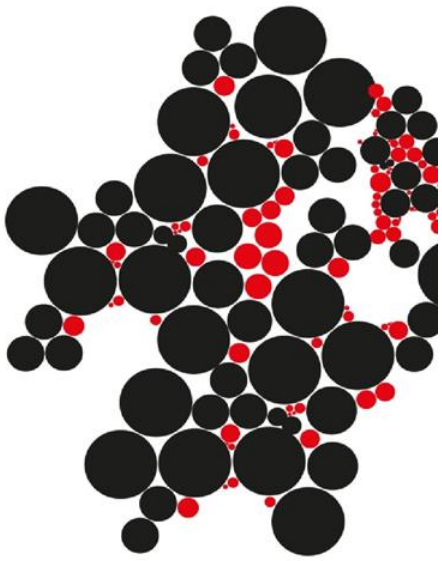
The potential of Augmented Reality Glasses in the Practice of Street Policing: an Experimental Study among Dutch (Mounted) Police Officers



A Thesis

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By

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Abstract (ENG)

Augmented Reality (AR) is a technique that adds information from a computer to the 'real' world through, for example, AR glasses. This innovative technology may take intelligence-led policing to the next level. However, there is not sufficient knowledge at this moment of how AR technology could be used for police work. Therefore, the objective of this study was to research whether police officers would accept AR glasses in the practice of street policing. Further, this study sought to answer what psychological factors may affect technology acceptance among police officers. Hence, psychological processes characteristic for field policing have been the focus of this study, which included: risk perception, subjective norms, and perceived stress. To examine this, a field experiment was organised during the summer of 2020. During the experiment, a sample of street police officers and mounted police (N= 75) got the opportunity to work with the navigation and notification functions of the AR glasses. After finishing the experiment, the participants filled out a digital questionnaire and 41 interviews were conducted. Based on the findings, it can be concluded that mainly the risk perception and subjective norms play an important role in the acceptance of the AR glasses, as opposed to perceived stress. One mediation effect was found between risk perception and behavioural intention (mediated by the perceived usefulness). The additional analyses and qualitative data further supported the previous conclusions. It was found that both the street police officers and mounted police officers were enthused by the possibility of working with the AR glasses. Particularly the mounted police officers thought the AR glasses would be useful for them because they operate nationwide. To conclude, a number of preconditions have been outlined that underlie the acceptance of AR glasses for policing.

Keywords: street policing, technology acceptance, perceived ease of use, perceived usefulness, risk perception, subjective norms, perceived stress.

Abstract (NL)

Augmented Reality (AR) is een techniek waarbij informatie van een computer wordt overgedragen naar de ‘echte’ wereld, door middel van bijvoorbeeld AR-brillen. Dit is mogelijk een veelbelovende techniek om politiewerk efficiënter en eenvoudiger te maken. Echter is er op dit moment onvoldoende kennis over hoe AR-technologie ingezet kan worden voor politiewerk. Het doel van dit onderzoek was daarom om te onderzoeken of politieagenten openstaan voor deze nieuwe technologie en welke psychologische factoren hierbij een rol spelen. In het specifiek is er daarom ingezoomd op psychologische processen die als kenmerkend worden beschouwd voor politiewerk op straat, namelijk: risicoperceptie, subjectieve normen en de mate van ervaren stress. Om het voorgaande te onderzoeken is er een veldexperiment georganiseerd in de zomer van 2020. Tijdens dit experiment heeft een steekproef van straatagenten en de bereden politie (*N*= 75*)* de mogelijkheid gekregen om de AR-bril te gebruiken voor navigatie- en notificatiefuncties. Na afloop hiervan hebben de agenten een digitale vragenlijst ingevuld en zijn 41 interviews afgenomen. Op basis van de resultaten kan geconcludeerd worden dat voornamelijk de risicoperceptie en subjectieve normen een cruciale rol spelen in de acceptatie van de AR-bril in tegenstelling tot de ervaren stress. Er is één mediërend effect gevonden tussen de risicoperceptie en de gedragsintentie (gemedieerd door de ervaren nuttigheid van de AR-bril). De additionele analyses en de kwalitatieve data ondersteunen de voorgaande conclusies. Zowel de straatagenten als bereden politie bleken enthousiast te zijn over de mogelijkheid om met AR-brillen te werken. De bereden politie gaven aan de AR-brillen als een echte aanwinst te zien omdat zij landelijk worden ingezet tijdens hun werk. Tot slot is uiteengezet welke factoren nog meer bijdragen aan de acceptatie van AR-brillen voor politiewerk.

***Trefwoorden*:** politiewerk, acceptatie van technologie, gebruiksgemak, bruikbaarheid, risico perceptie, subjectieve normen, ervaren stress.

Introduction

Innovative applications of Augmented Reality (AR) are expected to have a significant impact on the way we view and interact with the world around us. AR technology refers to technologies that synthesize virtual elements and the real world, resulting in a real-time experience in which the physical reality has been augmented or supplemented by computer-generated information (Ibáñez & Delgado-Kloos, 2018; Wang, Ong, & Nee, 2016). According to researchers from various disciplines, AR will have unlimited and game-changing potential in many fields, such as education, medicine, business, and law enforcement (Eckert, Volmerg, & Friedrich, 2019; Lee, 2012; Marks, 2011; Tredinnick, 2018; Tzima, Styliaras, & Bassounas, 2019).

For example, educational experts have reported that the use of AR technology may increase student motivation, resulting in enhanced student performance (Radosavljevic, Radosavljevic, & Grgurovic, 2018; Tzima et al., 2019). Similarly, the medical field has adopted AR applications to assist medical professionals in surgical and other critical practices (Chen et al., 2019; Gazzoni & Cerone, 2018; Haba, Sukenaga, Ueki, Furutani, & Komasa, 2020). As for business, the added value of AR technology lies in its possibility to create a blended workspace wherein team processes can be facilitated by providing digital information with one another (even remotely). Further, AR technology enables employees to execute certain tasks handsfree, making business processes more efficient (Tredinnick, 2018). Thanks to these promising instances, the possibilities of implementing AR within the police context is gaining more and more attention as well (Lukosch, Lukosch, Datcu, & Cidota, 2015; Marks, 2011).

In contrast to education, medicine, and business, AR technology has not been studied extensively within the police context. Yet, there are various possibilities to implement AR technology in the practice of street policing. For example, AR technologies could be employed to translate language, to obtain real-time information about crimes on patrol, to apply recognition data, and to create three-dimensional maps of areas police officers navigate through (Cowper & Buerger, 2003). Interestingly, some of these applications of AR have already been tested. For instance, Chinese police officers have experimented with smart glasses with a built-in facial recognition function to screen travellers who were passing through Zhengzhou railway station (Baraniuk, 2018). Likewise, other studies have explored the practicality of AR for field policing, ranging from crime scene studies, to studies that used AR to track criminals or locate explosive devices (Liao, Yang, Lee, Xu, & Bennett, 2020; Lukosch et al., 2015; Marks, 2011).

Although AR studies in the police context are becoming more prevalent, the number of studies is still limited. Additionally, preceding studies have primarily focussed on the applications of AR devices (Baraniuk, 2018; Datcu, Lukosch, & Lukosch, 2016; Marks, 2011), and have not (or to a lesser extent) addressed the psychological, cultural, behavioural, and other human attributes associated with using AR technology among police officers. Thus, it remains unknown what psychological factors may promote or obstruct the use of AR glasses, while these factors may predict whether police officers, and on a broader level, the police as an intelligence-led organization, would be willing to work with AR technology (Berkemeier, Zobel, Werning, Ickerott, & Thomas, 2019). On top of that, the Dutch police have been experimenting with various technologies that may support police officers in their work. Regardless of that, it remains undetermined what factors contribute to the successful implementation of technologies for field policing (Ernst, ter Veen, Lam, & Kop, 2019). Therefore, this study's aim is to assess whether Dutch (mounted) police officers would accept AR glasses as a new potential technology. In addition, this study seeks to reveal what psychological mechanisms contribute to the police officers' technology acceptance of AR glasses. By unveiling these mechanisms, it will become clear if and how AR glasses may help to make field policing more efficient. In addition, increased knowledge of these mechanisms may hold important implications for the implementation process (Teo, 2011).

In the following paragraphs, an overview of the AR literature will be discussed. First, a brief history of AR technology will be given as well as a more comprehensive definition of AR. Thereafter, the theory behind technology acceptance will be outlined. Next, the link between technology acceptance and the psychological mechanisms characteristic for field policing will be considered.

A Brief History of Augmented Reality (Glasses) and its Definition

The first invention of AR technology, the *Sword of Damocles*[1], dates back to 1968 and was invented by computer scientist Ivan Sutherland. Specifically, it was a head-mounted display that allowed users to partially see through the device, so that they would not be totally detached from their surroundings. The possibility of interacting with the real world while using AR technology is one of the fundamental characteristics of AR. In this case, the display

[1] The first head-mounted AR display was named after the Greek courtier 'Damocles' who was intimidated by the tyrant, Dionysius. Dionysius suspended a sword that was tied to the hair of a horse above Damocles' head as a way of saying that those who thrive must always be watchful.

could show the output of another computer programme and relied on headtracking, following the gaze of the user to show the output (Peddie, 2017).

Subsequently, in the 1970s and 1980s, other research departments such as NASA and the U.S. Airforce Armstrong's Laboratory gained interest in studying whether AR applications could be beneficial for the military and air- and spacecraft. Within this context, AR displays were used to provide air-traffic controllers with barometer settings, runway assignments and wind conditions. In addition, the displays would allow the controllers to see through adverse weather circumstances that would otherwise be unworkable and would lead to complete cancellation of flights (Stephen et al., 2002).

During the late 90s, AR officially became a research field, leading to international workshops on the topic as well as symposia. Around the same time, Ronald Azuma helped to define AR by demarcating three core elements of AR, which include (a) the synthesisation of the virtual world with the real world, (b) the possibility of movement in 3D and (c) the interaction in real-time (Carmigniani, 2011; Peddie, 2017). The sensory input that can be used by AR technology include text, images, 3D-models, music, and videos (Yungiang et al., 2019). Further, virtual reality (VR) and AR are sometimes perceived as interchangeable concepts while AR distinguishes itself by its capacity to integrate all types of information to the real world. In contrast, VR replaces the real world to let the user interact with a simulated one (Detmer, Hettig, Schindele, Schostak, & Hansen, 2017).

The first AR glasses, the *MicroOptical*, were launched in 1997. Since then, other glasses have found their way to the market, amongst which were the first commercial glasses, called *Glasstron*, which were produced by Sony (Peddie, 2017). Another example of AR glasses include Google glasses, which have the capacity to present information directly on the vision of the user wearing the glasses (Han, Tom Dieck, & Jung, 2019). Since then, other companies started to develop AR glasses at a fast rate. Currently, AR is still rapidly emerging and remains a technology of interest among researchers, developers, and investors (Wang et al., 2016).

Technology Acceptance and Augmented Reality Glasses within the Police Context

The traditional technology acceptance model (TAM). Technology acceptance can be defined as the psychological state that drives an individual to voluntarily use an emerging technological device (Jen-Hwa Hu, Lin, & Chen, 2005). The first model that explained technology acceptance is called the Technology Acceptance Model (TAM) and was developed by Davis (1989). According to the TAM, the perceived ease of use (PEOU) and the

perceived usefulness (PU) of a technology make up the attitude toward a technology (Marangunić & Granić, 2015; Pavlou, 2003). Hereby, the PEOU refers to 'the degree to which a person believes that using a particular system would be free of effort' (Davis, 1989, p. 320). The PU is defined as 'the degree to which a person believes that using a particular system would enhance his or her job performance' (Davis, 1989, p. 320). Additionally, the PEOU an PU affect the behavioural intention to use a technology. The behavioural intention refers to the willingness and readiness to perform specific behaviour (Azjen, 2011). In Figure 1, the TAM model is illustrated. As shown in Figure 1, external variables may affect the PEOU and PU. These external variables generally refer to context-specific characteristics (Al-Emran, Mezhuyev, & Kamaludin, 2018). Therefore, psychological variables that are characteristic for the context of field policing were integrated in this study.

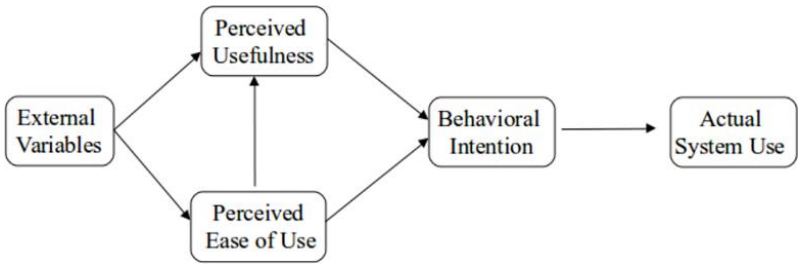

Figure 1. Technology Acceptance Model (TAM). Adapted from "A critical assessment of potential measurement biases in the technology acceptance model: three experiments," by F. D. Davis and V. Venkatesch, 1996, *International Journal of Human – Computer Studies, 45*(1), p. 20.

In their study, Colvin and Goh (2005) assessed the TAM in the context of law enforcement. Particularly, they explored what factors could explain why officers in the field would accept or reject technology. They focused on computer technology and found some evidence that the PEOU and PU affected the behavioural intention among police officers. In another study, COPLINK Mobile was tested on a handheld device among patrol officers. COPLINK Mobile grants police officers access to obtain critical information from crime databases. In addition, police officers can request important information (such as locations and crime events) through a radio function that enables real-time communication. The overarching aim of the study was to investigate whether police officers would accept COPLINK as a potential technology that would enable collaboration across agencies. The authors concluded that mostly the PU was a strong predictor of technology acceptance levels (Hu & Chen, 2005). Moreover, Lindsay, Jackson, and Cooke (2011) found that the

technology acceptance among police officers is greatly determined by the PEOU of a technology. Although the aforementioned studies did not test AR technology specifically, the previous findings in other technology acceptance studies among police officers give reason to expect that:

H1. *The PEOU and the PU positively influence the behavioural intention to use AR glasses among police officers.*

As presented in Figure 1, the PEOU directly influences the PU of a technology. Herewith, Davis (1989) theorized that the easier individuals would find a technology to use, the more useful they would find that technology. What is more, this link between the PEOU and subsequent PU has been corroborated by other technology acceptance studies (Dwi, Muhammad & Esa, 2018; Rese, Schreiber & Baier, 2014). Therefore, this study will test this relationship as well, leading to the following prediction:

H2. *The PEOU positively relates to the PU of the AR glasses; when the PEOU increases, the PU increases as well.*

Incorporating policing variables into the TAM. As mentioned earlier, external variables are an integral part of the TAM and may impact technology acceptance. At this time, there is not much knowledge of what external, psychological variables may impact technology acceptance among police officers. On top of that, there is little previous research available that has focused on AR technology and field policing. One exception to this involves a study performed by Engelbrecht and Lukosch (2020), which focused on testing augmented content among Dutch police officers. Their study has given a first, general impression of how police officers perceive AR for their work in the field. Nevertheless, they concluded that more research would be necessary to determine whether AR would be appropriate for field policing Therefore, this study will focus more deeply on a number of psychological variables that are characteristic for field policing, which include (a) risk perception, (b) subjective norms, and (c) perceived stress.

Firstly, the impact of risk perception on technology acceptance will be of interest. Given that police officers working in the streets have to engage continuously in complex decision-making processes about their actions relating to the public, criminals, and their environment (Dror, 2007), they also have to appraise risky situations they come across. The

technological devices they use during their work may also evoke risky situations. Thus, letting police officers operate with AR glasses will give insight into their risk perceptions of using the AR glasses while carrying out a variety of actions in the field.

Secondly, the subjective norms of the police officers will be added as an additional research variable. A characteristic of field policing includes working together with colleagues who are part of the same social group. Hereby, a social group refers to an aggregation of at least two people who share the same social identity. Individuals who share the same social identity tend to describe themselves as being similar to one another in terms of qualities and self-concept (Hogg, Abrams, Otten, & Hinkle, 2004). As a result, sharing a social identity influences group members in that they adopt similar attitudes, beliefs and behavioural intentions (Hagger & Chatzisarantis, 2006). Thus, it presumed that the perceptions of colleagues are important among police officers.

Thirdly, the role of perceived stress will be examined in this study. Being exposed to different types of stressors, ranging from slightly to deeply traumatic, is unavoidable in the practice of street policing (Gershon, Barocas, Canton, Xianbin, & Vlahov, 2008; Xu, 2020). As a consequence, police officers will experience fluctuating levels of stress most of the time during their work. Acknowledging the major role of police stressors, the relationship between perceived stress and the TAM components is incorporated in this study as well.

Risk perception and behavioural intention. Generally, risks can be classified according to three categories (probability, exposure, and consequences of exposure), formulaically expressed as the risk (r) = likelihood (l) x consequence (c). Thus, it is the probability of an event, situation, or behaviour having a specific outcome (Slovic & Weber, 2002). The appraisal of risks, also known as risk perception, refers to the cognitive process in which people evaluate risk characteristics in terms of their acceptability and seriousness (Renn & Benighaus, 2013). More specifically, the perceived risk associated with the use of technologies can be defined as the ‘felt uncertainty regarding possible negative consequences of using a product or service’ (Featherman & Pavlou, 2003, p. 453). The types of risks associated with using a technology can be classified as either psychological, physical, or as risks due to uncertainty associated with a technology. In this case, psychological risks refer to ‘the potential anxiety or disappointment that can occur after the consumer purchases the technology’ (Kalantari & Rauschnabel, 2018, p. 8). In contrast, uncertainty risks are primarily economical or functional and may involve loss of money or inadequate performance of the technology. Lastly, physical risks occur when the use of a technology may result in physical injury (Chuah, 2019).

In extension of the different types of risks, incorporating perceived risk within the TAM in relation to field policing is imperative since the use of a wearable technology impacts the user's vision and may in turn affect the ability to move adequately (Chuah, 2019). What is more, using AR glasses may obstruct the central and peripheral vision to such an extent that important visual cues are no longer observed correctly, or in the worst case, are not noticed at all (Sabelman & Lam, 2015). For instance, police officers may not see a perpetrator fleeing from their peripheral vision, may misjudge the speed of an approaching vehicle, or may underestimate their reaction time in a high-stake situation. The previous examples illustrate that these risks may result in detrimental scenarios. Therefore, it is necessary to study whether police officers perceive the use of AR glasses as risky. The risk perception of AR glasses in this context can thus be interpreted as the estimated physical risk of police officers. This has important implications for the technology acceptance since higher risk perceptions of a technology may interfere with the PU of that technology. That is, when individuals perceive a technology as risky, they are less inclined to evaluate that technology as useful and will be hesitant to adopt that technology (Siegrist, 2008). Therefore, it is hypothesized that:

H3. *Low risk perceptions and the PU will have a positive relationship, meaning that the lower the risk perception, the higher the PU of the AR glasses*

H4. *Low risk perceptions and the behavioural intention will have a positive relationship meaning that the lower the risk perception, the higher the behavioural intention to use the AR glasses*

Subjective norms and behavioural intention. Subjective norms can be defined as the 'evaluation of whether an individual feels significant others think he/she should engage in specific behaviour' (Sharma et al., 2015, p.2). In other words, when an individual believes that important people to him or her value specific behaviour, the more they are inclined to perform that behaviour as well (Choi & Chung, 2012). The idea that subjective norms play an important role in policing is supported by previous studies. For instance, it was found that police officers' often wonder about how others view and evaluate their actions and use these perceptions to guide their own behaviour (Finckenauer, 1976; Ishoy, 2016). Moreover, police officers seem to value their relationships with their colleagues, perceiving their attitudes as particularly important to them (Bell & Eski, 2016). With regard to technology acceptance, colleagues tend to share similar ideas about the usefulness of technologies. As a result, one

will be more willing to work with a technology when colleagues think positively about that technology. This is corroborated by the study of Schepers and Wetzels (2007), who concluded that subjective norms are strongly related to the PU and the subsequent intention to use a novel technology. So, it is expected that:

H5. *There will be a positive relationship between the subjective norms and the PU of the AR glasses, meaning that police officers who believe their colleagues find the AR glasses useful, will find the AR glasses more useful themselves*

H6. *The subjective norms will positively influence the behavioural intention, meaning that police officers who believe that their colleagues would want to work with the AR glasses, will be more likely to want to work with the AR glasses as well*

Perceived stress and behavioural intention. The affective state of stress can be defined as 'an experience that occurs when individuals simultaneously appraise events as threatening or otherwise harmful and their coping resources as inadequate' (Cohen, Gianaros, & Manuck, 2016, p. 458). An intrinsic part of working as a police officer in the field involves dealing with numerous stressors on a daily basis. For example, police officers on patrol may encounter threatening and traumatic situations that may pose a risk to their own safety (Aaron, 2000; Bell & Eski, 2016; Violanti, Castellano, O'Rourke, & Paton, 2006). Such situations may include recovering dead bodies, witnessing the death of another police officer, experiencing violence toward oneself or having to use violence to protect oneself (Bano & Talib, 2017). These examples do not make up an exhaustive list, but do paint a picture of the amount of stress that police officers may face in their line of duty. Because police officers can be exposed to high levels of stress, it is an important variable to take into account when studying the technology acceptance of AR glasses among police officers.

Although there are no studies about stress in the police context and technology acceptance, other studies that examined these subjects can serve as a reference to hypothesize if and how stress and technology acceptance may be linked. With respect to the TAM model, it is presumed that negative emotions may lessen the PEOU of a technology. The reason for this is that emotions such as anxiety and stress may monopolize an individual's attention so that they do not have complete attention for the task at hand (Venkatesh, 2000). In this case, negative affect interferes with the attentional process that is needed to easily work with a technology. In addition, deterrence emotions, such as anxiety, worry, fear, and stress are

presumed to negatively affect the appraisal of a technology in terms of usefulness. As a consequence, feeling stressed will lessen the behavioural intention to use a technology (Beaudry & Pinsonneault, 2010). On a broader level, the effect of moods and emotions on technology acceptance have been studied in the past (Marangunić & Granić, 2015). According to Hoong, Thi, and Lin (2017), the emotional state while using a specific technology affects the perception of that technology in terms of its opportunities and threats. Specifically, intense emotive states, such as stress, are more likely to affect someone's beliefs while performing tasks and activities than less intense emotions or moods (Bohner, Crow, Erb, & Schwarz, 1992). Transferring this knowledge to this study, it is suspected that:

H7. *The higher the perceived stress (negative affect) among the police officers, the lower the PEOU and PU of the AR glasses.*

H8. *Perceived stress and the behavioural intention will be negatively associated, meaning that the higher the perceived stress, the lower the behavioural intention to use the AR glasses.*

In the figure below, all the previous discussed research variables and their expected relationships are illustrated as follows:

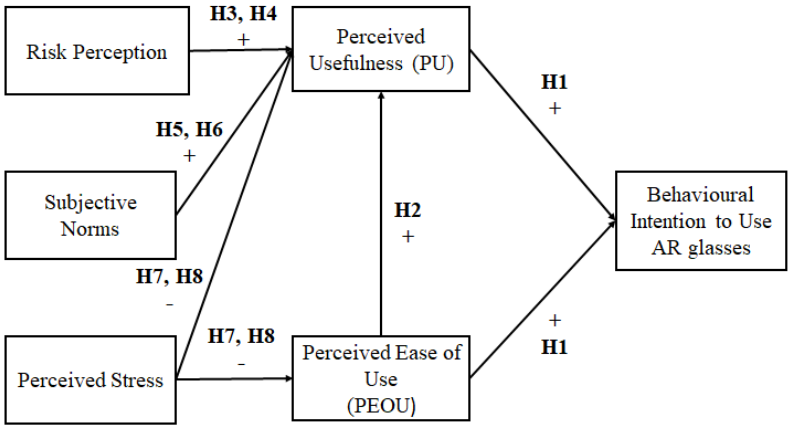

Figure 2. Hypothesized relationships between the research variables.

Method

Study Design

The objective of this study was to determine whether police officers would accept AR glasses as a new technology. Particularly, this study investigated whether risk perception,

subjective norms, and perceived stress underly the willingness to work with AR glasses from the perspective of street- and mounted police officers. To test the hypotheses, a field experiment was organised in collaboration with the Dutch (mounted) police during the summer of 2020. The experiment took place in two cities in the east of the Netherlands. During the experiment, the police officers testes two functionalities of the AR glasses. Further, there were two experimental conditions[2] the participants were randomly assigned to. After testing the AR glasses, the online questionnaire and the interviews assessed the research variables of interest.

Participants

The participants were recruited between the spring and summer of 2020 by the Dutch police by means of opportunity sampling. In total, 75 participants volunteered their time for the field experiment. With regard to the distribution of the participants among the cities, 70.7% (*n*= 53) partook in Nijmegen and 29.3% (*n*= 22) partook in Apeldoorn. Among the participants were a sample of mounted police and street police officers. Because of this, the descriptive statistics of these samples will be dealt with separately hereafter.

Mounted police. There were 13 participants in this sample, consisting of five males (38.5%) and eight females (61.5%). Ages ranged between 28 and 51 (*Meanage*= 38, *SD*= 7.19). On average, these officers have been in service of the police for 15.62 years (*SD*= 7.17). Among the participants were six senior constables, three sergeants, one superintendent. The other participants did not indicate their police rank[3]. From this sample, seven participants got the high priority condition and six participants received the low priority condition by random assignment.

Street police. This sample consisted of 61 participants, from which 55 were male (88.7%) and seven were female (11.3%). The ages varied across the sample from 21 to 60 years (*Meanage*= 35.60, *SD*= 10.29). Further, the average number of years the participants have been in service of the police was 10.82 years (*SD*= 10.81). The most common police rank within this sample was sergeant (32.2%), followed by senior constable (21.0%), and pupil (21.0%). The other ranks represented in this sample include inspector (8.1%), constable

[2] The experimental conditions were tested for broader research purposes that go beyond the scope of this study and included a high priority scenario and a low priority scenario. The experimental conditions were not expected to affect the results of this study given that the scenarios included realistic policing situations.
[3] Each country endorses their own ranking system within law enforcement. Please note that we have matched English ranking titles to the Dutch ranking titles we thought were most comparable. Nevertheless, we wish to emphasize that the English ranking titles and associated job content may not correspond fully to the Dutch context.

(4.8%), police administration worker (1.6%), and the category ‘other’ (11.3%). Among this sample, 30 participants were part of the high priority condition opposed to 32 participants who were assigned to the low priority condition.

Materials

The AR glasses that were used are called the Vuzix Blade, which are adaptable smart glasses that integrate the digital world with the real world with a variety of functionalities. The glasses feature a HD camera, noise cancelling microphones, full colour, wireless Wi-Fi, UV protection lenses, dual haptic feedback, multilingual voice control, and microSD expansion. In this study, exclusively the Wi-Fi function was used to establish a wireless connection between the glasses and the mobile phones. The applications that were used included the Vuzix Companion app and the RoboCop app. The Vuzix Companion app was used in order to link a mobile phone to the Vuzix Blade. The RoboCop application was created for this project by programmers from Hanze University of Applied Sciences (Groningen, the Netherlands). RoboCop was used by the police officers to navigate through the city and to receive notifications with hotspot information. Below, a photo has been inserted to illustrate what the glasses look like.

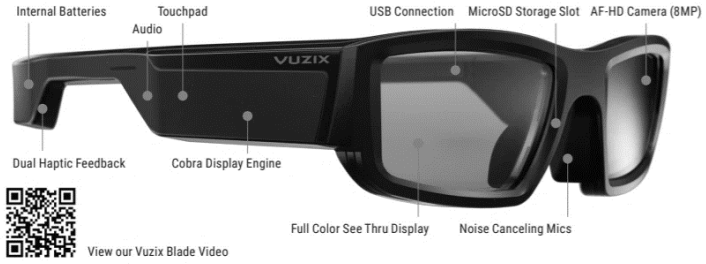

Figure 3. The Feature-Packed Vuzix Blade Smart Glasses with Advanced Waveguide Optics. Adapted from Vuzix Blade, retrieved from https://www.vuzix.eu/products/blade-smart-glasses.

Quantitative measures

Technology acceptance. Technology acceptance was measured with eight items that were inspired by the work of Davis (1989). The scale measured to what extent the police officers found the AR glasses user-friendly (PEOU) and useful (PU). Four items assessed the PEOU. One example was the item: ‘overall, I find the AR glasses easy to use.’ The other four items assessed the PU. One question included: ‘using the AR glasses saves me valuable time.’

The police officers could indicate their answers on a 5-point Likertscale, ranging from 1 (strongly disagree) to 5 (strongly agree). The mean scores of the scales were used to assess the PEOU and PU. The higher the mean PEOU score, the more user-friendly the police officers found the AR glasses. Similarly, a high mean score on the PU scale would mean that the police officers thought the AR glasses were very useful (PEOU α= .66, PU α= .90).

Behavioural intention. The behavioural intention scale assessed whether the police officers would be willing to work with AR glasses in the future. These items were used in another AR study by Ibili, Resnyansky, and Billinghurst (2019). The items were: 'I intend to use the AR glasses in the future' and 'I predict that I would use the AR glasses in the future.' These items were also assessed with a 5-point Likertscale, consisting of the same answer possibilities as the other scales. In this case, the higher the mean score, the greater the behavioural intention to work with the AR glasses (ρ = .94)[4].

Perceived risks. The risk perception scale consisted of three items and was based on the work of Clothier, Greer, Greer, and Mehta (2015). On this scale, the police officers could indicate to what extent they believed working with the AR glasses is risky (or not). A 5-point Likert-scale was used, from which the lowest point was 1 (strongly disagree), and the highest point was 5 (strongly agree). One of the items included: 'using the AR glasses is safe.' Higher mean scores on this scale corresponded to lower risk perceptions (α= .83).

Perceived stress. The self-report questions about perceived stress were adapted from a study by Ströfer, Ufkes, Noordzij, and Giebels (2016). The items asked the police officers whether they experienced stress during the experiment. For instance, one item was: 'to which extent did you feel tension during, or directly after the navigation task?' These questions were answered on a 5-point Likertscale, ranging from 1 (not at all) to 5 (extremely). Hereby, low scores matched low levels of perceived stress as opposed to high scores, which represented high levels of perceived stress (α= .67).

Subjective norms. Two items derived from the work of Venkatesh, Morris, Davis, and Davis (2003), were integrated in the questionnaire to get an idea of the police officers' normative beliefs about using AR glasses. An example of an item was 'colleagues whose opinion I value prefer that I should use the AR glasses', which could be answered using a 5-point Likertscale, with the same answer possibilities as the other scales. The total mean scores were calculated to get an idea about the subjective norms among the samples. In this case, higher scores corresponded to stronger normative beliefs about using the AR glasses (α= .89).

[4] The Spearman-Brown coefficient is a more appropriate measure to calculate the reliability of a two-item scale in comparison to the alpha coefficient (Eisinga, Grotenhuis, & Pelzer, 2013).

Qualitative measures

Semi-structured interview. In addition to the online questionnaire, 41 semi-structured interviews were analysed for this study[5]. The structured part of the interview consisted of seven questions and are summarized in Table 1. Roughly, there were three categories of structured questions, namely (a) questions about the police officers' experience and attitude towards using the AR glasses in the future, (b) questions about the cognitive demand of using the AR glasses, and (c) questions about the experimental conditions. In addition to the standard questions, specific follow-up questions were asked to get a more in-depth review of the participants' unique experience. For this study, only the qualitative data relating to technology acceptance were analysed and discussed in the result section.

Table 1

Overview of the Question Categories and Questions of the Semi-Structured Interview

Interview topic	Questions	
Technology acceptance	i.	How did you experience the use of AR glasses to navigate and to receive hotspot information? What went well and what did not?
	ii.	How would you feel if it was decided that the AR glasses would be implemented for your work to perform these tasks in the near future?
Cognitive load, situational awareness	i.	To what extent did you feel using the AR glasses demanded a lot of you mentally?
	ii.	Did you feel that the information you received helped to give you a clear idea of the situation? If yes, why? If no, why not?
Experimental condition	i.	What do you recall of the scenario you were shown on the mobile phone before engaging in the navigation task?
	ii.	Would you rate that as a high priority scenario or a low priority scenario?

[5] Initially, 47 interviews were conducted. However, it was discovered later that six interviews were missing. It is presumed that the interviews may not have been recorded at all, were lost during transmission from the audio recorder to the computer, or have been overwritten by other files. Therefore, 41 interviews were analysed.

iii. Imagine that you would have gotten a different scenario in terms of priority, would that have affected the way you handled the navigation task?

To establish how many police officers would be interviewed, saturation was the leading criterion. Saturation in qualitative research is reached when 'the appropriate depth has been reached and therefore it is there for the social scientist to make sense and describe.' (Constantinou, Georgiou, & Perdikogianni, 2017, p. 575) Although the aforementioned definition is rather ambiguous, findings from other studies suggest specific thresholds to attain saturation. According to these studies, the minimum number of interviews needed to ensure saturation lies around 12 interviews (Guest, Bunce, & Johnson, 2006; Latham, 2013).

Thematic analysis of the interviews. The interviews were analysed by means of thematic analysis, which entails the identification of meaningful patterns and reoccurring themes within qualitative data (Kiger & Varpio, 2020). The most widely used thematic analysis method as defined by Braun and Clarke (2006) was employed and consists of several steps. The first step involved the familiarization with the data. The researchers conducted this step by transcribing the interviews and checking the accuracy of the transcriptions in relation to the original audio recordings. Secondly, the researchers individually generated initial codes and coded the transcripts manually with Atlast.ti Version 9 qualitative analysis software. A predefined set of codes was used and corresponded to the psychological variables of the researchers' studies. The remaining texts were coded inductively, meaning that the codes arose from the qualitative data rather than from pre-existing ideas or theories (Varpio, Paradis, Uijtdehaage, & Young, 2020). The third step was to identify themes of broader significance within the data. The researchers brought their respective coding work together and conceptualised group codes to distinguish between broader themes and specific codes. The final coding scheme can be found in Appendix A.

Procedure

Preceding the experiment, all participants received information about the experiment through a flyer as well as the informed consent (see Appendix B) by e-mail. The police officers that registered for the experiment were contacted later with more specific information, such as the exact location and time they were expected at the police department. Seeing that the study took place during the COVID-19 pandemic, safety measures had been taken to minimize the contamination risk as best as possible. For instance, the precautions

were outlined in the informed consent to inform the participants of how everything was organised. Further, all safety concerns relating to COVID-19 have been addressed during the process of getting ethical approval for this project to ensure safe participation.

At the start of the actual experiment, each participant was welcomed by one of the researchers and received a short introduction about the experiment at the police department. During the introduction, the participants were told that they were about to follow a route with the help of navigation instructions using the AR glasses. They were also notified that they would come across various hotspots, which would be brought to their attention through the AR glasses. An example of one hotspot included an intersection where bikes are frequently stolen (see Appendix C for all hotspots). Next, all participants were taught how to use the AR glasses. After getting acquainted with the AR glasses, the police officers were escorted to the starting point of the route. Further, each participant received a cellular phone that they were asked to carry with them during the task. The cellular phones were connected to the glasses so that the navigation instructions and hotspot information would be transferred to the glasses. The participants did not have to use the phone, but only needed to carry it with them.

Subsequently, the researchers gave each participant a scenario. Specifically, this scenario encouraged the police officers to imagine that they were patrolling on a regular working day on the streets, stressing the importance to behave accordingly. The purpose of this was to keep the setting of the experiment as natural and realistic as possible. Except from the mounted police officers, the other police officers did not wear their uniforms to prevent unwanted attention by bystanders.

Just before embarking on the route, each participant was shown a notification on another cellular phone that included either a high priority scenario or a low priority scenario. These scenarios included believable, realistic policing scenarios. The high priority scenario was as follows: ‘stabbing at Café X, address:…, at least two wounded with severe injuries. One victim is being reanimated by bystanders. The perpetrator has fled the scene by foot. He was last seen at (location). Perpetrator description: white male, wears a cap, approximately 1 meter and 80cm high. Black shirt, light trousers.’ Opposed to the high priority scenario, the low priority scenario included a text that read: ‘public disorder at Café X, address: …, a young male is verbally abusive towards personnel and walked away intoxicated. No victims were reported. He was last seen at (location). Perpetrator description: white male, wears a cap, approximately 1 meter and 80cm high. Black shirt, light trousers.’ After the participants read the scenario, they were told they could start with the navigation task.

On each route, five hotspots were shown. A symbol in the right corner of the glasses

alerted the police officers of each hotspot. The route for both cities was approximately 700 meters long and led the participants to an area with restaurants, shops, bars and cafés. It took around seven to eight minutes to complete the route in an average walking pace. Each street police officer navigated individually to exclude the possibility of being influenced by colleagues. In contrast, the mounted police officers followed the route in pairs due to safety considerations. In this case, each mounted police officer was accompanied by a colleague that did not use the AR glasses and who was instructed not to interfere with the participant using the AR glasses. The aim of this was to collect data as unobtrusively as possible.

At the end of the route, the participants were awaited by one researcher who told them they had completed the navigation task. Subsequently, they were directed back to the police department. At their arrival at the police department, each participant was asked to fill out the digital questionnaire. Then, as previously mentioned, 47 police officers were invited to take part in the semi-structured interview, from which 41 interviews were used for subsequent analyses. Lastly, the police officers were debriefed about the priority manipulation and thanked for their participation.

Results

This section will discuss the quantitative and qualitative analyses. First, the Pearson correlations between the determinants and technology acceptance were calculated. Subsequently, the research hypotheses were tested. All quantitative analyses have been performed with the assistance of IBM SPSS Statistics 26 and the PROCESS macro by Hayes (2013). To conclude, the main findings from the qualitative data have been reported to get an in-depth understanding of the police officers' experiences.

Quantitative analysis

Relationships between the research variables. From Table 2, it can be concluded that there were many significant Pearson correlations between the TAM components and the other research variables. Firstly, the behavioural intention correlated significantly with the PEOU and PU, which grants early support for H1. Secondly, The significant correlation between the PEOU and the PU of the AR glasses provided initial backing for H2. In accordance with H3, lower risk perceptions and the PU correlated significantly. Similarly, as stated in H4, there was a significant positive relationship between the behavioural intention of using the AR glasses and lower risk perceptions. In alignment with the hypotheses relating to the subjective norms and technology acceptance, the results preliminary confirm H5.

Likewise, the significant relationship between the normative beliefs about the use of the AR glasses and the behavioural intention back H6. With regard to the relationships between the perceived stress and the TAM components, some initial evidence was found in support of the hypotheses. For instance, the results in part validate H7, seeing that there was a negative, significant relationship between the PEOU and the perceived stress. Nevertheless, H7 cannot be totally validated seeing that the negative relationship between the PU and perceived stress was not significant.

Table 2

Means, Standard Deviations, Cronbach's Alpha, and Pearson Correlations between determinants and Technology Acceptance (N=75)

Research variables	**Mean**	**Sd**	**α**	**Correlations**				
				1	2	3	4	5
1. Perceived ease of use (PEOU)	4.21	.56	.66	1.00				
2. Perceived usefulness (PU)	3.24	.89	.90	.46**	1.00			
3. Behavioural intention (ρ)***	3.71	.94	.94	.48**	.73**	1.00		
4. Risk perception	3.09	.31	.83	.38**	.53**	.51**	1.00	
5. Perceived stress	1.30	.38	.67	-.27*	-.15	-.13	-.19	1.00
6. Subjective norms	3.22	.96	.89	.47**	.62**	.79**	.46**	-.14

Note. *** in column α, **α=ρ** for behavioural intention. ** Correlation is significant at the .01 level; * Correlation is significant at the .05 level. All scales were measured on a 5-point Likertscale.

Mediation analysis. As noted in the previous section, initial evidence for various research hypotheses has been found. However, these correlations do not fully answer whether the theoretical model as proposed in the literature section can be validated. What is more, the correlations alone cannot exemplify whether the PEOU and PU mediated the effects of the external variables on the behavioural intention to use the AR glasses. Because of this, a supplementary mediation analysis has been performed with the assistance of the PROCESS macro for SPSS. The purpose of this analysis was to examine whether the PEOU and PU mediated the effects of the risk perception, subjective norms, and perceived stress on the behavioural intention to use the AR glasses. Further, the objective was to obtain additional

evidence for the research hypotheses. To reach this goal, three steps in the mediation analysis have been performed.

The first step of the mediation model was to determine whether the regression of risk perception, subjective norms, and the perceived stress on the behavioural intention was significant (*the c path*). The purpose of this step was twofold. On the one hand, the purpose was to investigate how the policing variables related to the behavioural intention in the absence of the potentially mediating variables (the PEOU and PU). On the other hand, this step was conducted to find more support to substantiate the expectations of H4, H6, and H8. Without considering the mediating variables (PEOU and PU), the model explained 66.29% of the variance and significantly predicted the behavioural intention, $F(4, 71) = 46.53$, $p < .01$. Risk perception was a significant predictor of the behavioural intention, $b = .54$, $t(71) = 2.28$, $p < .05$, backing H4. Likewise, H6 was further substantiated seeing that the behavioural intention was significantly predicted by the subjective norms, $b = .70$, $t(71) = 9.26$, $p < .01$. In contrast, no further confirmation was found for H8, given that the perceived stress did not contribute significantly to the model, $b = .01$, $t(71) = 0.04$, $p = .97$.

Subsequently, the second step involved testing whether the independent, external variables were significant predictors of the mediating variables (*the a path*). Through performing these analyses, it was possible to further test H3, H5, and H7. From studying the PEOU it was found that, in contrast to the expectations of H7, the perceived stress did not significantly predict the PEOU, $b = -.28$, $t(71) = 0.15$, $p = .07$. With respect to the PU, two significant predictors were found, namely the perceived risk, $b = .88$, $t(71 = 3.13$, $p = <.05$, and the subjective norms, $b = .44$, $t(71) = 4.86$, $p < .01$. These findings are thus in line with H3, and H5. Additionally, more evidence that contradicts H7 was found when studying the effect of perceived stress on the PU, $b = -.06$, $t(71) = 0.29$, $p = .77$.

There were two aims to the third step of the mediation analysis. Firstly, we wanted to verify whether the PEOU and PU predicted the behavioural intention to use the AR glasses, controlling for risk perception, subjective norms, and perceived stress (*the b path*). In other words, it was examined whether the PEOU and PU predicted the behavioural intention by taking into account the influence of the external policing variables. By performing this step, additional evidence for the rejection or confirmation of H1 was found. It turned out that the PEOU could not significantly predict the behavioural intention when controlling for the independent variables, $b = .09$, $t(69) = 0.69$, $p = .49$, whereas the PU could, $b = .37$, $t(69) = 4.02$, $p < .01$. Therefore, it was concluded that H1 can be partially confirmed.

Secondly, the analysis was conducted to see whether the relationship between risk perception, subjective norms, perceived stress and the behavioural intention reduced significantly in the presence of the PEOU and PU (*the c' path*). Herewith, it was studied whether the relationships could be explained by mediating variables. This step did not relate directly to the rejection and/or confirmation of the research hypotheses, but was performed to better understand how the variables were related when fully considered in one model. Thus, the purpose of this step was to clarify whether there were any mediation effects between the TAM components and the policing variables. In the presence of the mediating variables, risk perception no longer significantly predicted the behavioural intention to use the AR glasses, $b = .19$, $t(69) = 0.82$, $p = .41$. On top of that, the perceived stress did not significantly predict the behavioural intention, $b = .05$, $t(69) = 0.34$, $p = .74$. Lastly, the subjective norms still meaningfully predicted the behavioural intention when controlling for the PEOU and PU, $b = .52$, $t(69) = 6.42$, $p < .01$. When taking a closer look to the indirect effects of the mediators on the behavioural intention, it can be concluded that the PEOU did not mediate the effect of the perceived stress on the behavioural intention, *indirect effect*= .03, *SE*= .04, 95% CI [-.03, .14]. With respect to the PU, the results were indicative of mediation and therefore studied in more detail, *indirect effect*= .32, *SE*= .14, 95% CI [.07, .62]. After conducting a Sobel test, it was found that the PU partially mediates the effect of risk perception on the behavioural intention, $z = 2.47$, $p < .01$.

Summary of the Quantitative analyses

Taking into account the correlational analyses and the mediation analysis, H1 was partially confirmed since exclusively the PU significantly predicted the behavioural intention to use the AR glasses when controlling for risk perception, subjective norms, and perceived stress. Next, H2 could potentially be confirmed based on the significant Pearson correlation that was found between the PEOU and PU. However, the methodology that was used to test H2 granted correlational evidence only. Therefore, H2 was nor confirmed, nor rejected. The hypotheses relating to risk perception, H3 and H4, were validated. The effect of risk perception on the behavioural intention was partially mediated by the PU. H5 and H6 were also confirmed. On the contrary, H7 and H8 were rejected. The perceived stress did not contribute significantly to the model. Below, an adapted version of theoretical model and the hypotheses are presented once again for clarification. The hypotheses that were confirmed can be recognised by the uninterrupted pathways. The interrupted pathways were used for the hypotheses that were rejected or partially confirmed.

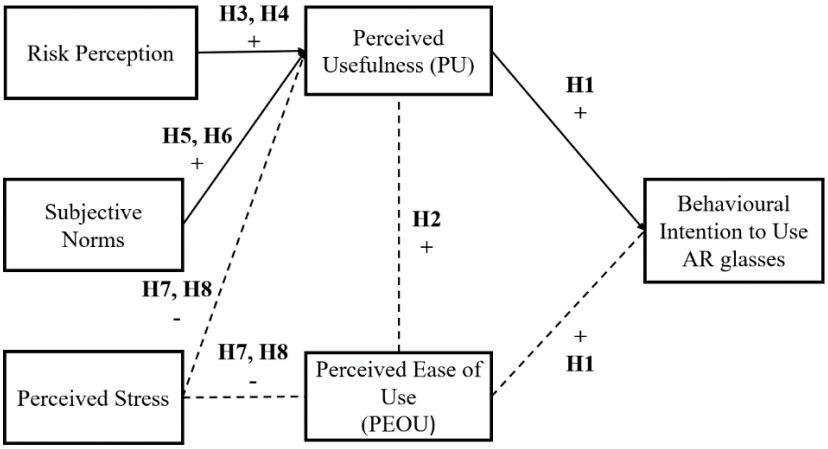

Figure 4. Adapted theoretical framework after testing the research hypotheses.

Qualitative analysis

The quantitative analyses have provided some first insights into whether the police officers would accept AR glasses as a new technology for field policing. This section will discuss *why* the police officers would or would not accept the AR glasses. The most important themes that emerged during the coding process will be discussed and supplemented by direct quotations[6]. Specifically, the PEOU, PU, risk perception, subjective norms, and perceived stress will be discussed hereafter to unveil the underlying motivations for the acceptance of AR glasses. To conclude, this section will outline the recommendations for implementation as proposed by the police officers during the interviews.

The PEOU: the user-friendliness of the AR glasses. Overall, most police officers had no trouble working with the AR glasses and indicated that they found the AR glasses user-friendly. Little effort was necessary to learn how to control the AR glasses, the controls were generally perceived as intuitive and straightforward. Still, there were some minor difficulties the police officers identified. For instance, it was not possible to retrieve hotspot information once the police officers tapped on the touchpad to open the next notification. They stressed that they found it inconvenient that it is impossible to go back to earlier notifications because one could mistakenly tap too many times. The touchpad was quite sensitive and as a result, many police officers indicated they accidently have skipped (sometimes multiple) notifications. Further, it was mentioned on various occasions that the police officers thought it would require some habituation and perhaps training to be able to properly work with the AR glasses.

[6] Originally, all interviews were transcribed and coded in Dutch. Therefore, the codes and quotations have been translated to English as literal as possible.

PU: more intelligence and real-time information. There were various reasons why the police officers thought the AR glasses could be useful for policing. Two of these reasons stood out, which included (a) the possibility to gain more intelligence in terms of hotspot information, and (b) the possibility to receive real-time information fast. With respect to more intelligence, the police officers mentioned that it would be beneficial to know what is going on at a specific location so that their contextual awareness would increase. This way, it would enable the police officers to pay extra attention to potentially criminal situations in specific locations. Further, the police officers thought that hotspot information may assist in preventing criminal activities. This is in line with the idea that increasing police visibility in crime hotspots is an effective method to hinder criminals in their attempts to break the law (Braga, Turchan, Papachristos, & Hureau, 2019). One police officer explained:

> "We generally work with specific checkpoints which we navigate to, it would be great to receive additional information, for example: this is going on at this café, this is a pedestrian area. It allows us to work fully informed."

What is more, the police officers indicated that as part of their job, they have to be capable of responding quickly to situations. Therefore, they stressed that information should be quickly available and retrievable. One mounted police officer stressed that:

> "(..) it saves a lot of time. If I would have to grab my phone first, open it – while riding a horse – that is difficult. Then I would have to Google the street, which costs valuable seconds."

PU: training, working handsfree, and working in unfamiliar locations. Another reason relating to the PU included using the AR glasses for training purposes. For instance, the camera function of the AR glasses could be used to reflect upon the decisions police officers made in the field. Another reason that was mentioned included the ability to work handsfree while using the AR glasses. Especially the mounted police officers recognised this as indispensable because they need most of their attention to ride their horses. As well as the previous example, the mounted police officers added that the AR glasses are particularly helpful for their line of work because they operate in various locations they do not know in advance. In contrast to street police officers, mounted police officers mainly work nationwide and have therefore a greater need for information and navigation when they are in an

operational setting (Giacomantonio, Bradford, Davies, & Martin, 2015). Therefore, the AR glasses can offer valuable support through navigation functions. One of them explained:

> "We operate throughout the whole country. Many cities are unfamiliar territory for us. Currently, we must take out our phones when we get an alert, look up where we need to be. If the operators could directly insert the navigation instructions into the AR glasses, I think that would be of added value for us."

Although the navigation functions could be of valuable assistance in unknown locations, the street police officers generally thought it could be disadvantageous to use these instructions when working in locations they know by heart. In this case, they would rather use their common sense when navigating to particular locations.

PU: face recognition. The police officers were asked a hypothetical question in the online survey, which asked them whether they would find it useful if the AR glasses could be used for the purpose of face recognition. As a result, many officers philosophized about this question during the interviews. There were two elements to this subject they repeatedly stated. First, they were enthused about the possibility of using this method. Second, they expressed their concerns in relation to privacy regulations and the possibility of information overload. The main advantages of face recognition were the possibility to identify suspects faster, and that the AR glasses enable officers to identify suspects who have tried to cover up their appearance. One officer explained that currently, they mostly depend on descriptions of the perpetrator's clothes, which is not always convenient because perpetrators may try to change characteristic features of themselves:

> "Imagine that you are walking in a crowd and the AR glasses notify you of a suspect, that would be fantastic. It is pretty outdated that we focus on descriptions of clothing, like a t-shirt, trousers, or caps."

As noted before, while enthused, the police officers critically assessed the risks associated with the use of face recognition technology. They wondered whether it would be appropriate to work with certain methods for policing. One of them expressed their apprehensions:

> "A question that rises is whether that would be justifiable to use among the public. It would be inconvenient when this would be applied to every bystander. And what about their privacy and whether this would be justifiable in an ethical sense? The first thought that came into my head was that this would be impossible ethically when taking into account our current regulations and laws."

Risk perception. There were a number of factors which relate to the risk perceptions of the AR glasses among the police officers. Firstly, they thought it would be risky to use the AR glasses in stressful and/or emergency situations. One of the officers explained why:

> "What if I would have to interfere physically in an arrest, then the AR glasses may hinder me. The glasses would then do more harm than good. Or what if I am pursuing a perpetrator and running?"

Many officers raised similar questions and added that the design of the AR glasses obstructed their vision. In addition, they indicated that the information in the glasses could also impede their vision in high stake moments:

> "Imagine if you are in a shooting situation, and the information is located in the centre of the glasses, and you would have to pull your gun and aim while you have got the information right in front of your dominant eye, that would be troubling."

Another risk that should be considered is the loss of situational awareness when using the glasses. Various officers agreed that they felt that their awareness of their surroundings decreased substantially while using the AR glasses. Therefore, the police officers explained it would be risky to miss relevant cues when working in the field. Nonetheless, there were also police officers who did not experience so much difficulty dividing their attention between the AR glasses and their surroundings.

Subjective norms and perceived stress. The interview did not contain questions that specifically asked about the subjective norms and perceived stress of the police officers. This may explain why these themes did not, or sporadically, surface during the interviews. It should thus be noted that there was little information that could explain how and why the subjective norms and perceived stress related to the other research variables. Still, a few police officers did wonder about how their colleagues would feel about using the AR glasses.

In particular, they wondered how older colleagues (with visual impairments) would manage to work with the AR glasses. Additionally, they speculated whether they would be more hesitant to work with the glasses, which is in accordance with the belief that older police officers are generally less willing to accommodate to new technologies (Kurkinen, 2013).

One reason why the influence of stress was not discussed regularly might be that the police officers experienced little to no stress during the experiment. Yet, some police officers reported that using the AR glasses in stressful situations could be dangerous. The underlying reasons for this were associated with risk perceptions, and the presumption that high stress levels would impair the fine motor skills that are needed to work with the AR glasses.

Recommendations for implementation. At last, the police officers were asked whether they would be willing to work with the AR glasses in the near future. The majority of them indicated that they would have the intention to work with the glasses, provided that a number of factors would be improved. First and foremost, they recommended to adjust the navigation instructions in terms of design and accuracy. Many officers emphasized that they would like to have a map in the AR glasses, similar to the design of Google Maps. Further, they suggested that they would prefer to work with AR glasses with a slimmer design so that it would be more comfortable and safe to wear the glasses. Another recommendation involved the importance of having a high level of control over the information that is given in the glasses. More specifically, the officers stressed the significance of being able to retrieve information anytime, or being able to turn the glasses off temporarily to avoid getting excessive and/or irrelevant information.

Additional analyses

The previous section has raised a few additional questions relating to the research samples and experimental conditions. First, the mounted police officers indicated more frequently that they thought the AR glasses would be particularly useful for their line of work in contrast to the street police officers. Further, it is not certain whether the manipulation (high/low priority scenario) has resulted in significant differences between the research samples regarding the TAM components and policing variables. Therefore, the following section will show some supplementary analyses. There were three reasons to incorporate these supplementary analyses in this result section, namely: (a) to gain more insight into the technology acceptance and policing variables for each respective sample, (b) to assess whether the priority manipulation resulted in significant differences between the samples, and (c) to help formulate practical implications for the Dutch police in the discussion section.

Comparing between street police and mounted police. The mean scores of the research variables have been compared among the street police and mounted police by means of independent t-tests. Only the difference in the mean perceived stress scores, 0.04, 95% CI [-0.20, 0.27], was not significant $t(75)= 0.32$, $p= .75$. All other differences between the scores of the research variables turned out to be significant. Firstly, the technology acceptance levels were generally higher among the sample of mounted police ($M= 4.21$, $SE= 0.16$), than among the street police ($M= 3.63$, $SE= 0.07$), the difference between these scores, -0.58, 95% CI [-0.93, -0.22], was significant $t(75)= -3.23$, $p < .01$. Secondly, the contrast between the risk perceptions scores, -0.30, 95% CI [-0.47, -0.18], was significant $t(75)= -3.31$, $p < .01$. On average, the mounted police had lower risk perceptions of the AR glasses ($M= 3.07$, $SE= 0.92$) as opposed to the street police ($M= 3.04$, $SE= 0.30$). The subjective norm scores differed significantly, -0.85, 95% CI [-1.40, -0.30], $p < .01$, meaning that the mounted police officers ($M= 3.92$, $SE= 0.12$) generally reported stronger normative beliefs about using the AR glasses compared to the street police officers ($M= 3.07$, $SE= 0.92$). Lastly, the behavioural intention to use the AR glasses in the future for policing was higher among the mounted police ($M= 4.50$, $SE= 0.18$) in contrast to the street police officers ($M= 3.55$, $SE= 0.12$). This difference of -0.95 was significant, $p < .01$ $t(75)= -3.58$, 95% CI [-1.48, -0.42].

Comparing between experimental conditions. As noted earlier, participants were randomly assigned to either the condition with the high priority scenario (stabbing) as opposed to the condition with a low priority scenario (verbal aggression). No significant differences in the research variables were observed based on this grouping variable, an overview is given in Table 3.

Table 3

Independent T-tests with Experimental Condition as Grouping Variable

Research Variables	***t***	***df***	***p***	***M* difference**
Technology Acceptance	0.39	73	.70	0.06
Risk Perception	0.03	73	.97	0.00
Subjective Norms	0.45	62.50	.66	0.10
Behavioural Intention	-1.08	73	.28	-0.23
Perceived Stress	-0.51	73	.61	-0.05

Discussion

This explorative study was the first to consider the technology acceptance of AR glasses among street police officers and mounted police officers in the Netherlands, using both a quantitative and qualitative approach. This study was pioneering given that it focused on the unique experiences of the (mounted) police officers using the AR glasses for field policing. To recapitulate, this study's aim was to investigate whether (mounted) police officers would accept AR as an innovative technology, thereby taking into account psychological constructs that are typical for field policing: risk perception, subjective norms, and perceived stress. From the results, four key findings have emerged.

In line with the expectations, the results suggest that it is critical that AR glasses are perceived as reliable and safe in order to be accepted by police officers. Not only do lower risk perceptions lead to an increased willingness to work with the AR glasses, it also affects whether police officers acknowledged the added value of this innovative technology. Additionally, the PU partially mediated the effect between the intention to work with the glasses and the risk perceptions of police officers. That is, police officers' perceptions of the usefulness of the AR glasses depended on whether they believed using the AR glasses would be free of risks. This is in accordance with the study of Siegrist (2008), in which risk perceptions are assumed to affect the PU and thereby the subsequent acceptance of a technology. Additionally, the qualitative data have granted further insights into what preconditions the police officers identified to be able to work safely with the AR glasses. For instance, the police officers noted that the AR glasses would be most suitable for surveillance purposes as opposed to more stressful or demanding policing situations, such as during arrests, shooting situations, driving in police vehicles, and when one is in pursuit of a perpetrator. In these situations, the police officers thought using the AR glasses would pose too many risks because of a decrease in situational awareness and higher levels of stress. These concerns are shared by Sabelman and Lam (2015), who have indicated that poorly designed AR glasses and/or AR applications may obstruct the vision to such an extent that would be comparable with various natural vision impairments, such as glaucoma, far- and/or near-sightedness, and presbyopia. Moreover, increased levels of (acute) stress lead to a decrease in crucial cognitive functions (Sandi, 2013). There are many negative consequences of impaired cognitive functioning under stress, such as making judgment errors, having low inhibition, and being unable to make appropriate decisions. Among police officers, these cognitive impairments may contribute to horrific, unintended acts, such as wrongful arrests, excessive use of force and memory loss in important situations (Gutshall, Hampton, Sebetan,

Stein, & Broxtermann, 2017). Taking the previous into account, using the AR glasses for field policing in stressful situations could be detrimental and is therefore discouraged.

Secondly, the quantitative results corroborate the presumption that subjective norms play an important role in the acceptance of the AR glasses among police officers. Overall, the subjective norms significantly predicted the PU of the AR glasses, as well as the behavioural intention to work with the AR glasses. Therefore, this study further strengthens the notion that the perceptions of colleagues are a leading factor that influences police officers beliefs, attitudes, and behavioural intentions (Bell & Eski, 2016; Hagger & Chatzisarantis, 2006). Thus, when police officers believed their colleagues would think favourably of the AR glasses and that they would be willing to work with the AR glasses, this belief would be internalized and propagated as their own belief and intention as well. In addition, some police officers wondered about the perceptions of older colleagues and their attitudes toward the AR glasses. From this, it appears that the police officers were mostly concerned about the perceptions of those who they thought would be less enthused by possibility of working with AR glasses.

Thirdly, the expectations relating to perceived stress and the TAM components were not confirmed in this study. There are multiple reasons that may explain why. In the first place, stress was measured with the use of a self-report scale. Consequently, the findings are a reflection of perceived stress as reported by the police officers from their subjective experience. However, there may have been a schism between the subjective stress as judged by the police officers and their objective level of stress. Yet, this study did not use an objective measure of stress to enable comparison between measures. In the second place, social desirability bias may have led to lower reported perceived stress levels. Generally, individuals tend to present themselves more positively when asked about their qualities, emotions, and attitudes in self report measures. One consequence of this includes the chance that relationships between constructs of interest are suppressed (King & Bruner, 2000). Thus, it may be that the police officers were affected by this response bias, which may have suppressed the relationship between perceived stress and the TAM components. This could be plausible given that the stress scores showed little variance and was generally low. An alternative explanation for the low variance in the stress scores could be that the reported stress levels were a genuine reflection of the actual perceived stress during the experiment.

Fourth, both the quantitative data and qualitative data imply that particularly the mounted police officers may profit greatly from using the AR glasses for their work. This sample had greater intentions to work with the AR glasses than the sample of street police officers. Although the street police officers were also mostly positive about the technology,

the mounted police officers saw more reasons why the AR glasses could have potential for their work. The main reason for this, as discussed in the qualitative analysis, comes down to working in many different locations that may be unfamiliar. The street police officers also agreed that the AR glasses would be most suitable for working at events in unfamiliar locations, such as football competitions, demonstrations, and parades. Hereby, both the navigation and notification function would be helpful to assist police officers in their activities.

Limitations and implications for practice and future research

Limitations and future studies. There are a two limitations that should be mentioned in light of this research. First, innovators and early adopters of AR technology are most likely overrepresented in the research samples seeing that the participants were gathered by means of opportunity sampling. As a result, the technology acceptance levels in this study may be higher than in the population. To prevent this, participation was promoted among as many police officers as possible working in the cities the experiment took place. The aim of this was to invite a diverse and mixed group of police officers to join in the experiment. Still, this study's results may be skewed in the sense that they may reflect higher levels of technology acceptance than one might expect in the study's population, the Dutch police. As a consequence, the findings do not allow complete generalization (Taherdoost, 2016). For future studies, it would be advisable to employ a different sampling method to obtain a more heterogenous research sample. Another suggestion for future research is to replicate the findings in broader police populations, such as operational teams throughout the whole country to be able to generalize the findings.

Second, it is debatable whether valid conclusions can be drawn from the stress manipulation. Almost unanimously, the (mounted) police officers reported they experienced little to no stress during the experiment. As noted before, the two scenarios (low/high priority) were created so the police officers got a scenario that would reflect a realistic policing situation. The high priority scenario may have evoked some level of stress among the police officers participating in that condition. Nonetheless, this attempt did not succeed seeing that the police officers indicated that the experiment was a mock situation, making it hard imagine that it was real. In light of this limitation, it should be mentioned that there were limited possibilities to replicate a real policing situation. Initially, the data would have been collected during the four-day marches in July 2020. However, the COVID-19 pandemic posed certain restrictions to this study. With that in mind, it is suggested that future studies test the AR

glasses in a naturalistic policing setting when the circumstances relating to COVID-19 allow it. Another suggestion for future studies that focus on stress in the police context, is to use both an objective and subjective measure of stress. As mentioned earlier, this study exclusively measured perceived stress by using a self-report measure. As a result, it was challenging to interpret the findings about stress and technology acceptance. Yet, there are multiple, reliable objective measures available that can test biomarkers of stress. A few examples of these methods include measuring heart rate variability (Kim, Cheon, Bai, Lee, & Koo, 2018), analysis of galvanic skin response (Kurniawan, Maslov, & Pechenizkiy, 2013), salivary sampling (Soo-Quee Koh & Choon-Huat Koh, 2007), and hair cortisol analysis (Russell, Rieder, & van Uum, 2012). Particularly hair cortisol analysis could be interesting, given the possibly to measure cortisol exposure over longer periods of times as opposed to the other methods that use biomarkers (Herane Vives et al., 2015). Hair samples could be used to compare between baseline stress levels of police officers and stress levels that were measured for research purposes. Additionally, using multiple methods could verify whether there exists a discrepancy between the subjective and objective levels of stress among police officers.

Implications for science. This study has assessed the police officers' subjective risk perceptions of using the AR glasses. On the other hand, it is essential to investigate the objective risks of using AR glasses in the real-world. To our knowledge, there are insufficient studies that have assessed the risks of AR glasses from a human factors and neuropsychological perspective. As a result, it may be too premature to tell whether it is ethically justifiable to employ AR glasses for occupations in a real-world setting (such as field policing). Therefore, it is encouraged that scholars will set out to investigate how safety can be ensured while interacting with AR technology. For example, neuropsychological experts could assess the risks objectively in a controlled setting, thereby taking into account different neuropsychological domains such as visual perception, spatial cognition, memory, attention, and executive functions. All these domains may pose specific constraints to the interaction between the user and the AR glasses.

Another field of inquiry could be to expand on the theoretical framework from this study to capture additional policing variables that may affect the TAM components. This study has focused on a set of policing variables from a social psychological perspective. Nonetheless, there may be other variables that affect the TAM components, such as personality traits. For example, Özbek, Alnıaçık, Akkılıç, and Kaş (2014) assessed the Big Five personality traits in relation to technology acceptance. From their analyses, it was found that openness, agreeableness, and neuroticism affected the TAM components. With respect to

the police, researchers have attempted to define ‘police personality’, given the presumption that police officers share similar personality traits. For instance, it is presumed that police officers are characterised by traits such as assertiveness, solidarity, confidence, autonomy, and masculinity (Twersky-Glasner, 2005). It could be that these traits affect the TAM components in addition to risk perception, subjective norms, and perceived stress. During the job application procedure to become a police officer, applicants go through a variety of assessments, including psychological tests. By grouping the data from future technology acceptance studies (if applicable) and future assessment data, personality traits can be researched in relation to the TAM components as well. This may help to gain knowledge about other factors that possibly underlie the technology acceptance of police officers.

Implications for practice. From a psychological perspective, the findings suggest that the pros and cons of using the AR glasses should be carefully weighed against each other to determine whether the AR glasses could have potential in the practice of street policing. Luckily, this study has identified a number of important psychological factors that yield important implications for implementation. Therefore, three practical implications have been formulated for the Dutch police.

First, the risk perception turned out to be an antecedent of both the PU and the behavioural intention of using the AR glasses. Therefore, a thorough risk assessment should be part of the implementation process if the police organization would be willing to implement AR glasses in the future. Particularly, the police officers explained for what situations the AR glasses would be (un)suitable for their work. As mentioned before, the most appropriate setting the police officers could envision themselves using the AR glasses, involved surveillance and patrolling situations (particularly in unfamiliar locations). Additionally, it is suggested to develop a protocol for the police officers who will be working with the AR glasses. In this protocol, clear behavioural instructions should be delineated with respect to using the AR glasses. These behavioural instructions should tackle the most common and relevant situations for field policing. By doing so, the risks of using the AR glasses in the field can be reduced as best as possible.

Second, the importance of the role of the subjective norms were reflected in the results. As expected, the opinions and perceptions of colleagues are of great importance to police officers and help shape their own views. Therefore, it is proposed that not only the early adopters, but all police officers who will potentially work with the AR glasses in the future are involved in the implementation process early on. This may help to promote a positive attitude toward the technology, given that the police community is tight-knit and

opinions will be echoed at a fast rate. In addition, it could be beneficial to involve the early adopters in the implementation process (Lindsay et al., 2011). They may play a critical role and explain the opportunities of AR glasses to their colleagues (who may be less enthused by AR technology). This may help 'flip' the attitudes of technophobes and other police officers who are more hesitant toward using the AR glasses.

Third, a number of recommendations were made for implementing the AR glasses by the police officers. These recommendations included specific suggestions aimed at the design, applications, and functionalities of the AR glasses. These recommendations bring forth useful implications the Dutch police could pay attention to.

Final comments. This study has identified risk perception and subjective norms as influential antecedents of technology acceptance among police officers. This has provided the Dutch police with useful information that might help to decide whether investing in AR technology for field policing would be worthwhile. Essentially, AR glasses have great potential in the practice of street policing in the right context. When working surveillance shifts or when deployed countrywide, hotspot information and navigation instructions can help officers considerably to be more informed and quicker. At the same time, there are several steps that should be taken before implementing AR glasses in the real-world for field policing. These steps consist of performing an objective risk assessment, creating a clear behavioural protocol, and designing a plan of action to involve all potential users in the implementation process.

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Appendices

Appendix A: Overview of Quantitative Measures and Final Coding Scheme

Table 1

Measures: Technology Acceptance, Risk Perception, Perceived Stress, and Subjective Norms

Measure	Questions/Statements	
Technology Acceptance adapted and translated from Davis (1989)	i.	Ik kan gemakkelijk onthouden hoe ik taken met de AR-bril kan uitvoeren / It is easy for me to remember how to perform tasks using the AR glasses (PEUO)
	ii.	Over het algemeen is het gebruiken van de AR-bril makkelijk / Overall, I find the AR glasses easy to use (PEUO)
	iii.	Het leren bedienen van de AR-bril gaat mij gemakkelijk af / Learning to operate with the AR glasses is easy for me (PEUO)
	iv.	Ik vind het gebruiken van de AR-bril verwarrend / I often get confused when I use the AR glasses (PEUO)
	v.	Het gebruiken van de AR-bril maakt mijn werk makkelijker voor me / Using AR glasses makes it easier to do my job (PU)
	vi.	De AR-bril zorgt ervoor dat ik mijn werk sneller kan uitvoeren / The AR glasses enable me to accomlish tasks more quickly (PU)
	vii.	Ik heb meer controle over mijn werk wanneer ik de AR-bril gebruik / I have greater control over my job when I use AR-glasses (PU)
	viii.	Door de AR-bril te gebruiken bespaar ik waardevolle tijd tijdens mijn werk / Using the AR glasses saves me valuable time (PU)
Behavioural Intention adapted and translated from Davis (1989)	i.	Ik ben van plan om de AR-bril in de toekomst te gebruiken / I intend to use the AR-glasses in the future

	ii.	Ik verwacht dat ik de AR-bril in de toekomst zal gebruiken / I predict that I would use the AR glasses in the future
Risk Perception adapted and translated from Clothier, Greer, Greer & Mehta (2015)	i.	Het gebruiken van de AR-bril is veilig / Using the AR glasses is safe
	ii.	Het gebruiken van de AR-bril is riskant /Using the AR glasses is risky
	iii.	De AR-bril is net zo veiliger of veiliger om te gebruiken als andere technologieën / Using the AR glasses is as safe or safer than other technologies that perform the same task
Perceived Stress adapted and translated from Ströfer, Ufkes, Noordzij & Giebels (2016), based on Cohen, Kamarck & Mermelstein (1983)	i.	In hoeverre voelde je je gespannen tijdens of direct na het uitvoeren van de navigatietaak? / To which extent did you feel tension during, or directly after the navigation task?
	ii.	In hoeverre voelde je je van streek tijdens of direct na het uitvoeren van de navigatietaak? / To which extent did you feel upset during, or directly after the navigation task?
	iii.	In hoeverre voelde je je zenuwachtig tijdens of direct na het uitvoeren van de navigatietaak? / To which extent did you feel nervous during, or directly after the navigation task?
	iv.	In hoeverre ervoer je stress tijdens of direct na het uitvoeren van de navigatietaak? / To which extent did you feel stressed during, or directly after the navigation task?
Subjective Norms, adapted and translated from Venkatesh, Morris, Davis, and Davis (2003)	i.	Ik denk dat mijn collega's vinden dat ik de AR-bril moet gebruiken / I think my colleagues believe that I should use the AR glasses
	ii.	De collega's van wie ik de mening belangrijk vind, zouden graag willen dat ik de AR-bril gebruik /

	Colleauges whose opinion I value prefer that I should use the AR glasses

Table 2

Final Group Coding Scheme and Sub Codes of the Qualitative Data

Theme description (Code Groups)	Subcodes
Recommendations for implementation This theme consists of a variety of recommendations as proposed by the police officers	Remote control, camera function, design, destination, extra alert, map, notepad, notifications, navigation, future research, information, extra function, employability, projection of information, real-time info
Perceived usefulness (PU) The police officers coined various reasons why (or why not) they thought the AR glasses could be of added value for policing	Hotspots, more intelligence, less actions, education and training, faster transmission of information, stress, less workload for control room, working handsfree, navigation, time savings, notifications, mnemonic, (un)familiarity in locations
Perceived ease of use (PEOU) In this theme, the police officers mentioned whether they found the AR glasses user-friendly and why	Operating with the glasses, glasses may fall, wearing comfort, user-friendliness, gloves, handsfree, navigation, speed, sunglasses, fragility, legibility, hotspots, replacement of mobile phone
Cognitive load The police officers explain whether they thought using the AR glasses was demanding in this theme	Fatigue in long-term, less cognitive load, amount of time spent using the glasses, mental exhaustion, (no) additional cognitive load, too much information, unsuitable for long shifts
Information processing This theme relates to how the police officers processed the information with the AR glasses and whether this went smoothly (or not)	Clarity of information, filtering information, information helps to feel at ease, missed information, (un)necessary information, information overload, retrieving information

Sight In this theme, the visual experience of using the AR glasses was the main focus	Impeded field of view, focus, readability of information, projection, obstructive projection, reflection vexatious, eye sight/vision
Behavioural intention A number of categories relating to the behavioural intention can be distinguished, ranging from police officers who would be willing to work with the glasses to police officers who do not want to work with the glasses	Argumentation for behavioural intention, impartial towards use of AR glasses, no intention to work with the AR glasses, intention to work with the AR glasses, innovation, hesitancy to use AR glasses
Situational awareness The extent to which the police officers felt aware of the context and their surroundings during the navigation task is discussed in this theme	Being aware of the surroundings, less situational awareness, tunnel vision, situational awareness (in general)
Attention In this theme, the police officers shared how their attentional processes functioned during their participation in the experiment	Dividing attention, possibility to perform multiple tasks at once, multitasking, switching between tasks, staying vigilant
Focus The police officers explained what stimuli they were most focused on during the experiment and how they focused their eyes	Information, AR glasses, navigation instructions, focusing/switching eyes
Functioning of navigation Did the navigation work?	Accuracy of navigation instructions, (un)clarity of navigation, delay in GPS

Habituation The thoughts of the police officers on getting used to working with AR glasses was the focus of this theme	Familiarization, accustomedness
Battery The police officers were curious whether the batteries of the AR glasses would endure long shifts	Durability of the batteries, quality of the batteries
Facial recognition Facial recognition as an added functionality of the AR glasses was discussed and emerged as a theme	Arguments pro/con facial recognition functionalities, facial recognition
Perception of civilians This theme was spoken about by the police officers, they wondered what the public would think of police officers using AR glasses	Opinions of civilians about the glasses, reaction of the public
Familiarity of locations The context of when/where AR could support police officers surfaced as a theme	Working at new locations, the usefulness of information in unfamiliar places
Risk perception What risks did the police officers associate with the use of AR glasses?	Perceptions of risks in relation to AR

Note. The group codes are structured by size, starting with the largest code and ending with the smallest code.

Appendix B: Informed Consent

UNIVERSITY OF TWENTE.

POLITIE

TOESTEMMINGSVERKLARING

Het gebruiken van AR-brillen bij de politie

Doel van het onderzoek
Dit onderzoek wordt geleid door de Politieacademie in samenwerking met de masterstudenten Marjolein Klaver en Myrthe Hoevers (Universiteit Twente) van de opleiding Psychologie in de richting van Conflict, Risico en Veiligheid. Het doel van dit onderzoek is om te kijken hoe politieagenten het gebruik van een augmented reality bril (AR) ervaren. Een AR-bril mixt de echte wereld met digitale informatie die via de brilglazen te zien is. Door deel te nemen aan dit onderzoek zult u meer inzicht krijgen in hoe is het om een nieuwe technologie in gebruik te nemen, daarbij willen wij graag politieagenten actief betrekken bij onderzoek naar nieuwe technologische innovaties.

Gang van zaken tijdens het onderzoek
U neemt deel aan een onderzoek waarin u een route zult gaan afleggen waarbij u gebruik maakt van een AR-bril. Daarna zult u een digitale vragenlijst invullen waarin wordt gevraagd hoe u het gebruik van de AR-bril heeft ervaren. Tot slot kunnen de onderzoekers nog enkele aanvullende vragen stellen nadat u de vragenlijst heeft afgerond. Van dit korte aanvullende interview zal, na uw toestemming, een audio-opname worden gemaakt, zodat het gesprek later kan worden uitgewerkt. Dit transcript zal geanonimiseerd worden. **Uw deelname zal maximaal 30 minuten in beslag nemen.**

Een voorwaarde voor dit onderzoek is dat u **minimaal** 18 jaar oud bent en **niet** brildragend bent**.**

Potentiële risico's en ongemakken
Wij verwachten dat er minimale fysieke, juridische of economische risico's verbonden zullen zijn aan uw deelname. Zo vragen wij van u om een route te lopen tijdens het gebruiken van een AR-bril. Houd er daarom rekening mee dat er externe factoren zijn waar wij geen controle over kunnen uitoefenen (zoals deelname aan het verkeer). Bovendien kan het gebruiken van de bril mogelijk enige duizeligheid en hoofdpijn veroorzaken. Vanzelfsprekend staat uw veiligheid voor ons voorop. Uw deelname is dan ook volledig vrijwillig en u kunt uw deelname op elk gewenst moment stoppen.

Verder zijn er corona maatregelen van kracht ten tijde van dit onderzoek. Deze zullen te allen tijde worden gewaarborgd om het besmettingsrisico te minimaliseren. Zo zullen wij u geen hand geven, wij rekenen daarvoor op uw begrip. Daarnaast houden wij gepaste afstand, de AR-bril en andere onderzoeksmaterialen worden na elk gebruik gedesinfecteerd en er is altijd handgel voorradig.

Vertrouwelijkheid van gegevens
Uw privacy is en blijft maximaal beschermd. Er wordt op geen enkele wijze vertrouwelijke informatie of persoonsgegevens van of over u naar buiten gebracht, uw anonimiteit blijft te allen tijde gewaarborgd.

Vrijwilligheid
Deelname aan dit onderzoek is geheel vrijwillig. U kunt als deelnemer uw medewerking aan het onderzoek te allen tijde stoppen, of weigeren dat uw gegevens voor het onderzoek mogen worden gebruikt, zonder opgaaf van redenen. Dit betekent dat als u voorafgaand aan het onderzoek besluit om af te zien van deelname aan dit onderzoek, dat dit op geen enkele wijze gevolgen voor u zal hebben.

Als u besluit om te stoppen met deelname aan het onderzoek, of als u vragen of klachten heeft, of uw bezorgdheid kenbaar wilt maken, neem dan alstublieft contact met ons op. Voor inhoudelijke vragen/opmerkingen over het onderzoek verwijzen wij u graag door naar Myrthe Hoevers (UT)

m.hoevers@student.utwente.nl of Marjolein Klaver (UT) m.klaver@student.utwente.nl.

Toestemmings-verklaring
Met het ondertekenen van dit document geeft u aan dat u minstens 18 jaar oud bent; dat u goed bent geïnformeerd over het onderzoek, de manier waarop de onderzoeksgegevens worden verzameld, gebruikt en behandeld en welke eventuele risico's u zou kunnen lopen door te participeren in dit onderzoek.

Ik verklaar hierbij dat ik dit formulier heb gelezen en begrepen. Al mijn vragen zijn naar mijn tevredenheid beantwoord en ik ga vrijwillig akkoord met deelname aan dit onderzoek.

Handtekening deelnemer:

X_____
Naam deelnemer:

Handtekening onderzoeker:

X_____
Naam onderzoeker:

Appendix C: Hotspots Overview

Table 2

Hotspots in Chronological Order, Nijmegen (First Row) and Apeldoorn (Second Row)

Hotspot 1	Hotspot 2	Hotspot 3	Hotspot 4	Hotspot 5
Ordeverstoring: geweldpleging tussen bezoekers	Geen leeftijdscontrole bij verkoop softdrugs: drugsbezit minderjarigen	Verkeersoverlast: Inrijverbod éénrichtingsverkeer	Fietsendiefstal: regelmatig meldingen van fietsendiefstallen	Openbaar dronkenschap: overlast hangjongeren
(*Public disorder: violence between visitors)*	(*Noncompliance legal age: drug possession among youngsters)*	(*Traffic disturbance: one-way street driving ban)*	(*Bike theft: recurrent reports of bike thefts)*	(*Public intoxication: disturbance caused by youngsters)*
Fietsendiefstal: regelmatig meldingen van fietsendiefstallen	Geen leeftijdscontrole bij verkoop softdrugs: drugsbezit minderjarigen	Verkeersoverlast: overlast van snorfietsers	Ordeverstoring: geweldpleging tussen bezoekers	Openbaar dronkenschap: overlast horecagasten
(*Bike theft: recurrent reports of bike thefts)*	(*Noncompliance legal age: drug possession among youngsters)*	(*Traffic disturbance: disturbance caused by mopeds)*	(*Public disorder: violence between visitors)*	(*Public intoxication: disturbance caused by guests)*

Appendix D: Additional Analyses

Comparative Analyses

A number of comparative analyses have been performed with the obtained data. Seeing that these analyses did not directly relate to testing the research hypotheses, these analyses were not included in the original texts of this master thesis. Within the experiment, multiple contexts and samples can be distinguished. First, the experiment took place in two different cities. Second, there was a sample of mounted and street police who volunteered their time for this research. Third, there was a manipulation, which included the high priority versus the low priority scenario that was implemented with the purpose of evoking stress among the participants. Therefore, a number of comparative analyses have been performed to analyse if there were any significant differences between these groups with respect to technology acceptance, risk perception, subjective norms, behavioural intention, and perceived stress.

Comparing between cities. Independent t-tests have been performed to compare the means of the research variables between the police officers who participated in Nijmegen and Apeldoorn. These groups differed significantly in terms of technology acceptance, risk perception, and the behavioural intention. With respect to technology acceptance, the independent t-test revealed that the participants from Nijmegen were less acceptant of the AR-glasses (M= 3.63, SE= 0.08), than those who participated in Apeldoorn (M= 3.95, SE= 0.13). This finding, -0.32, 95% CI [-0.62, -0.01], was significant $t(75)$= -2.05, p= .04. As for the risk perceptions, it can be concluded that on average, the participants who took part in Nijmegen indicated that they found the glasses less risky (M= 3.03, SE= 0.04), than the police officers who participated in Apeldoorn (M= 3.24, SE= 0.07). This difference, -0.22, 95% CI [-0.37, -0.07], was significant $t(75)$= -2.88, $p < .01$. Finally, the police officers who participated in Apeldoorn have greater behavioural intentions to use the AR-glasses in the future (M= 4.05, SE= 0.16), opposed to the police officers in Nijmegen (M= 3.58, SE= 0.13). This difference, -0.47, 95% CI [-0.93, -0.01] was significant $t(75)$= -2.02, p= .05. The other t-tests did not reveal any significant differences between the samples. A summary of those statistics can be found in Table 1.

Table 1

Independent T-tests with City as Grouping Variable without Significant Outcomes

Research Variables	***t***	***df***	***p***	***M* difference**
Subjective Norms	-1.24	73	.22	-0.30
Perceived Stress	1.74	73	.09	0.17