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Gender moderates the effect of darkness on ethical behaviors: An explanation of disinhibition☆

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ABSTRACT

The relationship between darkness and ethical behaviors is confusing. The mixed findings may be explained by the general process of disinhibition. In this view, gender may moderate the effect of darkness on ethical behaviors. The results of two experiments support this prediction. In Experiment 1, male participants in dimly lit streets exhibited lower levels of prosocial behaviors than those in well-lit streets, whereas women in dimly lit streets exhibited significantly higher levels of prosocial behaviors than those in well-lit streets. In Experiment 2, male college students in a dimly lit room exhibited significantly lower levels of trustworthiness in a trust game than those in a well-lit room, whereas there was no significant difference between the trustworthiness levels of women in rooms with varying levels of illumination; Experiment 2 also revealed that darkness did not affect participants' trust. In summary, gender moderates the effect of darkness on ethical and prosocial behaviors.

1. Introduction

Investigations of the effects of darkness on social behaviors are the most fascinating experiments in psychology. However, the results are confusing. On the one hand, several studies have revealed that darkness decreases an individual's ethical behaviors (Chiou & Cheng, 2013; de Kort & Veitch, 2014; Hanns & de Kort, 2012; Page & Moss, 1976; Zhong, Bohns, & Gino, 2010). For example, Chiou and Cheng found that participants in a dimly lit room were more likely to behave selfishly in a dictator game and less likely to return undeserved money than participants in a well-lit room. On the other hand, several studies have found that darkness increases an individual's cooperation and prosocial behaviors (Kombeiz, Steidle, & Dietl, 2017; Steidle, Hanke, & Werth, 2013; Werth, Steidle, & Hanke, 2012). For example, Steidle et al. revealed that participants in darkness were more willing to cooperate and return more fish to save a fish stock in a social dilemma situation. These mixed findings may be explained by the idea of disinhibition (Hirsh, Galinsky, & Zhong, 2011).

Disinhibition has been proposed to explain how two seemingly contradictory consequences emerge from the interruption of the activation of an individual's behavioral inhibition system (BIS) (Hirsh et al., 2011). The BIS would be activated in situations where individuals have two conflicting options, i.e., cheat to earn undeserved money or be honest but earn less money (Carver & White, 1994; Gray, 1982). In these situations, the activation of the BIS would interrupt any behaviors that may lead to aversive consequences. For example, when individuals are deciding whether they would like to watch a movie with a handicapped person, the motivation to maintain a moral self-concept would activate the BIS and prompt a prosocial behavior (Snyder, Kleck, Strenta, & Mentzer, 1979). However, the activation of the BIS may be interrupted by reducing the saliency of competing response options. Hirsh et al. (2011) indicated that disinhibition is a state in which the relative salience of any competing response is decreased, thus allowing participants to exhibit the most salient action, regardless of whether it is ethical or unethical. Darkness may provide participants with a sense of anonymity and reduce social desirability concerns, thereby decreasing the activity of the BIS and producing a state of disinhibition (Hirsh et al., 2011; Steidle & Werth, 2014).

Disinhibition could affect an individual's behaviors in darkness in two ways. On the one hand, disinhibition could increase the correspondence between situation-specific norms and behavior (Hirsh et al., 2011; Postmes & Spears, 1998). For example, Steidle et al. (2013) revealed that participants in darkness exhibited more cooperation in social dilemmas. In this research, participants were instructed to fish from

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a shared lake. If the common depletable fish resource was chronically overused, both fishers' profits would be inhibited. During five fishing seasons, participants had to decide how many of the fish they had caught they would keep and how many they would return to maintain the fish stock. The results showed that participants in darkness returned more than those in brightness. From the view of disinhibition, the repeated fishing game might increase the saliency of cooperation in obtaining a larger long-term interest. Therefore, darkness increased cooperation. In contrast, in one-time games, obtaining a larger short-term interest would be the most salient contextual cue, and thus, participants in darkness exhibited more selfish behaviors (e.g., Chiou & Cheng, 2013; Zhong et al., 2010). For example, Zhong et al. (2010) revealed that participants in a dimly lit room cheated more in a mask task and earned more undeserved money than those in a well-lit room.

On the other hand, disinhibition could increase the correspondence between an individual's traits and behaviors. On the basis of evolutionary psychology, men are expected to compete for material resources, while women are expected to be honest and loyal to build long-term relationships (Buss, 2004; Buss & Schmitt, 1993). As a result, the sexes may have evolved different personalities and characteristics. For example, men have been shown to have higher aggressiveness and assertiveness levels, while women have been shown to have higher agreeableness and warmth levels (Archer, 2009; Costa Jr, Terracciano, & McCrae, 2001; Eagly, 1987; Eagly & Steffen, 1986; Feingold, 1994; Van Vugt, 2009). According to the view of disinhibition (Hirsh et al., 2011), men exhibit more aggressive behaviors than women. Indeed, researchers have found that only all-male groups engage in aggressive antisocial behaviors when personal identification is absent (Cannavale, Scarr, & Pepitone, 1970), and men are more likely to exhibit competitive and selfish behaviors than women (Chen & Liu, 2017). Because ethically problematic behaviors are frequently correlated with selfish motivations (Shalvi, Gino, Barkan, & Ayal, 2015), we would like to suggest that when participants' disinhibition processes are activated in darkness, men are more likely to exhibit ethically problematic behaviors than women.

Disinhibition derives from the interruption of the BIS (Hirsh et al., 2011). Because the BIS was believed to be activated in situations where individuals have two conflicting options (Gray, 1982), it is reasonable to suggest that disinhibition would work only in situations where individuals have two conflicting motivations, i.e., to increase self-profit and to maintain one's moral self-concept. Specifically, darkness would only affect behaviors that activate an individual's conflicting motivations. For example, participants in Zhong et al.'s (2010) study would have conflicting motivations: to cheat to earn undeserved money and to be honest to maintain a moral self-concept. Therefore, darkness provides participants the opportunity to reduce social desirability concerns and thus decreases their ethical behaviors. Accordingly, darkness would not affect behaviors that have no explicit social expectations. To our knowledge, however, there is no research investigating this suggestion. We believe that the comparison of the effects of darkness on behaviors that have variable levels of social expectations would improve the understanding of disinhibition and the effects of darkness. Therefore, this study attempted to increase the knowledge in these areas by investigating the effects of darkness on trust and trustworthiness separately.

Trust is the willingness of a trustor to be vulnerable to the action of a trustee based on the expectation that the trustee will perform a particular action; trustworthiness is the extent to which a trustee fulfills the trustor's expectation (Mayer, Davis, & Schoorman, 1995). Trust and trustworthiness can also be defined in terms of behaviors in specific games. For example, in the typical trust game (Berg, Dickhaut, & McCabe, 1995), trust is indicated by the amount of money a trustor invests to a trustee, and trustworthiness is indicated by the amount of money a trustee returns to the corresponding trustor. Bicchieri, Xiao, and Muldoon (2011) found that participants were more willing to punish those who were untrustworthy than to punish those who were untrusting. It was concluded that trustworthiness is a socially expected behavior, but trusting is not. In other words, individuals are more likely to experience a conflict between the motivation to behave selfishly and the motivation to behave trustworthily. Therefore, darkness would affect trustworthiness more than it would affect trust. Specifically, we hypothesized that darkness would inhibit men's trustworthiness instead of women's trustworthiness.

Two experiments were conducted to examine these hypotheses. Experiment 1 was a field study that aimed to investigate the moderating effect of gender by examining the extent to which participants cheated to earn undeserved money in streets with varying levels of illumination. Using a trust game (Berg et al., 1995), Experiment 2 aimed to confirm the results of Experiment 1 as well as examine the effects of darkness on trust and trustworthiness separately.

2. Experiment 1: darkness and honesty

Experiment 1 was a field study that aimed to investigate the moderating effect of gender on the effect of darkness on ethical behaviors. In this experiment, passengers in streets with varying levels of illumination were invited to find two numbers that added up to 10 as many times as possible within 5 min (Cai, Huang, Wu, & Kou, 2015; Gino, Ayal, & Ariely, 2009). The participants were promised 1 yuan for each pair of numbers found. After the task, the participants were asked to take money privately based on their self-reported performance. Therefore, we could examine the extent to which the participants cheated to earn undeserved money in streets with varying levels of illumination. It was hypothesized that men in dimly lit streets would cheat more and take more money than men in well-lit streets and that women in dimly lit streets would cheat less and take less money than women in well-lit streets.

2.1. Method

This study was approved by the local ethics committee of the institution of the first author. All participants gave written informed consent. One hundred and five participants (49 females, M_{age} = 27.06, SD = 9.85) were randomly invited to participate in the experiment at night on streets in Jiaozuo, Henan province, Tianjin, and Shanghai (China). In terms of occupation, 36.8% participants were general staff, 26.3% participants were students, 9.2% participants were public servants, 14.5% participants were engaged in other occupations, and the others did not report their occupations. In terms of the highest degree obtained, 10.5% participants had master's degrees, 64.8% participants had bachelor's degrees, and the others did not have a degree. Fifty-three participants (24 females, M_{age} = 26.10, SD = 9.94) were invited to the experiment in well-lit streets (high-brightness condition), while 52 participants (25 females, M_{age} = 28.02, SD = 9.76) were invited to the experiment in dimly lit streets (low-brightness condition) (see Supplementary material A). According to a priori power analysis conducted using G*Power software (Faul, Erdfelder, Lang, & Buchner, 2007), for a significance level of $\alpha = 0.05$, power of 80%, and effect size f of 0.30, the sample size should be 90 participants, with 23 participants in each cell. Therefore, the sample size was sufficient.

The participants were instructed to find as many combinations as possible of two numbers that added up to 10 from 32 numbers on a worksheet (see Supplementary material B) within 5 min. The participants were promised 1 yuan for each pair of numbers found. There were 8 pairs of numbers that could have added up to 10. In a pilot experiment with 10 college students as participants, the participants were able to find an average of 6 pairs in 5 min. At the end of the task, the participants were asked to report their performance and throw the worksheet in a box. Finally, the participants could take money from a box that contained 15 1-yuan denominations without the experimenter watching. After testing each participant, the experimenter checked the participant's actual performance and the amount of money the