

## MASTER

Good darkness

a new perspective on the concept of darkness in urban settings

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## Good darkness: a new perspective on the concept of darkness in urban settings

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*Image of TU/e at night, taken with Canon 350D (2001) by Robin Flaton*

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## Abstract

Research has shown that people are more disconnected from nature than ever, even though a strong connection to nature has many benefits for well-being, as well as promoting pro-environmental behaviour. One of the ways in which humans have become disconnected from nature is through the ever more pervasive use of artificial light at night (ALAN), which largely bans the natural day-night cycle from our increasingly urban lives. Through our use of artificial light, we might be losing the benefits that darkness can bring. The aim of this thesis is to investigate these benefits as well as construct an idea of what conditions create positive experiences with darkness.

Historically, darkness has been viewed as negative and words relating to darkness have been used to describe undesirable situations or traits. However, emerging evidence suggests that feeling connected to darkness can foster well-being in ways similar to connecting with nature. Research in this area has largely focused on intentional and extraordinary activities such as stargazing while neglecting the more common, 'mundane' aspects of darkness that people experience regularly, such as during night time social events or while biking or walking through darkness. This thesis turns its attention to this more mundane darkness, especially in urban settings where 'true darkness' is hard to find.

Through a qualitative approach using focus groups and thematic analysis with 15 participants, I found that darkness indeed offers positive qualities, providing a quiet environment in which people feel free to be themselves, peaceful, and connected to loved ones. In this quiet contrast from the hassle of daily city life, people can wind down and relax. Further, darkness can provide some of the elements of attention restoration theory through the visibility of starlight and the use of beautiful and well-placed lighting (fascination) and creating a 'bubble of darkness' (being away) which makes people feel like they are in a whole other world (extent). This suggests that darkness itself could be a restorative environment.

When discussing urban darkness, it is inevitable that we discuss artificial light. In the discussions, participants expressed a desire for different lighting strategies that are common: coloured light,

integrated lighting and dimmer light. These findings implicate that modern lighting strategies might not be aligned with people's preferences, as they focus on uniform lighting for visibility.

Further, I found that darkness is experienced positively only when people feel at ease in their surroundings, which in large part depends on their sense of social safety. Appraisals of darkness further depend on the way darkness was discussed during one's childhood, previous experiences of the self and loved ones in darkness and where one grows up, which determines how often one was required to interact with darkness.

This work showed that everyday experiences of urban darkness can hold positive value in people's lives: darkness is appreciated for the peace and quiet that comes with it, the privacy it offers and its restorative potential. Further research could investigate user preferences for lighting strategies that allow for more darkness in urban areas. Darkness offers advantages both for people and nature and should thus be framed not as something to be banned completely, but in terms of generative value.

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## Introduction

Since the 1950s, shifts to an ever more urban and technological lifestyle have resulted in an increasing disconnection from nature as we now spend the majority of our time indoors (Ives et al., 2018; Softas-Nall & Woody, 2017). In striking research, Kesebir and Kesebir (2017) found a steady decline in references to nature in books, films and song lyrics since the end of the second World War, reflecting a cultural shift away from nature. They and other authors suggest this shift is in large part due to the rapid increase in the use of (screen-based) technologies, which can replace time spent outdoors with time spent interacting with technology (Andrews et al., 2020; Ives et al., 2018; Kesebir & Kesebir, 2017; Softas-Nall & Woody, 2017). At the same time, much research supports the idea that a sense of connection to nature is beneficial for both human and nature's well-being (Barnes & Passmore, 2024; Barrable & Booth, 2022; Bell et al., 2016; Kesebir & Kesebir, 2017; Sheffield et al., 2022; Sulfa et al., 2024).

Furthermore, western lifestyles have shifted to accommodate and even require nighttime activities, which means we are enthusiastically lighting our (urban) nights (Gao & Zhu, 2025). In modern cities, it is often impossible to see the starry night sky and our rhythms are determined not by natural cycles of day and night but by modern demands. Although lighting and its influence on human perception and well-being has been widely studied, the concept of darkness remains relatively unexplored.

In their research, Kesebir and Kesebir (2017) composed a list of words that they considered to be referencing nature. This list includes several words related to darkness and the night, such as moon(light), sky and star, as words relating to nature, suggesting that darkness itself could be seen as part of nature. Additionally, a connection to the night sky has been found to be correlated with a sense of nature connectedness and well-being (Barnes & Passmore, 2024). Barnes and Passmore (2024) suggest that the human-night sky relationship is a part of the broader human-nature one and that the loss of naturally occurring darkness "may contribute to our failing relationship with nature and the night" (Barnes & Passmore, 2024, p9). Thus, (re)connecting with darkness could be one of the many

ways in which we could reconnect with nature and obtain the positive effects linked with this connection.

However, most existing research on the benefits of darkness or night sky exposure relate to extraordinary activities, such as night hikes or stargazing with the use of a telescope, or true natural darkness, unspoiled by artificial lighting as found in for example natural parks (e.g., Frey, 2007; Madland, 2024). Little is known about the qualities and experience of darkness in mundane, everyday urban settings (Janssen, 2025). This thesis will therefore focus on (everyday) urban darkness and its positive qualities with the aim of investigating the possibilities of reconciling with darkness and/or significantly reducing our use of artificial light at night (ALAN) to foster connectedness to nature. I will try to define, based on focus group discussions and thematic analysis, under what conditions (everyday) urban darkness is acceptable, or even desirable.

To provide a complete account of the concepts that are relevant in our discussion of darkness, I will first provide some background information on nature connection and its benefits, and on both the benefits and adverse effects of lighting technology. Next, I will discuss darkness and its known associations. Then I will return to our connection to nature through the lens of the preference matrix and Attention Restoration Theory, which I will link to the possible restorative effects of darkness on humans. I will end this introduction with the research question and aims.

## Background literature

### Nature connectedness and pathways to connection

The way nature is defined and viewed is greatly influenced by culture: in the west, we tend to view nature as something separate from us, something outside of ourselves (Beery et al., 2023). As this is the dominant cultural paradigm in the location of the current research (Eindhoven, the Netherlands), I will consider humans to be separate from nature, and define nature as anything naturally occurring, and not man-made. For example, trees are part of nature, but buildings are not, similar to how Kesebir and Kesebir (2017) define nature.

The natural cycle of night and day can be considered a piece of nature everyone has access to, at least to some extent – certainly there is a qualitative difference between the night sky as viewed from a desert and from an inner-city apartment, due to differences in artificial lighting quality and quantity present in one's direct environment. Still, the day-night cycle could offer potential for connecting with nature, albeit in a different sense than one might consider nature connectedness. In this research, I will investigate whether people view darkness as a part of nature as one of the topics relevant to answering the main research question.

A growing body of research supports the idea that spending time in nature and fostering a sense of connectedness to nature has many benefits for human health, such as reduced stress and anxiety, increased immune system functioning and lower levels of depression (Barnes & Passmore, 2024; Barrable & Booth, 2022; Bell et al., 2016; Kesebir & Kesebir, 2017; Sheffield et al., 2022; Sulfa et al., 2024). Additionally, people who report being more connected to nature show increased pro-environmental behaviour such as recycling (Ives et al., 2018).

In contrast, people who report feeling disconnected from nature have been found to have lower life satisfaction and increased prevalence of anxiety and mood disorders (Andrews et al., 2020; Barrable & Booth, 2022). Moreover, some scholars have suggested that a perceived disconnection from nature is associated with the exploitative and destructive ways in which humans engage with the natural environment (Barrable & Booth, 2022; Lumber et al., 2017).

It has been argued that the positive effects of connectedness to nature are due to an innate affinity humans have for the natural world, as we are, essentially, part of nature and have, for thousands of years, lived with its rhythms (Softas-Nall & Woody, 2017; Vance, 2023): this theory is known as the biophilia hypothesis (Wilson, 1984). However, in more modern times, human interest in nature turned technical and we started to see nature for its economic potential, prioritizing how we can dominate and control nature for our own benefit rather than valuing how we directly experience nature (Beery et al., 2023; Softas-Nall & Woody, 2017).

In essence, our disconnection from nature is also visible in our disconnection from natural cycles through the banning of darkness at night by use of artificial light, even though humans are diurnal species. However, for healthy human (and ecosystem) functioning, we need the natural darkness that comes with nightfall (Kørner, 2023). Some researchers even found that a perceived connection to the night sky has similar positive effects on well-being as exposure to nature, such as better mental health and happiness as well as lower stress and less depressive feelings (Barnes & Passmore, 2024). In their research, Barnes and Passmore (2024) developed a scale measuring individual's connection to the night sky, which correlated strongly with scores on the nature connectedness index, suggesting that dark skies are a part of nature itself. They suggest that exposure to the night sky can inspire restoration, mindfulness and contemplation, which in turn are thought to enhance overall well-being. These effects appeared most notably when people intentionally engaged with the night sky, such as in stargazing activities. Bell et al. (2014) also found these positive effects in people who engaged in stargazing, as well as a link between years of experience stargazing and feeling connected to nature. Together, these studies underscore the positive effects on well-being inspired by natural darkness while highlighting the lack of research on more ordinary, everyday forms of darkness — the focus of the current study.

Nature connectedness has been defined by Barnes and Passmore (2024) as a person's subjective sense of their relationship with nature. It has been argued that simply being in nature is not enough and active engagement is required to reap the benefits associated with being connected to nature. Lumber et al. (2017) found that these benefits only become available when people engage with

contact-based activities that entail emotion, meaning, compassion and beauty – simply educating people about nature or walking through nature did not produce any significant results. Additionally, Ives et al. (2018) suggest there are several levels on which one can feel connected to nature. These levels are, from shallow to deep: material (the consumption of goods from nature), experiential (direct interaction with natural environments), cognitive (knowledge or awareness of the environment and attitudes and values towards nature), emotional (feelings of attachment to or empathy towards nature) and philosophical (perspective on what nature is, why it is important, how humans ought to interact with it). Depending on the level that one wants to (re)connect with nature on, the path to reconnection looks different. The authors suggest that fostering a connection at the shallower levels is unlikely to bring about systemic change, but it can support (re)connection on deeper levels. In contrast, even small changes to one's engagement with nature at the deeper levels can bring about significant sustainability outcomes.

Looking specifically at reconnecting with nature through reconciling with (urban) darkness, this connection would most likely take place at the experiential level where people directly interact with darkness (or a lack of it). Darkness, when experienced positively, can bring about emotion, meaning and beauty and could thus be a possible pathway to nature connection. This thesis will aim to find the preconditions necessary for positive interactions with urban darkness in everyday settings. Before I elaborate on darkness further, I will discuss light: there is no light without darkness and vice versa, so both sides of the issue merit attention.

### **Lighting and its role in human psychology**

Boyce (2019) lists many potential benefits of light at night, in line with the common historical association of light with positive feelings. These advantages of light include enhanced safety due to better vision, which leads to fewer incidences of tripping or falling; reductions in traffic accidents; reduced fear of crime, especially for women and older adults; increased perceived safety due to the presence of prospect (the ability to see all around oneself) and the visibility of places of refuge and

escape; an increased ability to notice the emotions of other people around us; encouraging people to engage in (social) activities rather than being confined to their homes once it is dark, and the 24-hour economy, which is thought to have helped many people escape poverty.

More specifically, Rahm et al. (2019) found that light plays a role in reassuring pedestrians and increasing feelings of safety. Completely unlit places or places where lights are hidden behind unkempt greenery are often avoided at night, even if that means taking a detour. These findings suggest that lighting plays an important role in making people feel at ease. Installing streetlight is the most often used strategy to improve an area, with the underlying assumption that it will lead to a reduction in crime. However, the evidence for a link between lighting quality and the incidence in crime is mixed (Boyce, 2019). Still, lighting plays a role in increasing perceived safety through improving prospect (overview over a scene) and reducing entrapment (lack of escape possibilities) and concealment (possible hiding places for attackers; Van Rijswijk et al., 2016; Van Rijswijk & Haans, 2018). These determinants of perceived safety are well-researched and empirically supported.

Other researchers wondered if feelings of fear were more related to the nighttime or the darkness itself and tested this by measuring fear both during the day and the night, in light and dark conditions (Li et al., 2015). They found that feelings of fear increased during the night, regardless of illuminance, and there were no significant differences between light and dark conditions, suggesting that it is mostly the night that makes us anxious, not the lighting levels. Since humans are diurnal species, this finding is not entirely surprising. However, it should be noted that this study was conducted in the laboratory, and that participants most likely were feeling rather safe. As a result, the effect of darkness may not have been as pronounced. Indeed, Jedon et al. (2025) found in an experimental study where they manipulated feelings of anxiety that one's state of mind influences safety perception: feelings of tension and stress caused people to rate environments as less safe, and cause us to adjust the demands we place on the environment. Taken together, these findings suggest that any setting will be perceived as less safe during the night since the nighttime makes us more anxious (Li et al., 2015).

Anxiety is most seen as something to be avoided, since excessive levels of it can impair our quality of life; however, anxiety serves an evolutionary function, and some level of anxiety can be useful through creating a state of alertness (Bateson et al., 2011). In short, anxiety prepares people (and other animals) for handling threats. Some researchers even pose that anxiety is our default state, and we are only ever not anxious when we perceive obvious signs of safety (Brosschot et al., 2018). Considering that urban areas offer a wealth of ambiguous information, Brosschot et al. (2018) pose that the urban environment is most often perceived as unsafe. This leads our anxiety response to be 'on' and causes us to perceive our environment through the lens of fear. Additionally, we have an innate tendency to view strangers as unsafe, and in urban environments, most people are strangers. All of this taken together can cause us to view the urban streets as an anxiety-inducing "territory of unknown others" (Brosschot et al., 2018, p.13).

These findings taken together suggest that we are inherently fearful in the night and in the urban environment. It also becomes clear that humans perceive light as a safety cue, regardless of its actual effect on safety. One of the most basic needs of any species is to feel safe (Van Rijswijk et al., 2016), which is why lighting has received so much attention in the research. However, we might be overlooking other important qualities in life related to that which we ban by prioritizing (perceived) safety. Light is a way to 'combat' darkness, to prevent the disadvantages darkness bring us such as reduced vision, but what advantages can darkness bring? I will examine darkness further in the next section.

### **Darkness – historical and contemporary associations**

Darkness is often seen as the absence of light, but little is known about the quality of darkness itself. Much of the existing research is of a philosophical nature or focuses on darkness in natural settings, such as camping areas or during therapeutic outings (e.g. Frey, 2007). In contrast, little is known about positive experiences and relationships with darkness in more mundane, everyday and urban settings (Janssen, 2025).

The way we view darkness is shaped by history and culture (Dunn & Edensor, 2023). In Western cultures, darkness is often seen as something bad, something ‘backwards’ and used as a synonym for those subjects we would rather not talk about: darkness makes us think of crime, or harmful psychological traits (e.g. ‘the Dark Triad’) or religious intonations such as dark (evil) spirits (Edensor, 2015a, 2015b). Historically and religiously, darkness was tied to fear, since malign spirits were said to lurk in the dark – in contrast, (western) religious beliefs tend to associate light with divinity and goodness, and the shift from medieval ignorance to a paradigm of science and rational thought is known as enlightenment for similar reasons. These associations continue into the present, where we refer to dark deeds or thoughts as those that are unacceptable, being ‘kept in the dark’ as a metaphor for ignorance and taking a ‘leap in the dark’ when we encounter unknown situations and risks.

After nightfall, feelings of unease come up for many people, especially around green spaces – those exact spaces that can provide rest and recreation during the daytime (Nikunen & Korpela, 2009; Rahm, 2019). In the dark, involuntary attention to moving shadows and changing light conditions can burden people, creating a “nightscape of fear” where relaxation becomes impossible (Nikunen & Korpela, 2012).

However, according to Edensor (2015a, 2015b) not all associations with darkness are negative: conviviality, intimacy, experimentation, excitement and spectacle have also been linked to dark spaces and the nighttime. Under the cover of darkness, a ‘second city’ takes shape, where there is space for otherwise shunned desires and identities, thus becoming an object of intrigue and mystery and providing ‘freedom from both labour and social scrutiny’. Furthermore, certain religious or spiritual practices include darkness as an important component that can inspire awe and inspiration (Edensor, 2013).

Other positive experiences with darkness come from people’s reports on city-wide blackouts, such as in 2003 in New York, where people report feelings of calm, being present in the moment, generosity and conviviality. When the light returned to some cities after the First World War, some would lament on the absence of clear views of the night sky (Edensor, 2015b). Edensor himself (2015b)

experienced the dark or gloomy nighttime markets in places like India and North Africa positively. As he was less able to rely on vision as his guide, he noted: “the need to pick a path carefully through the relative gloom enlivens the body, sharpens the senses and makes one aware of others, producing a heightened, tactile sense of mobility.” This creates other sensory experiences related to smell and sound, which is a vastly different experience from walking the brightly lit Western streets – proving that the normalization of ALAN is dependent on culture as well as historical context (Edensor, 2015b).

The first fixed street lanterns appeared in the late 17<sup>th</sup> century in cities like Paris and London (Painter, 1999). Although lighting was seen as progressive by many and opened up the night to people previously excluded from nighttime environments, new lighting technologies were not always accepted immediately: complaints about glare from light sources and their threat to the aesthetic and sensual qualities of the city were abundant (Edensor, 2015b). This new era of visibility was not welcomed by everyone, as the privacy the night used to offer diminished. Some people even went so far as to smash lighting fixtures to protest this increasingly ubiquitous lighting of urban areas, such as in Paris in the late 18<sup>th</sup> century (Painter, 1999). Indeed, streetlights were also called “police lights” as they were mandated by government officials.

As lighting has become the standard and we are no longer required to interact with (full) darkness in urban areas, many of us no longer know how to approach darkness. As Janssen (2025) found in a scoping review of the available literature on darkness, our negative associations with darkness are deeply embedded in society through centuries of reinforcement and so we tend to neglect its positive qualities. Similarly, Madland (2024) states that valuing darkness requires a shift in perception, away from the notion of darkness as fearful or something to be banished and towards a recognition of its positive qualities. In her site studies, she found that people often approached darkness with apprehension but with time they reported positive experiences such as feeling at peace and being connected with something greater than themselves (Madland, 2024).

There is a lack of contemporary research on darkness as an everyday concept which focuses on its qualities and positive sides, and the more extensively we light the night, the more we lose touch with

the concept of darkness (Janssen, 2025; Madland, 2024). We have overlooked the positive qualities of darkness and the different sensory experiences that the night offers (Lis et al., 2023). Therefore, this thesis will focus on the positive qualities of mundane, everyday darkness, hoping to contribute to filling the research gap in this area.

## **Restoration and relaxation in the dark**

Relaxation and leisure are often confined to the dark hours, especially in the wintertime in locations further from the equator (Boyce, 2019; Nikunen & Korpela, 2012). Thus, darkness could be considered to be an environment in which people can restore. One can imagine that relaxation and restoration can only occur under certain circumstances: the aim of this next section is to outline several conditions under which restoration can occur and later apply them to the concept of darkness, to see whether darkness can hold value as a restorative environment.

First, I will discuss some findings from environmental research regarding preference, as preference has been found to be linked to restorative potential of environments (van den Berg et al., 2003). Next, I will discuss attention restoration theory, which is relevant in understanding how and why certain environments can provide restoration.

## ***Environmental preferences***

Not every environment is preferred equally, and natural environments are consistently preferred over urban ones (Kaplan, 1987). An evolutionary approach is thought to influence preference, where humans decide unconsciously and quickly which environment has their preference – coincidentally, these are also the environments in which our ancestors would thrive. Combined research efforts have established a pattern that predicts which environments are preferred over others, based on two main components: exploration and understanding. Exploration entails the need and ability to update and refine one's knowledge, whereas a minimum level of understanding of the environment is crucial to survival.

Mystery is also found to be an important predictor of preference: scenes depicting a trail bending and disappearing from view or a scene partially hidden by foliage are preferred most (Kaplan, 1987). These types of scenes offer the promise of gaining more information if one were to move deeper into the scene – thus offering exploration potential. For the understanding dimension of preference, coherence between the different elements of an environment is thought to be an important factor. Natural environments that offer both opportunities for exploration and that can be understood to a sufficient degree elicit preference over environments that do not offer mystery (e.g. an open field) or understanding (e.g. complex urban areas with many different signposts cluttered together).

In the context of nighttime environments, preference has also been researched, albeit with a strong focus on the role of lighting. In survey research using photos of differently lit areas in urban parks, Lis et al. (2023) asked participants to rate the images on either safety, privacy, mystery and legibility. They found that an increase in path lighting decreased preference, as mediated by a decrease in mystery and privacy, whereas increased lighting of vertical elements in the areas around paths raised the assessment of mystery and preference. The authors suggest that this preference for the lighting of vertical elements away from the path is due to the highlighting of interesting elements from the darkness, which can encourage exploration. Furthermore, background lighting of these elements resulted in more legible spaces, i.e. environments that score high on the understanding aspect of the preference matrix. Intensely illuminated paths create contrast with the surroundings, making the space less legible, decreasing feelings of safety and mystery.

Similarly, Gao and Zhu (2025) suggest that lighting that is too bright can diminish a sense of mystery and privacy that the nighttime can offer, as well as lighting that focuses solely on horizontal surfaces and paths. Additionally, they discovered that by focusing light to the foreground beneath people's feet, the desire to explore the space waned, whereas background illumination to specific elements could effectively draw attention and encourage exploration – an important aspect predicting preference. The paper suggests that nighttime visitors to urban green spaces may prefer light that is spread throughout the space rather than too focused. The authors did not measure preference

explicitly, but through measuring the elements of attention restoration theory, which I will discuss in the next section.

These findings on preference for lighting strategies in dark spaces focus on urban parks and green spaces rather than the urban environment more broadly. The current research turns its attention towards the city more generally to investigate in which situations and settings darkness is liked, as liking has been found to be linked to restorative potential.

### *Attention restoration theory*

Through (re)connecting with nature, we can rest, relax and restore. An interesting framework for this is Attention Restoration Theory, or ART for short, which suggests that nature has stress-relieving and attention-restoring effects on humans (Kaplan & Kaplan, 1989; Kaplan, 1995). Throughout the day, we use our directed attention (also called voluntary attention) to focus on what must be done: this attention is limited and can be depleted. Viewing or experiencing nature is thought not to require voluntary attention, which allows for attentional resources to be refilled (restoration) and mental stress to be relieved through different aspects of the natural environment. These aspects include escape or a sense of being away from aspects of or worries about one's ordinary life; coherence or the extent to which elements of an environment relate to each other; fascination which calls forth involuntary attention; and compatibility between a person's environment and their needs and capabilities. Natural environments can provide for the elements of ART, but so could other environments. For example, Kaplan et al. (1993) investigated the potential for a museum to provide in the elements of ART by administering surveys to visitors and found that museums indeed scored high on restorative elements. They note that no comparison was made in directed attention performance before and after the visit, but these results at least suggest that the restorative potential of spaces is not limited to natural environments alone. Possibly darkness, in itself, could offer restoring experiences as well. ART has so far mainly been researched in daylight, but several authors are starting to look into the possibility of restoration in the dark (Gao & Zhu, 2025; Nikunen & Korpela, 2009).

Gao and Zhu (2025) investigated whether the components of ART mediated the relationship between different types of lighting and vegetation in urban parks, and restorative potential. The authors administered a validated perceived restoration score survey (PRS-11) to visitors of different urban parks in Singapore both during the day and the night and correlated these scores to the lighting strategies used in these locations. They found that the components fascination and being away scored slightly higher during the nighttime than during the day and that compatibility was slightly lower; there was no notable difference in extent between night and day conditions. All aspects of ART scored relatively high in these natural environments, both in light and dark conditions, suggesting that certain areas in darkness could have restorative effects on humans and that the restorative effect of nature might not be limited to the hours of daylight.

Furthermore, Gao and Zhu (2025) found that lighting paths and horizontal surfaces ('downlighting') resulted in higher scores on extent and compatibility but lower scores on fascination and being away compared to uplighting. Downlighting was also related to the highest perceived restorative value. Additionally, scattered lighting provided for a higher perceived restoration score than focused lighting as well as being more strongly related to being away, extent and compatibility. Background lighting showed a significant correlation with all four restorative aspects. There is not one single combination of lighting strategies (i.e. uplighting vs. downlighting, background vs. foreground, scattered vs. focused) that yields the highest scores on all elements of ART: a trade-off is to be made dependent on design objectives.

The authors note that other senses, such as thermal experience and auditory cues, may impact how restorative an environment is perceived to be (Gao & Zhu, 2025). Since the research was conducted in Singapore, with an all-year tropical climate and an absence of winter vegetation, it might be that in environments with more moderate climates, such as in the Netherlands, the experience of the restorative value of darkness is influenced by these other senses. Furthermore, subjects in the research were not asked about their feelings of safety during the night, which could further impact findings and influence restoration.

Nikunen and Korpela (2009, 2012) also suggest an important role for the focus of lighting in determining the restorative potential of dark spaces. They modelled several urban environments, both with and without natural elements, in the dark with different lighting compositions, administering the same survey as used by Gao and Zhu (2025) on perceived restoration. The authors found that lighting greenery resulted in higher perceived restoration than lighting parking lots and roads, although perceived restoration in all settings was relatively low. Often, the nighttime image consists of parking lots, roads and signposts, which are the most disliked elements of urban space. Importantly, it has been found that preference and restoration are correlated, such that environments that are preferred result in higher measured restoration after exposure to (images of) these places (van den Berg et al., 2003). Thus, focusing light on preferred elements of the outdoor space could increase the restorative potential of the space.

However, it must be noted that the research by Nikunen and Korpela (2009, 2012) and Lis et al. (2023) used images devoid of people as stimuli to test their hypotheses and these images are far from the lived experience of people outside at night. If the urban environment is considered as a territory of unknown others, as Brosschot et al. (2018) suggest, and being outside in this (perceived) unsafe space makes us feel anxious, we might not be able to restore in darkness (outdoor) in the urban environment. And if good lighting feels more important than darkness because fear shifts the demands people place on their environment (Jedon et al., 2025), darkness could gradually disappear from urban spaces, leaving little room for it to serve a restorative function. As Boyce (2019, p. 364) put it: “people like light at night ... they care more about their immediate surroundings than the distant past visible in the night sky.”

Additionally, it also becomes clear from the research mentioned so far that lighting and darkness can have opposite effects. For example, natural scenes are preferred in the daylight and increase perceived safety, but these same scenes in the dark lead to increased opportunities for concealment and limited prospect and escape routes: these factors may increase fear during the dark hours (Nikunen & Korpela, 2012). Similarly, while removing natural elements from an environment may increase

perceived safety at night, these 'non-natural' spaces could lack restorative qualities during the day. Furthermore, signs of human presence at night can both be reassuring due to social control, and increase fear of crime due to the presence of social danger (Nikunen & Korpela, 2012). Mystery of a space can be linked to both preference and fear as well (Herzog & Miller, 1998). Moreover, lighting can both increase and reduce fear of crime: it can reduce fear through better prospect and surveillance, and increase fear through making unpleasant aspects of the environment more visible as well as creating a feeling of being watched from unlit spots by possible attackers, especially by creating glare (Nikunen & Korpela, 2012).

To be able to restore in the dark, a framework is needed for what constitutes "good darkness" or dark settings that can be experienced in positive ways in everyday life, thereby fostering a connectedness with the natural world through its rhythms of day and night. Such a framework, to the author's knowledge, is not yet present. The aim of this thesis is to provide a basis for such a framework.

Most research on urban darkness to date is negative in that it focuses on crime, fear, perceived unsafety and anxiety. Existing knowledge on the more positive side of darkness concerns mostly extraordinary darkness, such as in art constellations (e.g. as in Edensor, 2013), experiences in nature or therapeutic exposure (e.g. as in Frey, 2007). Everyday or 'mundane' darkness is neglected, although everyday experiences with darkness are the most common ones and thus, arguably, the most impactful. Therefore, in this thesis, I focus on both positive and everyday darkness.

## This thesis – research aims

The goal of this thesis is to focus on people's everyday lived experience of urban darkness to investigate where and how a sense of connection to nature can be reintroduced by reconciling people with darkness in everyday, 'mundane' urban settings. The main research question of this thesis is as follows: under what conditions is urban darkness acceptable or even desirable?

Thus, the research question remains broad and exploratory: what constitutes 'good darkness' in everyday urban settings? Since the topic is so broad, several sub-questions were designed to answer the main question, relating to the topics discussed in the previous sections. These questions are as follows:

- How does darkness relate to nature in people's lived experiences?
- What aspects of darkness do people appreciate in their everyday lives?
  - When do people seek out darkness?
  - What aspects can make an experience in darkness positive?
- Under what conditions is relaxation and restoration possible in urban darkness?
- When is darkness preferred over light?

To answer these, a qualitative approach using focus groups was applied. In the next section, this approach will further be defined. The questions were designed as guidance, not as being leading. They form the basis for the design of the study methods. Considering the qualitative and exploratory nature of the research, no hypotheses were formulated.

## Methods

### Study design

To answer the research questions, a qualitative approach using focus groups was employed. Considering there is as of yet little empirical knowledge about the way people value and interact with urban darkness, a qualitative approach can make room for ideas and concepts not anticipated based on previous literature (Braun & Clarke, 2013). Focus groups were chosen for several reasons. For one, group discussions allow people to help each other formulate their thoughts, which can be helpful when talking about darkness as it is not a common theme people tend to discuss (Hennink, 2014). Focus groups also allow for contrasting views and opinions to emerge, which could lead to more insights into the reasoning behind different views: why does one person value darkness in a positive way, while another avoids darkness altogether?

Additionally, focus groups allow a wide range of views and perspectives to be discussed, which makes them a useful tool for areas that are under-researched. Within the timeframe of this thesis, focus groups are achievable as well, as according to Hennink (2014) a single focus group can generate about 70% of the data that a series of interviews with the same amount of people could. Group discussions reduce some of the artificiality of other forms of data collection and can help people refine their own views in light of what they hear others say. Finally, a group discussion seems appropriate because the subject is not highly controversial and so I expect no intense emotions to arise due to conflicting views.

A discussion guide was designed to answer the main research questions: this guide contained all the topics of interest and was used to structure the group sessions (Braun & Clarke, 2013). Sessions were semi-structured: the discussion guide served as a tool to keep overview of the topics to cover rather than as a timeline. The chosen discussion topics are rather broad, so further subtopics were devised with several questions and possible probes to stimulate the conversation. The full discussion guide (in Dutch and translated to English) can be found in Appendix A (Dutch) and B (English). The initial discussion guide was tested with a pilot group of three friends and an initial informal discussion with three family members and my partner to find potentially missing subjects or incomplete or ambiguous

questions. The guide was further revised after each session with the feedback provided by participants at the end of the discussion. The final subtopics covered associations with darkness, feelings about darkness, positive and negative experiences of darkness, relaxation in the dark, and darkness as part of nature.

Notes on nonverbal behaviour were taken by K. Ehlert, a PhD student studying the non-material values of darkness. These notes were integrated with the transcripts to check for nonverbal (dis)agreement such as nodding or shaking the head, and curiosities such as long silences. These could be important indicators of discussion dynamics which do not emerge clearly from the transcript alone (Hennink, 2014).

The focus groups were held in the evening for two reasons: to allow for people with day jobs to participate, and to have a direct reference to the subject that was being discussed. The rooms used for the sessions had floor-to-ceiling windows offering a view of the city in darkness. When discussing darkness as a concept and in trying to define what urban darkness is precisely, it could be useful to have a view of darkness itself instead of staying in abstract conversations. I felt this was more tangible than simply presenting participants with pictures, especially since those often do not represent the real lived experiences of people. Furthermore, having a view of Eindhoven could help participants point out landmarks and come up with specific examples.

## Participants

Participants were recruited through the JF Schouten participant database of Eindhoven University of Technology, flyers distributed on the university's campus, announcements in several bachelor-level university courses and messages to group chats of several student and study associations. The recruitment text mentioned the topic of the focus group—darkness—and the time (7pm), location and duration of the session. No further in-depth information was given so as not to influence participants in their contributions during the discussions. To participate in the research, people were required to fill in a survey which asked for their name, email, age, gender, as well as to state in one

sentence the first thing that comes to mind when they think about darkness. The aim of this was to try and mix groups with differing views that could have productive discussions instead of participants simply agreeing with one another most of the time.

Although the aim was to mix groups based on these criteria and answers to the questions about darkness, recruitment proved difficult, possibly due to the travel and time required to participate in the research, as well as the fact that the focus groups were held in the evening. Most respondents were students or recent alumni and thus aged between 20 and 30. Therefore I mixed as well as I could for gender and age, but within the time limits of this thesis, the prioritized goal became to fill the sessions planned, not to have the ideal balance of views and demographics.

In focus group research, group discussions are conducted until saturation is reached, i.e. no new information is gathered in new sessions (Hennink, 2014). My goal was to conduct four or five sessions to ensure saturation, but due to the time constraints of the research, this was unfortunately not feasible. However, in the third session, no completely new topics were brought up, suggesting that the sessions that were organised might have been enough.

I selected participants that lived in Eindhoven and had lived there for at least a year and who spoke fluent Dutch. I did this to allow participants to be specific about places in their discussion and because most people living in the Eindhoven area are of Dutch nationality. Hennink (2014) argues that homogeneity in social status can be beneficial for group dynamics, but offers no clear conclusions on whether or not to mix genders together. Considering the known differences in safety perception between men and women at night (e.g. Boyce, 2019), I thought it would be interesting to hear the views of both sexes in the discussion and I aimed to put together a balanced mix of men and women in each group. I foresaw no issues with mixing genders together in freedom to talk about the subject of darkness and decided to include both in each group.

A total of 15 participants participated in one of three focus group sessions at the end of November or beginning of December 2025. Participant characteristics per session can be seen below in Table 1. 47% percent were female and the mean age was 30.1 (SD 10.45, range 20-63). 53% percent of

participants was studying at TU/e or Fontys at the time of the research. In Table 1, the distribution of age and gender in each group can be seen. As suggested by Hennink (2014), I aimed for groups of four to six participants, slightly overrecruiting in case of dropouts. In the first session, one person cancelled last minute, and another did not show up without communicating it. I was unable to fill the second session, but all five participants that registered were present. For the final session, all six participants were present.

## Procedure

Three focus groups were held on the university campus of Eindhoven University of Technology on November 20<sup>th</sup>, November 27<sup>th</sup> and December 1<sup>st</sup> of 2025 in the Atlas building on the eighth and sixth floor, with floor-to-ceiling windows offering a view of the skyline of Eindhoven. Participants were met by the researcher at the entrance of the Atlas building and led to the interview room. The sessions started at 19:00 and lasted between sixty and ninety minutes: this time was chosen to ensure sufficient darkness and availability for participants with work or study obligations. Tea, coffee and snacks were provided for the participants. Before starting the focus groups, participants were asked to read and sign an informed consent form.

**Table 1**

*Participant characteristics per session*

Session date	Number of participants	Age range	Average age	Percentage female
20-11-2025	4	27-32	29.8	50
27-11-2025	5	22-63	32.6	40
01-12-2025	6	20-44	28.3	50
<b>All sessions</b>	<b>15</b>	<b>20-63</b>	<b>30.1</b>	<b>47</b>

Before starting the recording, I explained to the participants that the goal was for them to discuss the topics I would bring up, not to answer my questions directly. I ensured them there were no right or wrong answers and that every view was welcome. To make transcription easier, I asked them to raise their hand if they wanted to say something rather than interrupt another person. In addition to providing a clearer recording, this also ensured that everyone could be heard without being talked over or interrupted: this method proved effective, as people rarely spoke over one another.

Recordings were made using two separate devices (Samsung Galaxy A54 in flight mode and Jabra microphone: two devices were used in case one would fail). The session started with a round of introductions. Participants were asked to state their name, age, the place they grew up in and the time when they closed the curtains the previous night as an icebreaker. Next, participants were asked to take about two minutes to write down one instance in which they had a positive experience with urban darkness. They were asked to provide the location of that experience, and a short explanation of why this experience was positive – this provided a starting point for talking about the topic of darkness as well as another icebreaker activity helping people feel more comfortable sharing with the group. Participants were asked to write down their experience so as not to be influenced by other participants' answers, as I aimed for a range of perspectives rather than simply sharing similar experiences. I shared an experience of mine as the moderator (see Appendix C) to build rapport and take the initiative in the conversation.

First, I asked participants to try and define urban darkness together to make sure everyone would be talking about the same concept. The discussion continued on the subtopics of darkness as a part of nature, associations and feelings about darkness, activities conducted in darkness, safety in the dark, experiences with darkness and seeking out darkness. The full discussion guide, translated to English, can be found in Appendix B (Dutch version in Appendix A). The sessions were semi-structured: all topics were covered, but the order was flexible as one often transitioned into another naturally.

At the end of the session, participants were paid 21 euros through either a bank transfer or in cash for their time. I guided them to the exit of the building and thanked them for their time. All sessions lasted between one hour and ninety minutes (shortest: 1 hour, 7 minutes; longest: 1 hour, 24 minutes).

## Reflexivity

As a researcher, I bring my own perspectives, biases and personality into the discussion. Braun and Clarke (2013) suggest keeping a reflexive journal in order to be aware of these perspectives and biases and how they shape the production of the knowledge reported. Subjectivity is unavoidable, especially in qualitative research, and so is researcher influence. Understanding these aspects of qualitative work can help in critically reflecting on results as well as acknowledging my own role in it (Braun & Clarke, 2013).

Taking on the role of moderator, I have tried to not voice my own experiences and opinions too often so as not to influence the participants or the data. However, in the way of reacting to comments, asking questions and nonverbal behaviour, I do bring my view into the group. For example, when something struck me as interesting, I would nod and say something along the lines of: “Thanks, that is an interesting comment,” whereas contributions that were less personally interesting received a less elaborate response from me. This could have steered participants to favour sharing similar thoughts or experiences over other ones that were relevant as well.

My own view on darkness influences my reactions to the stories that were shared. Personally, due to my background in this research and my upbringing in a less urbanized area, I tend to think of darkness as a positive thing, an important part of the cycle of life that regulates our energy, moods and (in the past more than in modern times) our lifestyles. Like many others, I associate darkness with the cold winter months: in addition, I associate this time of the year with rest, introspection and connection, which does not seem to be the most common themes emerging from existing literature. When people complain about the darkness at night or in the winter specifically, I tend to want to tell them that “it isn’t so bad” and that there are other aspects of life highlighted through darkness – for me, my spiritual

side comes alive in the dark. In the discussions, I refrained from my own arguments about the value of darkness, instead encouraging people to share their experiences through staying silent or asking: “Can you tell us more about that?”

Additionally, I am aware that I can think in quite a black and white manner. When it comes to darkness and knowing the disadvantages of using ALAN pervasively, I tend to revert to thoughts such as: “if we are inherently anxious at night even with artificial light sources present, maybe we should simply accept that anxiety and live with less light.” For other people, this might not be such a present thought, and so I made it an important point to hear all perspectives, ask follow-up questions especially for those views contrasting mine and to not give the impression that I favoured some contributions over others, by keeping a neutral expression where possible and encouraging people to go deeper into their explanations. Furthermore, I also tried to ask for deeper explanations even if I thought I knew the reasoning behind someone’s argument because I held the same view.

Most participants were students or recent graduates, which caused a relatively easy construction of rapport in the group because of our similar status as young and academically educated individuals. In two of the groups, older individuals were present possibly causing a perceived difference in (social) status. This, in turn, could have influenced group dynamics or what was or was not said. A short description of group dynamics can be found in Appendix E.

## Data processing and cleaning

Verbatim transcriptions of the recordings were made using automated transcription with a locally installed version of WhisperAI (openai, 2025), which was set up through Anaconda Powershell<sup>1</sup>. These transcriptions were then manually checked for transcription mistakes as well as for grouping sentences together based on who was speaking. Any potentially identifying information, such as names, (email) addresses or job/school information were deleted from the transcripts. Participant codes were assigned to each participant: these codes, together with the age and gender of each person, can be

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<sup>1</sup> Code for setup provided by ChatGPT

found in Appendix D. Furthermore, double words, stuttering and half-finished sentences were removed from the texts to improve readability. Non-relevant information, such as what was said during a break or announcements from security to leave the building, was also removed.

## Data analysis

In the process of data analysis, I followed the six-step process developed by Braun and Clarke (2006). The steps in the process are outlined below, with the exception of the final step, 'writing the report', as that speaks for itself. The process is iterative in nature and usually, multiple rounds of coding are conducted and/or coding is done by two or more separate coders to ensure validity and reliability (Hennink, 2014). However, due to the constraints present in the timeframe of this student thesis, coding was done by only one coder. Rather than having two separate rounds of coding, I revisited the initial codes to check for consistency and uniqueness, changing them where necessary and removing redundant ones.

### *Step 1: Familiarization with data.*

I immersed myself in the data through manually checking the transcriptions and reading through each document again before starting the coding. I took selected some initial interesting quotes that might later be useful by highlighting them in Word, such as one participant (P4) stating (quotations translated from Dutch):

“But I think it is very different if you ask me again in summer. ... So, in summer I would probably be more positive about darkness.”

This statement indicates a different appreciation of darkness dependent on the season of the year, which was later coded as 'how we evaluate darkness depends on the time we are asked about'.

Additionally, I used the notes taken by K. Ehlert during the discussions to discover deeper meanings that might not have been conveyed by the words spoken or interesting group dynamics. For example, in one session participants laughed frequently over contrasting views, indicating their

engagement with the subject and proving the difficulty of drawing conclusions about a topic as complicated as urban darkness. Furthermore, participants often laughed or grinned when someone would mention that they would seek out darkness, such as going for a night walk, which could indicate that the idea of approaching darkness is not considered normal, but instead something interesting or funny. These notes were used to gauge (dis)agreement on certain topics in the group, highlighting certain topics as more important than only spoken data would suggest.

### *Step 2: Generating initial codes*

With the use of MAXQDA, I selected interesting phrases in the documentation that indicated issues of interest that were brought up and/or repeated, such as the social aspect of darkness, the role other people play in experiencing darkness:

“But during the day, there are a bunch of people, so there is social control. So, actually, it’s not even that I can’t see (in the dark), but also that others can’t see me if something happens to me, and nobody will help.” (P3)

Codes should eventually help in answering the research question, so there were some requirements for a segment to be coded at all: the text should cover *urban* darkness in an *everyday* setting in *the Netherlands*. Several examples were mentioned in the sessions about experiences abroad or extraordinary events like riding a rollercoaster in the dark – these examples were not included in and/or later removed from the codes.

In the first round of coding, new codes were added for each transcription, requiring another read for previous transcriptions to check for possibly missed segments. Afterwards, internal consistency of the codes was checked by manually going through all coded segments. Codes were created based on Naeem et al.’s (2023) description of good codes, which are robust, reflective, resplendent, relevant, radical and righteous. The ‘radical’ description proved the most difficult to adhere to, as many aspects overlapped: for example, data excerpts were sometimes coded separately as *ambiance*, sometimes as

aesthetics, and sometimes both applied. The difference is illustrated in the next two quotations, where the first one is coded only as 'ambiance' and the second one as both 'ambiance' and 'aesthetics'.

"But I do think it does something to the ambiance and that makes it cosy instead of threatening, so to say, to be out on the street in the evening." (P4)

"I agree that different colours, different ambiance lighting is fun. That is also what makes Christmas so fun, of course, in the dark. Because then there are cheerful little Christmas lights everywhere in different colours." (P2)

Since there are both separate and overlapping coded segments, I chose to retain both in the final analysis. During the coding process, I kept notes on decisions made, such as aspects which should not be coded (e.g. mention of extraordinary activities in darkness, darkness experienced abroad, darkness in nature). I revisited the Braun & Clarke handbook for qualitative research several times to further familiarize myself with the steps in the process (Braun & Clarke, 2013). Additionally, reading example codes in this handbook inspired new, more detailed codes, which were added as well in the second round of coding.

When revisiting the codes a few days after the initial coding process, redundant codes were merged or removed, such as the code "confidence in darkness", which was only applied to one fragment of data, suggesting this was not a common experience. In general, I decided to retain codes only if they were relevant for multiple segments, multiple participants and at least two separate focus group sessions, which suggests that experiences are shared across different people.

### *Step 3: Searching for themes*

Codes were grouped into categories after the coding was done to create some overview. For instance, under the overarching term "what makes darkness positive?", several codes were grouped, such as ambiance, aesthetic value, and peace and quiet. A mind map was created on Canva.com with the size of each element representing the frequency of the code and colour representing the different groupings, such as positive darkness, definitions of darkness, and negative darkness. Codes were

descriptive in nature, describing recurring elements in the data, such as frequent mention of the phrase 'social control'.

This initial mind map was used as a starting point for searching for themes. The codes and data extracts in each category were reviewed again to extract salient, common and significant themes. Some segments needed to be coded with a new code or removed altogether, such as segments that discussed driving on highways as this does not constitute urban darkness and thus was not relevant for the current research. Themes were given descriptive names, capturing the essence of the codes grouped under the preliminary themes.

For example, participants frequently mentioned the presence of other people in darkness as an important factor in evaluating how they felt about darkness itself. Initially, all references to others in darkness were coded as 'social darkness'. However, this code was too broad and was later split into several more specific codes, such as 'people do things in darkness they wouldn't do in daylight', 'social control is important to feel safe', and 'feeling connected to other people in darkness'. These all highlight different aspects of the presence of others and were thus coded separately. Later they were grouped into the preliminary theme 'whether darkness is positive or not depends on the presence of other people, who those people are and what they're doing'.

#### ***Step 4: Reviewing themes***

Themes were reviewed a few days after the initial theme search and again after a week of Christmas holidays. Due to the time limits in this project, it was not possible to review and refine themes for long or to go over each coded segment individually. Due to these limitations, reviewing of themes was stopped after these two iterations.

In each theme, coded extracts were revisited globally to assess coherence with the theme itself and to become aware of overlap with other themes. For example, the codes 'fear of other people in the dark' and 'evaluation of others is more negative in darkness than in daylight' were closely related and thus grouped together. Relationships between themes were visualized with lines in the mind map and

some codes were moved to different categories. For instance, the code 'enjoying nature in darkness' fit better with the general theme of activities people undertake in the dark than in the category of 'the relationship between darkness and nature'. The former theme was discarded relatively early in the theming process, as it does not relate to the research question of what constitutes positive darkness.

#### *Step 5: Defining and naming themes.*

Names were created for each theme that capture the meaning of the theme in a short sentence. The themes were then organized in a flowchart to distil them further and create overview. Some codes can be grouped under multiple themes, as was visualized by overlapping circles in the initial organizing of themes. Furthermore, some themes also relate to each other and were connected with lines. Themes can have multiple subthemes, and subthemes can be part of multiple larger themes, as will be discussed in the Results section.

## Results

Through the thematic analysis, I derived five main themes from the data. In order to get to a conceptualization of the positive qualities of darkness as well as what conditions create a positive experience with darkness, we need a working definition of the concept of darkness itself. Darkness has not been uniformly defined in the literature, so a discussion of the concept was considered useful. Each focus group started the discussion with trying to define urban darkness. Furthermore, we discussed how darkness relates to nature, as one of the arguments for the interest in urban darkness is its potential to reconnect people to nature. This part of the discussion resulted in the first theme as described below. A graphical representation of themes can be seen in Figure 1 on the next page.

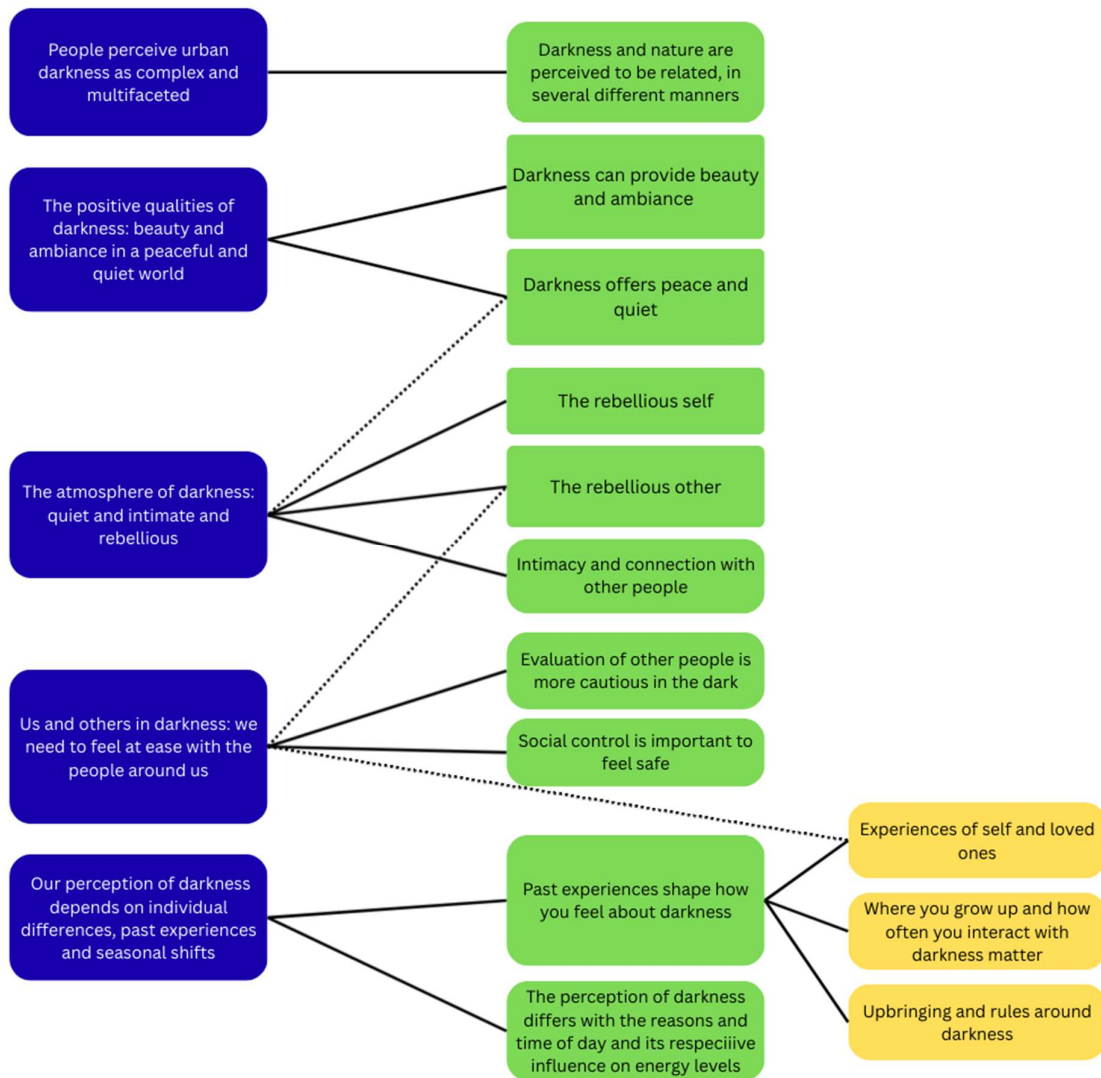


Figure 1: Identified themes (dark blue) and subthemes (green) derived from the data. Dotted lines represent overlap between themes. Yellow areas represent codes that could not be merged into one theme, but were deemed relevant nonetheless.

## Theme 1: People perceive urban darkness as complex and multifaceted

Generally, groups agreed that it was dark when the sky is dark, i.e. when there is no sunlight and it would be fully dark in natural areas (although there are differences in the intensity of darkness due to cloud coverage and moon phase). However, darkness is a multifaceted concept and cannot easily be pinpointed to one specific definition, especially in urban contexts.

“Actually, it’s not really dark in the city”, one participant (P15) stated, to nodding agreement from others in the group. There is always light outdoor at night in urban areas, making it hard to clearly grasp urban darkness as a concept. Lighting and thus darkness is not equal in different areas, causing some areas to be much darker than others. A frequently mentioned distinction was darkness within and outside of the ring road of Eindhoven – a motor vehicle road circling the inner city in its totality – with much more ALAN within the ring. Clearly, there are different intensities of darkness within one area. Urban darkness was seen as a paradox: because light in urbanized areas is so pervasive, ‘true’ darkness is hard to find.

In summary, darkness was generally seen as the outdoor conditions at the time of day when there is no natural light. There are variations in the intensity of urban darkness due to different lighting strategies per area, and whenever we speak about ‘urban darkness’, we will inevitably also speak about light. Furthermore, urban darkness is different from natural darkness, as will be discussed in the next subtheme.

### *Subtheme 1.1: Darkness and nature are perceived to be related, in several different manners*

Most participants agreed that darkness can be seen as a part of nature, albeit in different respects. Whereas some participants focused most on the cycle of day and night created by darkness and how that cycle is a part of nature, others mentioned the effect of darkness on nocturnal animals:

"When it's dark, of course the nocturnal animals come out, they start to live. ... I think the night matters a lot for animals. If it never got dark, a whole group of animals wouldn't exist." (P3)

In the discussions, it became clear that participants thought 'true' darkness is something that belongs to nature, not the city with its prevalent use of electric lighting. In nature, darkness is 'normal' and the further one moves away from civilization, the easier it is to find darkness. This links back to the conversation about the definition of darkness, where there was mention of urban darkness as a paradox due to the use of ALAN: darkness is no longer something we can truly find in the city, and if we discuss urban darkness, we are discussing something completely different than natural darkness. Urban darkness is of a distinctly different quality than natural darkness and its definition is much more complex than natural darkness due to the variations of lighting and building strategies in different areas.

## **Theme 2: Inherent positive qualities of darkness: beauty and ambiance in a peaceful and quiet world**

Darkness in itself has several positive qualities or associations. Part of these qualities appear to be inherent to darkness as a concept and were thus grouped together in theme 2. In this theme, the most frequently mentioned qualities inherent to darkness were ambiance and beauty in the dark and experiences of peace and quiet, which form the two different subthemes described below. Besides having qualities in and of itself, darkness can also provide a setting for other qualities and activities: the remainder of the themes focuses on these other qualities.

### ***Subtheme 2.1: Darkness can provide beauty and ambiance***

When night falls, the ambiance in the city changes. Whereas during the day, we can see nearly everything, in the dark we can only see those parts of the city that are made visible through the use of artificial light. The contrast between light and dark, especially when lighting is soft, perceived as warm and not overly bright, was described by participants as aesthetically pleasing. Darkness becomes a backdrop for light, as the following quote illustrates:

“Especially when it’s super dark, beautiful lighting can be fully appreciated.” (P2)

A special type of light source that needs this backdrop of darkness is starlight: many participants report seeing the stars as one of the best experiences once can have in darkness, especially since this is

a rare occasion in a brightly lit urban area like Eindhoven. Generally, a tone of regret was audible in discussions about stargazing in the focus groups, as skyglow remains an issue even when one removes oneself from the inner city. The majority of participants also stressed the importance of battling light pollution, both for the benefit of aesthetic pleasures and for ecosystem and human health.

The quality and quantity of artificial light influence the affective quality of a place. Cool white light was often appraised as unpleasant by participants, whereas yellow light was perceived as more pleasant, aesthetic and atmospheric. Participants noted that overly bright light creates too much contrast between lit and unlit areas, which limits vision of darker areas and can be experienced as blinding and overwhelming. Multiple participants expressed a desire for more colourful (narrow bandwidth) streetlights, such as those used on the main street of Strijp-S in the former industrial area of Eindhoven. As mentioned before, one participant (P4) stated about the use of artificial light in this area:

“I think it does something to the ambiance, and that immediately makes it cosy instead of threatening, so to say, to be outside in the evening.”

In summary, darkness can be aesthetically pleasing and atmospheric, especially functioning as a backdrop for beautiful (artificial and star)light. Additionally, from the way darkness is discussed here, we see that it is nearly impossible to separate darkness from artificial light, as the two will always occur together in urban areas.

### ***Subtheme 2.2: Darkness can offer peace and quiet***

Darkness is often associated with the peace and quiet that comes with nighttime, qualities that many participants found to be comforting and valuable. At the end of the day, shops close, people wind down and go to bed. “The more lights go out, the quieter it gets. That’s what I like about darkness”, one participant stated (P7). She further described how this quiet at night contrasts the busyness and hectic energy of the city during the day, making it a valuable time to decompress and wind down. Other

participants, too, mention the value of darkness as a means to 'de-stimulate', to let the mind and eyes calm down after a day full of input, as the following quotes illustrate:

"When you have a headache, or [...] you've had a lot of stimulation. Yes, then it's seriously nice to just sit in the dark for a bit." (P3)

"It is immediately calmer for my eyes, I can feel it. The stinging is gone." (P4, after the lights went out in the room)

Further, participants noted that the quiet that darkness offers can make it easier to focus on other aspects of life that are otherwise overlooked due to the distractions of the day. There is more room for one's own thoughts, sounds, possibly even some degree of work: one participant noted that she was better able to write at night and would often work in the dark hours. Another participant (P9) noted about the quiet of the night:

"When you are with your thoughts, you can focus on them a lot. If you are looking for constellations, you can focus on that very much. It feels like less is happening. That is partly because it is dark and because it is dark, most people are asleep, so there is less on the street, fewer cars. And because there is less, there are fewer distractions, I think."

Thus, darkness seems to offer an environment in which to unwind and calm down, possibly even providing distraction-free spaces that allow for increased attention for specific tasks or sensations.

### **Theme 3: The atmosphere of darkness: quiet, intimate and rebellious**

At night, a 'blanket of darkness' envelops us, as stated by one participant (P15). This 'blanket' makes for a different experience of the world, shielding us from the larger whole, creating a bubble of quiet solitude around us, the extent of which depends on where we are. This bubble, as it was called by several participants, is present whether we travel somewhere – by bike, on foot, in a car – or spend time with others outside in the dark. As becomes clear from the previous section, this quiet in and of itself is often an appreciated aspect of darkness. In addition to this inherent quality of darkness, it creates an environment that allows for other positive experiences.

In darkness, we are less visible to other people and they are less visible to us. This decreased visibility to others can be experienced both as a positive and as a negative, depending on the individual and the amount and type of people in the direct environment. One participant (P5) captured the essence of this phenomenon accurately:

"In the night you have this bubble around you, more than during the day. During the day, there's more sides watching you or able to observe you. In the evening that is way less."

This 'bubble' of darkness can make people feel like they have the world to themselves – a rich, meaningful sensation, allowing for different experiences than during the day. This specific atmosphere can provide space for intimacy and connection with others (subtheme 3.3) as well as allowing one to isolate oneself from the world, providing them with some alone time of contemplation and restoration (subtheme 2.2).

Additionally, in this environment of darkness there is space to be rebellious: due to decreased visibility, people feel free to be themselves more, to do things they would possibly not undertake in daylight. The appraisal of the anonymity that darkness offers is different across people, moments, and places, and results in two subthemes, discussed below. The presence of others and its role in experiencing darkness will be further discussed in Theme 4.

### ***Subtheme 3.1: The rebellious self***

Feeling free from the scrutiny of others was a frequently mentioned quality of darkness. This freedom made participants feel more comfortable being themselves: to be singing or humming along to a song or to go outside without fixing one's appearance suddenly feel like viable options. One participant (P5) said he felt free to do things in darkness he normally would not consider doing, such as visiting places that seemed off-limits during the day:

"It's easier to do things you normally don't do. [...] Like [...] climbing over a fence. Walking around in a random field, even though I wouldn't do that during the day."

This remark resulted in laughing and nodding from other participants, suggesting a relatable experience. In darkness, we can let go of our limits more, move more freely and exist outside of the judgement of other people. This does not only entail 'big' activities like those in the previous quotation, but darkness can also provide a sense of anonymity that allows us to care less about the way we present ourselves:

"It's also anonymous. Imagine you haven't washed your hair and you're not wearing make-up and you're wearing sweatpants and you want to go for a little walk, then you won't feel the need to dress up. Yeah, people don't really see you." (P4)

In less everyday settings, such as parties and festivals, participants reported feeling more free to dance and sing after the sky turns dark: there is a more rebellious vibe to the evening and night than the day. In everyday situations, rebellion can be small but significant, like not dressing up when going out in the dark.

### ***Subtheme 3.2: The rebellious other***

However, the relative absence of social scrutiny and the freedom for rebellion have a flipside: other people also experience this freedom, and we tend to think that others use this freedom for more grim or even illegal activities than we ourselves do. The way participants assessed other people is more cautious and negative in the dark compared to in the daylight, because "people feel less watched at night. They think they can do more. [...] More grim things happen," as stated by one participant (P8).

Whereas participants tended to agree that they themselves would use this freedom from others relatively innocently, by e.g. singing a song when biking home or going outdoors without investing time in their appearance, they considered others to be more seriously – and possibly dangerously – rebellious:

"Just like in Minecraft, very exaggerated: little monsters will come out at night. [...] That has to do with society and its undermining." (P14)

The nighttime is often associated with 'sketchy' activities such as doing or dealing drugs, picking fights, robbery or assault – even though people consider themselves to be interested in activities of another category altogether. The anonymity of darkness thus has two sides: providing freedom for the individual, while allowing a cover for more dangerous activities for others.

### ***Subtheme 3.3: Darkness offers space for intimacy and connection with others***

When we are with our loved ones, darkness can provide an aura of intimacy and foster connection: if the 'darkness bubble', as previously described, is shared with valued others, space is created for deeper conversations that bring people closer together. This intimacy in darkness was a common experience among participants, as many described social gatherings in darkness. One participant (P6), described sitting outside on her balcony with a friend and reaching such intimate, connecting moments:

"It's just really dark and you're having a drink and you'll arrive at the deeper topics sometimes. [...] Maybe it's easier to tell each other something in a moment like that, because you can see each other less well."

In essence, this links back to 'the rebellious self': we discuss some deeper, more sensitive topics in darkness, because we feel less watched, less scrutinized and more free, resulting in intimate experiences. Additionally, several participants mentioned going for night walks with friends or roommates, which brought forth a sense of adventure and strengthened the connection between them, having shared the 'darkness bubble' for a while.

## **Theme 4: Us and others in darkness: we need to feel at ease with the people around us**

Whether darkness is experienced as positive or negative depends on the presence of other people in one's direct environment and what activities those present are partaking in. In fact, the presence of others was one of the most discussed topics related to darkness during the focus groups. In the discussions, it became apparent that the majority of people was acutely aware of who is around

them in the dark, and their assessments of others were more cautious at night than during the day, verging on the negative side. As became clear in the subtheme 'The Rebellious Other', participants tended to think that other people were engaging in different activities than they themselves, effectively placing them in another category of people they did not deem 'normal' or trustworthy. Describing his neighbourhood at night, a participant noted (P8):

"It's a very quiet place. There is little nuisance during the day, but [there are incidences of] weird people, indeed, just strange things. People come to our parking lot or street because it is so quiet. [...] For example, they come and use drugs in the parking lot. [...] People seek it out as a quiet place, people who actually have no business here."

People felt especially uneasy when completely alone in darkness, or when around just one other (unknown) person: the concept of social control was frequently mentioned in determining whether darkness could be experienced as pleasant at all. The relative invisibility of others and objects at night can make people feel uneasy. To feel more at ease, participants relied on their idea of social safety. Generally, it was agreed upon that the presence of multiple people or separate groups provided the greatest sense of reassurance as compared to one or two persons/groups, as the chance that accidents or undesirable behaviours, such as assault or robbery, would be noticed and help would be offered by bystanders would increase. One participant (P6) articulated this nicely, when asked about what helps her feel safe at night:

"For me, the amount of people does matter. I indeed think that there's not more crazy people walking about at night than during the day, but there are more people in general [during the day]. So, for me it's more like an estimation that the chances are higher that there are people who will help you in a situation."

In summary, participants need to feel at ease in their social environment in order to enjoy darkness. They feel safer around known others or multiple distinct groups of people compared to just one person or group. If one does not feel at ease due to a lack of social safety, darkness is experienced as more negative.

## Theme 5: Our perception of darkness depends on individual differences, past experiences and seasonal shifts

In addition to the presence of others, other influences exist that determine how a person appraises darkness – some general, some more specific to the individual. Some specific limitations came up during the sessions that complicate experiencing darkness positively. For instance, one deaf participant expressed how deaf people are more reliant on vision, and for them darkness can bring difficulties into their communication with others and awareness of their surroundings. Another example that was brought up was ADHD, as a participant diagnosed with this condition reported being more dependent on light levels to function well. Additionally, one participant with night blindness reported experiencing the night as less positive regardless of any other factors – safety, presence of others, aesthetics – due to their heavily reduced sense of vision at night. Two subthemes were derived through the analysis that were more generally shared among participants. These themes play an important role in one's experience of darkness: past experiences with darkness and seasonal differences that influence energy levels.

### *Subtheme 5.1: Past experiences and upbringing shape how we feel about darkness*

Our past experiences shape how we view many aspects of life and this is not different for darkness. In the discussions on why people sought out or avoided darkness or certain places in darkness, many past experiences came up that influenced current choices and behaviours. Even experiences of those close to us in darkness can determine how we behave, as this quote illustrated:

"I would bike through some parts of the city in the light and not in the dark. [...] Like certain places in Woensel. My brother was once [...] robbed there." (P4)

Furthermore, the way we are raised with regard to darkness changes the associated connotations with the concept: many women especially in the focus groups told of not being allowed

to bike home alone after dark in their youth, from sports or from social events, as the following quote shows (P3):

"When the street lights went on, we had to go inside if we were playing outside. That was a rule when I was little. And when I got a little older, as a teenager, and I went out, a boy had to bike with me all the way to my home. Yeah, he would bike home all girls from the village."

A little later in the conversation, another female participant (P4) responded in agreement:

"Indeed, no biking back from sports alone if it was dark. Or from going out. Rather home late than biking alone."

In contrast, another (male) participant in this same session had virtually no rules about being out in the dark while growing up, and continues to feel at ease and relaxed when outside in the dark by himself. He added that he was aware that his feeling comfortable in darkness was probably also due to his gender, and that he could imagine women feeling less safe in the dark. In all sessions, these gender differences in perception of darkness were discussed, with notable awareness of the issue from people of both genders present. The gender differences in perceived safety in darkness have been well-researched and, due to the constraints of this thesis, will not be further discussed here.

An additional interesting note that came up is the difference between growing up in a town versus in a city, where 'town kids' have had to interact more with darkness due to less pervasive ALAN outside of urban areas and longer biking distances. Those coming from towns in the focus groups tended to accept darkness more as an inherent part of life, focusing on how to interact with darkness rather than how to ban it. When directly asked about the role of upbringing in thinking about darkness, a participant (P7) said:

"I think that it does play a role, indeed, because all of us come from towns. I think we are all used to bike through the dark and move through the dark. I think it's a big difference with being used to always being in [...] the city light."

In conclusion, the rules people grow up with surrounding darkness and their own and loved ones' experiences in the dark strongly shape the way they view darkness in the present.

*Subtheme 5.2: The perception of darkness differs with the seasons and time of day, which may be explained by differences in energy levels*

Time of day and year matters in how one views darkness: in winter, darkness comes much earlier. One participant (P8), when asked about associations with darkness, immediately said: “Cold and the winter months. Because for some reason, in December four AM feels a lot darker than in July. Even though both are just night.” With this, he referred to a difference in sensation that did not relate to actual illumination, as 4AM in winter and summer are equally dark.

Later this participant noted: “I think it also has to do with [...] if it were July now and it was eleven at night and it was dark, the city would be more ‘on’ [...] Nobody wants to be outside when it’s freezing cold and dark. [...] The city is just less alive, it is a lot more quiet and I think [...] that it feels way more like night, even though it is, what, seven, seven thirty, than midnight on a summer’s night.”

Nights are much longer in winter than in summer in the Netherlands, so one must deal with darkness more frequently and for longer periods of time. Furthermore, the association of darkness with winter also links to temperature, and participants reported not wanting to be outside when it is cold and preferring the warmer summer nights.

Thus, darkness is evaluated differently in the different seasons, suggesting that ‘good darkness’ might not be the same in each season – or might not even exist in winter, when it is associated with cold temperatures and lower energy levels. People feel less energized and motivated to undertake activities when it is dark. “Maybe darkness means we should go to bed,” stated one participant (P15), who aimed to live more with natural rhythms by going to sleep much earlier in winter, to great benefit for her energy levels. Several participants agreed that being obliged to work and be active in darkness were uncomfortable and difficult due to lower energy levels, and that this is at least in part due to the fact that humans are not nocturnal animals.

Other than the seasonal shifts in darkness, the time of day matters, too. The experience of darkness in the morning versus in the evening is significantly different, and what is going on in the city

in the dark matters for e.g. feelings of safety. One participant (P14) mentioned the example of the difference between two times at night only an hour apart, which influence how one experiences darkness:

“Whether it’s at four thirty or three thirty AM, that’s also a difference, of course. First all cafes (bars) are still open and later they close. [...] How much light is coming from other businesses that are opening or closing.”

This social aspect of darkness is more pronounced in the evening and night compared to the morning, resulting in different experiences at different times of the day. During the morning, the experience of darkness relates more to the quiet and at night more to the presence of other people as noted by one participant (P9) who mainly experiences darkness in the mornings due to the early starting time of his work:

“When I walk to the bus stop or when I bike, I barely run into anyone. So, you are more going towards that bubble, really your own bubble. While at night [you have] the deeper conversations.”

In summary, darkness is experienced different in winter and summer and in the morning versus the evening and night. Winter darkness is often viewed more negatively than summer darkness, and mornings and evenings have different associations (quiet mornings, social evenings).

## Discussion

This research set out to conceptualize the idea of 'good darkness' in urban areas by investigating the positive qualities of darkness in people's lived experiences. The aim was to determine whether it is possible to reconnect people to nature by reconciling them with darkness. Through the employment of focus groups and thematic analysis, five distinct but related themes were derived from the data. Each of these themes and their implications and connections to the literature will be discussed below.

### **Darkness is perceived to be complex and multifaceted, and to be a part of nature**

In the focus groups, urban darkness was complex to define, as there are different intensities of darkness in different areas of the city. Additionally, there is never full darkness in the city due to the presence of ALAN. The multifaceted nature of darkness suggests that researchers should take care to define darkness well before further inquiring into the concept, as different people may hold different ideas of what darkness is. Conceptualizing the complexity of urban darkness could be in itself a direction for future research.

Importantly, there was consensus over darkness being a part of nature. Participants acknowledged the role of darkness in regulating our own and nature's rhythms. They realized that darkness is different in nature due to the absence of ALAN and comment on the absence of true darkness in the city. As the current research is based on the assumption that reconciling people with darkness could help people reconnect with nature, this finding is promising. However, further research is needed to conceptualize the relationship between darkness and nature more clearly and to establish the role of reconnecting with darkness in reconnecting people with nature in more detail. In the current research, the focus was on the qualities of urban darkness itself rather than its relationship to nature, and a relatively small part of each discussion was dedicated to darkness as part of nature. Therefore, no strong conclusions should be drawn on the darkness-nature relationship from the findings in this paper alone.

Interestingly, similar to Beery et al.'s (2023) account on the human-nature relationship, the discussions in the focus groups departed from a point of seeing nature and darkness as something separate from ourselves, something outside of urban life. A distinction was made between darkness in the city and darkness in nature, but at the same time participants noted that darkness is present in both settings even though the quality and intensity differ. As darkness is present in urban life, reconciling with darkness could offer possibilities for reconnecting with nature, bringing together the natural and the urban in a way that is not often considered consciously. Further research could empirically investigate an intervention that focuses on reconnecting people with darkness and its effect on nature connectedness, taking into account the suggestions on reconnection from Lumber et al. (2017) and Ives et al. (2018).

### **Inherent positive qualities of darkness: beauty and ambiance in a peaceful and quiet world**

Darkness was appreciated by participants for the peace and quiet that often comes with it. At night, the city quiets down, creating an atmosphere of calm. Combined with ambient lighting or starlight, the night can become a stage for beauty, which is one of the aspects that Lumber et al. (2017) found to be important for increasing nature connectedness and well-being.

Interestingly, during the discussions there was indirect mention of several of the aspects of attention restoration theory (Kaplan & Kaplan, 1989). When participants talked about darkness as a background for beautiful light or a starry sky, they did so with awe, noting that watching the stars could make them feel mentally recharged and at peace. In other research, Bell et al. (2014) note that the awe that is often related to stargazing can significantly add to one's well-being and happiness, as it is a positive emotion.

This awe also links back to the element of fascination, because starlight and ambient lighting are expected to draw involuntary attention, thereby allowing people to restore their depleted (directed) attentional resources. Some participants noted that they felt more focused in darkness, suggesting increased attentional performance. This suggests that darkness can indeed provide for certain elements

of ART (others discussed in the next section) and that darkness can provide an environment for relaxation and restoration. Additionally, awe entails emotion, another aspect that Lumber et al. (2017) found to be an important predictor of nature connectedness.

Ives et al. (2018) propose five levels of engagement with nature (from shallow to deep: material, experiential, cognitive, emotional and philosophical), as described in the background section on nature connectedness. Participants in this research went beyond the material and experiential levels in their discussions: when talking about the beauty and peace of the night, they were engaging with darkness on an emotional level, expressing the desire to see the stars more often. In short, they felt attached to (certain aspects of) darkness. Further, they stressed the importance of battling light pollution, signaling a more philosophical engagement with darkness in how they think humans ought to interact with it. Ives et al. suggest that deeper levels of (re)connecting with nature (i.e. philosophical and emotional) are more likely to bring about systemic change leading to sustainable behavior than are more shallow connections (i.e. material and experiential). Thus, participants' level of engagement signals potential for reconciling with darkness, as they show a willingness to engage with darkness for the benefits it can bring – both to humans and nature.

For light to be appreciated in darkness, it should not be blinding: overly bright lighting can create contrast with the surrounding unlit areas, making the space less legible and decreasing preference (S. Kaplan, 1987; Lis et al., 2023; Nikunen & Korpela, 2012). This finding was echoed in the focus groups as well, where participants expressed their dislike for floodlights, LED advertisements, and brightly lit buildings like offices and shops closed for the night. This dislike stemmed from a desire to wind down at night, which was prevented by overly bright lighting, as well as an awareness of the ecological and monetary cost of unnecessary lighting. Participants frequently mentioned the desire to battle light pollution – the knowledge of which signals engagement on a cognitive level as posed by Ives et al. (2018) – for these concerns as well as aesthetic values related to darkness. Furthermore, this desire reflects compassion for nature, another important factor influencing nature connectedness (Lumber et al., 2017). Rodrigo-Comino et al. (2023) provide an elaborate overview of the adverse effects of light

pollution on human and animal health, some of which were expressed to be known by the participants in this research.

Furthermore, the correlated colour temperature (CCT) of ALAN in public spaces influences the evaluation participants have of darkness. Participants reported being overwhelmed by overly high CCT lighting (blue and white light) or even experiencing this type of lighting as threatening. In contrast, lower colour temperatures (i.e. red, orange and yellow) were perceived as atmospheric, adding character and beauty to the city at night. These findings are similar to Hao et al.'s (2022) findings on preference, where participants preferred low to medium CCTs over higher CCTs. Davidovic et al. (2019) also found that their participants preferred warm white lighting over neutral white as well, and even rated warm white lighting better in terms of light intensity and the appearance of other people's faces. Interestingly, the type of lighting that seems to be disliked by end users (cool white) is also the most problematic in terms of light pollution as it can disrupt the natural rhythms of wild animals, plants and ecosystems (Schulte-Römer et al., 2019).

### **The atmosphere of darkness: quiet, intimate and rebellious**

For an environment to be considered restorative, Kaplan and Kaplan (1989) suggest that it needs to provide for fascination, a sense of being away, extent (the feeling of being in another world) and compatibility. As described in the previous section, darkness can be a source of fascination. Further, a sense of being away from the hassle of daily life was often present in positive experiences with darkness reported by participants, and allowed them to wind down and relax. In darkness, we can remove ourselves from overwhelming stimuli, which makes space for focusing our attention on our own thought, which allows us space for reflection. Participants expressed feeling like they were in a sort of 'bubble': another, smaller world inside of reality. Being in this atmosphere felt positive, relaxing and intimate if they shared it with others, and also reflects a sense of being away. Furthermore, this environment of darkness can make people feel like they have the world to themselves, which reflects the idea of extent as expressed by Kaplan and Kaplan (1989).

Similar to findings from Gao and Zhu (2025), the themes found in this thesis reflect most strongly the aspects of being away and fascination in darkness, while compatibility was interpreted to be slightly lower at night. Even if darkness offers the setting necessary for the other elements of ART, its restorative value could be lowered due to factors such as reduced vision, communication and orientation difficulties, and feelings of unease around the presence of other people at night, the latter of which will be discussed in the next section.

Another frequently mentioned benefit of darkness was the anonymity it offers, allowing people the freedom to be themselves and to go unnoticed by others. Edensor (2013, 2015a) has previously noted this anonymity as a possible advantage of darkness, as it provides space for outcasts and revolutionaries, who are scrutinized during the day. Although the sentiment expressed in the focus groups was not as grand as that described by Edensor, still, the freedom from scrutiny and judgement seems to be an important benefit of darkness.

Egner et al. (2020) further pose that there is less social feedback in nature and that this is key in understanding why nature has restorative benefits. Social feedback tends to elicit arousal, regardless of its valance: when one is in a state of arousal, it is difficult to relax and restore. In addition to darkness providing for some of the elements of ART, the perceived absence of social scrutiny in darkness could help people relax and restore.

Furthermore, this perceived anonymity could foster intimacy and connection. Gergen et al. (1973) found similar results: when putting groups of people into a completely dark room for an hour and promising them anonymity (i.e. they would not meet each other afterwards), these people explored the room more, sought each other's vicinity and had deeper conversations than those placed in a lit room. Having deeper conversations in darkness was frequently discussed in the focus groups as well. "There is liberation in anonymity", Gergen et al. (1973; p.130) posed, a sentiment that was echoed by the participants in the current research.

Another reason why darkness and relaxation seem to be associated is also given by Egner et al. (2020), who suggest that the reason for the restorative potential of nature lies in our conditioning: we

learn to associate nature with restoration, because we tend to find ourselves in nature for the purpose of leisure and recreation. The same could hold for darkness, as leisure and recreation are often confined to the dark hours of the day, especially in winter (Boyce, 2019; Nikunen & Korpela, 2012). Indeed, participants associated darkness with leisure time: spending time with friends, going out, or generally relaxing and not being engaged in work.

In addition, awe and beauty have been found to be correlated with social connection. People who are exposed to natural environments that inspire awe show more prosocial behaviour, tend to feel more connected to a larger whole and are more concerned with the needs of other people (Goldy & Piff, 2020). In this sense, the theme 'positive qualities of darkness' is related to 'the darkness atmosphere' and especially the aspect of intimacy, where participants report feeling closer to others in darkness. If darkness can inspire (some degree of) awe through its beauty, especially combined with starry skies or ambient lighting, it could foster social connection, which in turn is an important predictor of both physical and emotional well-being (Holt-Lunstad, 2021).

### **Us and others in darkness: we need to feel at ease with the people around us**

At night, participants reported being more alert and aware of their surroundings, especially concerning the presence of others. The freedom from scrutiny as mentioned in the previous section is also present for others, which could allow them to engage in activities that participants often labelled as 'sketchy'. This alertness can sometimes induce anxiety, as we are often interacting with strangers: Brosschot et al.'s (2018) 'territory of unknown others' may be even more evident at night. Upon those others, we project ideas based on fear, indeed 'othering' people in the sense that we think they cannot be trusted to act benevolently towards us in darkness.

In a similar vein, Zhong et al. (2010) found that people engage in more morally questionable behaviour in a room with dimmed lights or even while wearing sunglasses compared to well-lit rooms or while wearing clear glasses. Participants in this research who felt they were not being noticed by others as much acted more out of self-interest and cheated more than those who felt more watched.

Indeed, these findings suggest that the (perceived) anonymity that darkness brings can make people act in ways they would not in daylight. Thus, participants' fear of others in the current research might not be entirely misplaced.

Once again, we can see there are two sides to the coin of darkness: it offers anonymity, which can help us feel free and connected to others, while also disinhibiting certain undesirable behaviours (which we mostly attribute to people other than ourselves). To feel at ease, a certain (as of yet undefined) number of others must be present in our surroundings to balance the benefits and disadvantages of the anonymity of darkness. Social safety is a prerequisite for being able to relax in the dark, and the place and its reputation, time of day and our past experiences shape how at ease we feel in dark environments.

### **Our perception of darkness depends on individual differences, past experiences and seasonal shifts**

Egner et al. (2020) note that having bad experiences in nature can lower the restorative potential of nature for an individual. The same most likely holds true for darkness: having negative experiences results in appraising darkness as less positive or relaxing. As becomes clear from participants' narratives on their upbringing or experiences of themselves or others close to them, their evaluation of darkness is indeed conditioned by past experiences.

Additionally, darkness and light influence the secretion of different hormones and neurotransmitters, such as serotonin and melatonin (Valerio, 2006). Lower levels of these biochemicals, which can be a result of less daylight exposure, can result in less energy and lower mood. Participants in the current research discussed the effect of (winter) darkness on their energy and motivation to be active, which could possibly be explained by changing levels of certain compounds in their bodies.

Further, in Gao and Zhu's (2025) research on the relationship between lighting strategies and the restorative potential of green spaces, they noted that thermal and auditory cues could shape our perception of restorative value of a space. Participants in this thesis research were conscious of the

effects of the seasons in their perceptions of darkness, saying it was hard to separate cold and dark from one another in their evaluation during the early wintertime. This suggests that the restorative value of darkness could differ between the seasons, as Gao and Zhu implied might be the case. Further research is necessary to determine the influence of different weather conditions on people's appraisals of darkness.

## Limitations and future research

There were several noteworthy limitations to the present study. First, due to the constraints of this thesis, only one person analysed and interpreted the data; additionally, there was not sufficient time for coding the transcripts in two separate rounds, reducing within-coder reliability. Quick decisions needed to be made and so the resulting themes might not capture the full range of important aspects of darkness that I hoped to find at the outset of the research. Hennink (2014) suggests using multiple analysts as a triangulation method to ensure validity of the research findings, but this was not possible for this research project. Additionally, due to the threshold I set for inclusion of segments in the analysis (sentiment shared by multiple participants in at least two of the focus groups), certain interesting insights might have been overlooked, such as suggestions for systemic change in safety in the dark, which were only discussed in one focus group by one person.

Secondly, an important issue with the word 'darkness' came up during the second focus group: the Dutch language has two words for darkness: 'donker' and 'duister'. The two words differ in their intensity and associations, with 'duister' generally seen as a superlative of 'donker'. This distinction was not discussed in the first group and does not translate easily to English: the words were used interchangeably throughout the sessions. However, due to the different meanings associated with the two words, some clarity and nuance could be lost in the analysis of the themes. A suggestion for future research would be to increase the language sensitivity of the analysis, accounting for the nuances present in the language that is being analysed.

Furthermore, darkness and nighttime were discussed jointly, as they mostly occur together. The terms were often used interchangeably as well, even though darkness falls during daytime hours in winter. Li et al. (2015) suggest that it is mostly the nighttime that increases fear and not darkness in itself, such that darkness late at night can be perceived differently from darkness right after sunset. Future qualitative research could discuss darkness during specific times of the day more in depth, focusing on e.g. the first hours of darkness as compared to the middle of the night, depending on the area of interest of such research. The night, like darkness itself, is not a concept that is uniform during

its entire duration: it has temporal aspects depending on the time and season, and thus deserves further attention.

Third, as discussed in the results, the experience of darkness differs in winter compared to summer due to the differing amount of dark hours and outside temperatures. Since this research was conducted in late autumn/early winter, talking about darkness was inevitably linked to weather conditions like low temperatures and high precipitation. Ideally, similar research would be repeated in each season to discover potential different appraisals of darkness in different times of the year and the effect of different weather conditions – most notably precipitation and temperature, as these were most frequently mentioned in the current research – on the evaluation of darkness.

The fourth limitation pertains our decision to have to focus group after dark and in a room that offered a view over the inner city. During the discussion, participants often referred to the outside and pointed to specific places, and commented on what they saw through the window. The view of the inner city could have biased participants in discussing mostly the inner city area and neglecting the outer city (outside of the Ring road). However, the distinction between the inner and outer city was often discussed explicitly in the sessions, signalling an awareness of the multifaceted nature of urban darkness. Participants also mentioned specific examples of areas that were not in view, suggesting this is a minor limitation.

Further, the three focus groups were held on the sixth and eighth floor, respectively, which provides a different perspective and thus possible a different experience of darkness as from ground level. It could be useful to study how different vantage points of the city at night affect people's appraisals of darkness. An interesting approach for future research would be to conduct the discussions outdoors in darkness in order to be immersed in the subject and be even closer to the everyday, lived experience of participants. Importantly, this would allow for other sensations than vision, such as thermal and auditory cues, to be directly evaluated and discussed during the focus groups. Whilst we considered doing so when we designed the study, unpredictable whether conditions (and their implied limitations in the use of electronic audio recording) and the focus on one specific area this would imply,

prevented such an approach. The goal of this thesis was to derive general ideas about positive darkness in the entire Eindhoven area, whereas this approach of outdoor focus groups could be better suited for a case study.

A fifth limitation is that most participants in this research were university students: comments from one older participant (63 years) showed that the time in which we grow up might influence how we experience darkness. She extensively shared that in her youth, she would play outside in the dark, just like every other child in her neighbourhood, and that she feels that we are less free as young people in the information age due to the societal pressure to always be reachable. Including more participants from different age groups could provide for a more accurate and rich insight into the experience of darkness and the factors influencing that experience.

In addition, the majority of the sample of participants was or has at some point been a university student, which could result in different beliefs and knowledge: for example, many participants were aware of the extent and some of the effects of light pollution, which might motivate them to see the positive side of darkness more than people who are not aware of this phenomenon. Also, future research could investigate the role of the place where one grew up in shaping people's views on darkness, as this was a topic that came up during the discussion which was not extensively analysed. In summary, I did not manage to reach my initial goal of having diverse samples on the basis of the criteria I defined at the outset, and future research should consider creating more diverse participant samples as well as analysing more sociodemographic factors that could influence participant contributions (e.g. where participants grew up or their educational background).

Lastly, qualitative research is influenced by researcher experience (Braun & Clarke, 2006, 2013; Hennink, 2014), and this thesis is no exception to this. Whereas I consciously tried to inquire further into each statement of interest, I found in reading the transcripts that I have missed opportunities to do so, thereby possibly missing interesting elaborations. Additionally, at times I had trouble allowing everyone equal speaking time or redirecting the conversation when it got off-topic. A researcher with more experience would probably have had fewer troubles in these areas: considering that a thesis is, in

a sense, a learning opportunity, I do not see how I could have done this better with the knowledge of the moment. However, more skilled moderators could possibly derive deeper, richer insights from similar focus groups than I have done.

As the topic of darkness and mundane, urban darkness especially are as of yet under-researched, I would suggest further qualitative research inquiring into the nature and appraisals of darkness. Interesting directions for research questions could pertain to people's views on the darkness-nature relationship, the manner in which the time of day and the seasons shape appraisals of darkness, and early life influences on present views on darkness. This can help build a solid basis to start creating more quantitative measurements relevant to the subject in the future.

Quantitative methods could further focus on the restorative potential of dark spaces in the urban environment. Current research in this area focuses strictly on urban parks (e.g. Gao & Zhu, 2025) or uses simulation methods (e.g. Nikunen & Korpela, 2012) that lack ecological validity. Additionally, in the research discussed in this thesis, only perceived restoration was measured, not actual restoration. An experimental set-up measuring attentional performance before and after a period of restoration in darkness in different urban environments, which also takes into account the time of day, could be of interest here.

## Implications

Implications for designing 'good darkness' in urban areas inevitably focus on lighting design. As Lis et al. (2023) previously noted, their findings that people prefer lighting of vertical elements over path lighting and background lighting over foreground lighting, are not in line with the common practice of delivering standardized levels of light intensity and uniformity. Similarly, participants in the current research complained about overly bright lighting, overhead lighting and high CCT lighting, instead favouring dimmer, more distributed and colourful lights. Other researchers have also found that lowering and balancing brightness levels with the surroundings resulted in increased visibility of the surroundings, increased perceived safety and a relaxed atmosphere (Hvass & Hansen, 2022).

Participants in the current research also stressed that bright light can be overwhelming and many objects that are traditionally lit, such as empty office buildings, closed shops or LED advertisements, were often experienced as unnecessarily lit up. They also expressed a wish for more creative use of lighting rather than standardized street lighting, such as ambient lighting or coloured lights – as long as vision remained sufficient for safety, orientation and communication with others in the public space. The sentiment that light pollution should be decreased was shared across all groups, both for aesthetic and ecological reasons. Little research has been done on people's attitudes towards light pollution and how it shapes the willingness to engage with darkness in different sociodemographic groups (e.g. Lyytimäki & Rinne, 2013). Future research could investigate this matter further, including participants of different socioeconomic and educational backgrounds, especially those less aware of the concept and consequences of light pollution.

It is difficult to please everyone with lighting strategies, as specific personal circumstances (e.g. deafness or ADHD) and preferences influence the perception of light in darkness. However, several interesting suggestions can be derived from the data generated by the discussions. For example, one participant suggested that light could gradually become dimmer as the distance from the city centre increases. The human eye can function under a range of different illuminance conditions: light adaptation happens within seconds, whereas dark adaptation can take several minutes, depending on

previous exposure to light (Amoruso et al., 2022). To allow for dark adaptation while significantly reducing the use ALAN in urban areas, Amoruso et al. (2022) suggest using extremely low illuminance levels (about 1 lx) and avoiding extreme contrast between light and dark zones, with uniformly distributed light at ground level.

Many participants expressed a desire to be able to see the stars more often, which is difficult in urban areas. They suggest having more frequent events where as many lights as possible are turned off during the night to increase the visibility of the stars and raise awareness of light pollution. (e.g. 'Nacht van de Nacht', translated as 'Night of the Night'). Further, participants voiced that it might not be necessary to light as much of our cities as is currently being done, but further research is necessary to determine exactly how much more darkness is acceptable to introduce into the city. The introduction of darkness should be gradual, not sudden, as high contrast can be experienced as blinding as well as create fear of the darkness, which seems even darker due to bright lighting.

The results of the current work suggest there is a mismatch between common lighting strategies and user preferences. Reconciling with darkness might need an approach to lighting design that focuses on aesthetics rather than function alone. This implies shifting our mindset from banning darkness to designing with darkness. Municipalities can play a role in bringing forth this shift by changing the narrative around darkness, through participatory design of public spaces as well as informing citizens about the benefits of darkness. Through information, cognitive engagement (as defined by Ives et al., 2018) with darkness can be fostered; through the organisation of events such as the earlier mentioned 'Night of the Night' or expositions featuring lighting design that respects darkness, emotional engagement could be created. This allows people to see the nonfunctional, aesthetic side of light as well as engage with darkness (experientially), which could in turn lead to a psychological adaptation to darkness and different lighting. Hopefully, increasing awareness of the benefits of darkness (as well as the adverse effects of ALAN) and allowing people to interact with darkness (safely) could motivate them to support darkness initiatives as well as increase the willingness to reconcile with darkness.

This thesis proves that darkness is not solely a negative nuisance to be expelled completely from urban life. Instead, darkness has positive qualities that should not be neglected in lighting policy. Future research efforts should establish a balance between the functional and aesthetic side of lighting design, focusing on user preference and needs.

## Conclusions

As multiple authors have noted, we tend to view darkness negatively and therefore neglect its positive qualities (Janssen, 2025; Lis et al., 2023; Madland, 2024). However, darkness holds positive qualities and can create a setting for positive experiences. As such it should be considered in terms of what it can bring us, rather than solely what it costs. Furthermore, as darkness is thought to be a part of nature, reconnecting people with darkness could help reconnect them to nature and realize the benefits associated with such a connection.

Through thematic analysis on three focus groups, I have investigated people's lived experiences with darkness with the aim of conceptualizing 'good darkness' in everyday urban settings. Darkness was generally appreciated for the quiet that often comes with it, allowing people to wind down and experience peace. In this quiet, people can focus on their own thoughts, their connections and leisure activities. In addition, darkness was found to make space for intimacy and connection when we are surrounded by the right people. When it is dark, participants reported connecting on a deeper level through more intimate conversations or through the beauty and awe that is inspired by starlight or ambient lighting. The cover of darkness was found to make participants feel free to be themselves, free from judgement of others and free to be a little rebellious – to dance, to sing or to dress as they want. Darkness was also found to provide some of the elements of attention restoration theory (ART) – fascination, being away, and extent – and serve as a beneficial environment for restoration. Participants were able to appreciate the positive qualities of darkness when they felt at ease enough in their environments, which was facilitated by a sense of social safety. It was thought to be easier to enjoy darkness when in the presence of known others or when feeling surrounded by multiple distinct (groups of) others.

The findings from this research have several implications for lighting design. As darkness has been found to have positive values, current strategies of lighting for optimal vision might not be ideal. Instead, participants expressed a preference for background lighting, light dimming and coloured lights. To reintroduce darkness into our cities, lighting design might need to shift the focus from banning

darkness to designing with darkness, allowing darkness where possible and significantly reducing the brightness, glare and contrast of lighting within the city. Municipalities play a role in changing the narrative around darkness through e.g. events highlighting the qualities of darkness, and designing public lighting with user preferences in mind. 'Good darkness' is something that can be designed through the way we choose to light (or not light parts of) our cities, and by shifting our mindset to see the bright side of darkness.

Through our current use of artificial light at night (ALAN), we are banning the darkness from our lives, thus losing any positive qualities that darkness could bring us. The outcomes of this work show that mundane urban darkness can provide quiet and peace, the freedom to be oneself and certain elements of ART (fascination, being away and extent), which are generally experienced as positive by participants.

Considering darkness in terms of what it can bring us could be a step in the direction of reconnecting ourselves to nature. We need this nature connection for our health and wellbeing; our planet needs us to connect back to nature as well for her health and wellbeing. To reconnect, we do not need to leave the city behind forever: we could simply light it differently, and learn to embrace the darkness.

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## Statement of AI use

Generative AI was used solely for the purpose of writing the commands for installing WhisperAI locally through the Anaconda Powershell. All text is my original work.

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## Appendix

### A. Discussion guide (Dutch)

Topic	Questions
<b>Definities van duisternis en natuur</b>	<p>Hoe kunnen we stadsduisternis definiëren?</p> <p>Is er een link tussen het donker en de natuur? Hoe ziet die link eruit?</p>
<b>Ervaringen met duisternis</b>	<p>Wat voor gevoel heb je als je aan stadsduisternis denkt? (probe: hoe voel je je als je buiten bent in het donker?)</p> <p>Wat associeer je met duisternis?</p> <p>Wat doe je als je buiten bent in het donker? Wat denk je dat andere mensen doen?</p>
<b>Duisternis en veiligheid</b>	<p>Wanneer voel je je veilig in het donker?</p> <p>Wat maakt dat het donker vaak niet veilig voelt? (probe: andere mensen, zicht)</p> <p>Als je sowieso veilig zou zijn, hoe zou het donker dan voelen?</p>
<b>Specifieke ervaringen</b>	<p>Wat voor positieve/negatieve ervaringen heb je met licht in het donker? En met de afwezigheid van licht? Wat maakte dit positief/negatief?</p> <p>Wanneer is het donker fijn?</p> <p>Wat is er nodig voor een fijne ervaring in het donker? (probe: veiligheid, zicht, andere mensen in de buurt, weer)</p>
<b>Op zoek naar duisternis</b>	<p>Wanneer zoek je het donker op?</p> <p>Kunnen we ontspannen in het donker? Waarom (niet)?</p> <p>Hoe kunnen we anders met licht omgaan in de stad? (probe: sommige gebieden niet verlichten, beter licht op andere plekken, lichtvervuiling)</p>

## B. Discussion guide (English)

Topic	Questions
<b>Defining darkness &amp; nature</b>	<p>How can we define urban darkness?</p> <p>Is there any link between darkness and nature? What does it look like?</p>
<b>Experience of darkness</b>	<p>What feelings does darkness bring up? (probe: how do you feel when you are outside in the dark?)</p> <p>What associations does darkness have?</p> <p>What activities do you do in the dark? What do you think others do?</p>
<b>Darkness and safety</b>	<p>When do you feel safe in the dark?</p> <p>What makes the dark feel unsafe? (probe: other people, less vision)</p> <p>If your safety was guaranteed, how would darkness feel?</p>
<b>Specific experiences</b>	<p>What positive/negative experiences do you have with light in the dark? What made them positive/negative?</p> <p>What positive/negative experiences do you have with an absence of light in the dark? What made them positive/negative?</p> <p>When is darkness something pleasant?</p> <p>What is necessary for a pleasant experience?</p>
<b>In search of darkness</b>	<p>When is darkness something you seek?</p> <p>Can we relax in the dark? Why (not)?</p> <p>How can we treat light and darkness in the city differently? (probe: not lighting certain areas, better lighting in others, light pollution)</p>

### C. Experience shared by moderator

I was biking home from an evening event in one of the least attractive areas of Eindhoven: de Hurk. As I crossed the canal, I noticed that the sky was clear and I could see some stars. I stopped my bike and took a moment to just look at the stars. I liked the tranquillity of the moment, as there was nobody outside, and it was cool to see the stars, since you don't often see them in this city.

#### D. Participant characteristics

In the first session, P1-P4 participated; P5-P9 in session two; P10-P15 in session three.

Participant code	Age	Gender
P1	29	Male
P2	32	Male
P3	27	Female
P4	31	Female
P5	22	Male
P6	22	Female
P7	63	Female
P8	26	Male
P9	30	Male
P10	23	Female
P11	26	Male
P12	20	Female
P13	25	Male
P14	32	Male
P15	44	Female

## E. Group dynamics

### Group 1

At first, participants were answering the moderator more than each other; after about 20 minutes, they started having more discussion and addressed the others too. Polite, no talking over each other. All young (under 32) people. The evaluations of darkness in this group were mixed: some people were more positive, others more negative. There was a lot of discussion on the topic of energy levels related to darkness: this seemed to be a main interest for many involved. Towards the end of the session, the lights in the building went off, which resulted in laughing and made for a fun sort of 'immersion' in the subject of darkness.

### Group 2

This group was especially positive about darkness: this was the session where the term 'Darkness Bubble' came up, and there was candid chatting about darkness and the good things it brings. There was an older participant who worked in an uplifting way, because they were open and positive, also telling us enthusiastically about their past. Everyone got about equal speaking time. There was lots of laughter in this group, too: people seemed to feel at ease.

### Group 3

This group skewed towards negative appraisals of darkness and tended to focus on safety issues related to the dark and the night. There was a lot of talk about systemic issues in society that cause such issues and it was often difficult to remain on the topic of positive darkness. One person dominated the conversation and talked for long amounts of time when given the floor. Some people seemed to lose interest during the conversation, instead looking outside. Two participants talked very little, even when prompted. One participant tended to interrupt others. The conversation was less of a discussion and more a taking turns of sharing. Still, there was lots of laughing and grinning in this group, but at times this was to take away the tension from a more sensitive subject.