Preventing the (alcoholic) abuse on shared e-scooters: a Virtual Reality study

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Abstract

The sharing economy has received much attention in recent years of which shared moped e-scooters are an important, largely growing part. Accordingly with its growth, the growth in accidents spiked, often because of alcoholic abuse. This study combined personal vulnerability and processing fluency to find a proper prevention method for alcoholic abuse of shared moped e-scooters. Current prevention methods in literature are marketing campaigns designed to prevent drinking and driving *before* intoxication. This study creates an understanding of how accidents can be prevented *after* intoxication has taken place by influencing an intoxicated individuals' maladaptive decision making. Maladaptive decision making is influenced by a stimulus that explains an individual's personal vulnerability to a health threatening activity, to be processed fluently or disfluently. A conceptual framework was tested through a Virtual Reality experiment and a survey, designed to answer the research question; How can the intoxicated use of shared moped e-scooters be prevented by a shared e-scooter company using the perceptual fluency of a stimulus? Results showed that conceptual fluency is affected by a perceptually fluent notification design, but intention to engage in risky behaviour was not affected by any construct. This study contributes to an understanding how conceptual fluency can be used to prevent drinking and driving. Furthermore, it aids shared mobility companies by establishing a target group which should be prevented from driving while intoxicated, but further research should study how this group should be prevented, incorporating the finding that a perceptually fluent notification's design significantly increases conceptual fluency.

Key areas: shared economy, intoxication, processing fluency, Virtual Reality

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1. Introduction

Sanasi et al. (2020) call the sharing economy the sharing revolution, implicating its importance. The 'sharing economy' is mostly used as an umbrella term which Curtis and Lehner (2019) explain by saying that it covers "a variety of behaviours and business models that cannot be narrowed down to one specific definition" (p.3). The definition as delineated by Schlagwein et al. (2020) is used in this current study, where the sharing economy "is an IT-facilitated peer-to-peer model for commercial or non-commercial sharing underutilized goods or service capacity through an intermediary without transfer of ownership" (p.827). Shared mobility services are the component of the "sharing economy" that includes (sustainable) transportation. The shared use of different types of vehicles is known as shared mobility (Shaheen et al., 2015) and has become more and more popular over the last few years and is a growing sector of the shared economy. Moped e-scooter sharing is a recent variation on this shared mobility which has started to grow since 2015 (Shaheen et al., 2016). The potential for shared moped e-scooters is high (Rose et al., 2020), since they are convenient for traffic congestion, they are inexpensive, and easy to use. To use the shared moped e-scooter an application must be downloaded to a smartphone, through which a moped e-scooter can be rented. This can be done in two ways only: 1) by making a reservation for a scooter beforehand, or 2) by scanning the Quick Response (QR) code of a scooter. Afterwards, the shared moped e-scooter is left at the rider's destination.

1.1. Practical need

The growth of the availability of moped e-scooter sharing can be seen in the total market which already consists of 77.1 million users and is expected to reach 134.70 million users by 2027 (Statista, n.d.). However, moped e-scooter accidents also had a spike in numerous countries (Aizpuru et al., 2019; Vasara et al., 2022). For Great Britain, e-scooter accidents rose by 178,26% from 2020 to 2021 (Attwood, n.d.). Blomberg et al. (2019) found that 37% of moped e-scooters accidents involve alcohol or drug use. Since mostly well-educated and young populations prefer the scooter sharing devices (Alarçin & Kirçova, 2020), and that also being the population group that has high numbers of alcohol consumption (Greening & Stoppelbein, 2000) it is beneficial to analyse methods that prevent e-scooter accidents involving alcohol use for this group, as that would benefit all traffic around the drivers, the drivers themselves as for young drivers (age <21) the relative risk for an accident is greater at all blood alcohol levels (Moskowitz & Fiorentino, 2000), and moreover for the sharing scooter organizations. Additionally, brain injuries could be decreased by preventing driving while intoxicated (Suominen et al., 2022).

Despite the increased market for shared moped e-scooters, the regulations and policies by companies in that market, the shared mobility companies, are lacking. The shared mobility company Felyx only states a strict prohibition regarding alcohol and drugs that influence driving skills but say nothing about a fine or any other consequence in their terms and conditions (*FELYX ALGEMENE VOORWAARDEN*, n.d.). The only regulation found for shared mobility company *GO Sharing* are fines for drivers who drove while intoxicated or who did not possess a driver's license ("DPG Media Privacy Gate," 2022). This fine is however given after the felony has been committed, not preventing any accidents. This should however be highly necessary since, e.g., in the United States 32 people die in general drunk driving crashes every day, which concludes in one death every 45 minutes (*Drunk Driving | NHTSA*, n.d.). The shared mobility companies thus show a need for guidance in establishing a method to prevent these accidents. Existing research on preventing drinking and driving crashes, however, offers little guidance.

1.2. Theoretical need

This study lies in an intersection of different literature streams, which is why this study focusses on gaps in three literature streams: decision-making, prevention, and conceptual fluency.

First, traditional decision-making has been largely studied in many areas such as risky decision-making (Birnbaum, 2008) and personality traits in decision-making (Davis et al., 2007), but intoxicated decision-making has not yet been study. To understand how decision-making is different when an individual is intoxicated has however been called for (Hatz, 2022; Obst et al., 2018). This study thus adds to the literature of decision-making by adding a new domain to it. Moreover, decision-making and intoxicated risk-taking have been combined in multiple areas, such as in sexual risk-taking (e.g., Fromme et al., 1999; Stoner et al., 2008), but not yet in business literature. It is however crucial for businesses to be offered knowledge in how intoxicated decision-making can be influenced to change maladaptive behaviour towards risk-taking.

Second, prevention literature focuses on preventing drinking and driving prior to alcohol consumption (Greening & Stoppelbein; McCormick & Ureda, 1995), but not after alcohol consumption. Intoxication can result in different decisions than non-intoxicated decisions

(Hatz, 2022; Obst et al.,2018) which is especially risky in the drinking and driving area. Literature therefore echoes that an alcohol-related policy could be an improvement (MacDonald et al., 1995), especially in the sharing economy, which has not yet been studied. The Protection Motivation Theory will be used to fill this gap, which has already been applied to various health and risk behaviours such as smoking (Thrul et al., 2013; Yan et al., 2014), condom use (Boer & Tshilidzi Mashamba, 2007), and vaccination (Williams et al., 2022), but only the research by Scott (2015) tried to underpin the Protection Motivation Theory to driving while intoxicated. No research yet combined this with the sharing economy.

Third, the existing studies have not examined how factors can be utilized to prevent drinking and driving. An example of a factor that can prevent drinking and driving is a notification, which can be considered as a stimulus. The sensory system detects this stimulus and employs sensory processing to interpret it (Abraham et al., 2015). When a stimulus is easily processed, it has a high perceptual fluency (Reber et al., 2004). According to the theory of repetition, a stimulus that has a high perceptual fluency is perceived as true because it gives individuals a sense of familiarity and truthfulness (Silvia et al., 2016). Over time, perceptual fluency contributes to processing fluency, making it easier for individuals to process stimuli they have encountered before (Scholl et al., 2014) and understanding the stimulus, called conceptual processing (Reber et al., 2004). How conceptual fluency can be used to influence maladaptive intoxicated decision making has not yet been studied. Concluding, there thus is a theoretical need for empirically assessing antecedents and outcomes of conceptual fluency to develop effective strategies for preventing alcohol-related misuse of shared moped e-scooters.

1.3. Approach

To address the gaps, the present study sets out to investigate whether a shared mobility company can prevent driving while intoxicated. This study thus aims to answer the following research question: *How can the intoxicated use of shared moped e-scooters be prevented by a shared e-scooter company using the perceptual fluency of a stimulus?*

To reach this aim, this study uses a notification’s design as a prevention method. The perceptual fluency of a notification’s design (i.e., the ease with which stimuli such as visual cues can be recognized (Reber et al., 2004)), the conceptual fluency of that notification (i.e., ease with which individuals can understand and process information at the conceptual level (Reber et al., 2004)), and the level of a person’s personal vulnerability (i.e., how an individual perceive themselves to be vulnerable to a variety of risks (Svenson et al., 1985)) to a risk will be analysed regarding their effect on the intention to engage in risky behaviour. The risky behaviour is to drive while intoxicated. The antecedents of engaging in the risky behaviour indicate that personal vulnerability is a crucial element in taking such a risky decision. A notification's design and its easiness of processing try to strengthen the degree an individual feels personally vulnerable to the risk of driving while intoxicated for this study, while including the personality trait sensation seeking. The distinction to drive while intoxicated or not can respectively be labelled as a maladaptive or alternative response to driving while intoxicated as delineated by Greening and Stoppelbein (2000) and the Protection Motivation Theory by Ravert et al. (2009). Greening and Stoppelbein (2000) concluded that the likelihood of the maladaptive response decreases if the risks are perceived to be severe and if one perceives he or she is personally vulnerable to the risks of the response. To increase the awareness of an individual's personal vulnerability this study provides an easy to process notification and analyses whether this aids in intervening in maladaptive decision-making.

The study will be conducted with the help of a lab experiment, using Virtual Reality (VR). VR provides a vivid first-person experience in a three-dimensional environment while blocking out the physical world (Bailey & Bailenson, 2017). For this study, participants will be shown a simulation in VR whereby the participant will be immersed in the point of view of an intoxicated individual trying to get home from a social setting where intoxication took place. The individual is directed towards a shared moped e-scooter, and when the individual opens the application which is needed to rent the shared moped e-scooter, they will be interrupted by a notification, after which a decision will have to be made regarding the behaviour they will engage in. The participant will be asked to verbally convey their decision and after this, a survey is conducted.

1.4. Contributions

In conclusion, this study contributes to advancing academic knowledge in multiple research areas and finding solutions for a practical problem.

To start with, this study advances academic knowledge in multiple research areas because it lies in an intersection of multiple literature streams. First, it sheds new light on the traditional decision-making research adding to a domain little is known about, namely intoxicated decision-making. Only very little research has been done on intoxicated decision-making due to ethical considerations of studying intoxicated individuals (Davis, 2020). By studying individuals that are simulated to be intoxicated, this research adds to literature by gaining knowledge on intoxicated decision making. Secondly, by studying individuals that are simulated to be intoxicated, this research adds knowledge to literature about overall processing fluency in an intoxicated context and how this can be used as a prevention method. Prevention methods now focus on preventing drinking and driving before intoxicated, but with the knowledge of this study, literature can more effectively target those who are vulnerable to health-threatening behaviour after intoxication has taken place. Thirdly, this study will also add to business literature by combining risk-taking and decision-making by adopting from the prevention literature. Risk-taking and decision-making have been combined (Birnbaum, 2008), but not with the use of prevention methods. Studying the effectiveness of a fluent stimulus as a prevention method thus adds to business literature giving businesses more insights in how they can effectively use fluent stimuli as prevention methods.

Lastly, from a practical perspective, existing research unfortunately does not offer shared mobility companies any guidance for preventing accidents. Only prevention literature has focused on promoting adaptive alternative health responses to drinking and driving prior to consuming alcohol, such as choosing a designated driver (Ministerie van Infrastructuur en Waterstaat, 2022) but no research was done on effectively designing a prevention for drinking and driving after intoxication has taken place. With this study, shared mobility companies now know that a perceptually fluent stimulus is a proper prevention method. Additionally, a target group is established so shared mobility companies know who to target to prevent the alcoholic abuse of shared moped e-scooters with a perceptually fluent notification's design. Shared mobility companies can thus use the results of this study to incorporate a prevention method for alcoholic accidents.

1.5. Outline

The overall structure of the thesis takes the form of 6 chapters, starting with chapter 2 where all theoretical dimensions of this study are delineated which is followed by chapter three where hypothesis are developed. The fourth chapter is concerned with the methodology for this study. The fifth chapter will provide the results of the study which will be discussed and concluded to answer the research question in chapter six. This will be followed by both theoretical and managerial implications. Lastly, possible research limitations will be discussed and recommendations for further research is given.

2. Literature review

2.1. Sharing economy

Contrary to the traditional market model, which is built on ownership (Puschmann & Alt, 2016), the sharing economy has received much attention in recent years. The sharing economy is a socio-economic model where goods or services are shared without a transfer of ownership (Schlagwein et al., 2020). The sharing concept is not new for businesses, where machinery was for example shared already, but it is new in the business-to-consumer domain. The access-based consumption theory explains this sharing phenomenon to be shifted to the consumer domain, by suggesting that consumers acquire value from obtaining and using products instead of owning them (Belk, 2014). The sharing economy phenomenon in the business-to-consumer domain brings opportunities for (new) businesses, including businesses with a shared mobility perspective. Moped e-scooter sharing is an example of shared mobility. In the shared mobility construction, both businesses and consumers rely on a combination of an electronic service that uses a smartphone app (Puschmann & Alt, 2016) which is a key feature of the sharing-based activity (Nabradi & Tünde, 2020). Also, for shared moped e-scooters, businesses allow consumers to rent a shared moped e-scooter directly through a smartphone application (Schelte et al., 2021). Moped-style scooter sharing is sharing a scooter with a seated-design, which is electrically powered, and which are designed to travel on public roadways and therefore require a verification of a driver's license (Aguilera-García et al., 2021; Shaheen & Cohen, 2019). When an individual possesses a driver's license, they can decide to use the shared moped e-scooter.

2.2. Decision-making

Decision-making is the process of making choices among competing courses of action (Choo, 1996). Edwards (1954) describes decision-making that when two states are given into which an individual can put themselves, A and B, the individual chooses A in preference to B (or vice versa). How an individual arrives at that outcome is explained by several models. Furby and Beyth-Marom (1992) lay out the process of decision-making in five steps. First, all possible options are considered. Secondly, the possible consequences that may follow are considered, and thirdly the desired outcome is concluded. The fourth step is where risk comes in, as in this step the likelihood of consequences including the possible losses, and the risks, are considered. In this fourth step of the process, risk perception is an important element of the decision-making situation. Finally, the optimal choice is concluded, and the decision is made. This model from Furby and Beyth-Marom (1992) aligns with the rational decision-making model as described by Simon (1979). In the rational decision-making process, a sequence is also followed to arrive at a certain decision. Both models place a strong emphasize on thorough analysis and optimization. But not all decision-making models rely on this. For example, the prospect theory by Kai-Ineman and Tversky (1979) views decision-making under risk and uncertainty as an entire process rather than as a step-by-step procedure. Where Furby and Beyth-Marom (1992) mainly look at risk at the fourth step in the process, risk underlies the entire decision-making process in the prospect theory. The prospect theory examines the psychological aspects that underlie decision-making under risk and uncertainty by giving more weight to individual subjective benefits and losses. One psychological factor that both studies commonly describe, is a certain decision rule which depends on personal perceptions indicates the optimal choice for the individual. For driving while intoxicated these perceptions could for example be personal experience (Farrow & Brissing, 1990), being influenced by marketing campaigns (Cismaru et al., 2009), or other reasons.

2.3. Prevention

A marketing campaign is often a national education health campaign designed to prevent driving while intoxicated and reducing its rate (Greening & Stoppelbein; McCormick & Ureda, 1995). Multiple theories lay a base for explaining individual's cognitive processes and reactions to perceived threats. A theory often used for designing marketing campaigns aimed at preventing drinking and driving is the Protection Motivation Theory (PMT) by Rogers (1975). The PMT aims to increase an individual's protection motivation so that the individual chooses an alternative response when in a health-threatening situation. This is therefore a helpful framework in preventing drinking and driving. Another framework is the theory of planned behaviour (TPB) by Ajzen (1991). According to both theories, intentions determine actual behaviour. TPB suggests intentions result from subjective norms, where the PMT states intentions result from motivation. Moreover, PMT highlights threat severity and vulnerability as factors that can influence certain behaviours, where TPB does not address those. Vulnerability is however a factor that can aid in the prevention of driving while intoxicated (Greening & Stoppelbein), which is why this study will use the PMT instead of TPB. Prevention in combination with PMT has been studied, also incorporating it in marketing campaigns (Cismaru et al., 2009; Greening & Stoppelbein, 2000). However, prevention in combination with PMT has not yet been studied after intoxication has taken place which is why this study turns to general literature on decision-making and prevention.

When an individual's risk perception is high in the fourth stage of the decision-making process as described by Furby and Beyth-Marom (1992), the more likely the individual is prevented to engage in risky behaviour. This is explained by the PMT; when an individual feels personally vulnerable, it enhances an individual's motivation to protect themselves regarding this health threatening activity (Rogers, 1983). Therefore, to prevent an individual to behave in risky behaviour, this is the stage where additional information should be given, since there is greater engagement with information in responding behaviours than in initiating behaviours (Gauld et al., 2016). Shared moped e-scooters are rented on a mobile device as stated earlier, which thus is the location where additional information must be given. An event on a mobile screen is called a stimulus (Courtemanche et al., 2019) and, in this study, a notification is used as such stimulus.

2.4. Stimulus

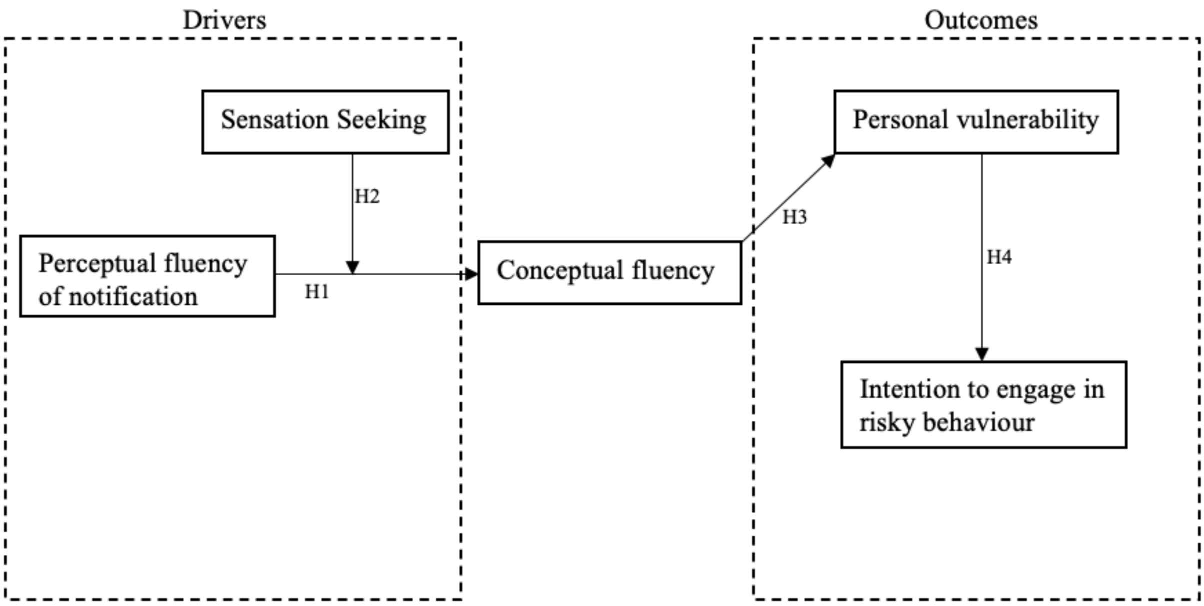
The stimulus is recognized through the sensory system. The sensory system includes many aspects, such as the auditory system (sense of hearing), the tactile system (the sense of touch), and the visual systems (the sense of sight). A combination of all these systems is called the sensory system, and how all these separate systems together receive, analyse, and form a respond to signals received from its environment is called sensory processing (Abraham et al., 2015). Some stimuli are processed better, faster, or deeper than others. When this happens, they have a better chance of producing or influencing a behavioural response (Lamme, 2003). Vision is a dominant sense of the sensory system (Krishna, 2012) and visual attention of an attribute helps in the process of selecting incoming stimuli. The visual attention of a stimulus makes sure that the stimulus keeps the attention of the individual and assures that the stimulus is not forgotten. When this happens, the stimulus is salient (Lamme, 2003). A salient stimulus is often recognized regardless of an individual's current goals and intentions (Chang & Egeth, 2020) and means that it is processed more efficiently than non-salient stimulus (Lamme, 2003). This processing of such a visual stimulus is called perceptual fluency and is part of processing fluency. Schwarz (2004) laid the groundwork for most of the current theoretical understanding of the processing fluency construct.

2.5. Processing fluency

The processing of stimuli or information can be described by a range of spectrums that are non-specific to its content, such as the speed of stimulus processing. This leads to a common experience of processing ease or fluency called processing fluency (Reber et al., 2004). Thus, processing fluency is a perception of ease associated with perceiving, encoding, or retrieving new information and stimuli (Ball et al., 2014). Processing fluency is important because 1) it affects consumer decisions and judgments of truth, and 2) it is easily manipulated. Judgments of truth in combination with processing fluency can be explained by repetition. When a stimulus is easier processed it is considered to be true (Hansen et al., 2008). When an individual encounters a statement that has been previously encountered already, an individual can process the statement more efficiently, meaning that the statement is thus processed more fluently. Repetition elicits preference for the stimuli because of the feeling of familiarity, and familiarity holds illusions of truth (Silvia et al., 2016). Thus, a high processing fluency indicates a truth judgment of the stimulus (Scholl et al., 2014). Marketing campaigns also support and adopt this theory; the persuasive effect processing fluency has on risk communication (Bullock et al., 2019) and health communication (Bullock & Shulman, 2021) have been studied and both conclude that when a stimulus is fluently processed, it is considered to be true. A stimulus can be manipulated in order for it to be processed more fluently. This can be done by manipulating the conceptual fluency and perceptual fluency of the stimulus, which together form processing fluency (Reber et al., 2004). Conceptual fluency and perceptual fluency will be delineated in the following sections.

Figure 1

Conceptual model



3. Hypothesis development

Conceptual fluency

Processing on the conceptual level refers to the ease with which individuals can understand and process information at the conceptual level (Reber et al., 2004). The processing of information on a conceptual level is done through the semantic knowledge structures, which activates meaning to a stimulus (Topolinski & Strack, 2009). When an individual encounters a stimulus, their cognitive knowledge of any word they are familiar with arises. This cognitive input is subsequently used to attach a meaning to the stimulus. Familiarity thus plays an important role in conceptual fluency. Hence, to increase conceptual fluency of a stimulus, semantically related concepts of that stimulus can be presented (Alter & Oppenheimer, 2009). Drinking and driving is an example of a pair of words that are semantically related since they are commonly linked in discussions about the risks, legal consequences, and social impact of drinking and driving (*Drunk Driving | NHTSA*, n.d.). For warning messages regarding drinking and driving it is of importance that conceptual fluency is high (Kuligowski & Dootson, 2018) because this leads to a more effortless overall processing (Reber et al., 2004) and to the processing of the meaning of the message (Gao et al., 2019).

3.1. Drivers

3.1.1. Perceptual fluency of notification design

Notifications are a core feature of current mobile phones. In the form of visual pop-ups or auditory cues, notifications are an effective way of proactively helping individuals maintain information awareness (Iqbal & Horvitz, 2010) additional to the activity currently undertaken (McCrickard & Chewar, 2003). Depending on the importance of the notification, they can be ignored, or immediate action can be taken. Studies (e.g., Kushlev et al., 2016; Yoon, 2014) found that the core problem is that individuals tend to stop their activities in the current task they are engaging in to check the notification instead. For this study, that finding is meaningful considering it indicates that full attention is put into absorbing the notification. From the study by Pratama et al. (2021) can be concluded that a pop-up notification is a proper prevention method for undertaking health-threatening activities. Participants in the studies of Iqbal and Horvitz (2010) and Mark et al. (2012) appreciated the awareness that notifications provide, which supports that a notification is an accepted method to influence an individual's awareness.

Notifications are not universal and thus differ in design. Namely, a notification's design can include auditory aspects, visual aspects, be tactile in nature, or consist of a combination of these (Tarasewich et al., 2004). As visual aspects of a stimuli aid in increasing perceptual fluency, this study looks at how different visual aspects of a notification's design result in a different effect the notification's design. According to van Gerven et al. (2013), when stimuli are clear, well-defined, and visually salient, it increases attentional processes. This is because visually salient stimuli capture an individual's visual attention (Moore, 2006). When visual attention increases, the stimuli are processed better during sensory processing (Pan et al., 2020; Schwarz et al., 2021). When stimuli are processed better during sensory processing, the perceptual fluency is high, since perceptual fluency refers to the ease with which stimuli such as visual cues can be recognized (Reber et al., 2004). It is therefore expected that different designs can have different effects whereby a visually clear notification aids in the easiness of processing of the notification and thus results in high perceptual fluency (Reber et al., 2004). When information is presented in a perceptually fluent presentation, individuals tend to process this information preferably over a disfluent presentation. When the stimulus is interpretated more readily, their meanings are easier comprehended (Lee & Labroo, 2004), because words need to be deciphered (perceptual fluency) but after that also have to be understood (conceptual fluency) (Pieger et al., 2016) to give meaning to a stimulus. Thus, an individual can only comprehend a message once the message is acquired. It is therefore expected that a perceptually fluent notification design positively influences an individual's conceptual fluency. In the context of this study, the first hypothesis is therefore formulated as:

> H1: A perceptually fluent notification design can positively influence an intoxicated individual's conceptual fluency while engaged in maladaptive decision making in the context of shared moped e-scooters.

3.1.2. Sensation seeking

Extensive research on the personality trait sensation seeking has been done by Zuckerman (1988; 2007). In this study, the definition is used where sensation seeking is a trait defined as seeking a sensation in combination with the willingness to take risks for the purpose of this sensation (Jonah et al., 2001). Sensation seeking is a biologically based personality trait (Zuckerman, 2007) but can also be influenced by social factors (Zuckerman, 1984) which influence certain behaviours and predicts a variety of risk-taking behaviours. Sensation seeking individuals are called sensation seekers, and they often engage in behaviours that increase the amount of stimulation and arousal they experience. Sensation seekers do not particularly search for risky activities, they are just more willing to take risks as a possible outcome of pertaining to an activity that arouses them (Roberti, 2004). Consequently, sensation seekers do not evaluate their behaviour as riskier (Heino et al., 1996), leading to an optimistic bias sensation seekers often have (Jonah, 1997). The optimistic bias is the feeling individuals have that makes them feel less likely to experience negative events than others (Helweg-Larsen & Shepperd, 2001). The optimistic bias has shown for various events, under which driving while intoxicated (Arnett, 2005; Sloan et al., 2017). Stephenson and Palmgreen (2001) describe the possible risks that sensation seekers take to be classified into social risks, physical risks, legal risks, and financial risks. All these risks can be linked to driving while intoxicated.

High sensation seekers are also much more likely to be intoxicated than low sensation seekers in general (Stephenson & Palmgreen, 2001) additional to sensation seekers often also taking more risks in general already (Dayan et al., 2010). Alcohol increases risk taking even more (Hong et al., 2017), indicating that sensation seeking and being intoxicated reinforces each other. Additionally, sensation seekers are often highly motivated to engage in certain behaviours (Arnett, 1994), but this motivation is driven by the desire for excitement instead of a specific outcome (Palmgreen et al., 1991). Many studies (e.g., Curran et al., 2010; Garrity & Demick, 2001; McMillen, 1992) state that sensation seekers are more likely to drive when intoxicated. However, for non-sensation seekers the earlier mentioned reinforcement also holds, those who were more likely to be intoxicated also reported more intoxicated risk-taking (Hartzler & Fromme, 2003).

Another difference for low and high sensation seekers has been found by Palmgreen et al. (1991), namely for retrieving information from a notification. In their study, high sensation seekers indicated a strong preference for notifications that were dramatic, intense, exciting, novel, and suspenseful. Furthermore, research has shown that sensation seekers may have a different style or processing information compared to non-sensation seekers (Fillmore et al., 2009). The style of processing refers to the way of processing information, where processing fluency refers to the easiness of processing information. Sensation seekers tend to process information more global, less detail-oriented, and rely more on intuitive processing rather than analytical processing. This indicates that not all available information is processed as this may be perceived as less exciting or stimulating (Lang et al., 1990). Different styles of fluency often indicate a different level of processing fluency, where a more analytical way of processing results to a lower processing fluency. Analytical processing involves consideration of additional information and can result in reconsidering an earlier choice (Benishek et al., 2015).

Overall, it is important that the notification includes clarity about what an individual should do in the situation (Kuligowski & Dootson, 2018). Stephenson and Palmgreen (2010) found a linkage between sensation seeking and differences in the desired level of stimulation from exposure to information such as notifications. When the perceptual fluency of the notification is high, the information is grasped more easily (Reber et al., 2004). Since sensation seekers process information more globally, it is expected that when visual aids implicate the meaning of a message additional to the message itself, sensation seekers intuitively decide to listen to those cues (Lang et al., 1990). It is therefore expected that sensation seeking positively moderates the effect a perceptually fluent notification's design has on an individual's conceptual fluency. A hypothesis for this study can therefore be given as:

> H2: An intoxicated individual's level of sensation seeking moderates the effect such that a perceptually fluent notification's design has a positive effect on conceptual fluency while engaged in maladaptive decision-making in the context of shared moped e-scooters.

3.2. Outcomes

There are several positive consequences of high conceptual fluency. Individuals are for example more likely to understand and retain information, but most importantly a high conceptual fluency can lead to truth judgments. Truth judgments happen more on a conceptual level than on a perceptual level, because at conceptual level the validity of what is perceptually perceived is assessed (Silvia et al., 2016). When information is presented in an easy-to-process way, overall processing is easier, and individuals are more likely to perceive information to be true and valuable (Reber et al., 2004). In this study, the information presented regards an individual's perception on their personal vulnerability.

3.2.1. Personal vulnerability

A high or low personal vulnerability means that individuals perceive themselves to be respectively more or less vulnerable than others to a variety of risks (Svenson et al., 1985). To reduce risky behaviours, the identification of personal vulnerabilities in the decision to choose the risky option can be considered an accepted indicator to direct interventional actions (Amaral et al., 2017). Cohn et al (1995) also suggest that involvement in many health-threatening activities could be reduced by increasing the perceived personal risk of the health-threatening activities. The difference between vulnerability and personal vulnerability is important because when an individual considers themselves to be less risky to risky behaviours than others, public marketing campaigns will not lead to a decrease in risky behaviour of this individual. It is only when the vulnerability reaches above a personal threshold that vulnerability can result in a change in behaviour (McKenna & Horswill, 2006). It can thus be that individuals may recognize being impaired by alcohol but still choose to drive. The presence of a variety of psychological and social factors contribute to this.

Among these factors, the Protection Motivation Theory (PMT) stands out as one psychological explanation. The PMT is a framework established by Rogers (1975) and aims to support in an understanding of the impact of fear appeals. The theory suggests that individuals are more likely to engage in protective behaviours when they perceive a threat to their health and feel that they can take action to reduce the threat. PMT also explains how individuals make decision to engage in protective behaviour in response to perceived threats (Wang et al., 2019). PMT suggests that decision-making process involves two stages described by Rogers (1975): threat appraisal and coping appraisal. Threat appraisal is where an individual assesses the threat level of a particular situation by evaluating the severity and vulnerability to the threat. For example, an individual may perceive the threat of driving while intoxicated as severe but may believe that their own risk of being involved in an accident is low. Coping appraisal suggests that an individual evaluates the effectiveness of different protective behaviours. Based on both appraisals, individuals decide to engage in protective behaviour or not. PMT thus influences decision-making and suggests that individuals are more likely to engage in protective behaviour when they perceive a threat to their health.

Particularly in the area of driving, individuals have a low estimate of their own vulnerability (McKenna & Albery, 2001) meaning that they perceive themselves to be less vulnerable than others to a variety of risks (Svenson et al., 1985). The potential for these risks is recognized, but the likelihood of being personally vulnerable to them is discounted. More broadly, adolescents have a strong belief in their invulnerability to harm, which is called a 'personal fable' as largely mentioned in the literature (Alberts et al., 2007; Elkin, 1967; Galanaki, 2012). The personal fable supports a feeling of protection for the individual and is thought to explain adolescent risk-taking (Millstein & Halpern-Felsher, 2002). The personal fable has the greatest impact at the point of decision-making and can lead to a maladaptive perception of immunity to risk, resulting in a maladaptive choice to the decision (Frankenberger, 2004). Invulnerability to harm has more largely been studied than vulnerability and is mostly studied in two components formed by Lapsley and Hill (2010) in the Adolescent Invulnerability Scale: psychological invulnerability and danger invulnerability. Danger invulnerability is most relevant to risk-taking behaviour as it leads individuals to overlook the dangers of hazardous behaviours. An example of this hazardous behaviour resulting from danger invulnerability is driving while intoxicated (Ravert et al., 2009). If the risks and personal vulnerability of drinking while intoxicated would be perceived to be severe, the likelihood of drinking and driving would decrease (Cismaru et al., 2009; Greening & Stoppelbein, 2000; Jonah, 1997) because risk vulnerability increases risk aversion (Gollier & Pratt, 1996). A study by Hoffmaster (2006) even states that "vulnerability engages our feelings as much as, *if not more than,* our reason" (p.43).

As stated earlier, notifications are designed to provide an awareness of information while an individual is undertaking risky activities (Iqbal & Horvitz, 2010) and will therefore be used as the prevention method for this study (Cohn et al., 1995). If an individual perceives themselves to be more susceptible to a threat, an alternative choice instead of a maladaptive one is often made (Conner & Norman, 2005). Therefore, the message of the notification in this study should indicate an individual's personal vulnerability so they perceive themselves more susceptible to a threat. When this message has a high conceptual fluency, the meaning is assimilated through conceptual processing and is considered as true through the fluency effects as explained earlier (Reber et al., 2004). Therefore, it is expected that for this study, an individual's personal vulnerability will be evident through a notification when conceptual fluency is high.

> H3: a high conceptual fluency increases an intoxicated individual's perception of personal vulnerability when engaging in maladaptive decision making in the context of shared moped e-scooters.

3.2.2. Intention to engage in risky behaviour

An individual can arrive at a good outcome through a bad procedure, which in this study's context would mean arriving somewhere safely after driving while intoxicated. Since driving while intoxicated needs to be prevented it is of importance that an individual chooses not to drive while intoxicated, decreasing engagement in risky behaviour. According to Labouvie and Pinsky (2001), adolescents will regard both the less risky and more risky options every time they stand in the position to make a decision. It is assumed that when at the time of a decision the correct information is present, also the correct decision will be made (Tiemeijer & voor het Regeringsbele, 2010). Providing an individual with the correct information during a decision-making process is therefore of high importance, to prevent the personal fable to predominate while making a decision.

However, decisions are impacted by being intoxicated (Hatz, 2022) resulting in that intoxicated decisions are more goal-directed and result in more hasty decisions than non-intoxicated decisions (Obst et al., 2018). Additionally, alcohol has impact on impulsivity (Hatz, 2022) resulting in more impulsive decisions. Moreover, intoxication by alcohol will increase overall risk-taking (Peacock et al., 2013) and induces maladaptive risky decision-making because of impaired evaluation of existing alternatives (Proestakis., et al., 2013). However, an increase in personal vulnerability, increases one's protection motivation and thus decreases the likelihood that someone decides to engage in risky behaviour (Rogers, 1975).

Nordfjærn and Rundmo (2009) describe a three-step decision-making process including personal vulnerability. First, the risk items of the activity need to be identified. Secondly, the risks that the activity has for others need to be assessed, and thirdly the personal vulnerability must be considered. After these three steps, the consumer's final decision will change in line with those considerations. When available information such as perception of personal vulnerability is considered after the third step of this model, an individual's decision can change from a maladaptive to an alternative choice (Glendon & Walker, 2013; Greening & Stoppelbein, 2007; Ravert et al., 2009; Thurman et al., 1993). A reason for this is perceived control; when an individual feels like they are in control of their own health and can take preventive measures, they are more motivated to engage in behaviour that reduced the health threat (Glanz et al., 2008). This motivation is explained by PMT; when an individual feels personally vulnerable, it enhances an individual's motivation to protect themselves regarding this health threatening activity (Rogers, 1983). It is thus expected that the awareness of an individual's personal vulnerability will influence the individual's decision-making regarding risky behaviour during maladaptive decision making. This leads to the following hypothesis:

> H4: the awareness of an intoxicated individual's personal vulnerability has a negative effect on the intention to engage in risky behaviour while engaged in maladaptive decision making in the context of shared moped e-scooters.

4. Methodology

4.1. Research strategy

To conceptualize concepts for this study, the topics perceptual fluency of a notification design, sensation seeking, conceptual fluency, personal vulnerability, and decision-making were studied. Different theoretical frameworks were used to hypothesize relationships between these concepts. A pre-test and manipulation check were conducted to verify whether the conditions were experienced correctly (Field, 2018). Results of the pre-test can be found in section 5.1. The final conceptual model (Figure 1) was tested with a lab experiment at a university with the help of a Virtual Reality (VR) study. VR has been increasingly used as a tool in research to investigate a wide range of phenomena.

4.2. Design

The lab experiment that was utilized for this study is a one-factor, between-subjects experimental design (Field, 2018; Hair et al., 2019). The experiment was conducted in a simulated environment.

This study consisted of two components, indicating that two types of research methods were used for data collection. The first component of the study was a VR simulation as described earlier. It was crucial to include a VR experiment because the VR simulation conveyed a perception of drunkenness to the participants which was not possible with solely another form of research such as a survey. The second component of the study was a survey. A survey was needed to measure the concepts of perceptual fluency of the notification design (level of perceptual fluency), sensation seeking (level of sensation seeking), conceptual fluency (level of conceptual fluency), personal vulnerability (level of personal vulnerability), and intention to engage in risky behaviour. Moreover, a survey was needed to measure the socio-demographics of the participants.

4.2.1. VR experiment

Virtual Reality (VR) is a medium for digital visualization as an interactive interface. VR allows to directly assess a participants reaction using immersive stimuli, meaning that the virtual environment surrounds the participant (Appendix 7.1.1.). It is important for this experiment to try to obtain the highest level of presence possible in the simulation, meaning that a participant behaves in the simulation in a similar way as participant would behave in the real reality (Jensen & Konradsen, 2018). The sense of presence can vary depending on the level of immersion felt in a virtual environment (Steuer, 1992). Also, it is important to emulate the simulation in a way that a participant perceives a level of intoxication. This will be discussed in the next section. Dietrich et al. (2019) used VR to immerse participants into environments of alcohol consumption without putting the participants at risk for the physical dangers the study could have in real life. For this study and for ethical considerations, VR is the best method to conduct this study. VR allows for a ‘learning by doing’ approach, which is shown to be an effective teaching method for illegal behaviours (Schank et al., 1999).

A 360-degree camera, the Insta360 One X, was used to record the simulation of an intoxicated individual on their way home on foot. The Insta360 One X is a 360-degree camera which can record videos in 360 degrees with audio in a high dynamic range shooting, which means the footage will be true-to-life (Insta360 ONE X - Own the Moment., n.d.). The 360-degree camera was mounted on the researcher’s head to mimic an individual’s visual view of leaving a social setting and heading home while encountering a shared moped e-scooter. Until the point where the e-scooter is encountered, both simulations were the same. After this point, the two simulations differed from each other. In the simulation, the participant was shown a mobile phone which opened the camera to scan the shared moped e-scooter’s QR code. A notification was shown, and its notification design differed for both simulations. It is of importance that the simulation tries to reach a level of perceived intoxication for the participants.

4.2.1.1. Perception of intoxication

In the real reality, alcohol intoxication is linked to the physical effects such as a slurred speech, diminished coordination, and a staggered gait (Martin et al., 2013) and moreover to a slower reaction time, difficulties in multitasking, a reduced attention span, and dulled senses (Wilson et al., 2016). This results in that additional attentional tasks such as information processing, decision-making, and judgment are most impaired by alcohol (Calhoun et al., 2004). Conceptual fluency is also complicated by intoxication. Therefore, intoxication is necessary to be simulated in the Virtual Reality scenario.

The study of von Mammen et al. (2016) tried to implement these effects alcohol has on a participant’s physique in the VR. They imitated a participant’s higher blood alcohol content with a deteriorating of senses and reaction time, a balance disorder and they darkened the colours, reduced contrast, deployed Gauss, added vignette and fisheye filters on the simulation. These filters were opted for to include in the VR simulation for the current study as well. This resulted in a VR scenario presented to the participant using the Oculus Go. This headset is a standalone headset with a head-mounted display, one controller, has integrated personal audio, can be used while both standing and sitting, and is comfortable to wear with or without glasses (The Deep Dive on Oculus Go and Oculus Quest, n.d.). In this headset, one of the two VR scenarios was presented to a participant. Both VR simulations were similar until the participant unlocked their mobile phone to start a rental session for a shared moped e-scooter. The simulation then showed a notification in the application, which differed for both simulations.

4.2.1.2. Notification's design

The presentation of the notification's content, the notification's design, for this study is based on literature. Colour is important because it highlights important information and influences an individual's decision-making. Moreover, colour enhances visual signals and reduce uncertainty at the decision-making level (Kim et al., 2021). It was found that the colour red is associated with the danger of failure in certain contexts and raises avoidance motivation (Elliot & Maier, 2012). When paired with negative contents, the colour red facilitates fluent processing according to Kim and Jang (2018). Therefore, the colour red was used for both notification designs. Furthermore, visual aids, such as icons, added to a message will increase the visual attention of a message. Also, a circular icon decreases reaction time and thus increases processing fluency (Yun & Yang, 2020). An exclamation mark often is a representation of warning (Samsudin et al., 2017). Therefore, an exclamation mark was chosen to include as icon with a circle around it and was used for both notification designs. Lastly, fonts are visual stimuli that affect the visual perception of text, including its legibility, clarity, and aesthetic appeal (Michaelidou & Hassan, 2008) and thus influence processing fluency. Fonts can be fluent or disfluent. Fluent fonts are considered as easy to process (Motyka et al., 2016). A font is considered fluent when it is black, clear, and familiar (Cacali, 2016). A disfluent font is considered italicized (Cecire, 2019) and is processed less fluently.

The two notifications thus differ in their fonts. One notification content will be displayed in a fluent, straight, font and one notifications content is displayed in a disfluent, italicized, font. Thus, both notification designs for this study will include the colour red, a visual icon, and a specific font.

4.2.2. Survey

The survey was conducted after the VR experiment. Socio-demographics were measured such as age and gender. The used device for the methodology is often an additional control variable but is not included in this study as every participant uses the same device (Vennix, 2016). Furthermore, questions regarding three concepts of the conceptual model (Figure 1) were asked. For these questions, existing well-developed scales retrained from literature were used to collect data from enough participants (Vennix, 2016). The same number of participants that participated in the VR study were utilized in the survey for analysis purposes (Vennix, 2016), which is why a survey method after the VR experiment was useful in this study. Furthermore, data from a survey can be statistically processed with a quantitative format as output (Vennix, 2016). The questions were based on a literature review of available related survey research. The questions can be found in Appendix 7.4.

4.3. Procedure

For the procedure, individuals were recruited upon the campus of a university in Nijmegen, the Netherlands, to conduct the VR experiment. Individuals were guided to a room to be taken through a consent process, and when consent is given the individual read the scenario. Participants were randomly assigned to one of the two conditions, where everything other than the manipulation is equal. With the application ‘pretty random’ a number between 0 and 61 was drawn which placed the participant in either scenario 1 (<30) or scenario 2 (^{3}30). The scenario explained that an individual is trying to get home after having visited a social setting and has reached a level of drunkenness. Once the scenario was read, the participant was administered a VR headset; the Oculus Go. It is important that the participant was standing instead of sitting down, as this is more like the real reality and increases presence as discussed earlier (Jensen & Konradsen, 2018). In both VR experiences, the subjects were asked to verbally convey their intention to engage in risky behaviour on a 7-point Likert-scale. Their answer was recorded as stated in the consent form. The audio was named with the number of the participant to keep the results anonymous. After the VR simulation, the participant was asked to answer a survey and after answering the survey the participant was allowed to leave.

4.4. Participants

As stated, a university provided for the recruitment setting for this study. This university was the Radboud University in Nijmegen, the Netherlands. Judgment sampling was used in this study, which is a non-probability sampling method that indicates that recruited individuals meet certain practical criteria such as accessibility, availability, willingness to participate, and qualities an individual has (Etikan et al., 2016). For this study, the quality is that the individual is higher educated as stated earlier. According to the central limit theorem the general rule is to use a sample size of 30 per condition (Chang et al., 2006) to secure an approximate normal distribution of the sample (Ganti & Brock, 2022). For this study there were two conditions, which resulted in a minimum of sixty participants. Finally, sixty-one participants (M_{age}= 23.18; 31 females) were recruited. Almost all participants ($N = 60$) had experience with being drunk and a mere majority ever drove an e-scooter ($N = 38$).

Having a driver’s license is a requirement for driving a shared moped e-scooter (FAQ, n.d.), therefore one should consider this to be a requirement for the participants in this experiment. However, a participant may have access to the login credentials of someone with a driver’s license or someone with a driver's license can create an account on the application on the phone from someone without a driver’s license, so that even without a driver's license a shared moped e-scooter can be rented. Therefore, the question on the driver's license was included as a control question. The same holds for age; the age from which it is allowed to drive a shared moped e-scooter is 18 (GO Sharing | FAQ, n.d.). This age-group has also been associated with a higher rate of e-scooter riding (Kazemzadeh et al., 2022) and for drivers aged between 18 years and 24 years, there is a 30-fold risk of having an accident after a few drinks. However, also for age another one's driver’s license can be used to unlock an account on a shared company application. Therefore, age was also included as a control question.

Research results from sampled data create the opportunity for this study to be generalized to a larger population (Vennix, 2016). However, the selected sample for this study will most likely affect the generalizability of the results (Vennix, 2016).

4.5. Measurement

4.5.1. Operationalizations

Concept	Definition	Subscale	Item	Source
		Manipulation check		
Perceptual **processing fluency**	Perceptual fluency refers to the ease with which stimuli such as visual cues can be recognized.	Processing fluency scale	Difficult to process Difficult to read Takes a long time to process Difficult to understand	Kostyk et al. (2021)
		Study		
Conceptual **processing fluency**	Conceptual fluency refers to the ease with which individuals can understand and process information at the conceptual level.		How easy was it to understand the meaning of the message How much effort did you spent to understand the message How clear was the meaning of the message How quickly did you get the idea from the message	Seo (2010)
Sensation seeking	Sensation seeking is a biologically based personality trait which influences certain behaviours and predicts a variety of risk-taking behaviour (Zuckerman, 2007).	Thrill and Adventure Seeking Scale	I often wish I could be a mountain climber. I sometimes like to do things that are a little frightening. I would like to take up the sport of water skiing. I would like to try surfboard riding. I would like to learn to fly an airplane. I would like to go scuba diving. I would like to try parachute jumping. I like to dive off the high board. I would like to sail a long distance in a small but sea-worthy sailing craft. I think I would enjoy the sensations of skiing very fast down a high mountain slope.	Zuckerman et al. (1978)
		Disinhibition Scale	I like wild "uninhibited" parties. I enjoy the company of real "swingers." I often like to get high (drinking liquor or smoking marijuana). I like to have new and exciting experiences and sensations even if they are a little unconventional or illegal. I like to date members of the opposite sex who are physically exciting. Keeping the drinks full is the key to a good party. A person should have considerable sexual experience before marriage. I could conceive of myself seeking pleasures around the world with the "jet set." I enjoy watching many of the "sexy" scenes in movies. I feel best after taking a couple of drinks.	

Personal vulnerability	A high or low personal vulnerability means that individuals perceive themselves to be respectively more or less vulnerable than others to a variety of risks (Svenson et al., 1985).	Danger invulnerability	Safety rules to not apply to me. Taking safety precautions is far more important for other people than it is for me. I'm unlikely to get hurt if I did a dangerous thing. Driving very fast wouldn't be very dangerous if I were driving Nothing can harm me. I could probably drink and drive without getting into an accident There are times when I think I am indestructible Special problems, like getting an illness or disease, are not likely to happen to me. The problems that happen to people my age are unlikely to happen to me. It is not necessary for me to worry about being injured or harmed. I'm unlikely to be injured in an accident. Nothing bad will happen to me when I go to a place by myself.	Duggan et al. (2000)
Intention to engage in risky behaviour	Intention to engage in the maladaptive response to a health threatening activity.		How likely are you to drive home with the e-scooter under these intoxicated conditions?	Kamerdze et al. (2014)
		Control variables		
Brand attitude			I find this brand appealing I find this a good brand I find this a pleasant brand I find this a favourable brand I find this brand likable	Spears and Singh (2004)
Age			What is your age?	Taylor et al. (2017)
Gender			What is your gender?	Leary et al. (2022)
License			Do you have a valid driver's license?	Zanis et al. (1997)
Education			What is the highest level of education you have completed?	Luyk (2022)
Scooter experience			Have you ever driven an e-scooter?	Mer (2022)
Scooter frequency			How frequently have you used a e-scooter the past year?	Özmen (2023)
Alcohol experience			Have you ever consumed alcohol?	Taylor et al. (2017)
Drunk experience			Have you ever found yourself drunk?	Morgenstern et al. (2009)
Drove while intoxicated experience			Have you ever driven a car when you had drunk enough to be in trouble if the police had stopped you?	Caetano and Clark (2000)

4.5.1.1. Intention to engage in risky behaviour

After the notification was shown in the VR simulation the participant was shown a question in the VR simulation on how likely the participant was to engage in maladaptive behaviour, meaning how likely the participant was to drive the shared moped e-scooter under the conditions, on a Likert scale ranging from 1 (very unlikely) to 7 (very likely) (Appendix 7.1.1.). The question was shown in the simulation to provide this final decision verbally after going through the entire simulation. After this, the VR headset was taken off and a survey was conducted, which can be found in Appendix 7.4.

4.5.1.2. Survey measures

The study's measures were adopted from extant literature to suit the context of this study best. To start with, to measure the ease of processing the notification's design will be assessed to the degree it was 'complex', 'complicated', and 'easy to comprehend' as adopted from Anand and Sternthal (1990). This was used for the manipulation check. Secondly, the conceptual fluency of the content of the notification was assessed on a 7-point Likert scale as adopted from Kostyk et al. (2021).

Furthermore, Zuckerman et al. (1978) have established a Sensation Seeking Scale which has also been revised in later work (Arnett, 1994) from which Sensation Seeking Scale V is the most common one used. The Sensation Seeking Scale has been used as a standard test instrument for defining the trait of sensation seeking and consists of four subscales; Thrill and Adventure Seeking; Disinhibition; Experience Seeking; and Boredom Susceptibility. For this study, only Thrill and Adventure Seeking and Disinhibition are expected to be of importance. Thrill and Adventure Seeking estimates the aspiration to engage in physical activities that provide arousal, unusual sensations, and experiences. For driving while intoxicated, the thrill of the general risk to drive while intoxicated would provide a sensation full experience for an individual (Hatfield et al., 2014). Disinhibition has a reliable relationship with alcohol use according to Darkes et al. (1998) and describes the desire for social disinhibition with drinking and partying (Michel et al., 1998). According to the study of Rimmö and Åberg (1999) the Thrill and Adventure Seeking and Disinhibition subscales were each significantly related to driving while intoxicated. Therefore, even though the Sensation Seeking form V is mostly used, form IV will be used for this study since it excludes the experience seeking and boredom susceptibility scales, leaving the Thrill and Adventure Seeking subscale and the

Disinhibition subscale (Zuckerman et al., 1978). Jonah (1997) looked at 18 studies that studied the relationship between sensation seeking and driving while intoxicated, whereby the Sensation Seeking Scale was the most used scale among these 18 driving while intoxicated studies.

Lastly, the survey questions for this study concerning personal vulnerability are retrieved from the work of Lapsley and Duggan (2001). They have established the adolescent invulnerability scale (AIS), which incorporates both danger invulnerability and psychological invulnerability. Danger invulnerability refers to an individual's indestructibility and predicted drug use in their study, which is why this scale fits best with this present study. Psychological invulnerability measures an individual's invulnerability to psychological distress and is therefore not crucial to the current study and will therefore not be used. As Lapsley and Hill (2010) state, an adolescent who drives while intoxicated without having an incident might have a basis for a sense of optimism or invulnerability regarding driving while intoxicated that is different from an individual who does not drive while intoxicated. This scale as constructed by Lapsley and Hill (2010) will measure this. The scale from AIS consists of 20 items which can be responded to on a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Important in the danger subscale is that items are phrased in a way that assumes that participants had taken the risk, which is the same formulation that will be opted for in this study.

Additionally, control variables were measured. First, socio-demographics were measured. Participants were asked about their age to establish whether the target audience was reached. Subsequently, questions were asked on whether the participant had ever consumed alcohol or is familiar with consuming alcohol, has experience with driving a (shared) moped e-scooter, has ever experienced being drunk, and has ever driven while intoxicated. These questions are necessary because the experience would explain an increase in presence of the virtual reality simulation for some of the participants. The survey also included questions about gender, and valid driving license, which were all measured using a dichotomous scale where 0 indicated 'no' and 1 indicated 'yes' and age which was an open-ended question. Three other control variables were also measured. Firstly, education will be used as a control variable. The rationale behind using education as a control variable is because mostly well-educated individuals prefer the scooter sharing devices (Alarçin & Kirçova, 2020), and that also being the population group that has high numbers of alcohol consumption (Greening & Stoppelbein, 2000). To the question "what is the highest level of education you have completed" the possible answers could be: high school, secondary vocational education, university of applied sciences, WO bachelor, WO master, and PhD. Secondly, experience will be used as a control variable. This was measured by how frequently one has used a shared e-scooter in the past year adopted from the study by Özmen (2023). To the question the possible answers could be every day, several times a week, several times a month, very rare, never. Lastly, brand attitude was asked as a control question. Brand attitude can influence intention to use the brand and will be measured by the items whether the brand is appealing, is found a good brand, is found a pleasant brand, is found a favourable brand, and is found likeable. All can be answered on a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree).

4.6. Data analysis procedure

The analysis of the data included multiple steps. To start with, the data collected were coded into variables. Following, SPSS Statistics 27 was used to analyse descriptive information of the data, including the missing data, outliers, and assumptions towards skewness and kurtosis (Field, 2018). After data preparation, reliability and validity will be tested for the conceptual model (Figure 1) will be assessed including its hypothesis and assumptions. Lastly, SmartPLS was used for Structural Equation Modelling, which is the most convenient way for data analysis in this study because Structural Equation Modelling allows a model to be assessed to fit the data. Additionally, latent variables can be observed through observed variables which are useful for analysing a perception of drunkenness.

4.7. Research ethics

There are ethical implications that are essential to be discussed. Firstly, participants are allowed to know what data will be collected, why data will be collected, and how this data will be collected (Martin & Murphy, 2017). Also, the aim of the study, to prevent alcoholic abuse of shared moped e-scooters, will be mentioned. This information will be shared by introducing the experiment with a text that explains these points. The duration of the experiment will also be told here, as well as the possible discomfort of the VR headset. If someone agrees to participate, the participant will have to read a consent form which will include the notion that the participant is allowed to withdraw at any given time (Fischer, 2006). The consequence is that the data cannot be used (Hardy et al., 2009), which will be explained to the participant. Also included in the consent form is that anonymity will be kept regarding the data and no data will be uploaded anywhere which can be traced back to an individual (Martin &

Murphy, 2017). A participant can only continue with the experiment once the consent form is signed.

Furthermore, the results of this study will be uploaded to the digital thesis repository owned by Radboud University. Participants can find the results of the study here. If there are any questions after completing the experiment, participants have can ask questions to the re-searcher via her e-mail address.

5. Analysis

In this chapter, the study will be further elaborated on with the results. To analyse the data SPSS Statistics and SmartPLS were utilized. SPSS Statistics was used for descriptives, normality assumption, for the pre-test and the manipulation check. Afterwards, SmartPLS was used to study the measurement model and the structural model, including the reliability, validity, assumptions, and hypothesis testing. SmartPLS provides the analysis PLS-SEM which is the partial least squares structural equation modelling. This is a combination of an iterative combination of principal components analysis and ordinary least squares path analysis (Chin, 1998). In addition to the PLS-SEM measurement techniques, the bootstrapping values have to be specified. A 10,000 resamples bootstrapping procedure was utilized to generate robust standard errors and *t*-statistics (Hair et al., 2019).

5.1. Pre-test

The pre-test confirmed that the manipulation worked as indented. This was analysed with a pre-test with 14 participants. The participants were randomly assigned to either one of the two notifications (straight vs italic). Thus, 7 participants encountered scenario 1 (straight) and the other 7 participants encountered scenario 2 (italic). All participants were asked to complete a three-item perceptual processing fluency manipulation check: “the notification is difficult to process”, “the notification is difficult to read”, “the notification takes a long time to process”. All items were measured using a seven-point Likert scale ranging from “strongly disagree” (1) to “strongly agree” (7). Independent-samples *t*-tests showed that participants who were exposed to the straight notification had a significantly higher perceptual processing fluency than those who were exposed to the italicized notification ($M_{straight}$=1.4667, M_{italic}=3.6667, t = -2.400, $p < 0.05$). Independent-samples *t*-tests revealed that the manipulation worked as intended.

In addition, participants were asked to evaluate the attractiveness of the notification design. All participants were asked to evaluate the notification's attractiveness on a six-point item scale. All items were measured using a five-point Likert scale. Independent-samples *t*-test showed that there was no difference in attractiveness for both notifications ($M_{straight}$=3.2333, M_{italic}=3.5333, t = -0.775, $p > 0.05$).

Therefore, concerning that perceptual processing fluency significantly differed for the two different notifications designs, and attractiveness for both notification designs were significantly equal, the conclusion could be made that both notification designs were suitable to use for the experiment.

5.2. Study

Data preparation and normality assumption

Descriptive statistics analysis was performed in SPSS Statistics which showed that there were no missing data (Appendix 7.6). One item (conceptualfluency2) had to be reverse coded. A few extreme values were detected, for the control variables 'license', 'alcoholexperience', 'drunkexperience'. With Stem-and-Leaf Plots, the extreme values were detected (Appendix 7.6). For license, out of all participants (N = 61) only 4 participants had no license resulting in 4 extreme values. For alcohol experience 60 participants scored yes, where only one participant scored no, immediately making that an extreme value. For drunk experience, only 2 participants scored no making those extreme values as well. For the item 'the problems that happen to people my age are unlikely to happen to me' only 1 participant scored with strongly agree, making that an extreme value and lastly, for 'I enjoy the company of real "swingers"' one participant scored strongly agree and one participant scored agree, where everyone else scored strongly disagree to disagree. The items and "The problems that happen to people my age are unlikely to happen to me" had extreme respectively 2 and 1 extreme answer as well. All extreme values were kept in the data because they explain variation of the sample (Hair et al., 2019).

The descriptives statistics are utilized to indicate problems regarding the normality assumption. When items range within -2 / 2 for skewness and within -7 / 7 for kurtosis, no problems are indicated regarding the normality assumption (Hair et al., 2019). The descriptive statistics table indicated that only the control variables "drunkexperience" "alcoholexperience" and "license" demonstrates high positive skewness and high positive kurtosis. However, since those were binary variables, these variables could not be subjected to the computation of new variables utilizing a square root measure. Thus, the level of skewness and the level of kurtosis could not successfully be lowered to acceptable ranges for the three indicators. This is not a problem for data analysis because SmartPLS can operate with a non-normal distributed data (Wong, 2013).

Manipulation check

In line with the pre-test result, the manipulation worked as intended for the study. All items for the manipulation check were measured using a seven-point Likert scale ranging from "strongly disagree" (1) to "strongly agree" (7). Independent-samples *t*-tests showed that participants who were exposed to the straight notification had a significantly higher perceptual fluency than those who were exposed to the italicized notification ($M_{straight}$=1.9569, M_{italic}=2.8516, t = .014, $p < 0.05$). Independent-samples *t*-tests thus revealed that the manipulation worked as indented.

Table 1

Factor loadings, composite reliability, and average variance extracted of the constructs and their items

Components and manifest variables	Loading (*t*-values)
Personal vulnerability	*CR: 0.936 AVE: 0.551*
Safety rules to not apply to me.	0.773 (5.164)*
Taking safety precautions is far more important for other people than it is for me.	0.678 (4.116)*
I'm unlikely to get hurt if I did a dangerous thing.	0.859 (8.524)*
Driving very fast wouldn't be very dangerous if I were driving	0.794 (7.011)*
Nothing can harm me.	0.764 (6.182)*
I could probably drink and drive without getting into an accident	0.692 (5.114)*
There are times when I think I am indestructible	0.637 (4.397)*
Special problems, like getting an illness or disease, are not likely to happen to me.	0.665 (4.738)*
The problems that happen to people my age are unlikely to happen to me.	0.726 (5.676)*
It is not necessary for me to worry about being injured or harmed.	0.686 (4.714)*
I'm unlikely to be injured in an accident.	0.813 (6.951)*
Nothing bad will happen to me when I go to a place by myself.	0.787 (6.468)*
Conceptual fluency	*CR: 0.872 AVE: 0.632*
How easy was it to understand the meaning of the message: Very difficult/Very easy	0.869 (21.773)*
How much effort did you spent to understand the message: Very much/Very little	0.663 (6.653)*
How clear was the meaning of the message Very unclear/Very clear	0.796 (10.014)*
How quickly did you get the idea from the message Very slowly/Very quickly	0.836 (10.688)*
Sensation seeking	*CR: 0.890 AVE: 0.504*
I sometimes like to do things that are a little frightening.	0.806 (8.671)*
I would like to take up the sport of water skiing.	0.729 (6.766)*
I would like to try surfboard riding.	0.704 (6.372)*
	0.667 (5.110)*

I would like to go scuba diving.	0.725 (6.414)*
I would like to try parachute jumping.	0.705 (6.446)*
I like to dive off the high board.	0.657 (5.627)*
I would like to sail a long distance in a small but sea-worthy sailing craft.	0.736 (8.598)*
I think I would enjoy the sensations of skiing very fast down a high mountain slope.	
Brand attitude	*CR: 0.949 AVE: 0.825*
I find this brand appealing	0.852 (6.098)*
I find this a good brand	0.941 (8.130)*
I find this a pleasant brand	0.921 (7.140)*
I find this a favourable brand	0.915 (7.567)*

Note. CR: composite reliability; AVE: average variance extracted; *$p < 0.001$

Evaluation of the measurement model

The evaluation of the measurement model included four steps: internal reliability, construct reliability, convergent validity, and discriminant validity.

To start with, internal validity was measured utilizing composite reliability values. Composite reliability values were composed for constructs containing more than one indicator. The threshold for composite reliability values is >.600 (Hair et al., 2018). Composite reliability was achieved for all indicators.

Furthermore, construct reliability was measured utilizing Cronbach's Alpha values. Cronbach's Alpha values were composed for each construct. The threshold for Cronbach's Alpha is >.700. Construct reliability was achieved for all indicators.

Additionally, convergent validity was measured utilizing average variance explained (AVE) values. AVE values were composed for each construct. The threshold for AVE values is >.500. AVE was not achieved for "SensationSeeking". How this was resolved is explained later in this section.

Lastly, discriminant validity was measured utilizing Heterotrait-Monotrait (HTMT) ratio of correlations. This is the mean value of the indicator correlations across the constructs according to Hair et al (2018). The threshold for HTMT values is <.850. Discriminant validity was achieved for all indicators.

Following that, twelve indicators did not exceed the AVE threshold (>500). Therefore, the following indicators were omitted: SSd10, SSd7, SSd9, SSd6, SSd5, SSd3, SSd2, SSt1, SSd1, SSd8, SSd4, SSt5 (see Appendix 7.7.1.). Subsequently, acceptable validity and reliability were achieved (see Table 2, Appendix 7.7.1.). After the iterations whereby indicators were omitted, no indicators of the disinhibition subscale could be added back to the model while still achieving acceptable validity and reliability. To start with, internal reliability was established. The composite reliability for all indicators ranged from 0.872 to 0.949 exceeding the threshold of >0.600. Furthermore, construct reliability was established. The Cronbach's alpha ranged from 0.802 to 0.930 exceeding the >0.700 threshold. Additionally, convergent validity was reached. The AVE values for all constructs ranged from 0.515 to 0.825 exceeding the threshold of >0.500. Finally, discriminant validity was established. The HTMT values for and between all constructs did not exceed the <0.850 threshold (see Table 4, Appendix 7.7.1.).

Evaluation of the structural model

Prior to assessing the structural model and the hypothesized paths, the overall fit of the model was evaluated. The model fit is measured using the Goodness-of-Fit (GoF) Index. Also, Collinearity, Coefficient of determination, Effect size, size and significance of path coefficients (Hair et al., 2008) were measured.

The Goodness of Fit (GoF) Index was utilized instead of the Goodness-of-Fit measure. Tenenhaus et al. (2005) indicated that this is a more appropriate evaluation. A GoF of 0.1 is a small threshold, 0.25 is the medium threshold, and 0.36 is the large threshold. The GoF Index for this model is 0.385 (see Appendix 7.8, Table 5), indicating that the threshold for a large threshold is exceeded (0.385 > 0.36) (Wetzels et al., 2009).

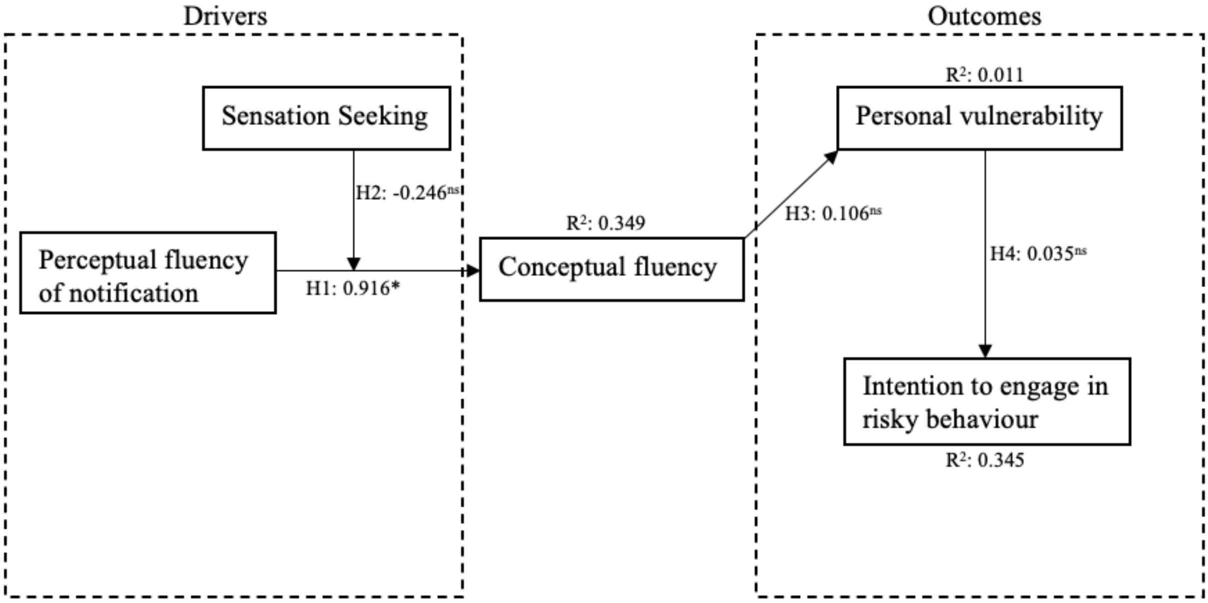
The level of collinearity was measured using the VIF values among predictor constructs. The threshold for VIF values is <5 (Hair et al., 2019). Brand attitude 3 and brand attitude 5 showed a VIF above 5. Brand attitude 5 had the highest VIF value (5.471) and was removed first. After this, there were no collinearity issues (see Appendix 7.8, Table 6)

The coefficient of determination indicates the predictive power of the model. An appropriate measure for the coefficient of determination is the R^2, and the threshold is <0.10 (Hair et al., 2019). Results show that the R^2 for conceptual fluency and risky behaviour are weak, and for personal vulnerability are very weak (Appendix 7.8, Table 7).

Additionally, the effect sizes were measured using the f^2. The threshold is >0.02 (Hair et al., 2019). Subsequently, effect sizes ranged from 0.001 to 0.315. The smallest effect size was 0.001 for risky behaviour (Appendix 7.8, Table 8) and the largest effect size was 0.315 for (Appendix 7.8, Table 8).

Consecutive, the significance of path coefficients was measured. The significance of path coefficients (beta coefficient) demonstrates whether hypothesized effects are indicated by the structural model results. However, despite all evaluation criteria of the structural model being met, to conduct the bootstrapping procedure was not possible in SmartPLS 4. Possibly, this is because of either (a) an almost perfect collinearity in the model or (b) a variable with zero variance. Both problems may not appear on the original data but may manifest during bootstrapping (*PLS-SEM and Bootstrapping Problems - SmartPLS*, n.d.). Due to a too low sample size, this could not be overcome for this study. To still perform bootstrapping, the following control variables were omitted; “license”, “education”, “alcoholexperience”, and “drunkexperience”.

Figure 2 *structural model result*



Note. *: meets or exceed p < 0.05 (two-tailed); ns: non-significant

To start with, the structural model results (Figure 2) indicate that H1 is statistically significant ($\beta = 0.916$; $p < 0.05$; $R^2 = 0.349$). In addition to H1, the results indicate that H2 is insignificant ($\beta = -0.246$; $p > 0.05$) meaning that sensation seeking does not moderate the effect such that a notification’s design has a positive effect on conceptual fluency. Prior to the analysis, a dummy was created where condition 1, the italic font, was coded as 0. Condition 2, the straight font, was coded as 1. Subsequently, the Simple Slope Analysis in Figure 3 illustrates the moderation effect. The illustration shows that for a more fluent notification design (M=1), conceptual fluency increases when sensation seeking is high (+1 SD), low (-1 SD), and when sensation seeking is at its mean. Furthermore, the results indicate that H3 is statistically insignificant ($\beta = 0.106$; $p > 0.05$; $R^2 = 0.011$). Ergo, the results indicate that H4 is statistically insignificant ($\beta = 0.035$; $p > 0.05$; $R^2 = 0.345$) meaning that awareness of personal vulnerability did not statistically affect the intention to engage in risky behaviour.

Finally, regarding the control variables, the variables age ($\beta = 0.229$; $p > 0.05$; $R^2 =$ 0.345), gender ($\beta = -0.457$; $p > 0.05$; $R^2 = 0.345$), scooter frequency ($\beta = 0.266$; $p > 0.05$; $R^2 =$

0.345) and brand attitude ($\beta = 0.163$; $p > 0.05$; $R^2 = 0.345$) did not significantly affect the intention to engage in risky behaviour. However, drove while intoxicated ($\beta = 0.669$; $p < 0.05$; $R^2 = 0.345$) and scooter experience ($\beta = 0.729$; $p < 0.05$; $R^2 = 0.345$) did have a significant effect on the intention to engage in risky behaviour. The entire structural model can be found in Appendix 7.9.

Next to the above mentioned, an additional analysis was done. As the control variable drove while intoxicated had a significant effect on intention to engage in risky behaviour, an Independent-Samples *t*-test was conducted. Found was that those who ever drove while intoxicated (M=4.7895; SD=1.51213) were significantly ($p < .001$) more likely to engage in risky behaviour than those who never drove while intoxicated (M=3.0714; SD=1.81313). The control variable scooter experience also had a significant on intention to engage in risky behaviour, and therefore also for scooter experience an independent *t*-test was conducted. Found was that those who had scooter experience (M=4.0789; SD=1.85095) were significantly ($p < .05$) more likely to engage in risky behaviour than those did not have scooter experience (M=2.8261; SD=1.72290). To look at this even more in-depth, Figure 4 shows that those who have scooter experience were highly likely to engage in risky behaviour, and that those who ever drove while intoxicated (0=no, 1=yes) were also most likely to engage in risky behaviour. Concluding, those who did not ever drive an e-scooter before and did not drive while intoxicated is the group that is least likely to engage in risky behaviour.

An additional analysis on the intention to engage in risky behaviour was conducted whereby two direct effects from the variables perceptual fluency of notification design and conceptual fluency on intention to engage in risky behaviour. Reliability and validity of the measurement model was confirmed for this additional analysis. In contrast to its positively significant effect on conceptual fluency, a notification's design did not significantly affect the intention to engage in risky behaviour ($\beta = -0.199$; $p > 0.05$; $R^2 = 0.447$). Moreover, conceptual fluency did not significantly affect intention to engage in risky behaviour ($\beta = -0.131$; $p > 0.05$; $R^2 = 0.365$). In other words, the model did not support any significant direct effect to intention to engage in risky behaviour. When taking a more in depth look at intention to engage in risky behaviour, it can be seen (Figure 5) that most answers that were given were 'somewhat agree', the highest bar on the histogram. A reason for this could be that the answers to the question are subject to social desirability (Schuetzler et al., 2018). Social desirability means that the participant answers a questionnaire in a way to make a favourable impression (af Wåhlberg, 2010). Since the researcher was a student, and most participants as well (Figure 6), it could be that a favourable impression would be to engage in risky behaviour since that is considered as 'cool' (Scott-Parker et al., 2009). This could be a reason for deviating outcomes than expected.

Figure 3

Simple Slope Plot of the interaction between perceptual fluency of notification design and sensation seeking on conceptual fluency

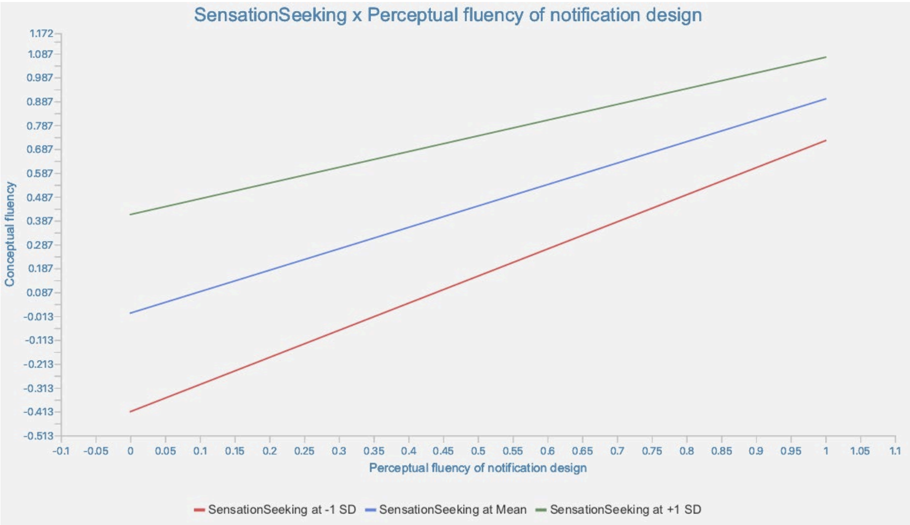


Figure 4

Bar chart intention to engage in risky behaviour

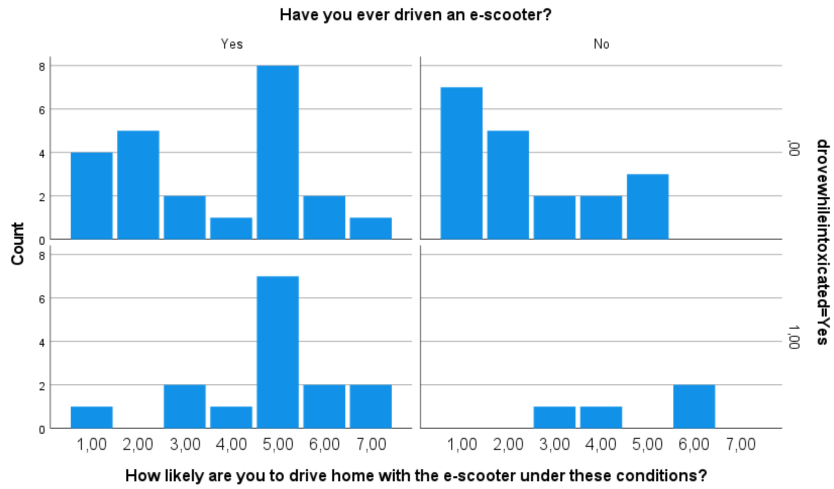


Figure 5

Histogram

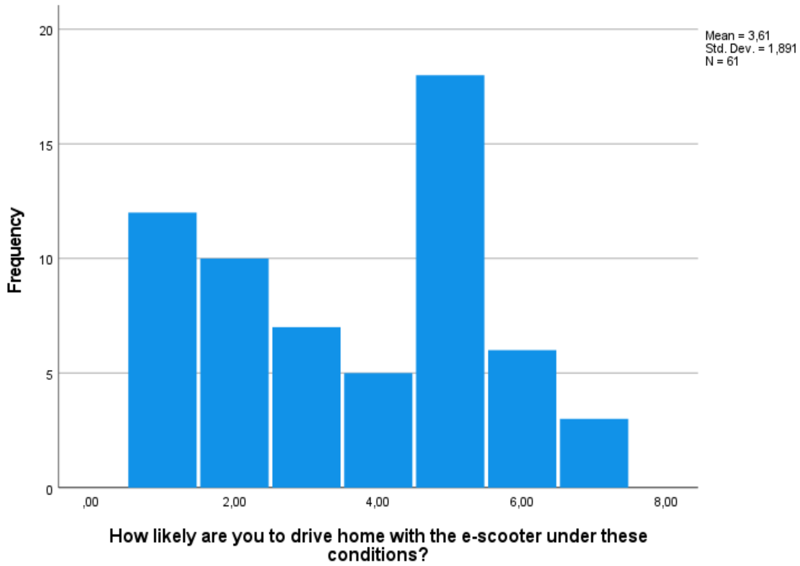
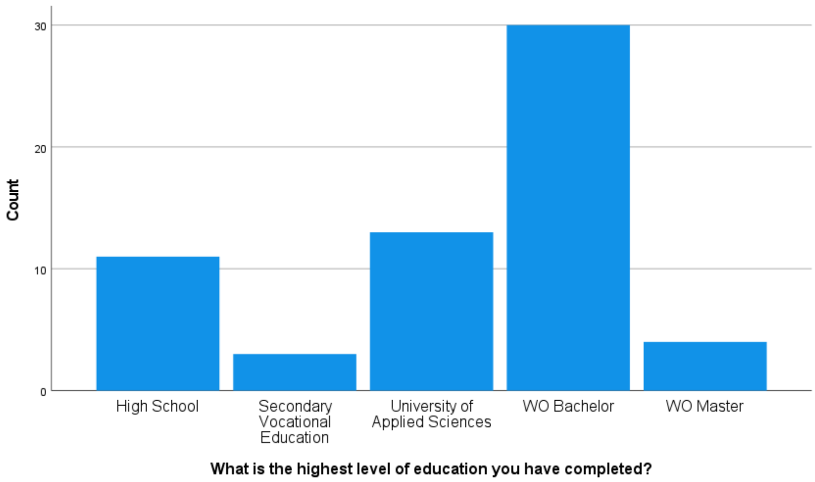


Figure 6

Bar chart education



6. Discussion & conclusion

6.1. Discussion

The increase of the shared economy increases the need for prevention methods regarding the alcoholic abuse of shared mobility services (Davis-Sober et al., 2018). Therefore, the reported study tried to provide an understanding of how intoxicated maladaptive decision making can be influenced to reach preventive behaviour. The aim of the study was to reveal an antecedent of drinking and driving that could prevent the maladaptive decision making towards drinking and driving behaviour. The key findings are highlighted in Figure 2.

To start with, the results provide support for an effect of perceptual fluency notification design (straight or italic) on conceptual fluency, whereby conceptual fluency was higher for participants who had been exposed to the straight notification design than for those who had been exposed to the italic notification design. Sensation seeking was expected to moderate this effect, but the results provided no support for a moderating role of sensation seeking on the effect the notification design has on conceptual fluency. This means that even though literature would expect a moderating role because sensation seekers often engage in health threatening activities and like intense stimuli (Palmgreen et al., 1991), this was not the case in this study. A reason for this could be that high sensation seekers did not experience an intense sensation of intoxication during the Virtual Reality simulation, indicating that they were not aroused enough for the stimuli, the notification, to have an influence on their intention to engage in risky behaviour. Their tendency towards seeking excitement (Arnett, 1994) could have been larger than the positive influence the notification's design has on conceptual fluency for them, leading to no moderating effect. The notification designs thus worked equally well for everyone in the sample of this study. On top of that, the results provided no support for an effect of conceptual fluency on personal vulnerability. This could indicate that personal vulnerability does not play a role in the maladaptive decision making, or that an individual's personal vulnerability was already clear. This second option would be more likely in this study, because the participating individuals had to imagine themselves to be intoxicated. The final choice was however still made sober, only with an imagination of intoxication. It was not measured whether their choice was based on what they would truly choose when intoxicated, and level of imagination was also not measured. When sober, it is generally known that drinking and driving is risky behaviour, but when intoxicated this negative knowledge towards drinking and driving decreases making it more likely that someone engage in that risky behaviour (MacDonald et al., 1995). Therefore, the outcomes could be different than expected. For this study this however means that a fluent notifications design does not increase an intoxicated individual's personal vulnerability towards risky behaviour. Moreover, no support for a negative effect of personal vulnerability on intention to engage in risky behaviour was found. This could mean that possibly the individual's personal vulnerability was not clear enough to cause an increase/decrease of the intention to engage in risky behaviour. When turning to literature, MacDonald et al. (1995) for example state that such a warning should contain a more triggering fear appeal, such as “drinking and driving kills”. A more intense use of the PMT as described in the literature review could result in a more triggering fear appeal.

Moreover, despite being outside the original scope of this research, additional analysis revealed that both a perceptually fluent notification design as well as conceptual fluency did not significantly influence the intention to engage in risky behaviour. A reason for this could be that in the intoxicated context, disfluency may play a larger role than expected. This shows some contradiction to the fluency literature, but according to some theories (Diemand-Yauman et al., 2011), disfluency may lead to a deeper processing and difficult to process stimuli are considered to be riskier than fluent processing (Song & Schwarz, 2009). It could thus be that in an intoxicated context, disfluency would have resulted in an effect on intention to engage in risky behaviour. More additional analysis showed that those who have experience with driving an e-scooter and those who already drove while intoxicated are more likely to engage in risky behaviour. A possible explanation for this could be the theory of overconfidence. Overconfidence in the area of driving refers to the belief that one is more adept at driving than others. (Deery, 1999), and results from experience (Mishra & Metilda, 2015). Therefore, those who have already driven an e-scooter may be overconfident when it comes to driving while intoxicated. For those who have already driven while intoxicated this also holds, and the theory of habituation even strengthens this. Habituation signifies that a risk is gotten used to and fear for the risk is obsolete (Schmidt, 2004).

6.2. Conclusion

A final conclusion can be made regarding antecedents and outcomes of conceptual fluency, to answer the research question “How can the intoxicated use of shared moped e-scooters be prevented by a shared e-scooter company using the perceptual fluency of a stimulus?”. Different notification designs (straight vs. italic), and thus the perceptual fluency of a stimulus, do significantly impact an individual’s conceptual fluency. However, this is not attributable to any differences in personal vulnerability which solely also not negatively affect the intention to engage in risky behaviour. Sensation Seeking did not moderate the effect the notification design had on conceptual fluency. Moreover, no direct effect significantly showed an influence in maladaptive decision making regarding the risky behaviour.

Despite the findings being not as unambiguously evident as hoped for, this research still revealed that, in an intoxicated environment, a fluent notification design positively effects conceptual fluency. Moreover, with use of additional analysis this study did manage to form an answer to the research question; shared e-scooter companies should focus on a particular target group and make use of fluent stimuli to try and prevent drinking and driving. The target group consists out of those who have experience with e-scooters and those who already drove while intoxicated. Also, shared e-scooter companies should focus on a different content of the stimuli since this study does not reveal a significant outcome for the content of the notification.

6.3. Theoretical implications

The current state of literature on the relationship between intoxication and processing fluency is very limited. Also, when combined with prevention (Greening & Stoppelbein; McCormick & Ureda, 1995) studies are very scarce. Existing literature also highlights the need of more empirical evidence in these fields (MacDonald et al., 1995). The study in this research tried to answer the above-mentioned needs by empirically assessing antecedents (perceptual fluency of a notification design) and outcomes (intention to engage in good behaviour) of conceptual fluency when intoxicated as well as whether sensation seeking can moderate this effect.

First, study adds to the domain of intoxicated decision making by studying how a perceptually fluent stimuli can be used to intervene in maladaptive decision making. Consistent with existing literature (Lamme, 2003) this research found that a perceptually fluent notification was more easily processed than a perceptually disfluent notification. This is an addition to the processing fluency literature because intoxicated processing has not yet been studied. Second, no research had yet added to business literature by studying how PMT could be used as a prevention method in the shared economy. Even though this study did not significantly find how PMT could be used as a prevention method in the sharing economy, it did add literature to this research stream. Namely, contrary to existing literature (Glendon & Walker, 2013), it was found that an increasing an individual's protection motivation in the form of personal vulnerability did not negatively affect the intention to engage in risky behaviour.

With the above-mentioned findings, this research contributes to the needs called for in (recent) literature and provides new data on intoxicated processing fluency and how this can aid in prevention. With the combination of Virtual Reality and survey data, this research gains unique insights into the coherence between intoxication and processing fluency resulting in prevention in an experimental setting.

6.4. Managerial implications

Despite the findings being not as unambiguously evident as hoped for, this research can still guide shared mobility companies. To start with, this study shows that 31.1% ($M = 19$) of the participating individuals ever drove while intoxicated, showing the relevance to prevent this. Also, shown is that participants who had ever drove a scooter before were more likely to engage in the risky behaviour (Figure 4). This indicates that a notification in the application as a prevention is beneficial as existing scooter users have the application, and that the prevention method is more useful for already existing users than for new users. Moreover, shown is that a fluent font results in a higher conceptual fluency. According to literature, this results in a truth judgement of the stimulus. Shared mobility companies can use this knowledge to incorporate a fluent notification as prevention method in their application to convey a message. The content of a notification should however be conducted further research for because the results of this study were not unambiguously enough to advice shared mobility companies on the content to prevent drinking and driving.

Furthermore, this research found that those who already committed the felony of driving while intoxicated are more likely to engage in risky behaviour again. When subscribing to their service, shared mobility companies could thus for example ask the new user if the individual has a history of driving while intoxicated, taking example from how the car insurance industry does this (Lastenvrij, 2023). This means that next to driver's license check, an obligatory question should be answered about a possible history of driving while intoxicated.

6.5. Limitations & further research

Although the study showed insights into intoxicated processing fluency and prevention methods for shared mobility companies, it also had some limitations. To start with, there was limited amount of time to conduct this research which resulted in a smaller number of participants for this study. A large limitation was that SmartPLS could not perform bootstrapping with this small sample size (*PLS-SEM and Bootstrapping Problems - SmartPLS*, n.d.). Because of that, multiple control variables had to be dropped. Additionally, larger numbers would indicate greater generalization (Vennix, 2016). For multiple reasons, further research should thus aim to reach a higher number of participants.

Furthermore, Virtual Reality is a large part of this study and brings its own limitations along. VR technology requires a high level of immersion. For immersion, participants needed to feel intoxicated. However, research cannot be conducted ethically with intoxicated participants. This study thus asked a high level of imagination and immersion in the VR headset.

However, immersion for some participants was minimized as the same blood alcohol concentration level was used for all participants even though blood alcohol concentration can differ for different demographics (age, gender, etcetera) (Hong et al., 2011). Further research could use different simulations with different blood alcohol simulations that fit the particular participant.

An additional limitation of this study is that gender differences are not accounted for. Research has shown that gender results in differences regarding driving while intoxicated. It is for example most dominantly shown that young male drivers are at the highest risk for engaging in an accident as well as engaging in alcohol and drug behaviour (Farrow & Brissing, 1990). The sample for this study does however not focus on solely male or female genders. In the data it can however be seen that indeed more male participants are highly likely to engage in risky behaviour ($N = 3$) than females ($N = 0$). Additionally, more females show to be very unlikely to engage in risky behaviour ($N = 9$) than males are ($N = 3$).

Another limitation participants denoted was that the 360degree video with which the VR experience was made was recorded in Nijmegen. Since participants were recruited in Nijmegen, some of the participants were familiar with the location. When conveying how likely they were to use the e-scooter, they considered the location of their own house in comparison to the location of where the e-scooter was into account. This meant that duration of the e-scooter ride was taken into account, but this was not accounted for in the conceptual model or as control variable. Further research could thus make sure that the video is recorded in an unknown/fictive location to overcome this.

A last limitation is that this research did not account for socially desirable answers. The researcher was present in the room of the experiment where the participant verbally conveyed their answer. Because of this, participants may have modified their answer to increase the social desirability of their response (Schuetzler et al., 2018).

Finally, some directions for further research are shared. Firstly, further research could aim to use disfluency. Few studies (Briñol et al., 2006) explained a theory where disfluency required more effort to be put into understanding a stimulus. When more effort is used to understand a stimulus, it could be that the stimulus is considered as true according to this theory which is interesting to adopt for further research. As the results of this study are insignificant for fluency, further research could analyse whether disfluency would result in significant affects. Secondly, this research shows who should be targeted for prevention methods. Further research can study how this target group should be targeted.

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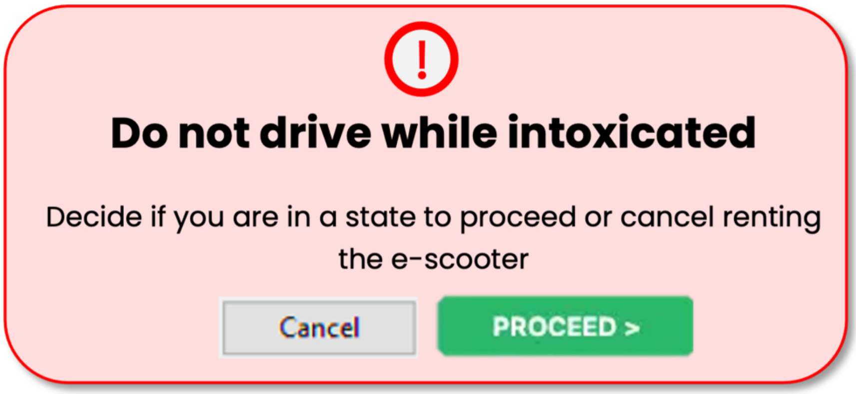
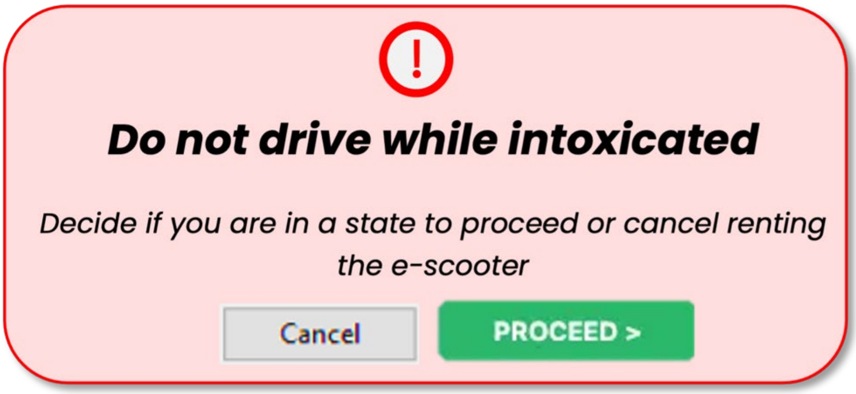
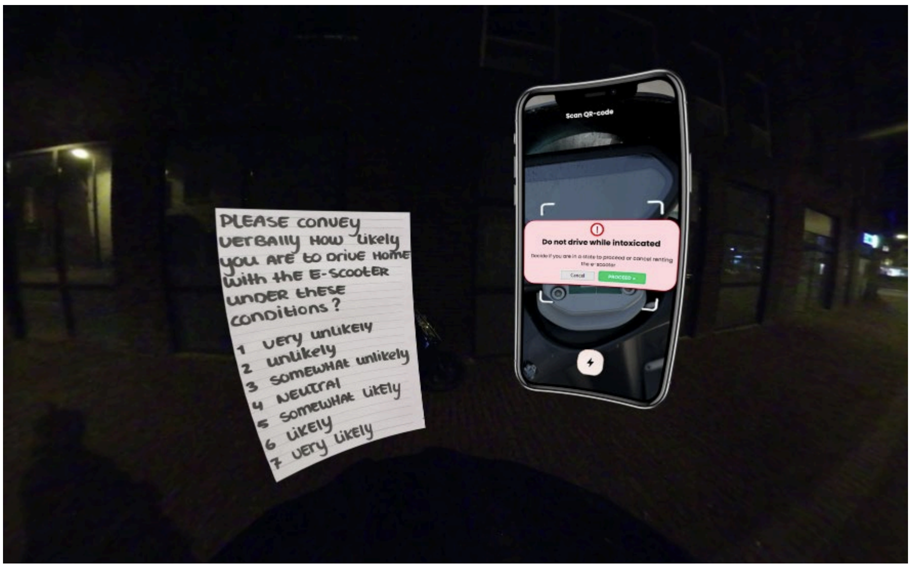
8. Appendices

8.1. Appendix 1: Notification designs





8.1.1. 360degree view in VR headset



8.2. Appendix 2: Scenario

Consider the following scenario. You are walking home from a social setting where you had a few drinks. Your level of intoxication has reached the level of drunkenness, and you are trying to get home. It is past midnight so there is no option to use public transportation which you used to get to the bar. You need to find another solution to get home. You walk past a e-scooter which is a shared moped transport service in which electric motorized scooters are made available to use for short-term rentals. You consider using it to get home. You try to unlock a scooter, but you receive a notification.

8.3. Appendix 3: Consent form

Purpose: The purpose of this research study is to investigate an individual's decision-making process in an intoxication simulation.

Equipment: Virtual Reality (VR) headset the Oculus GO, Macbook

Procedure: This research consists of two parts: first, you will be exposed to a Virtual Reality (VR) experience, after which you are asked to complete an online questionnaire. The VR experiment will consist out of a 1 minute 360-degree video in the virtual reality headset in which you will be asked to convey an answer to a certain notification you will see on a mobile phone. Please convey your answer verbally.

Please confirm the following:

- I understand that my verbal answer to that what I will encounter in the virtual reality simulation will be recorded.
- I understand that Virtual Reality (VR) experiences are immersive and can feel extremely realistic at times.
- I confirm that I do not have any physical, mental or health-related reasons or problems that should preclude my participation in the Virtual Reality experiment (e.g. dizziness, nausea, epilepsy, seizures).
- I confirm that I assume all of the physical, psychological, and financial risks and their possible consequences for me associated with the use of Virtual Reality equipment.

If you agree to participate in this study, you will be asked to do the following:

a) Be immersed in VR experiment using the VR headset and be audio recorded.
b) Complete a short online questionnaire afterwards.

This research will take about 5 to 10 minutes (including briefing, set up/calibration and survey).

Health Notice/Risks: The VR headset you will be administered is not expected to cause any harm or discomfort, however if you experience feelings of distress as a result of participation in this study you can let the researcher know and you will be provided with assistance. You are allowed to withdraw at any given time. In some cases, participants report a so-called 'Virtual Reality (VR) Simulator Sickness' caused by the Virtual Reality (VR) experience, which can cause dizziness, headaches, anxiety, or other effects on the user's sense of balance, or other mental or physical negative effects when experiencing Virtual Reality (VR). I voluntarily assume all associated risks and take full responsibility for these and any other consequences that may arise from my participation. I agree to report any discomfort or disorientation immediately, so that the researcher can remove the equipment and take appropriate measures to assist.

Confidentiality: Your participation in this study is entirely voluntary and you may refuse to complete the study at any point during the experiment or refuse to answer any questions with which you are uncomfortable. You may also stop at any time and ask the researcher any questions you may have. Your data will be treated strictly confidential and will be used for a research project, in which data of all participants will be collated. The collected data can and may only be shared with the researcher's supervisor. Information collected for this research project may be made available to other research projects in de-identified form only. Additionally, the information and results from this project may be submitted for publication in the Radboud Thesis repository, however this information will not identify you in any way.

Contact and Questions: If you have any questions regarding this study, you may contact the researcher via marlijn.gijsen@ru.nl

Statement of Consent: I have read and understood the above information. I have asked any questions I had regarding the experimental procedure, and they have been answered to my satisfaction. I consent to participate in this study.
Date: __________
Name of participant: ____
Signature of Participant ____

If you are interested in the thesis, you will be able to find it in the Radboud repository after summer.

Thanks for your participation!

8.4. Appendix 4: Survey

Start of Block: Start thesis

Welcome to the survey. The survey consists out of 7 parts and will take approximately 8 minutes.

End of Block: Start thesis

Start of Block: Consent form

Q1 I confirm to the above

○ Yes (1)

○ No (2)

Q2 Click to write the question text

- ○ Date (1) ____
- ○ Name (2) ____

Q3 Signature of participant

End of Block: Consent form

Start of Block: ontvangen nummer

Q4 Enter below the number given by the researcher

____

End of Block: ontvangen nummer

Start of Block: vragen

Q1 Please indicate your answer to the following questions

	very difficult	difficult	somewhat difficult	neither difficult nor easy	somewhat easy	easy	very easy
	1	2	3	4	5	6	7
How easy was it to understand the meaning of the message? ()							

Q2 Please indicate your answer to the following questions

	very little	little	somewhat little	neither little nor much	somewhat much	much	very much
	1	2	3	4	5	6	7
How much effort did you spent to understand the message? ()							

Q3 Please indicate your answer to the following questions

	very clear	clear	somewhat clear	neither clear nor un-clear	somewhat clear	clear	very clear
	1	2	3	4	5	6	7
How clear was the meaning of the message? ()							

Q4 Please indicate your answer to the following questions

	very slowly	slowly	somewhat slowly	neither slowly nor quickly	somewhat quickly	quickly	very quickly
	1	2	3	4	5	6	7
How quickly did you get the idea from the message? ()							

Page Break

Respond to the following statements where 1 is strongly disagree and 7 is strongly agree

	1	2	3	4	5	6	7
The notification was difficult to process ()							
The notification was difficult to read ()							
The notification takes a long time to process ()							
The notification was difficult to understand ()							

Page Break

Thrill and Adventure Respond to the following statements where 1 is strongly disagree and 7 is strongly agree

	1	2	3	4	5	6	7

I often wish I could be a mountain climber ()	
I sometimes like to do things that are a little frightening. ()	
I would like to take up the sport of water ski-ing. ()	
I would like to try surfboard riding. ()	
I would like to learn to fly an airplane. ()	
I would like to go scuba diving. ()	
I would like to try parachute jumping. ()	
I like to dive off the high board. ()	
I would like to sail a long distance in a small but sea-worthy sailing craft. ()	
I think I would enjoy the sensations of skiing very fast down a high mountain slope. ()	

Page Break

Disinhibition Respond to the following statements where 1 is strongly disagree and 7 is strongly agree

1 2 3 4 5 6 7

I like wild "uninhibited" parties. ()	
I enjoy the company of real "swingers." ()	
I often like to get high (drinking liquor or smoking marijuana). ()	
I like to have new and exciting experiences and sensations even if they are a little unconventional or illegal. ()	
I like to date members of the opposite sex who are physically exciting. ()	
Keeping the drinks full is the key to a good party. ()	
A person should have considerable sexual experience before marriage. ()	
I could conceive of myself seeking pleasures around the world with the "jet set." ()	
I enjoy watching many of the "sexy" scenes in movies. ()	
I feel best after taking a couple of drinks. ()	

Page Break

Danger Invulnerabily Respond to the following statements where 1 is strongly disagree and 7 is strongly agree

	1	2	3	4	5	6	7

Safety rules do not apply to me. ()

Taking safety precautions is far more important for other people than it is for me. ()

I'm unlikely to get hurt if I did a dangerous thing. ()

Driving very fast wouldn't be very dangerous if I were driving. ()

Nothing can harm me. ()

I could probably drink and drive without getting into an accident. ()

There are times when I think I am indestructible. ()

Special problems, like getting an illness or disease, are not likely to happen to me. ()

The problems that happen to people my age are unlikely to happen to me. ()

It is not necessary for me to worry about being injured or harmed. ()

I'm unlikely to be injured in an accident. ()

Nothing bad will happen to me when I go to a place by myself. ()

Page Break

Respond to the following statements where 1 is strongly disagree and 7 is strongly agree

	1	2	3	4	5	6	7
I find the brand Felyx appealing ()							
I find Felyx a good brand ()							
I find Felyx a pleasant brand ()							
I find Felyx a favourable brand ()							
I find the brand Felyx likeable ()							

Page Break

Q1 What is your age?

____

Q2 What is your gender?

- ◯ Male (1)
- ◯ Female (2)
- ◯ Non-binary (3)
- ◯ Prefer not to say (4)

Q3 Do you have a valid driver's license?

- ◯ Yes (1)
- ◯ No (2)

Q4 What is the highest level of education you have completed?

- ◯ High School (1)
- ◯ Secondary Vocational Education (2)
- ◯ University of Applied Sciences (3)
- ◯ WO Bachelor (4)
- ◯ WO Master (5)
- ◯ PhD (6)

Q5 Have you ever driven an e-scooter?

- ◯ Yes (1)
- ◯ No (2)

Q6 How frequently have you used a shared e-scooter the past year?

- ◯ Every day (1)
- ◯ Several times a week (2)
- ◯ Several times a month (3)
- ◯ Very rare (4)
- ◯ Never (5)

Q7 Have you ever consumed alcohol?

- ◯ Yes (1)
- ◯ No (2)

Q8 Have you ever found yourself drunk?

- ◯ Yes (1)
- ◯ No (2)

Q9 Have you ever driven a car when you had drunk enough to be in trouble if the police had stopped you?

- ◯ Yes (1)
- ◯ No (2)

End of Block: vragen

Start of Block: vragen

Please indicate your answer to the following questions

	very difficult	difficult	somewhat difficult	neither difficult nor easy	somewhat easy	easy	very easy
	1	2	3	4	5	6	7
How easy was it to understand the meaning of the message? ()							

Please indicate your answer to the following questions

	very little	little	somewhat little	neither little nor much	somewhat much	much	very much
	1	2	3	4	5	6	7
How much effort did you spent to understand the message? ()							

Please indicate your answer to the following questions

	very clear	clear	somewhat clear	neither clear nor un-clear	somewhat clear	clear	very clear
	1	2	3	4	5	6	7
How clear was the meaning of the message? ()							

Please indicate your answer to the following questions

	very slowly	slowly	somewhat slowly	neither slowly nor quickly	somewhat quickly	quickly	very quickly
	1	2	3	4	5	6	7
How quickly did you get the idea from the message? ()							

Page Break

Respond to the following statements where 1 is strongly disagree and 7 is strongly agree

	1	2	3	4	5	6	7
The notification was difficult to process ()							
The notification was difficult to read ()							
The notification takes a long time to process ()							
The notification was difficult to understand ()							

Page Break

Respond to the following statements where 1 is strongly disagree and 7 is strongly agree

	1	2	3	4	5	6	7

I often wish I could be a mountain climber ()	
I sometimes like to do things that are a little frightening. ()	
I would like to take up the sport of water skiing. ()	
I would like to try surfboard riding. ()	
I would like to learn to fly an airplane. ()	
I would like to go scuba diving. ()	
I would like to try parachute jumping. ()	
I like to dive off the high board. ()	
I would like to sail a long distance in a small but sea-worthy sailing craft. ()	
I think I would enjoy the sensations of skiing very fast down a high mountain slope. ()	

Page Break

Respond to the following statements where 1 is strongly disagree and 7 is strongly agree

1 2 3 4 5 6 7

I like wild "uninhibited" parties. ()	
I enjoy the company of real "swingers." ()	
I often like to get high (drinking liquor or smoking marijuana). ()	
I like to have new and exciting experiences and sensations even if they are a little unconventional or illegal. ()	
I like to date members of the opposite sex who are physically exciting. ()	
Keeping the drinks full is the key to a good party. ()	
A person should have considerable sexual experience before marriage. ()	
I could conceive of myself seeking pleasures around the world with the "jet set." ()	
I enjoy watching many of the "sexy" scenes in movies. ()	
I feel best after taking a couple of drinks. ()	

Page Break

Respond to the following statements where 1 is strongly disagree and 7 is strongly agree

1 2 3 4 5 6 7

Safety rules do not apply to me. ()	
Taking safety precautions is far more important for other people than it is for me. ()	
I'm unlikely to get hurt if I did a dangerous thing. ()	
Driving very fast wouldn't be very dangerous if I were driving. ()	
Nothing can harm me. ()	
I could probably drink and drive without getting into an accident. ()	
There are times when I think I am indestructible. ()	
Special problems, like getting an illness or disease, are not likely to happen to me. ()	
The problems that happen to people my age are unlikely to happen to me. ()	
It is not necessary for me to worry about being injured or harmed. ()	
I'm unlikely to be injured in an accident. ()	
Nothing bad will happen to me when I go to a place by myself. ()	

Page Break

Respond to the following statements where 1 is strongly disagree and 7 is strongly agree

1 2 3 4 5 6 7

I find Felyx appealing ()	
I find Felyx a good brand ()	
I find Felyx a pleasant brand ()	
I find Felyx a favourable brand ()	
I find the brand Felyx likeable ()	

Page Break

Q1 What is your age?

____

Q2 What is your gender?

- Male (1)
- Female (2)
- Non-binary (3)
- Prefer not to say (4)

Q3 Do you have a valid driver's license?

- Yes (1)
- No (2)

Q4 What is the highest level of education you have completed?

- High School (1)
- Secondary Vocational Education (2)
- University of Applied Sciences (3)
- WO Bachelor (4)
- WO Master (5)
- PhD (6)

Q5 Have you ever driven an e-scooter?

- Yes (1)
- No (2)

Q6 How frequently have you used a shared e-scooter the past year?

- Every day (1)
- Several times a week (2)
- Several times a month (3)
- Very rare (4)
- Never (5)

Q7 Have you ever consumed alcohol?

- Yes (1)
- No (2)

Q8 Have you ever found yourself drunk?

○ Yes (1)

○ No (2)

Q9 Have you ever driven a car when you had drunk enough to be in trouble if the police had stopped you?

○ Yes (1)

○ No (2)

End of Block: vragen

8.5. Appendix 5: Data preparation

Table 2

Descriptive statistics

Descriptive Statistics

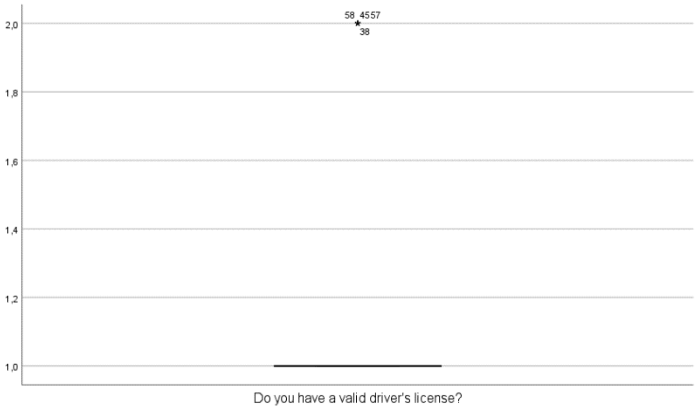
	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
conceptual1	61	2,00	7,00	5,3279	1,53538	-,806	,306	-,564	,604
conceptual2	61	1,00	6,00	3,4098	1,74525	,117	,306	-1,449	,604
conceptual2_reversed	61	2,00	7,00	4,5902	1,74525	-,117	,306	-1,449	,604
conceptual3	61	2,00	7,00	5,5738	1,30969	-1,041	,306	,278	,604
conceptual4	61	2,00	7,00	5,0492	1,44252	-,571	,306	-,711	,604
SSt1	61	1,00	6,00	2,9508	1,57508	,454	,306	-,860	,604
SSt2	61	1,00	7,00	4,6885	1,48931	-,442	,306	-,448	,604
SSt3	61	1,00	7,00	4,1311	1,67805	,005	,306	-,740	,604
SSt4	61	1,00	7,00	4,8197	1,65839	-,791	,306	,019	,604
SSt5	61	1,00	7,00	3,6721	1,87724	,058	,306	-1,106	,604
SSt6	61	1,00	7,00	4,9672	1,91457	-,718	,306	-,672	,604
SSt7	61	1,00	7,00	5,1148	1,87170	-,661	,306	-,620	,604
SSt8	61	1,00	7,00	4,2295	1,94417	-,251	,306	-1,155	,604
SSt9	61	1,00	7,00	3,0492	1,78350	,598	,306	-,765	,604
SSt10	61	1,00	7,00	4,3770	2,05072	-,255	,306	-1,172	,604
SSd1	61	1,00	7,00	4,3934	1,68601	-,565	,306	-,687	,604
SSd2	61	1,00	7,00	1,8852	1,34286	1,796	,306	3,303	,604
SSd3	61	1,00	7,00	4,5738	1,72684	-,852	,306	-,067	,604
SSd4	61	1,00	7,00	3,9344	1,50409	-,310	,306	-,750	,604
SSd5	61	1,00	7,00	5,0328	1,71238	-,959	,306	-,029	,604
SSd6	61	1,00	7,00	4,8033	1,53644	-,598	,306	-,062	,604
SSd7	61	1,00	7,00	4,2951	1,74494	-,257	,306	-,808	,604
SSd8	61	1,00	7,00	3,6066	1,76332	,138	,306	-,880	,604
SSd9	61	1,00	6,00	3,6557	1,59044	-,102	,306	-,998	,604
SSd10	61	1,00	7,00	3,4590	1,58718	,052	,306	-,624	,604
vulnerability_1	61	1,00	5,00	2,2131	1,21264	1,082	,306	,484	,604
vulnerability_2	61	1,00	6,00	2,7213	1,36786	,607	,306	-,394	,604
vulnerability_3	61	1,00	6,00	2,9672	1,69280	,373	,306	-1,100	,604
vulnerability_4	61	1,00	6,00	2,8525	1,78733	,592	,306	-1,041	,604
vulnerability_5	61	1,00	5,00	2,0164	1,25820	1,214	,306	,472	,604
vulnerability_6	61	1,00	7,00	2,6557	1,73095	,874	,306	-,323	,604
vulnerability_7	61	1,00	6,00	2,6230	1,51838	,732	,306	-,536	,604
vulnerability_8	61	1,00	7,00	2,6721	1,64034	,972	,306	,278	,604
vulnerability_9	61	1,00	7,00	2,6066	1,42920	,947	,306	,469	,604
vulnerability_10	61	1,00	6,00	3,0492	1,51026	,334	,306	-,855	,604
vulnerability_11	61	1,00	6,00	2,6885	1,50046	,832	,306	-,144	,604
vulnerability_12	61	1,00	7,00	4,0820	1,91742	-,164	,306	-1,251	,604
brand1	61	1,00	6,00	3,9016	1,49114	-,544	,306	-,827	,604
brand2	61	1,00	6,00	4,1639	1,28037	-,810	,306	,331	,604
brand3	61	1,00	6,00	4,0984	1,31282	-,598	,306	-,348	,604
brand4	61	1,00	6,00	4,0328	1,30342	-,343	,306	-,481	,604
brand5	61	1,00	6,00	4,3115	1,46675	-,696	,306	-,378	,604
perceptual1	61	1,00	6,00	2,6230	1,52931	,756	,306	-,527	,604
perceptual2	61	1,00	6,00	2,3770	1,52931	1,036	,306	-,072	,604
perceptual3	61	1,00	6,00	2,4590	1,60804	,972	,306	-,162	,604
perceptual4	61	1,00	6,00	2,2459	1,37424	,933	,306	-,194	,604
gender	61	1	2	1,51	,504	-,034	,306	-2,068	,604
license	61	1	2	1,08	,277	3,125	,306	8,029	,604
education	61	1	5	3,21	1,226	-,816	,306	-,528	,604
scooterexperience	61	1	2	1,38	,489	,520	,306	-1,789	,604
scooterfrequency	61	3	5	4,20	,771	-,357	,306	-1,219	,604
alcoholexperience	61	1	2	1,02	,128	7,810	,306	61,000	,604
drunkexperience	61	1	2	1,03	,180	5,380	,306	27,863	,604
drovewhileintoxicated	61	1	2	1,69	,467	-,835	,306	-1,348	,604
riskybehaviour	61	1,00	7,00	3,6066	1,89102	-,018	,306	-1,306	,604
condition	61	1,00	2,00	1,5246	,50354	-,101	,306	-2,058	,604
Valid N (listwise)	61								

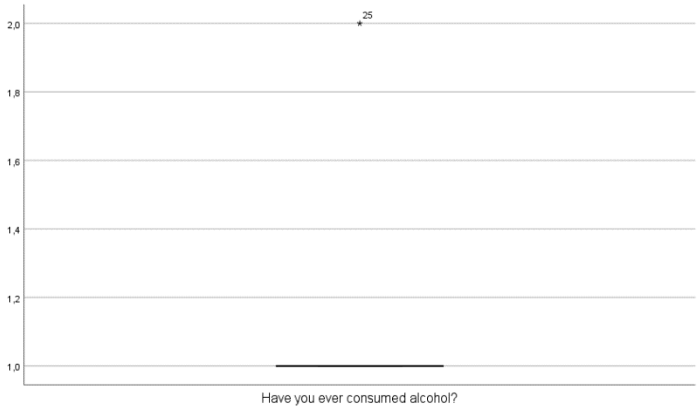
Missing data

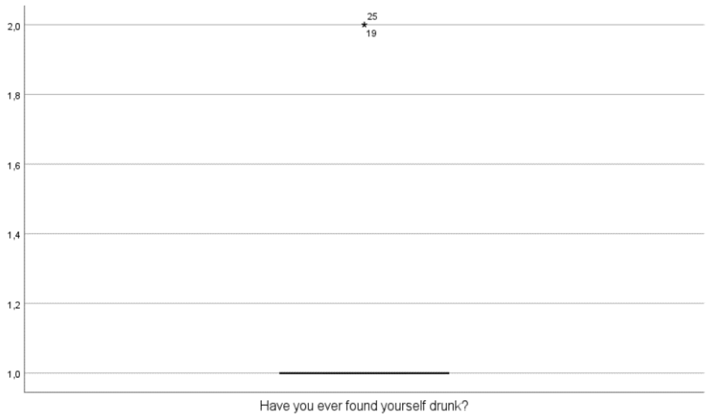
//61 participants

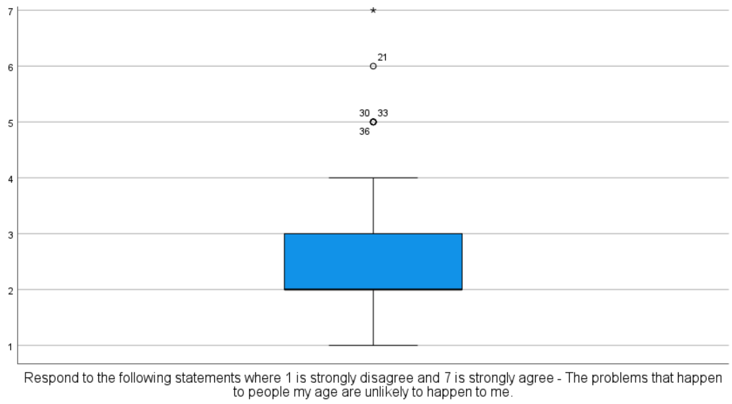
//0 missing data

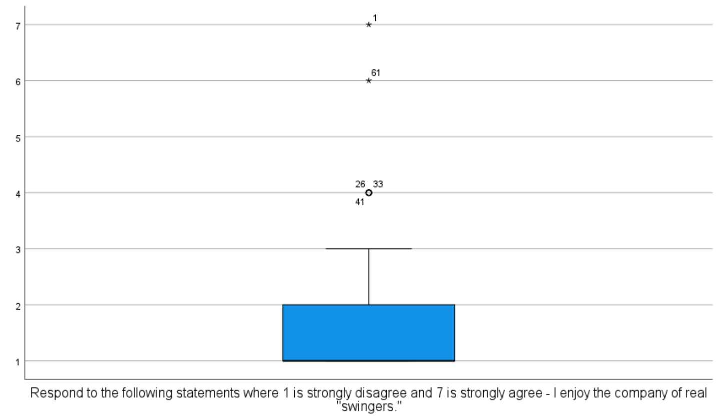
Stem-and-Leaf plots











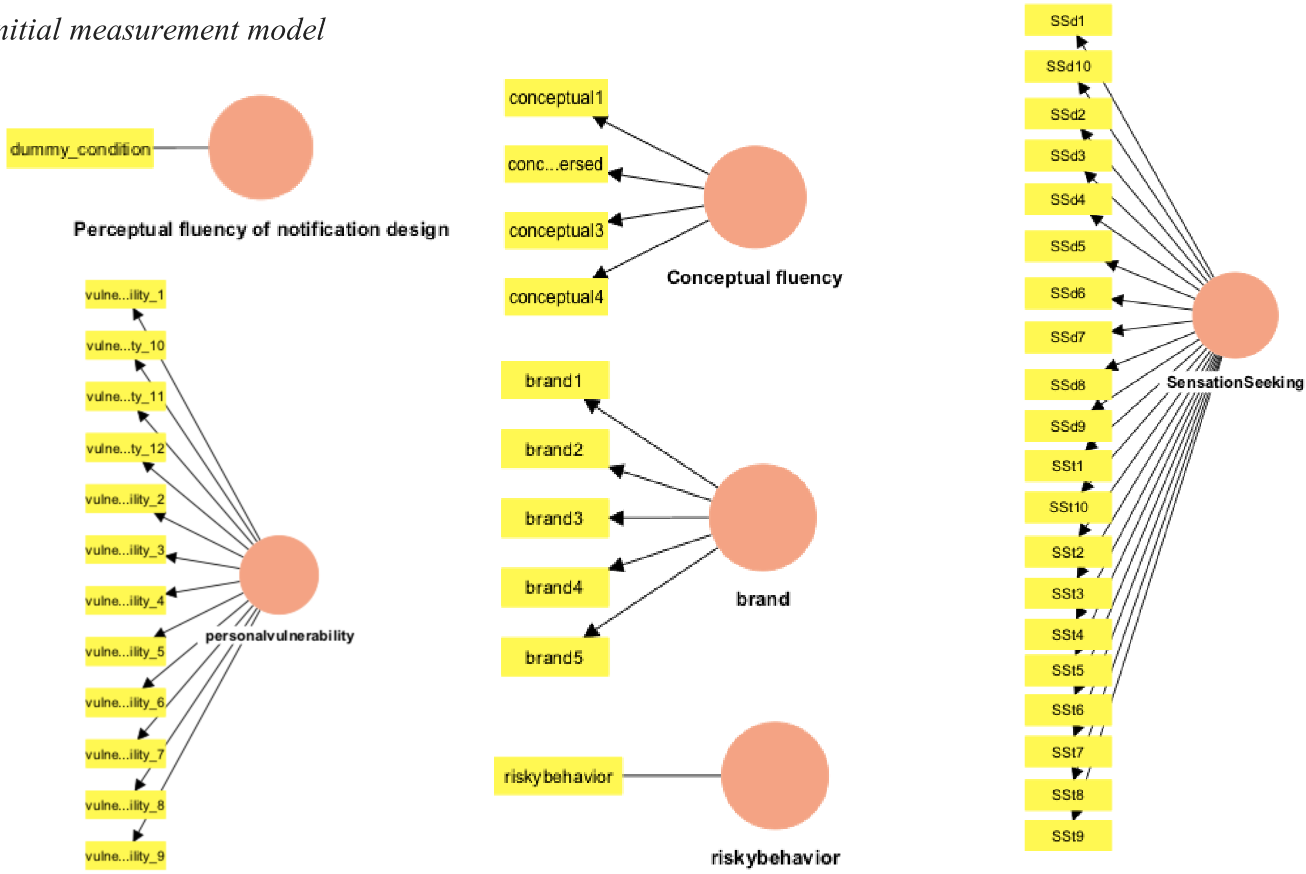
Normality assumption

Furthermore, descriptive statistics were used to indicate possible problems regarding the normality assumption. Skewness should range within -2 / 2 and kurtosis within -7 / 7 to have no problems regarding the normality assumption (Hair et al., 2019). Table A1.1 shows that there are three indicators (control variables) that demonstrate high positive skewness (>2) and high positive kurtosis (>7). However, since these are binary variables, they cannot be transformed using a log transformation or the square root measure and are therefore used in the analysis. SmartPLS can handle data that is not normally distributed (Wong, 2013).

8.6. Appendix 6: Evaluation of measurement model

Figure 7

Initial measurement model



Initial construct reliability and validity

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Brand attitude	0.930	0.967	0.949	0.825
Conceptual fluency	0.802	0.821	0.871	0.631
Personal Vulnerability	0.927	0.941	0.936	0.551
Sensation Seeking	0.893	0.899	0.895	0.317

8.6.1. Iterations

1. Loading on SSd10 was 0.134 which did not exceed the threshold (0.134 < 0,600). This item was therefore removed.

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Brand attitude	0.947	0.991	0.959	0.824
Conceptual fluency	0.802	0.821	0.871	0.630
Personal Vulnerability	0.927	0.941	0.936	0.551
Sensation Seeking	0.894	0.903	0.900	0.335

2. Loading on SSd7 was 0.283 which did not exceed the threshold (0.283 < 0,600). Subsequently item SSd7 was removed.

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Brand attitude	0.947	0.991	0.959	0.824
Conceptual fluency	0.802	0.820	0.871	0.630
Personal Vulnerability	0.927	0.941	0.936	0.551
Sensation Seeking	0.894	0.902	0.902	0.348

3. Loading on SSd9 was 0.314 which did not exceed the threshold (0.314 < 0,600). Subsequently item SSd9 was removed.

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Brand attitude	0.947	0.991	0.959	0.824
Conceptual fluency	0.802	0.820	0.871	0.630
Personal Vulnerability	0.927	0.941	0.936	0.551
Sensation Seeking	0.895	0.901	0.903	0.363

4. Loading on SSd6 was 0.401. which did not exceed the threshold (0.401< 0,600). Subsequently item SSd6 was removed.

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Brand attitude	0.947	0.991	0.959	0.824
Conceptual fluency	0.802	0.820	0.871	0.630
Personal Vulnerability	0.927	0.941	0.936	0.551
Sensation Seeking	0.891	0.901	0.903	0.375

5. Loading on SSd5 was 0.445 which did not exceed the threshold (0.445< 0,600). Subsequently item SSd5 was removed.

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Brand attitude	0.947	0.991	0.959	0.824
Conceptual fluency	0.802	0.819	0.871	0.630
Personal Vulnerability	0.927	0.941	0.936	0.551
Sensation Seeking	0.890	0.900	0.902	0.388

6. Loading on SSd3 was 0.438 which did not exceed the threshold (0.438 < 0,600). Subsequently item SSd3 was removed.

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Brand attitude	0.947	0.991	0.959	0.824
Conceptual fluency	0.802	0.819	0.871	0.630
Personal Vulnerability	0.927	0.941	0.936	0.551
Sensation Seeking	0.888	0.896	0.902	0.402

7. Loading on SSd2 was 0.462 which did not exceed the threshold (0.462< 0,600). Subsequently item SSd2 was removed.

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Brand attitude	0.947	0.991	0.959	0.824
Conceptual fluency	0.802	0.818	0.871	0.631
Personal Vulnerability	0.927	0.941	0.936	0.551
Sensation Seeking	0.886	0.892	0.901	0.417

8. Loading on SSt1 was 0.495 which did not exceed the threshold (0.495< 0,600). Subsequently item SSt1 was removed.

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Brand attitude	0.947	0.991	0.959	0.824
Conceptual fluency	0.802	0.818	0.871	0.631
Personal Vulnerability	0.927	0.941	0.936	0.551
Sensation Seeking	0.882	0.888	0.899	0.431

9. Loading on SSd1 was 0.496which did not exceed the threshold (0.496< 0,600). Subsequently item SSd1 was removed.

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Brand attitude	0.947	0.991	0.959	0.824
Conceptual fluency	0.802	0.818	0.871	0.631
Personal Vulnerability	0.927	0.941	0.936	0.551
Sensation Seeking	0.876	0.886	0.898	0.448

10. Loading on SSd8 was 0.531which did not exceed the threshold (0.531< 0,600). Subsequently item SSd8 was removed.

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Brand attitude	0.947	0.991	0.959	0.824
Conceptual fluency	0.802	0.818	0.871	0.631
Personal Vulnerability	0.927	0.941	0.936	0.551
Sensation Seeking	0.872	0.878	0.896	0.465

11. Loading SSd4 was 0.552 which did not exceed the threshold (0.552< 0,600). Subsequently item SSd4 was removed.

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Brand attitude	0.947	0.991	0.959	0.824
Conceptual fluency	0.802	0.818	0.871	0.631
Personal Vulnerability	0.927	0.941	0.936	0.551
Sensation Seeking	0.873	0.882	0.897	0.493

12. Loading SSt5 was 0.636 which did exceed the threshold (0.636 > 0,600). But since convergent validity was still not reached, the first lowest item was still deleted. Subsequently item SSt5 was removed. With that, convergent validity was achieved.

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Brand attitude	0.947	0.991	0.959	0.824
Conceptual fluency	0.802	0.816	0.872	0.632
Personal Vulnerability	0.927	0.941	0.936	0.551
Sensation Seeking	0.867	0.885	0.894	0.515

Figure 8

Final measurement model

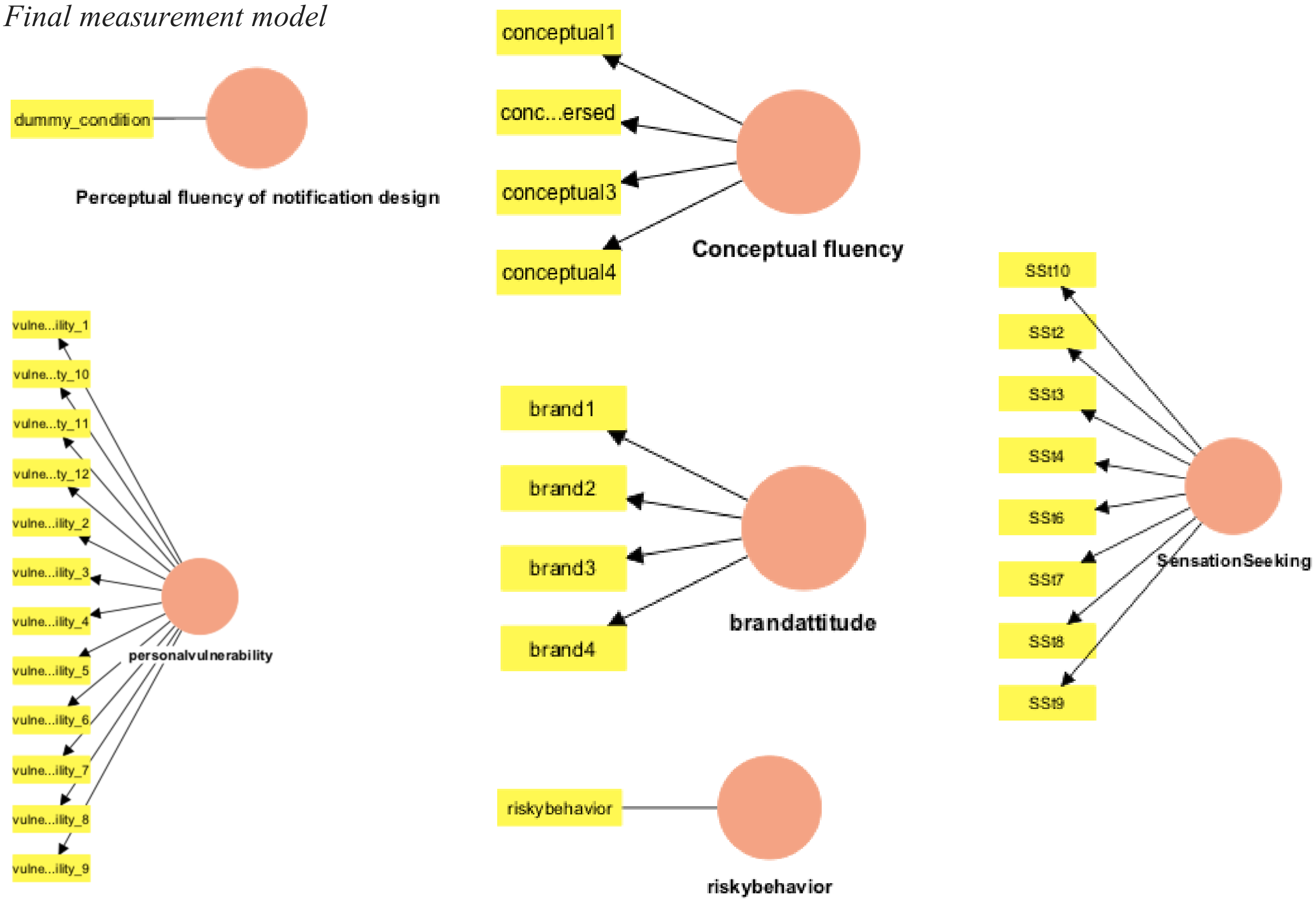


Table 3

Final construct reliability and validity

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Brand attitude	0.947	0.991	0.959	0.824
Conceptual fluency	0.802	0.816	0.872	0.632
Personal Vulnerability	0.927	0.941	0.936	0.551
Sensation Seeking	0.867	0.885	0.894	0.515

Table 4

Discriminant validity HTMT

	Intention to	Perceptual F	Personal Vul	Conceptual Flu	SensationSe	age	brand	d_drov	d_scooterex	gender	scooterfrequ	SensationSeeking x Perceptual Fluency of Notification Design
Intention to engage in risky behavior												
Perceptual fluency of notification De	0.168											
Personal Vulnerability	0.362	0.117										
Conceptual Fluency	0.247	0.540	0.209									
SensationSeeking	0.126	0.138	0.400	0.410								
age	0.216	0.163	0.135	0.120	0.210							
brand	0.193	0.050	0.346	0.197	0.269	0.241						
dummy_drovewhileintoxicated	0.424	0.069	0.508	0.108	0.092	0.221	0.163					
dummy_scooterexperience	0.324	0.004	0.372	0.173	0.114	0.102	0.223	0.231				
gender	0.311	0.017	0.603	0.047	0.485	0.103	0.156	0.188	0.292			
scooterfrequency	0.255	0.013	0.393	0.146	0.273	0.085	0.342	0.405	0.729	0.382		
SensationSeeking x Perceptual fluen	0.133	0.100	0.170	0.189	0.734	0.030	0.034	0.043	0.011	0.375	0.117	

8.7. Appendix 7: Evaluation of structural model

Table 5

Goodness-of-Fit

GoF-Index calculation	
Mean construct communality	**Conceptual Fluency** 0,632 **Personal Vulnerability** 0,551 **Sensation Seeking** 0.515 **Risky Behaviour** 0,825 **Mean =** 0,63075
Mean R^2	**Personal Vulnerability** 0,011 **Conceptual fluency** 0,349 **Risky behaviour** 0,345 Mean = 0,235
GoF-Index	$\sqrt{0.235} * 0.63075$ = 0,38500162

Table 6

Collinearity among predictor constructs (VIF values)

	Intention to	Perceptual fl	Personal Vul	Conceptual f	SensationSeeking	age	brand	dumm	dummy_sco	gender	scooterf	SensationSeeking x Perceptual fluency of Notification Design
Intention to engage in risky behavior												
Perceptual Fluency of Notification Design				1.018								
Personal Vulnerability	2.476											
Conceptual Fluency			1.000									
SensationSeeking				1.945								
age	1.215											
brand	1.273											
dummy_drovewhileintoxicated	1.868											
dummy_scooterexperience	2.281											
gender	1.710											
scooterfrequency	2.789											
SensationSeeking x Perceptual Fluency of Notification Design				1.930								

Table 7

Coefficient of determination

R^2 SmartPLS output

	R-square	R-square adjusted
Intention to engage in risky behaviour	*0.345*	*0.258*
Personal vulnerability	*0.011*	*-0.006*
Conceptual fluency	*0.349*	*0.315*

Table 8

F^2 SmartPLS output

	Intention to (	Peceptual flu	Personal Vul	Conceptual Flu	SensationSe	age	brand	d_drov	d_scooterex	gender	scooterfrequ	SensationSeeking x Perceptual fluency of Notification Design
Intention to engage in risky behavior												
Perceptual fluency of Notification Design				0.315								
Personal Vulnerability	0.001											
Conceptual Fluency			0.011									
SensationSeeking				0.138								
age	0.066											
brand	0.032											
dummy_drovewhileintoxicated	0.078											
dummy_scooterexperience	0.084											
gender	0.047											
scooterfrequency	0.038											
SensationSeeking x Perceptual fluency of Notification Design				0.023								

8.8. Appendix 8: Structural model output SmartPLS

Figure 9

Structural model