



Safety in the eye of the beholder: Individual susceptibility to safety-related characteristics of nocturnal urban scenes



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ABSTRACT

What determines whether people consider an environment to be safe or unsafe? In two studies, we employed a multi-level model to examine how safety-related environmental characteristics and individual characteristics influence people's perception of the safety of night-time urban environments. Both studies support previous findings highlighting a key role for environmental appraisals of entrapment (perceived escape possibilities), prospect (perceived overview over a scene), and concealment (perceived environmental affordance of hiding places). More importantly, the studies provide a systematic investigation of person–environment interaction in the safety appraisal process. Our results reveal substantial individual variability in susceptibility to safety-related environmental characteristics (Study 1) and identify an interaction between individual characteristics and appraisals of environmental characteristics (Study 2). Additionally, while both studies replicate an effect of biological sex on safety appraisals, we show that this effect is mediated by trait anxiety, a psychological variable reflecting the propensity to experience anxiety.

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1. Introduction

One of the most basic needs for humans is the need to feel safe. This is not only evident in our personal experiences in daily life, but also in the attention that safety receives in public discourse. Even today, in an era that is historically among the safest to be alive, one has but to read a newspaper or turn on the television set to see that much of current societal debate revolves around issues of safety. In dealing with increased public consideration of public safety, much attention of municipalities and other governmental bodies will typically be directed at controlling the objective risks that individuals are exposed to (e.g., crime rates). However, although crime rates and other tangible manifestations of low levels of safety may indeed substantially affect daily life (e.g., Hale, 1996; Skogan, 1986; Brunton-Smith & Sturgis, 2011), the relationship between objective risks and the experience of safety is characterized by complex interactions with other factors (Hale, 1996). In other words, being safe is not the same as feeling safe. Previous research has associated feelings of insecurity with a number of negative

consequences, such as an increase in the number of people who avoid leaving their home after dark (Warr, 1985; 1990), social isolation as a result of severely limiting daily activities (Keane, 1998; Lorenc et al., 2013), and detrimental effects on physical and mental well-being (e.g., Stafford, Chandola, & Marmot, 2007; Jackson & Stafford, 2009). In effect, perceived safety is important in and of itself, as feelings of insecurity, even when seemingly unjustified, affect people in ways similar to actually being at risk.

Based on Appleton's prospect-refuge model (Appleton, 1975), the current research investigates the dynamic relationship between individual characteristics and the weighing of safety-related environmental characteristics in the safety appraisal process. A large body of research has identified a variety of factors that may influence people's sense of safety, ranging from influences on a societal (e.g., mass media coverage of crime; Heath & Gilbert, 1996) or neighborhood level (e.g., information about crime from social networks; Skogan, 1986), to more immediate environmental and individual influences (e.g., Skogan, 1986; Fisher & Nasar, 1992; Wilson & Kelling, 1982). In the current research, we are primarily interested in how people use the site-specific physical information (i.e., proximate environmental information, see Nasar, Fisher, & Grannis, 1993) to make a perceptual judgment of the safety of an (urban) environment. This focus thus excludes more large-scale situational influences such as prior experiences or information

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gathered from the media (e.g., representations of spaces; see Valera & Guàrdia, 2014). Furthermore, although we acknowledge the importance that social factors may play in the immediate environment when making a safety appraisal (e.g., Foster, Giles-Corti, & Knuiman, 2010; Warr, 1990), our focus also excludes the visual presence of other people and animals and centers on the immediately apparent physical information in an environment. Thus, here we define *perceived environmental safety* as the perceptual judgment of the safety of an environment using site-specific, immediate and safety-related physical information from that environment. The following sections provide an overview of the most important theoretical concepts and empirical findings on the relationship between safety-related environmental information, individual characteristics, and appraisals of environmental safety.

1.1. Safety-related environmental characteristics

An important notion underlying the discussion of the literature on safety-related environmental information in this section is that an organism's behavior is evolutionary shaped and adapted to the effective functioning of the organism in its environment (i.e., *functionalism*; see e.g., Brunswik, 1952; Kaplan & Kaplan, 1989). To aid effective functioning in the environment, an organism should be able to make accurate perceptual judgments about the environment through the processing of environmental information. Yet, some of the objects of perceptual judgment, such as the perception of environmental safety, do not always manifest themselves directly to an observer. Brunswik (e.g., Brunswik, 1952) developed his model of *probabilistic functionalism* to deal with the question how people use environmental information to infer environmental qualities that may not be directly perceived, and introduced the term *proximal cues* to signify information that can be directly perceived and bears a certain, but unknown (and hence the probabilistic component of his model) relationship to the environmental quality under consideration. Viewed from a functionalist perspective, the use of these environmental cues to extract relevant information from the environment is one of the hallmarks of humans' effective adaptation to their environment.

A large number of the studies on safety perceptions are based on the work by Appleton (1975; 1984), who asserted that in most species the satisfaction of basic needs (e.g., food, shelter, safety), and thus the survival of the organism, are often dependent on a combination of the ability to see and the ability to hide. His prospect-refuge theory predicts that environmental preference is based on the opportunities an environment offers to (a) have a clear overview over the situation (*prospect*), and (b) avoid being seen by potentially dangerous others (*refuge*). Appleton acknowledged that there are additional environmental qualities besides prospect and refuge that are conducive to the survival of an organism, and likewise have an influence on environmental preferences. Yet, the prospect-refuge model has provided researchers with an important framework for investigating how appraisals of environmental characteristics impact people's perceptions of environmental safety. Most notably, Fisher, Nasar, and colleagues (e.g., Fisher & Nasar, 1992; Nasar et al., 1993) have extended Appleton's prospect-refuge theory with some important insights, studying how subjective appraisals of environmental characteristics, referred to as *proximate cues* (Nasar et al., 1993), influence people's perception of that environment.

Fisher and Nasar (1992) recognized that refuge may have different meanings depending on whether you take on the perspective of a potential victim or the perspective of a potential offender. The prospect-refuge perspective predicts that people feel most safe in environments offering high prospect as well as high refuge. However, the presence of one or more hiding spots is

exactly what a potential offender would prefer, rendering those refuges potentially dangerous to any passer-by, which may actually make people feel less safe in environments offering many hiding spots (i.e., refuge ambiguity; see Loewen, Steel, & Suedfeld, 1993). To avoid future misunderstandings, Nasar and Jones (1997) introduced the term *concealment* to indicate those environmental qualities that offer potential offenders a place to hide.

Second, Fisher and Nasar (1992) argued that there may be a third factor besides prospect and concealment that should be considered when we try to explain how perceptions of environmental safety are derived from perceptual judgments of safety-related environmental characteristics. They introduced the ease of escape as a factor in the model, which entails either the opportunity to flee the scene in case of a threat or the opportunity to come into contact with other people who are able to help you. Defining ease of escape in more similar terminology as prospect and concealment, *entrapment* refers to those physical environmental qualities that impose a barrier to escape the environment (Nasar & Jones, 1997).

Thus, in short, the proximate cues framework asserts that people use appraisals of certain proximate environmental characteristics (i.e., prospect, concealment, and entrapment) to infer the safety of an environment. A number of studies have corroborated these assertions, showing that environments judged to offer high levels of concealment and entrapment, and low levels of prospect tend to be associated with higher levels of fear of crime (e.g., Fisher & Nasar, 1992; Nasar et al., 1993; Loewen et al., 1993; Nasar & Jones, 1997) and higher perceived danger (e.g., Blöbaum & Hunecke, 2005). For example, Blöbaum and Hunecke (2005) investigated the impact of environmental characteristics and individual characteristics on perceptions of environmental safety and found entrapment to be the single most important factor contributing to people's sense of safety.

However productive this proximate cues framework has proved to be in broadening our understanding of how people infer the safety of an environment from the available environmental information, some issues may be raised with respect to the underlying theory and findings discussed in the preceding paragraphs. First, the better part of the studies focus on investigating the relationship between the safety-related environmental characteristics and the perception of environmental safety on very specific sites, most prominently on university campuses. As some authors have duly noted (e.g., Blöbaum & Hunecke, 2005), assessing environmental qualities on-site enhances the ecological validity of the findings from these studies by accurately reflecting the actual experience people would have traveling through that particular environment. Yet, the explicit focus on university campuses (or a specific architectural site, see Fisher & Nasar, 1992) may run afoul of covering the wide range of environments that people typically encounter on a day-to-day basis. Consequently, we cannot yet be sure that the relationships between safety-related characteristics of the environment and perceptions of environmental safety found in these situations are generalizable to the wide range of environments we experience in our ecological niche or merely idiosyncratic to the environments under consideration.

Second, the typical design employed by these studies is one in which participants rate the safety of a selection of environments that, based on an evaluation using (expert) judges, differ systematically in prospect, concealment, and entrapment. Such factorial designs, in which the safety-related environmental characteristics are operationalized as independent factors, assume that each of the factors in the design can be manipulated independently, and may thus overlook any naturally occurring covariations that may exist between these factors. The artificial untying (Brunswik, 1956) of variables that tend to covary naturally and cannot be separated

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