çalışmalar sürücü hatalarının anlaşılmasına odaklanmıştır (Parker vd., 1995). Rasmussen hata sınıflandırmaları (1982, 1997) ve daha sonrasında Reason'ın (1990) insan hatası çerçevesi, kazaların yalnızca bireysel hatalardan değil, aynı zamanda insan eylemleri, sistem tasarımı ve organizasyonel kısıtlamalar arasındaki etkileşimden kaynaklandığını vurgulamıştır. Bu bilişsel ve sistemik çerçeve, "Güvenli Sistem Yaklaşımı" ve "Güvenlik-II" (Dekker, 2011; Hollnagel, 2014) gibi modellerin temelini oluşturmuş; ancak birçok

trafik sistemi halen araç akışını önceliklendirmekte, yaya güvenliğini arka plana atmaktadır (Job & Mbugua, 2020; Liu vd., 2021).

1.2. Yayaların Risk Grubu Olarak Konumu

Yayalar, araç içindeki yolcuların aksine yapısal koruyucu sistemlerden yoksun oldukları için, orta hızlardaki çarpışmalarda bile ciddi yaralanma veya ölüme maruz kalabilmektedir (Tefft, 2013). Yol altyapıları sıklıkla motorlu araçların hareketini kolaylaştırmak üzere tasarlanmakta, bu da çoğu zaman yaya güvenliği ve rahatlığı amacıyla olmaktadır (OECD, 2000; Šucha vd., 2021). Yetersiz aydınlatma, işgal edilmiş kaldırımlar ve belirsiz geçiş noktaları gibi altyapı eksiklikleri, yaya hareketliliğini bilişsel olarak zorlayıcı ve belirsiz bir etkinlik haline getirmektedir (Foreman vd., 2024; Yannis vd., 2020). Gelişmiş koruyucu teknolojiler sürücü ve yolcu güvenliğini artırsa da yayalar için eşdeğer korumalar sağlanmamıştır (Hussain vd., 2019). Yayalar, trafik güvenliği yeniliklerinden ve kentsel planlama kararlarından büyük ölçüde dışlanmaya devam etmektedir (Rhoads vd., 2023). Bu fiziksel, altyapısal ve politika düzeyindeki eksiklikler, yayalar için karmaşık bir dezavantaj sistemi oluşturmaktadır ve bireylerin trafik ortamındaki davranış kalıplarıyla da etkileşime girmektedir (Balk vd., 2014).

1.3. Yaya Davranışlarının İncelenmesi

Trafik psikolojisi, Reason'ın (1990) sürücü hatalarını sınıflandıran çalışmalarıyla ve sonrasında yapılana araştırmalarla (Reason vd., 1990; Parker vd., 1995) yol güvenliğindeki insan faktörlerini anlamaya odaklanmıştır. Modern araçlardaki güvenlik önlemlerinden yoksun olan yayaların, karmaşık ortamlarda hareket etme zorunluluğu, riskleri nasıl değerlendirdikleri ve tepki verdikleri gibi davranışlarını önemli bir belirleyici haline getirmektedir. Yaya davranışlarını anlamak için çeşitli değerlendirme araçları geliştirilmiştir. Bunlardan ilki, Sürücü Davranışları Ölçeği (Driver Behavior Questionnaire, DBQ, Reason vd., 1990), mantığını yayalara uyarlayan Yaya ve Trafik Davranışları Ölçeği (Pedestrian and Traffic Behavior Questionnaire, (PBQ), Moyano Díaz, 1997) olmuştur. Daha sonra Elliott ve Baughan (2004) ergenlerde risk alma eğilimlerini hedefleyen Ergen Yol Kullanıcı Davranışları

Ölçeği (Adolescent Road User Behavior Questionnaire, ARBQ) ölçeğini oluşturmuşlardır. Fransa'da ise Granié vd. (2013) tarafından geliştirilen Yaya Davranışları Ölçeği (Pedestrian Behavior Scale, PBS), yetişkin yaya davranışlarını değerlendirmek için en kapsamlı araçlardan biri haline gelmiş; bu ölçek ihlaller, dalgınlıklar, saldırgan ve olumlu davranışlar olmak üzere dört alanı içermiştir.

Türkiye'de de benzer öz bildirim araçları kullanılmaya başlanmış; Moyano-Díaz'ın PBQ'su Yıldırım (2007) tarafından, Granié'nin PBS'si ise Nordfjærn ve Şimşekoğlu (2013) ile Demir (2017) tarafından Türkçe'ye uyarlanmıştır. Bu çalışmalar, yaya davranışlarının her zaman rasyonel veya planlı olmadığını, anlık durumsal ipuçlarına, sosyal normlara veya duygusal durumlara tepki olarak ortaya çıkabileceğini vurgulamıştır (Ajzen, 1991; Gibbons vd., 1998).

Dünya genelindeki bazı çalışmalara bakıldığında ise, demografik faktörler (yaş, cinsiyet), çevresel koşullar ve psikolojik unsurlar (tutumlar) yaya davranışlarının önemli belirleyicileri olarak öne çıkmaktadır (San-Juan-Escudero vd. 2025; Granié, 2009; Useche vd. 2021). Ancak literatürde yaya bağlamına özgü geçerli ve güvenilir ölçme araçlarının eksikliği bulunmaktadır.

1.4. Risk Algısı ve Yaya Davranışları Arasındaki İlişki

Risk algısı, bireylerin belirli bir durumda ve zamanda, zararın olasılığını ve ciddiyetini öznel olarak değerlendirmesidir (Deery, 1999). Trafik psikolojisinde, algılanan riske nasıl tepki verildiğini kavramsallaştıran birçok model geliştirilmiştir. Wilde'ın (1982) Risk Homeostasisi Teorisi, insanların algılanan riski tercih edilen bir seviyede tutmak için davranışlarını düzenlediğini öne sürer; örneğin, altyapı iyileştirmeleri nedeniyle daha güvende hissetmek, daha iddialı veya daha az dikkatli yaya eylemlerine yol açabilir. Peltzman'ın (1975) Risk Telafisi Teorisi, güvenlik müdahalelerinin, bireyler koruyucu önlemlerin kırılganlıklarını azalttığına inandıklarında istemeden risk almayı teşvik edebileceğini belirtir. John Adams (1995) bu fikri "risk termostatları" kavramıyla daha da geliştirmiştir. Näätänen ve Summala'nın (1974) Sıfır-Risk Teorisi ise, yol kullanıcılarının belirgin bir tehlike ortaya çıkana kadar riskin yokmuş gibi davrandığını öne sürer. Summala'nın (1996)

Tehditten Kaçınma Modeli bu görüşü genişleterek, düzeltici eylemin sürekli risk izlemesinden ziyade, yaklaşan bir araç gibi doğrudan ve belirgin ipuçlarıyla tetiklendiğini savunur. Fuller'in (2005) Risk Allostasisi Teorisi (RAT), riski görev zorluğu ve algılanan yetenek arasındaki bir denge olarak tanımlar. Loewenstein ve ark. (2001) tarafından geliştirilen "Duygu Olarak Risk" yaklaşımı, anlık güvenlik kararlarının çoğunlukla rasyonel hesaplamadan ziyade duygusal tepkilerle şekillendiğini belirtirken, bazen risk almanın aciliyet, heyecan arayışı veya zaman kazanma isteği gibi duygusal dürtülerle ilişkili olduğunu vurgular. Rogers'ın (1975) Koruma Motivasyonu Teorisi ise, koruyucu eylemlerin yalnızca algılanan şiddet ve kırılganlıkla değil, aynı zamanda koruyucu davranışın etkinliğine olan inançla da şekillendiğini ekler.

Risk algısı, yaya davranışlarını önemli ölçüde şekillendirmektedir; yüksek risk algısı daha temkinli stratejilerle, düşük risk algısı ise ihlal, dalgınlık ve saldırgan davranışlarla ilişkilendirilmektedir (Salducco vd., 2022). Yetersiz veya çarpıtılmış risk algısı güvensiz davranışlara yol açabilirken, doğru ve yüksek düzeyde algılanan risk daha dikkatli davranışları teşvik etmektedir (Yu vd., 2020; Kim vd., 2024). Yayaların anlık kararları ve belirsiz koşullar altında sıklıkla doğaçlama kararlar vermesi nedeniyle risk algısı kritik bir rol oynamaktadır (Oxley vd., 2005; Tiwari vd., 2007). Ancak literatürde yaya bağlamına özgü geçerli ve güvenilir ölçme araçlarının eksikliği dikkat çekicidir; çoğu araştırma sürücülere yönelik ölçekleri uyarlamış veya dar kapsamlı ölçümler kullanmıştır (Elliott & Baughan, 2004; Rundmo & Iversen, 2004). Nitel araştırmalar, yaya risk algısının sadece tehlikelerin nesnel varlığıyla değil, aynı zamanda kültürel normlar ve yapılı çevre tarafından öznel olarak yorumlanmasıyla şekillendiğini göstermektedir (Katopola vd., 2022; Villaveces vd., 2012). Bu durum, yayalara ve karşılaştıkları durumlara özgü, kapsamlı olarak uyarlanmış bir ölçek geliştirme ihtiyacını doğurmuştur.

1.5. Tutumların Rolü

Tutumlar, bireylerin nesnelere, insanlara, davranışlara veya soyut kavramlara yönelik değerlendirmelerini yansıtan psikolojik eğilimlerdir (Petty vd., 2007). Trafik psikolojisinde tutumların rolü, hız yapma veya emniyet kemeri kullanma gibi sürücü

odaklı bağlamlarda kapsamlı bir şekilde belgelenmiştir (Kweon & Kockelman, 2010; Iversen & Rundmo, 2011). Uluslararası çalışmalar, olumlu güvenlik tutumlarının kural uyumunu artırdığını, esnek ya da olumsuz tutumların ise riskli davranışlarla ilişkili olduğunu göstermiştir (Papadimitriou vd., 2012; Dinh vd., 2020). Örneğin, Vietnam'da (Dinh vd., 2020) ve Yunanistan'da (Papadimitriou vd., 2012) yol güvenliğine ve altyapıya yönelik tutumların davranışları anlamlı şekilde yordadığı bulunmuştur.

Türkiye'de yapılan araştırmalar, tutumların davranışlarla ilişkili olduğunu, fakat bu alandaki çalışmaların sınırlı olduğunu göstermektedir (Demir vd., 2019; Nordfjærn & Şimşekoğlu, 2013; Serin vd., 2018). Şimşekoğlu ve ark. (2012) tarafından yapılan Türkiye ve Norveç'i karşılaştıran bir çalışma, Türk katılımcıların daha yüksek risk algısına sahip olmasına rağmen, bu algıların fiili güvenlik davranışları veya tutumlarıyla anlamlı bir ilişkisi olmadığını rapor etmiştir. Yazarlar, zayıf denetim ve yaygın gayri resmi normların bulunduğu trafik ortamlarında algılanan riskin davranışı değiştirmek için yeterli olamayabileceğini belirtmişlerdir.

1.6. Genel Girişin Sonucu

Bu bölüm, yaya güvenliğine sistemik, psikolojik ve davranışsal faktörleri inceleyerek çok katmanlı bir anlayış sunmaktadır. Yayalar yapısal olarak savunmasız kalmaya devam etmekte ve altyapı tasarımı ile güvenlik politikalarında genellikle yeterince hizmet alamamaktadır (Bendak vd., 2021; Yannis vd., 2020). Ancak, yayaların bireysel risk algısı ve tutumlar tarafından önemli ölçüde şekillenen davranışları, günlük tehlikelerle başa çıkmada kritik bir rol oynamaktadır (Liu vd., 2021). Yaya davranışları üzerine mevcut araştırmalar genellikle sürücü odaklı çalışmalardan uyarlanan araçları kullanmakta, bu da ekolojik geçerliliklerini ve kültürel duyarlılıklarını sınırlamaktadır (Elliott & Baughan, 2004; Granié vd., 2013). Yayaların dinamik, gerçek dünya bağlamlarında riskli durumları öznel olarak nasıl değerlendirdiklerine dair bir boşluk devam etmektedir. Bu tez, bu nedenle, bu tez, ekolojik geçerliliğini ve kavramsal sağlamlığını artırmak amacıyla nitel içgörülere dayanarak Yayalar İçin Riskli Durum Algısı Ölçeğini (PRSS-P) geliştirmeyi hedeflemektedir.

BÖLÜM 2:

ÇALIŞMA 1: YAYALAR İÇİN RİSKLİ DURUM ALGISI ÖLÇEĞİ (PRSS-P) GELİŞTİRME

2.1. Giriş

Bu tez çalışmasının ilk aşaması, yayaların günlük trafik senaryolarında riskli durumları öznel olarak nasıl yorumladıklarını ve değerlendirdiklerini ortaya koymak amacıyla nitel bir tasarımla gerçekleştirilmiştir. Bu, kültürel olarak uyarlanmış ve bağlamsal olarak temellendirilmiş bir ölçüm aracı olan "Yayalar İçin Riskli Durum Algısı Ölçeği (PRSS-P)"nin geliştirilmesi için temel oluşturmuştur. Yarı yapılandırılmış görüşmeler, katılımcıların gündelik deneyimlerinden yola çıkarak riskli durum algılarını ortaya koymak üzere kullanılmıştır.

2.2. Yöntem

Araştırmaya başlangıçta 25 kişi katılmış, ancak ses kaydı veya içerik sorunları nedeniyle dört görüşme elendikten sonra toplam 21 görüşme analize dahil edilmiştir (erkek = 11, kadın = 10; yaş aralığı = 18–36, Ort. = 23,62). Bu sayı, veri doyum noktasına ulaşıldığı için yeterli kabul edilmiştir (Yıldırım & Şimşek, 2021). Görüşmeler 15-30 dakika sürmüş ve katılımcı rızası alınarak kaydedilmiştir. Sorular, literatür taraması, Ankara ve ODTÜ kampüsündeki saha gözlemleri ve uzman görüşleri doğrultusunda hazırlanmış ve pilot uygulama sonrası netleştirilmiştir. Katılımcılara hem genel ("Yaya olmak sizin için ne ifade ediyor?") hem de spesifik ("Son zamanlarda, trafik ortamında riskli bulduğunuz bir durumu anlatır mısınız?") sorular yöneltilmiştir.

2.3. Bulgular

Veriler, tematik analiz yöntemiyle çözümlenmiştir. Analizler, yaya risk algısının çok boyutlu bir yapıya sahip olduğunu ortaya koymuştur. Katılımcılar riskleri dört ana alanda tanımlamıştır. İlk olarak, “Yetersizlik Hissi”: yayaların algılanan

incinebilirliği ve trafikte yaşadıkları önceliklendirilmeme durumları ile ilgili konuları kapsamaktadır (örn. “Yaya olmak çaresizliktir.”, “Yaya olarak önceliğimiz yok trafikte.”). İkinci olarak, “Riskin Kaynakları”: genel olarak sürücülerin dikkatsizlikleri ve ihlallerine odaklanan bu temada ayrıca az da olsa altyapısal eksiklikler yer almaktadır. Üçüncü olarak, “Riskli Durumlara Verilen Tepkiler”: bu temada ise kişilerin duygusal ve düşünsel süreçleri ifade eden sıfatlar bulunmaktadır (örn. “Korku”, “Endişe”, “Çaresizlik”). Son olarak ise, “Kurallar ve Önlemler”: bu temada ise katılımcıların trafik kurallarına yönelik tutumları ve risk durumlarda kullanılan korunma yöntemleri bulunmaktadır. Önemli bir bulgu, katılımcıların çoğunun kendi davranışlarını risk kaynağı olarak açıkça tanımlamaktan kaçınmasıdır. Bu durum, yayaların genellikle riskin pasif mağdurları olarak konumlandırıldığı kavramsal eğilimle örtüşmektedir (Papadimitriou vd., 2017; Kummeneje & Rundmo, 2019). PRSS-P'nin geliştirilmesinde, bu eksiklik dikkate alınarak yayalar ile ilgili riskli durumlar da ölçeğe dahil edilmiştir. Görüşme bulguları, ulusal trafik güvenliği belgeleri (2021-2030 Karayolu Trafik Güvenliği Strateji Belgesi), uluslararası trafik tüzükleri (Birleşik Krallık, 2015 ve Birleşik Devletler Karayolları Kodları) ve akademik literatür (Elliott & Baughan, 2004; Pasha vd., 2015; Nasrudin vd., 2020), kişisel gözlemler ve deneyimlerden elde edilen içeriklerle birleşerek 73 maddelik bir taslak madde havuzu oluşturulmuştur. Uzman görüşleri doğrultusunda kapsam geçerliği değerlendirilen maddeler arasından 13'ü elenmiş ve ölçek 60 madde ile son haline getirilmiştir. Nitel bulgular, yaya risk algısının tek boyutlu veya sürücü odaklı ölçümlerle açıklanamayacağını, bağlama duyarlı, çok boyutlu ve psikometrik açıdan güçlü araçlara ihtiyaç olduğunu ortaya koymuştur (Elliott & Baughan, 2004; Gehlert vd., 2014).

BÖLÜM 3:

ÇALIŞMA 2: PRSS-P’NIN FAKTÖR YAPISI VE YAYA DAVRANIŞLARIYLA İLİŞKİSİ

3.1. Giriş

Literatürde risk algısındaki bireysel farklılıkların yaya davranışlarını önemli ölçüde şekillendirdiği gösterilmiştir; yüksek risk algısı daha temkinli stratejilerle, düşük risk

algısı ise ihlal, dalgınlık ve saldırgan davranışlarla ilişkilendirilmektedir (Salducco vd., 2022). Ancak bu ilişki doğrusal değildir; trafik kurallarına ve diğer yol kullanıcılarına yönelik tutumlar risk algısı ile davranış arasındaki bağı koşullandırıcı bir rol üstlenmektedir (Holland & Hill, 2007; Ulleberg & Rundmo, 2003). Ayrıca sosyal ipuçları ve altyapı yetersizlikleri de risk algısını ve davranışı etkilemektedir (Budzyński vd., 2021; Pelé vd., 2017). Bu bağlamda, alanyazındaki eksikleri giderme amacıyla PRSS-P ölçeğinin faktör yapısının incelenmesi, güvenilirliğinin test edilmesi ve risk algısının yaya davranışlarıyla ilişkide tutumların düzenleyici rolünü incelemek amaçlanmıştır.

3.2. Yöntem

Bu çalışmaya 18 ile 76 yaş aralığında değişen, %60,4'ü kadın ve %39,6'sı erkek olmak üzere toplam 402 katılımcı dâhil edilmiştir. Katılımcılara çevrim içi bir anket uygulanmış ve katılımcılara sosyal medya aracılığı ve kampüs içinde QR dağıtımı yoluyla ulaştırılmıştır

Bu çalışmada kullanılan ölçüm araçları: Demografik Bilgi Formu, Yaya Davranışları Ölçeği (PBS; ihlaller, dalgınlıklar, saldırgan davranışlar ve olumlu davranışlar; α = .84), Yaya Tutumları Ölçeği (PAS; Diğer Yol Kullanıcılarına Yönelik Tutumlar ve Trafik Kurallarına Yönelik Tutumlar; α = .78) ve bu tez kapsamında geliştirilen PRSS-P (ilk hâlinde 60 madde, α = .97).

PRSS-P, Fine-Kinney Risk Analizi yönteminden (Fine, 1971; Kinney & Wiruth, 1976) uyarlanan üç aşamalı bir risk değerlendirme yaklaşımıyla yapılandırılmıştır. Katılımcılar her bir durum için (1) karşılaşma sıklığını, (2) bahsi geçen durum sebebiyle kaza meydana gelme olasılığını ve (3) ve olası kazının sonuçlarının şiddetini ayrı ayrı değerlendirmişlerdir. Bu üç puanın çarpımı, her bir madde için risk algısı indeks değerini oluşturmuş, yüksek değerler daha büyük algılanan riski ifade etmiştir.

Ölçek üzerinde yapılan Açımlayıcı Faktör Analizi (AFA) sonucunda, düşük ortak varyans, zayıf faktör yükleri veya kavramsal uyumsuzluk gerekçesiyle bazı maddeler

çıkarılmış ve ölçeğin son hâli 40 maddeden oluşmuştur. Kaiser-Meyer-Olkin değeri .96 bulunmuş ve örneklemin faktör analizi için mükemmel düzeyde uygun olduğu belirlenmiştir (Tabachnick & Fidell, 2013). Analizler Principal Axis Factoring yöntemi ile Direct Oblimin rotasyonu kullanılarak yürütülmüş ve üç anlamlı ve tutarlı faktör ortaya çıkmıştır: 1) Yayalarla İlişkili Risk Algısı (20 madde, α = .93), 2) Sürücülerle İlişkili Risk Algısı (11 madde, α = .89) ve 3) Altyapıyla İlişkili Risk Algısı (9 madde, α = .87).

3.2. Betimleyici İstatistikler ve İkili Korelasyon Bulguları

Betimleyici istatistiklere bakıldığında, PRSS-P için: katılımcıların en çok sürücülerle ilişkili riskleri tehdit olarak değerlendirdiklerini (*M* = 72.73, *SD* = 24.47), bunu yayalarla ilişkili risklerin (*M* = 57.19, *SD* = 22.08) ve altyapıyla ilişkili risklerin (*M* = 46.43, *SD* = 23.24) izlediğini göstermiştir. Yaya davranışları ölçeğinin verileri, genel olarak düşük-orta düzeyde dalgınlıklara (*M* = 1.94, *SD* = 1.21) ve saldırgan davranışlara (*M* = 1.88, *SD* = 1.15), orta düzeyde ihlallere (*M* = 3.13, *SD* = 1.21) ve yüksek düzeyde olumlu davranışlara (*M* = 4.62, *SD* = 1.07) işaret etmiştir. Tutumlar açısından ise diğer yol kullanıcılarına yönelik tutumların yüksek (*M* = 4.23, *SD* = 0.50), trafik kurallarına yönelik tutumların ise orta düzeyde (*M* = 2.63, *SD* = 0.74) olduğu görülmüştür. Her iki boyutta da yüksek düzeyde tutumlar eleştirel ve şüpheci yaklaşıma işaret etmektedir.

İkili korelasyon analizleri çeşitli anlamlı ilişkiler ortaya koymuştur. Yaş ile ihlal davranışları arasında anlamlı ve negatif bir ilişki bulunmuştur ($r = -.33$, $p < .01$), bu da yaş arttıkça kural ihlallerinin azaldığını göstermektedir. İhlal davranışları ile dalgınlık ($r = .39$, $p < .01$) ve saldırgan davranış ($r = .32$, $p < .01$) arasında güçlü ve pozitif ilişkiler gözlenmiştir.

Trafik kurallarına yönelik tutumlar, üç olumsuz yaya davranışının tamamıyla anlamlı ve pozitif korelasyon göstermiştir: ihlaller ($r = .62$, $p < .01$), dalgınlık ($r = .30$, $p < .01$) ve saldırgan davranış ($r = .27$, $p < .01$). Bu sonuç, kurallara daha esnek ya da şüpheci yaklaşan bireylerin daha fazla güvensiz davranış sergilediğini ortaya koymaktadır (Serin vd., 2018). Diğer yol kullanıcılarına yönelik tutumlar ise

yayalarla (r = .28, $p < .01$) ve sürücülerle ilişkili risk algıları ($r = .48$, $p < .01$) ve olumlu davranışlarla ($r = .26$, $p < .01$) pozitif yönde ilişkili bulunmuştur. Özellikle, sürücülerle ilişkili risk algısı olumlu yaya davranışları ile pozitif yönde ilişkili bulunmuştur ($r = .21$, $p < .01$). Bu sonuç, sürücülerden kaynaklanan tehlikeleri daha yüksek algılayan bireylerin daha uyumlu davranışlar sergileyebileceğini, çünkü riskin farkında olan yayaların trafik ortamında daha dikkatli ve tepkisel davrandıklarını göstermektedir (Yu vd., 2020). PRSS-P'nin üç risk boyutu (yayalarla, sürücülerle ve altyapıyla risk algısı) birbirleriyle güçlü şekilde ilişkili bulunmuştur (örneğin, yayalarla ile sürücülerle ilişkili risk algısı $r = .72$, $p < .01$), bu da farklı alanlarda genel bir tehlike duyarlılığına işaret etmektedir.

3.3. Düzenleyici Analizleri Bulguları

Düzenleyici analizlerinde, risk algısı ile yaya davranışları arasındaki ilişkilerin tutumlara bağlı olarak farklılaşıp farklılaşmadığı incelenmiştir. Toplam 24 model test edilmiş ve bunların 11'inin istatistiksel olarak anlamlı olduğu bulunmuştur.

3.3.1. Risk Algısı ve İhlaller Arasındaki İlişkide Tutumların Rolünü İnceleyen Modeller

Analizler, ihlallerin özellikle trafik kurallarına yönelik tutumlar üzerinden şekillendiğini göstermiştir. Yayalarla ilişkili risk algısı, kural şüpheciliği düşük bireylerde ihlallerle bağlantısızken; şüphecilik arttığında yüksek risk algısı daha fazla ihlalle ilişkilendirilmiştir. Benzer bir desen, altyapı risk algısı için de gözlenmiştir: kuralları bağlayıcı görmeyen katılımcılar, altyapı eksikliklerini gerekçe göstererek daha fazla ihlal sergilemiştir. Bu bulgular, ihlallerin her zaman basit kural ihlali değil, bazen "uyumsal ihlaller" olduğunu göstermektedir. Katılımcılar, sistemsel yetersizlikleri veya kuralların bağlama uygun olmamasını risk algısıyla birlikte değerlendirerek kuralsızlığı meşrulaştırabilmektedir (Peltzman, 1975; Adams, 1985).

3.3.2. Risk Algısı ve Dalgınlıklar Arasındaki İlişkide Tutumların Rolünü İnceleyen Modeller

Dalgınlıklar, risk algısı ve tutumların etkileşiminde en karmaşık sonuçları ortaya koymuştur. Yayalarla ilişkili risk algısı, diğer yol kullanıcılarına yönelik tutumlarla

etkileştiğinde farklı sonuçlar vermiştir: Eleştirel bakış açısına sahip bireylerde yüksek risk algısı daha fazla dalgınlıkla ilişkilendirilirken, daha güvene dayalı tutumlarda daha az dalgınlık rapor edilmiştir. Bu durum, yüksek risk algısının bazı bireylerde bilişsel yükü artırarak dikkatsizliğe yol açabileceğini, diğerlerinde ise dikkat artışı sağlayabileceğini göstermektedir (Schwebel et al., 2012). Benzer şekilde, sürücülerle ilişkili risk algısı da hem diğer yol kullanıcılarına hem de kurallara yönelik tutumlarla etkileşmiştir. Eleştirel tutuma sahip bireylerde yüksek sürücü risk algısı daha az dalgınlıkla sonuçlanmış, bu koruyucu etki güvene dayalı tutumlarda zayıflamıştır. Ayrıca, kurallara şüpheyle yaklaşan bireylerde yüksek sürücü risk algısı yine dalgınlıkları azaltıcı rol oynamıştır. Altyapıyla ilişkili risk algısı ise yalnızca yüksek kural şüpheciliği altında daha fazla dalgınlıkla bağlantılı bulunmuştur. Bu karmaşık desenler, dalgınlıkların sadece bireysel dikkatsizlik değil, aynı zamanda bilişsel yük, sosyal değerlendirmeler ve bağlamsal koşulların birleşimi sonucu ortaya çıktığını göstermektedir.

3.3.3. Risk Algısı ve Saldırgan Davranışlar Arasındaki İlişkide Tutumların Rolünü İnceleyen Modeller

Saldırgan davranışlara dair sonuçlar seçici olmuştur. Sürücülerle ilişkili risk algısı ile diğer yol kullanıcılarına yönelik tutumların etkileşiminde yalnızca küçük bir alt grup (yaklaşık %4) anlamlı bir sonuç vermiştir: diğer yol kullanıcılarına yüksek derecede olumsuz bakan bireylerde risk algısı arttıkça saldırganlık artmıştır. Genel örneklemde bu ilişki kaybolmuştur. Daha belirgin bir etkileşim altyapıyla ilişkili risk algısı ve kurallara yönelik tutumlarda görülmüştür. Kurallara şüpheyle yaklaşan bireylerde yüksek altyapıyla ilişkili risk algısı daha fazla saldırgan davranışla ilişkilendirilmiştir. Bu bulgu, saldırgan davranışların yalnızca bireysel öfke değil, aynı zamanda sistemsel yetersizliklere verilen bir tepki olduğunu göstermektedir (Bayomi et al., 2022). Katılımcılar, yetersiz altyapıyı ve adil olmayan trafik koşullarını saldırgan davranış için bir gerekçe olarak kullanabilmektedir.

3.3.4. Risk Algısı ve Olumlu Davranışlar Arasındaki İlişkide Tutumların Rolünü İnceleyen Modeller

Olumlu davranışlarda risk algısı ile tutumların etkileşimi daha yapıcı sonuçlar doğurmuştur. Yayalarla ilişkili risk algısı, diğer yol kullanıcılarına güvenen

bireylerde daha fazla olumlu davranışla ilişkilendirilmiştir. Ancak eleştirel tutumlarda bu etki kaybolmuş veya tersine dönmüştür (Pelé et al., 2017; Zhao et al., 2024).

Sürücülerle ilişkili risk algısı da benzer biçimde, eleştirel tutum düzeyi düşük veya orta seviyedeyken daha fazla olumlu davranışa yol açmıştır. Ancak yüksek eleştirellikte bu ilişki kaybolmuştur. Altyapıyla ilişkili risk algısı için ise çapraz bir etkileşim bulunmuştur: düşük/orta eleştirellikte yüksek risk algısı daha fazla olumlu davranışla bağlantılı iken, yüksek eleştirellikte aynı risk algısı daha az olumlu davranışla sonuçlanmıştır (Öztürk & Farrelly, 2025; Zafri et al., 2022). Bu bulgular, olumlu davranışların yalnızca risk farkındalığından değil, aynı zamanda sosyal güven ve karşılıklılık inancından beslendiğini göstermektedir.

3.3.5. Düzenleyici Modelleri ile İlgili Değerlendirme

Sonuçlar, risk algısının tek başına davranışları açıklamak için yeterli olmadığını, tutumların kritik bir düzenleyici rol oynadığını göstermektedir. İhlaller, algılanan riskin kurallara yönelik şüpheyle birleştiğinde "uyumsal" hale geldiğini; dalgınlıklar, bilişsel yük ve sosyal değerlendirmelerle şekillendiğini; saldırgan davranışların, özellikle altyapı eksikliklerine karşı hayal kırıklığı ve sistem başarısızlığının dışavurumu olduğunu ortaya koymuştur. Olumlu davranışlarda ise güven ve işbirliği inancı belirleyici olmuş, risk algısı ancak bu sosyal zeminle birleştiğinde prososyal sonuçlar doğurmuştur. Bu bulgular, yaya güvenliğini artırmak için yalnızca altyapısal önlemlerin değil, aynı zamanda tutumları hedefleyen ve güven ortamı sağlayan müdahalelerin gerekliliğini vurgulamaktadır.

3.4.Tartışma ve Genel Sonuç

Çalışma, PRSS-P'nin üç faktörlü bir yapıya sahip olduğunu ortaya koymuştur: a) yayalar, b) sürücüler ve c) altyapı ile ilgili risk algısı. Sürücülerle ilgili risklerin en yüksek algılanan tehdit boyutu olması, motorlu taşıt kullanıcılarının yaya ortamlarında en önemli tehlike kaynağı olarak algılandığını göstermektedir. Ayrıca, PRSS-P'nin yaya kaynaklı riskleri (örn. dikkatsizlik, kural ihlali) ölçülebilir bir boyut

olarak tanımlaması önemlidir, çünkü mevcut araçlar ve kamusal söylem bu tür riskleri sıklıkla göz ardı etmektedir. Altyapı ile ilgili riskler ise diğer risk türlerine göre daha az acil tehlike olarak algılanmıştır.

Korelasyon analizleri, yaşın ihlal davranışlarıyla negatif ilişkisini ve eğitim düzeyinin davranışsal paternlerle karmaşık ilişkilerini ortaya koymuştur. Davranışsal alt ölçekler arasında güvenli olmayan davranışların kümelenme eğilimi gözlenmiştir (Reason vd., 1990). Tutumlar, davranışlar üzerinde güçlü etkilere sahiptir; trafik kurallarına yönelik esnek tutumlar daha fazla ihlalle ilişkilendirilirken, diğer yol kullanıcılarına yönelik eleştirel tutumlar daha yüksek risk algısı (yaya ve sürücü ile ilgili) ve olumlu davranışlarla ilişkilidir. Bu durum, bireylerin sosyal-bilişsel çerçevede davranış oluşturmada tutumların merkezi rolünü öneren kuramı pekiştirir (Planlı Davranış Teorisi; Ajzen, 1991) ve bulgular da bunu destekler niteliktedir (Dinh vd., 2020; Useche vd., 2022).

Son olarak, PRSS-P'nin üç boyutu da birbiriyle güçlü bir şekilde ilişkilidir, bu da tehlikelere karşı genel bir duyarlılığa işaret etmektedir.

Düzenleyici analizleri, risk algısı ile yaya davranışları arasındaki ilişkinin, bireylerin tutumlarına bağlı olarak değiştiğini açıkça göstermiştir. Kurallara yönelik şüphecilik ve diğer yol kullanıcılarına yönelik eleştirel bakış açısı, ihlaller ve dalgınlıklar gibi uyumsuz sonuçları artırırken; daha az eleştirel, işbirlikçi yönelimler olumlu davranışları teşvik etmiştir. Bu sonuçlar, durumsal ve altyapısal baskıların kural uyumunu bastırarak, bilinçli karar vermeden çok sezgisel karar verme süreçlerini tetikleyebileceğini düşündürmektedir ve Prototip İsteklilik Modeli bu durumu destekler niteliktedir (Gibbons vd., 1998; Gerrard vd., 2008).

Öte yandan, kurallara şüpheyle yaklaşan yayalar için, algılanan riskler kural ihlallerini meşrulaştırabilir ve bu bulgu Peltzman'ın Risk Telafisi Teorisi ile uygumludur (Peltzman, 1975). Öte yandan, diğer yol kullanıcılarına güvenen bireylerde, algılanan risk olumlu davranışları teşvik edebilir (Zhao vd., 2024). Bu bulgular, yaya güvenliğini artırmaya yönelik müdahale programları ve kentsel planlama açısından doğrudan uygulanabilir çıkarımlar sunmaktadır (Hou vd., 2025; de Souza vd., 2024).

3.5. Sınırlılıklar ve Gelecek Çalışma Önerileri

Çalışmanın bazı metodolojik sınırlılıkları bulunmaktadır. Veri toplama öz bildirimlere dayanmakta olup, sosyal beğenirlik yanlılığına açık olabilir (Paulhus, 1991). Mevcut çalışma, PRSS-P'nin faktöriyel yapısını açıklayıcı faktör analizi (EFA) ile kurmuş olsa da bağımsız bir örneklem üzerinde doğrulayıcı faktör analizi (CFA) yapılmamış olması bir sınırlılıktır (Worthington & Whittaker, 2006). Ayrıca, nitel bir takip çalışmasının eksikliği ve çevrim içi örneklemin temsiliyet sınırlılıkları da dikkate alınmalıdır (Yıldırım & Şimşek, 2021).

Buna karşın, çalışma önemli katkılar sunmaktadır. PRSS-P, sürücü, yaya ve altyapı risklerini kapsayan çok boyutlu bir araç olarak literatüre kazandırılmış; risk algısı ile tutum-davranış etkileşiminin incelenmesine zemin sağlamıştır. Teorik olarak ise risk algısının, tutum ve davranışları birbirine bağlayan bağlamsal ve psikolojik bir unsur olduğunu vurgulamakta; Planlı Davranış Teorisi (Ajzen, 1991) ve Prototip İsteklilik Modeli (Gibbons vd., 1998) gibi sosyal-bilişsel çerçevelerle uyum göstermektedir.

Gelecekteki araştırmalar, PRSS-P'nin farklı demografik ve kültürel bağlamlardaki uygulanabilirliğini ve kültürlerarası geçerliliğini incelemelidir. Boylamsal çalışmalar, risk algılarının zaman içinde ve trafik ortamındaki değişikliklere yanıt olarak nasıl geliştiğini araştırabilir. Ayrıca, PRSS-P'yi davranışsal gözlem yöntemleriyle birleştirmek, algılanan risklerin fiili yaya davranışlarına nasıl dönüştüğü konusunda daha kapsamlı bir anlayış sağlayacaktır.

Sonuç olarak, bu tez, risk algısını çevresel gerçeklikler, tutumsal yönelimler ve gözlemlenebilir davranışlar arasında köprü kuran merkezi bir psikolojik yapı olarak konumlandırmakta ve yaya güvenliğinin anlaşılmasında kritik bir rol oynadığını ortaya koymaktadır. Bu teorik konumlandırma hem araştırma hem de pratik uygulamalar için yeni yollar açmakta; yaya güvenliğini artırmayı amaçlayan müdahalelerin sadece kural uyumu ve altyapıyı değil, aynı zamanda yayaların trafik ortamını yorumladıkları tutumsal ve algısal filtreleri de hedeflemesinin faydalı olabileceğini düşündürmektedir.

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TEZİN TÜRÜ / DEGREE: **Yüksek Lisans** / Master ☒ **Doktora** / PhD ☐

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