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Feeling Disconnected from Others:

The Effects of Ambient Darkness on Hedonic Choice

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Abstract

This research documents a novel effect of ambient lighting on consumer choice. We propose and find that ambient darkness (vs. brightness) can result in consumers feeling disconnected from others. As a result, consumers become more authentic in their choices and they choose hedonic over utilitarian options because these choices reflect what they truly want (Study 1). Past research had suggested darkness increases hedonic choice by making choice less observable, but we find this effect emerges even when the choice is already anonymous and darkness cannot further increase anonymity. Rather, feeling disconnected from others and less weight to social norms heightened self-authenticity in darker (vs. brighter) surroundings (Study 2). When consumers are reminded of social connection, this difference is attenuated (Study 3). Thus, consumers making hedonic choices regulate their choices when reminded of their social connections. Implications of these findings and possible extensions are discussed. (144 words)

Keywords: ambient lighting; environmental influence; authenticity; hedonic choice

1. Introduction

Ambient lighting is an important aspect of retail atmospherics, but how might it influence consumer choice, especially the choice of a hedonic over a more utilitarian product? For example, imagine you are in a quiet bookstore. As you enjoy your anonymity and solitude while browsing, your attention is drawn to two different books. One is utilitarian, and it will expand your knowledge of world history. The other is hedonic, and it will be great fun to read. Would you be more likely to make a hedonic over a utilitarian choice if the store were dimly lit rather than bright? When and why might your choice be influenced in this manner?

The notion that atmospherics serve as a critical influence on consumer behavior is widely accepted in the marketing literature (Bitner, 1992; Kotler, 1973). Background factors such as lighting, scent, temperature, sound, or music provide sensory information and can stimulate the five senses. Surprisingly, despite ambient lighting being an inherent characteristic of retailing and service settings, there is very limited research examining its impact on consumers' responses and choices (for exceptions, see Areni & Kim, 1994; Dong, Huang, & Zhong, 2015; Scheibehenne, Todd, & Wansink, 2010; Xu & Labroo, 2014).

To fill this gap, we investigate the impact of ambient lighting on consumers' preferences for hedonic versus utilitarian options. We propose that ambient darkness (vs. brightness) can make consumers feel disconnected from others, and they assign less weight to what others might think of them. Consequently they become more authentic to themselves and to make choices that reflect what they truly want. As hedonic choices align more with what consumers want whereas utilitarian choices align with what consumers think they should choose (Dhar & Wertenbroch, 2000; O'Curry & Strahilevitz, 2001; Okada, 2005), in darker surroundings consumers become more likely to choose hedonic options over utilitarian ones.

In what follows, we first review the literatures on the influence of ambient lighting on consumer choice and on hedonic choice. We then elaborate on how and when ambient darkness may increase hedonic choice among consumers. We then report the results of three experiments testing our hypotheses, the underlying mechanism, and the boundary condition. We conclude by discussing the theoretical and managerial implications of our findings.

2. Conceptualization

2.1. The literature on lighting effects

Lighting is an extremely important feature of the retailing environment, for two reasons. First, from the perceptual point of view, bright light facilitates visual acuity. Because bright light facilitates the ability to see things, consumers can examine and handle more merchandise (e.g., to read labels, check prices) when the lighting is bright than when it is dim (Areni & Kim, 1994). Conversely, in darker surroundings, due to the lower level of visual acuity, consumers become less accurate in their estimates and evaluations of products. For instance, in darker surroundings consumers underestimate the quantity of food portions that they consumed (Scheibehenne et al., 2010). Second, lighting is also one of the crucial factors in determining arousal level – brightly lit rooms are more arousing than dimly lit ones (Mehrabian, 1976). Marketers frequently use ambient lighting to create optimal levels of stimulation that will lead to more favorable consumer behavior. For example, marketers employ dim lighting in their stores in order to reduce the level of stimulation and slow down the pace consumers shop in the store (Markin, Lillis, & Narayana, 1976). In line with these findings showing that bright light increases arousal, a recent study showed that bright light can amplify consumers' affective responses towards products they are evaluating and dim light can reduce their affective responses. For instance, spicy foods are perceived as more enjoyable, and positive (vs. negative) words are perceived as more positive by

participants in a brightly versus dimly-lit room (Xu & Labroo, 2014). Thus, brighter ambient lighting compared to darker lighting is known to influence consumer choices by changing their visual acuity and allowing them to examine products more accurately and also by changing their arousal levels and enhancing their affective responses towards the products they are examining.

In current paper, rather than focusing on consumers' perceptions of the stimuli present in the environment, we examine whether ambient lighting may shift consumers' choices between a utilitarian and a hedonic option. We elaborate on how and why ambient lighting might shape consumers' choices in the next section.

2.2. Ambient darkness leads to perceived disconnectedness from others

Of most relevance to our research is the finding that ambient darkness can reduce people's emotional reactions to external stimuli. In particular, prior research shows that darker (vs. brighter) lighting can lead people to experience less (vs. more) intense emotions toward stimuli present in their surroundings (Xu & Labroo, 2014), and affective intensity is likely to impact hedonic choice. Studies show that emotional intensity and psychological distance are negatively correlated – stronger emotional intensity corresponds with a lower psychological distance towards others whereas reduced emotional intensity corresponds with a greater perceived psychological distance from others (Van Boven, Kane, McGraw, & Dale, 2010). If darkness reduces affective response, and if consumers feel more distant from others when they experience less emotional response, then they may feel more psychologically distant from others when they are making choices in darker rather than brighter surroundings. Moreover, if darkness leads consumers to feel emotionally disconnected from others, consumers might assign less weight to opinions others might have of them (Duhan et al., 1997; Shafir, Simonson, & Tversky, 1993; Simonson, 1989; Trope, Liberman, & Wakslak, 2007). They may therefore be less likely

to make choices they "should" make if they would like to adhere to social norms and behave in socially desirable ways. Instead, they may become more authentic to their own wants and desires. Because utilitarian choices adhere more strongly to what consumers should choose, but hedonic choices adhere more to what consumers want to do (Dhar & Wertenbroch, 2000; O'Curry & Strahilevitz, 2001; Okada, 2005), in darker surroundings consumers might thus become more likely to make hedonic over utilitarian choices.

Existing research also supports the view that ambient darkness might increase hedonic choice (Gergen, Gergen, & Barton, 1973; Page & Moss, 1976; Zhong, Bohns, & Gino, 2010). This stream of research posits that darker surroundings reduce visual acuity, and as a result a consumer's actions become less observable by others (Gergen et al., 1973; Page & Moss, 1976; Zhong et al., 2010). Therefore, in darker surroundings, people feel they can get away with moral transgressions because others cannot see them or their transgressions (Zhong et al., 2010). For example, Zhong et al. (2010) found that participants seated in a dim rather than bright room were more selfish when making allocations to another participant in a dictator game, because they felt their actions were hidden from others and therefore did not need justification. To the extent that consumers feel they generally have to justify hedonic choices (Dhar & Wertenbroch, 2000; O'Curry & Strahilevitz, 2001; Okada, 2005), and to the extent that darker surroundings make choice more hidden and anonymous (Gergen et al., 1973; Page & Moss, 1976; Zhong et al., 2010), they may feel they have to justify choice less in darker surroundings. Consumers might therefore become more likely to make hedonic choices in darker surroundings, similar to what we propose, but for a different reason – that consumers feel they will not have to justify their choice to people who would normally have observed it because the choice is hidden.

Because of the difference in reasoning, the theorizing and predictions based on this alternative view regarding why and when darker surroundings will increase hedonic choice are somewhat different from our predictions. The view that darkness increases transgressions by making behavior anonymous and not observable by others (e.g., Zhong et al., 2010) implies that darker surroundings compared to brighter ones should be especially likely to increase hedonic choice when a consumer's actions could otherwise be scrutinized by others (e.g., in a public consumption context). The key assumption in this stream of research is that consumers generally wish to make choices that are socially desirable, which implies that they weight others' opinions highly. When consumption is already anonymous and cannot be observed by others (e.g., in a private consumption context), the effect of ambient darkness (vs. brightness) on reducing scrutiny is not applicable, that is, regardless of ambient lighting, a consumer's choice is hidden from others. Thus, if darker (vs. brighter) surroundings increase hedonic choice by making choice feel more anonymous, then we should expect that when a choice is already anonymous, ambient lighting should not impact choice.

Our view differs from this view because we instead posit that consumers assign less importance to what others might think because they feel emotionally disconnected from others. Thus, regardless of whether their actions are observable or not by others, they will make more hedonic choices. That is, even when choice is anonymous and not observable by others, and darkness cannot further increase anonymity, consumers will make more hedonic choices in darker (vs. brighter) surroundings because they feel psychologically disconnected or distant from others. Furthermore, an intervention that makes consumers making choices in darker surroundings feel connected with others is expected to reduce their hedonic choice.

2.3. The current research

In sum, we posit that people in darker surroundings might feel less connected from others, which can increase authentic choice (Lenton, Bruder, Slabu, & Sedikides, 2013; Zhang, Feick, & Mittal, 2014) and the tendency for consumers to act in accordance with their wants (Kernis & Goldman, 2006). For example, previous research shows that indulgent women tend to eat more in response to feeling disconnected from others (Jaremka et al., 2015). In other words, consumers in darker (vs. brighter) surroundings may do what they want to do and to adhere to their authentic self, which may increase their likelihood of making hedonic choices. We further posit that these differences in hedonic choice caused by ambient lighting will arise even when choices are not observable by others, and therefore darkness cannot further increase anonymity of choice. And these differences in hedonic choice caused by ambient lighting will attenuate when consumers are reminded of connectedness with others. More formally, we propose that:

H1: Ambient darkness (vs. brightness) can increase consumers' choice of hedonic options.

H2: This proposed effect of ambient lighting on hedonic choice will be mediated by consumers' heightened self-authenticity that might result from feelings of disconnected from others in dark (vs. bright) surroundings.

H3: If darkness increases hedonic choice by making consumers feel disconnected from others (H2), this effect of ambient lighting on hedonic choice will be attenuated when consumers are reminded of their connections with meaningful others.

We test these hypotheses in three studies. In Study 1, we test the basic effect – whether consumers make more hedonic choices when their choices are observable by others, and when their choices are not observable by others, in darker than in brighter surroundings (H1). Study 2 investigates whether darkness increases consumers' self-authenticity which in turn leads them to

pursue their own wants (H2) and tests the potential mediating role of heightened self-authenticity. Study 3 further tests our proposed mechanism to show that the positive effect of ambient darkness on hedonic choice is attenuated when consumers are reminded of their connections with others (H3). As a set, these three studies provide convergent evidence showing that ambient darkness can increase hedonic choice among consumers by making them feel disconnected from others and therefore they become more authentic to their wants.

3. Study 1

Our objective in Study 1 is to investigate whether ambient darkness increases hedonic choice (H1). A second objective of this study is to test whether this effect is driven by the salient feeling of disconnectedness from others or the desire to avoid social scrutiny. The logic is that if the effect is driven by the motivation to avoid other's scrutiny of consumers' choices (e.g., Zhong et al., 2010), then the effect should only emerge when a choice is observable because darkness should make the choice feel less observable than bright surroundings. When a choice is not observable, then darkness should not increase preference for a hedonic over a utilitarian option, because the choice is already hidden and darkness cannot hide it further. However, if darkness increases hedonic choice by making consumers feel disconnected from others, as we propose, then we expect ambient darkness to increase hedonic choice regardless of whether the choice is observable by others or not. Study 1 thus follows a 2 (lighting: dim vs. bright) × 2 (consumption context: observable vs. non-observable) between-subjects design in which preference for a hedonic and a utilitarian option serves as the key dependent variable of interest.

3.1. Method

3.1.1. Participants and design. One hundred and three undergraduate students (43 males; M_{age} = 21.66 years, SD = 2.36) from a major Asian university participated in this study for a cash

payment (approximately US$5). They were randomly assigned to one of four conditions in a 2 (lighting: dim vs. bright) × 2 (consumption context: observable vs. non-observable) between-subjects design.

3.1.2. Procedure. We manipulated ambient lighting prior to the participants' arrival by varying lighting in the lab. In the brightly lit condition, we turned all the lights on, whereas in the dimly lit condition, we turned all the lights off so the room was lit only by a computer screen and natural light (see Appendix I for pictures of the lab).

Participants were told that the researchers were interested in understanding individuals' consumption preferences. Under this guise, participants were asked to imagine that they were considering purchasing a chair and were facing a decision between two chairs—one that was superior in terms of its *utilitarian* aspect (i.e., "it is only modestly attractive, but has very effective back support function"), and one that was superior in terms of its *hedonic* aspect (i.e., "it has a very stylish design, but only a modest back support function"). Participants were also told that both chairs are similar in all other domains (e.g., price). We conducted a separate test for all the dependent measures used in this research to ensure that the hedonic option, compared to its corresponding utilitarian option, can better express one's self-identity. We report the results of this test in Appendix II.

In the observable (*public*) consumption-context condition, participants were instructed that the chair was to be used by them in a public area, such as their office, which was visible to many people and so the choice they made would be observable to others. In the non-observable (*private*) consumption-context condition, participants were instructed that the chair was to be used in a private area, such as their own bedroom, which no one would normally enter and so their choice would not be observable by others. In both conditions, participants were asked to

indicate their preference for each chair on a 9-point scale (1 = *dislike very much*, 9 = *like very much*).

Afterwards, as a manipulation check of private versus public consumption, participants indicated on a 9-point scale whether their choice would be observable to others (1 = *not at all*, 9 = *very much*). Participants also provided a manipulation check of lighting in the lab (1 = *very dark*, 9 = *very bright*), as well as control ratings of perceived cleanliness of the lab (1 = *very dirty*, 9 = *very clean*). Lastly, they also indicated their feelings at the end of the experiment (sad, upset, guilty, and ashamed; all along a scale from 1 = *not at all* to 9 = *extremely*), and reported demographic information including age and gender.

3.2. Results and discussion

3.2.1. Manipulation checks. As we expected, participants in the dimly lit room perceived the lab as darker compared to those in the brightly lit room (M_{dark} = 2.45, *SD* = 1.31; M_{bright} = 6.48, *SD* = 1.34; $F(1, 101) = 237.28$, $p < .001$, $\eta^2 = .70$). We observed no significant difference on control ratings of the room, in terms of the perceived cleanliness (M_{dark} = 7.30, *SD* = 1.44; M_{bright} = 7.70, *SD* = 1.00; $F(1, 101) = 2.65$, $p = .11$) of the two rooms, suggesting our manipulation of ambient darkness was successful and also it did not change other aspects of the room.

Equally importantly, participants in the observable (*public*) consumption-context condition indeed believed their choice of chairs would be more likely to be viewed by others than those in the non-observable (*private*) consumption-context condition (M_{public} = 6.08, *SD* = 1.67; $M_{private}$ = 5.22, *SD* = 2.30; $F(1, 101) = 4.75$, $p = .032$, $\eta^2 = .05$). Thus, our manipulation of observable versus non-observable seems to have been successful.

Finally, as we expected, and consistent with Xu & Labroo (2014), who also did not find any effects on current feelings of their participants (experiments 4 & 5), in our study, lighting did not change participants' feelings measured at the end of the experiment (sad: M_{dark} = 4.08, *SD* = 1.76; M_{bright} = 4.04, *SD* = 1.29; $F < 1$; upset: M_{dark} = 2.64, *SD* = 1.73; M_{bright} = 3.02, *SD* = 1.98; $F(1, 101) = 1.06$, $p = .31$; guilty: M_{dark} = 2.02, *SD* = 1.46; M_{bright} = 2.51, *SD* = 1.85; $F(1, 101) = 2.23$, $p = .14$; ashamed: M_{dark} = 1.96, *SD* = 1.47; M_{bright} = 2.37, *SD* = 1.68; $F(1, 101) = 1.69$, $p = .20$).

3.2.2. Preference for the hedonic option. Preference for hedonic over a utilitarian option was our main dependent variable of interest. We first subtracted participants' liking of the utilitarian chair from their liking of the hedonic chair to create an index of the relative preference for the hedonic chair (see Table 1 for the means and SDs of participants' liking for each of the two chairs separately). A 2 (ambient lighting) × 2 (choice context) between-subjects ANOVA on the relative liking for the hedonic-chair index yielded only a significant main effect of lighting (M_{dark} = 1.45, *SD* = 1.87; M_{bright} = .56, *SD* = 1.80; $F(1, 99) = 6.11$, $p = .015$, $\eta^2 = .06$). Thus, participants preferred the hedonic chair more in the dark (vs. bright) room, regardless of whether consumption was private or public. No other effects were significant (*p*s > .26). The effect of ambient darkness on consumers' preference for the hedonic option remains significant even after controlling for the specific feeling measures ($F(1, 94) = 4.86$, $p = .030$, $\eta^2 = .05$; 1 missing value in guilty measure recorded).

------ Insert Table 1 about here ------

3.2.3. Discussion. This result provides support for H1 and demonstrates that participants preferred the more hedonic choice significantly more compared to the more utilitarian chair when they evaluated it in darkness, regardless of whether the chair was for private or public

consumption. One aspect of these findings that should however be noted is that the results seem to be driven more by a reduced valuation of the utilitarian option, rather than an increased evaluation of the hedonic option (see Table 1). It is possible that evaluation of the hedonic option suffered from ceiling effects as the ratings for this option were quite high and so darker surroundings did not further increase evaluation of this option. It is also possible that the effect occurred because we presented the utilitarian option before the hedonic option.

Given this pattern of results, our goal in Study 2 is to replicate this finding and extend its generalizability by employing four different choice sets and counterbalancing the order of presenting the different choice sets as well as the hedonic and utilitarian options within each choice set. Another important objective of Study 2 is to directly test our proposed account by investigating whether ambient darkness enhances consumers' self-authenticity and that perception in turn increases hedonic choice (H2).

4. Study 2

4.1. Method

4.1.1. Participants and design. One hundred eighty participants (105 males; M_{age} = 37.23 years, *SD* = 11.04) recruited from Amazon's Mechanical Turk (MTurk) online platform took part in our study in exchange for payment (US$ 0.5). This study followed a 2 (lighting condition: dim vs. bright) between-subjects design in which participants were randomly assigned to one of the two lighting conditions. All participants then made several consumption choices, each between a hedonic and utilitarian option.

4.1.2. Procedure. We manipulated ambient lighting by requesting participants who had been assigned at random to the dim versus bright light condition to either turn off or turn on all the lights in their room. Regardless of whether participants were instructed to turn off or turn on

the lights, the cover story for doing so was the same—the experimenters wanted them to take this action so the participants could see everything more clearly on their screens. One participant reported at the end of the study that he did not follow the instructions to turn off the lights, and we excluded his responses from further analysis (final $N = 179$).

Next, we asked participants to complete a consumer-choice study in which they were asked to make four choices, each between a utilitarian and a hedonic option. The choices were between a competent job candidate and a fun job candidate, a mobile app for work and a mobile app for entertainment, a durable laptop for the home office and a stylish laptop for the home office, and a documentary drama TV program and a love drama TV program. We adopted this choice measure from previous research (Lu, Liu, & Fang, 2016).

Afterwards, participants indicated the extent to which they wanted to be authentic ("I feel I am free to decide for myself how to live my life," "I feel that nobody can tell me what to do," and "I feel I can be myself in my daily situations," all along a scale from 1 = *strongly disagree* to 9 = *strongly agree*; adapted from Kernis & Goldman, 2006; $\alpha = .89$; averaged to create an index of self-authenticity).

Lastly, participants completed a manipulation check and answered control questions about their surroundings (bright, clean, warm; 1 = *not at all*, 9 = *very*), indicated whether they had followed instructions to turn off/ turn on the lights, and reported their feelings (sad, upset, guilty, ashamed, nervous, jittery, afraid, scared; 1 = *not at all*, 9 = *extremely*).

4.2. Results and Discussion

4.2.1. Manipulation check. As expected, participants in the dimly lit room perceived the lab as darker compared to those in the brightly lit room ($M_{dark} = 2.19$, $SD = 1.80$; $M_{bright} = 7.19$, $SD = 2.18$; $F(1, 177) = 282.10$, $p < .001$, $\eta^2 = .61$). We observed no significant difference in

perceived cleanliness (M_{dark} = 6.97, *SD* = 1.60; M_{bright} = 6.68, *SD* = 1.91; $F(1, 177) = 1.18$, $p = .28$) or temperature (M_{dark} = 5.52, *SD* = 1.57; M_{bright} = 5.61, *SD* = 1.47; $F < 1$) of their surroundings, suggesting our manipulation of ambient darkness was successful. Also, consistent with Xu & Labroo (2014), the lighting condition did not change experienced feelings measured at the end of the experiment (sad: M_{dark} = 4.13, *SD* = 2.27; M_{bright} = 4.40, *SD* = 2.31; $F < 1$; upset: M_{dark} = 1.79, *SD* = 1.52; M_{bright} = 1.74, *SD* = 1.24; $F < 1$; guilty: M_{dark} = 1.46, *SD* = 1.23; M_{bright} = 1.55, *SD* = 1.36; $F < 1$; ashamed: M_{dark} = 1.64, *SD* = 1.60; M_{bright} = 1.63, *SD* = 1.59; $F < 1$; nervous: M_{dark} = 1.74, *SD* = 1.68; M_{bright} = 2.01, *SD* = 1.69; $F(1, 177) = 1.19$, $p = .28$; jittery: M_{dark} = 1.63, *SD* = 1.38; M_{bright} = 1.72, *SD* = 1.38; $F < 1$; afraid: M_{dark} = 1.76, *SD* = 1.73; M_{bright} = 1.45, *SD* = 1.22; $F(1, 177) = 1.83$, $p = .18$; scared: M_{dark} = 1.66, *SD* = 1.59; M_{bright} = 1.47, *SD* = 1.14; $F < 1$).

4.2.2. Preference for the hedonic option. We coded hedonic choice as "1" and utilitarian choice as "0." We then summed for all four choices for each participant to create a hedonic-choice index (ranging from 0 to 4). An ANOVA analysis with lighting condition as the independent variables, and the hedonic-choice index as the dependent variable, revealed that participants in the dark room were more likely to choose options with superior hedonic aspects, compared to those in the bright room (M_{dark} = 1.71, *SD* = .96; M_{bright} = 1.41, *SD* = 1.04; $F(1, 177) = 4.19$, $p = .042$, $\eta^2 = .02$). The effect remained significant even after controlling for participants' self-reported emotional experiences in the study ($F(1, 169) = 6.82$, $p = .010$, $\eta^2 = .04$).

4.2.3. Authentic to Self. Participants in the dark room also expressed a greater self-authenticity (*M* = 6.92, *SD* = 1.93) than those in the bright room (*M* = 6.28, *SD* = 2.28, $F(1, 177) = 4.06$, $p = .045$, $\eta^2 = .02$).

4.2.4. Mediation Analysis. We coded the dark-room condition as "1" and the bright-room condition as "0." Regression analyses revealed that darkness was positively associated with being authentic to the self (b = .64, SE = .32, $t(177) = 2.02$, p = .045) and preference for the hedonic options (b = .31, SE = .15, $t(177) = 2.05$, p = .042). Moreover, being authentic to the self was positively associated with preference for the hedonic options (b = .11, SE = .04, $t(177) = 3.19$, p = .002). When both darkness and authenticity to the self were used to predict preference for hedonic options, the effect of darkness dropped to non-significance (b = .24, SE = .15, $t(176) = 1.63$, p = .11), but the effect of being authentic did not diminish (b = .10, SE = .04, $t(176) = 2.92$, p = .004). Bootstrapping (Hayes 2013) based on 5,000 samples further confirmed the indirect effect of darkness. The 95% confidence interval ranged between .0028 and .1509, excluding zero (see Figure 1). These results showed that people in the dark surroundings expressed greater preference for hedonic options, because they had a strong tendency to be authentic to themselves.

--- Insert Figure 1 about here ---

4.2.5. Discussion. The results of this study provide evidence that ambient darkness increases consumers' self-authenticity, which increases hedonic choice. These results support our position that ambient darkness may result in disconnecting from others, which then results in a greater self-authenticity (H2).

If our logic is correct, sensitizing consumers to their social connections with others should reduce hedonic choice by making consumers act more according to what they should want rather than what they do want. Study 3 tests this moderation-by-process account (Spencer, Zanna, & Fong, 2005). If consumers' disconnectedness from others drives the positive effect of ambient

darkness on hedonic choice, reminding them of connectedness with others should attenuate the effect of ambient lighting on hedonic choice.

5. Study 3

5.1. Method

5.1.1. Participants and design. Three hundred and fifty participants (194 males; M_{age} = 38.70 years, *SD* = 12.58) recruited from MTurk took part in our study in exchange for payment (US$0.5). They were randomly assigned to one of four conditions of a 2 (lighting: dim vs. bright) × 2 (reminder: connection vs. control) between-subjects design.

5.1.2. Procedure. We manipulated ambient darkness following the same procedure as we used in Study 2. Six participants reported at the end of the study that they did not follow our instructions to turn off or turn on the lights, and we excluded their data from further analysis (final *N* = 344).

Next, participants assigned to the connection condition were asked to list three close, meaningful personal connections. We made this request as part of an inventory the experimenters were presumably collecting for future research. In the control condition, participants instead were asked to list any three of their own facial features.

All participants then proceeded to a decision-making study in which they were asked to make one professional choice. Specifically, we asked participants to imagine they were in charge of recruiting for their company and were choosing between two job candidates. One candidate was personable and fun to have around but less skilled and competent (a more hedonic option), whereas the other candidate was very skilled and competent but less personable or fun to have around (a more utilitarian option). Participants were asked to indicate their preference for how much they would like to hire each candidate (1 = *not at all*, 9 = *very much*).

Lastly, participants completed manipulation-check questions, rating the brightness, cleanliness, and temperature of their immediate surroundings, and indicated their feelings along the same eight dimensions as we used in our Study 2.

5.2. Results and discussion

5.2.1. Manipulation checks. As expected, participants in the dark-environment condition perceived their surroundings as darker compared to those in the bright-environment condition (M_{dark} = 2.65, *SD* = 1.96; M_{bright} = 7.54, *SD* = 1.83; $F(1, 342) = 572.21$, $p < .001$, $\eta^2 = .63$). We observed no significant difference in terms of perceived cleanliness (M_{dark} = 6.60, *SD* = 1.92; M_{bright} = 6.98, *SD* = 1.77) or temperature (M_{dark} = 5.42, *SD* = 1.47; M_{bright} = 5.73, *SD* = 1.55) between the two conditions (*p*s > .05), suggesting that our manipulation of ambient darkness was successful. Also, replicating our findings in the first two studies, lighting did not change participants' current feelings solicited at the end of the experiment (sad: M_{dark} = 3.90, *SD* = 2.16; M_{bright} = 3.64, *SD* = 1.99; $F(1, 342) = 1.30$, $p = .26$; upset: M_{dark} = 1.98, *SD* = 1.63; M_{bright} = 1.77, *SD* = 1.34; $F(1, 342) = 1.83$, $p = .18$; guilty: M_{dark} = 1.82, *SD* = 1.59; M_{bright} = 1.61, *SD* = 1.38; $F(1, 342) = 1.62$, $p = .20$; ashamed: M_{dark} = 1.81, *SD* = 1.63; M_{bright} = 1.59, *SD* = 1.21; $F(1, 342) = 1.94$, $p = .17$; nervous: M_{dark} = 2.06, *SD* = 1.78; M_{bright} = 1.80, *SD* = 1.27; $F(1, 342) = 2.50$, $p = .12$; jittery: M_{dark} = 2.08, *SD* = 1.86; M_{bright} = 1.83, *SD* = 1.32; $F(1, 342) = 2.23$, $p = .14$; afraid: M_{dark} = 1.78, *SD* = 1.57; M_{bright} = 1.63, *SD* = 1.25; $F < 1$; scared: M_{dark} = 1.79, *SD* = 1.58; M_{bright} = 1.61, *SD* = 1.23; $F(1, 342) = 1.39$, $p = .24$).

5.2.2. Preference for the hedonic option. We first subtracted participants' liking of the utilitarian option from their liking of the hedonic option to create an index for their relative preference for the hedonic option (see Table 2 for the means and SDs of participants' liking of both job candidates separately). An ANOVA with the hedonic-choice index as the dependent

variable, and lighting and reminder as the independent variables, yielded an expected significant interaction ($F(1, 340) = 4.17$, $p = .042$, $\eta^2 = .012$). No other effects were significant (ps > .14). This interaction effect remains viable even after controlling for participants' self-reported emotional experiences during the study ($F(1, 332) = 3.27$, $p = .071$, $\eta^2 = .010$). As we expected, and replicating our previous studies, in the control condition, darkness (vs. brightness) increased participants' choices of hedonic options ($M_{dark} = 1.04$, $SD = 2.81$; $M_{bright} = -.12$, $SD = 3.26$; $F(1, 340) = 6.33$, $p = .012$). However, the effect disappeared when participants' attention was directed to their social connections ($M_{dark} = .19$, $SD = 3.02$; $M_{bright} = .38$, $SD = 3.06$; $F < 1$).

------ Insert Table 2 about here ------

5.2.3. Discussion. In sum, this study provides further support through moderation by showing that darker surroundings reduce emotional connection with others and result in consumers becoming more authentic to their wants and making more hedonic choices. When they are reminded of close personal connections, they reduce hedonic choice. Importantly, this result demonstrates that increasing the emotional connection with others can be used as a potential intervention to reduce hedonic choice among people in darker surroundings.

6. General Discussion

In the current research, we proposed and found that ambient darkness can make consumers feel disconnected or psychologically distant from others. As a result, people in darkness assign less weight to what others might expect them to do over what they want to do, because social expectations become less important to them. Thus, darkness increases hedonic choice by heightening one's self-authenticity.

In Study 1, we demonstrated the basic effect that in dark compared to bright surroundings, participants prefer a hedonic choice more than a utilitarian one. This effect arises

for observable choices that can potentially feel more anonymous when surroundings are darker, but also for non-observable choices that are already anonymous and darker surroundings cannot further increase their anonymity. In Study 2, we directly measured consumers' self-authenticity, and showed darkness increases hedonic choice because it leads to increased authenticity to the self. Building on these results, in Study 3, we proposed that if darkness makes consumers feel disconnected from others and thus make more hedonic choices as a result, one way to reduce hedonic choices in darkness would be to remind consumers about their meaningful social connections with others. Doing so should reduce salience of the self and also make consumers feel more connected. We found support for this premise. Specifically, Study 3 provides further evidence for our proposed mechanism by showing that when consumers are reminded of their meaningful social connections, the positive effect of ambient darkness on hedonic choice disappears.

6.1. Theoretical Contributions

These findings are important for several reasons. First, our research extends past research on the psychological consequences of being in dark (vs. bright) surroundings on human behavior. Past research investigating the effects of ambient lighting has focused on the effects of darkness on visual acuity (Areni & Kim, 1994; Scheibehenne et al., 2010), perceived arousal (Markin et al., 1976), cheating behavior (Zhong et al. 2010), perceived prospects for future (Dong et al., 2015), or self-regulation (Steidle & Werth, 2014). Building on previous research showing that darkness (a) reduces emotional reactions towards external stimuli (Xu & Labroo, 2014) and (b) reduced emotional intensity corresponds with a greater perceived psychological distance from others (Van Boven et al., 2010), we derived a novel hypothesis regarding the effect of ambient darkness on perceived disconnectedness from others and self-authenticity.

Specifically, we proposed and found that darkness can increase hedonic choice by making consumers feel disconnected from others and therefore becoming more authentic to what they want to do. By showing that darkness makes consumers feel psychologically disconnected from others and heightens self-authenticity, we demonstrated situations when ambient lighting will impact hedonic choice that past research would not have directly predicted. We also showed an intervention that will reduce hedonic choice that past research would not have specified (cf. Study 3).

Furthermore, this research contributes to our understanding of the potential factors that could influence hedonic choice, including the salience of hedonic goals (Gollwitzer & Moskowitz, 1996), feelings of deprivation (Chen et al., 2017), and choice difficulty (Sela et al., 2009). Our findings highlight a novel sensory factor—ambient darkness—and a novel psychological factor—self-authenticity—that can increase hedonic choice.

It is also worth noting that previous research has found that when consumers view an ad depicting a close relationship, they will indulge more by choosing more high-end (vs. low-end) products if they happen to have this type of close relationship depicted in the ad (Cavanaugh, 2014). In our findings, we instead demonstrated that ambient darkness could lead to perceived social disconnectedness with others and increase consumers' likelihood to choose hedonic versus utilitarian options. There are two key differences between our findings and Cavanaugh (2014)'s. First, in Cavanaugh (2014), participants were asked to choose between low-end vs. high-end hedonic products, and they did not directly compare consumers' choice likelihood of hedonic versus utilitarian options. Second, the effect in our work is shown to be driven by the heightened self-authenticity (or the lowered need to justify one's choices to others) as a result of the greater feeling of disconnectedness, while in Cavanaugh (2014), the effect is mainly caused by

perceived deservingness and social comparison brought on by the ad message. In sum, our work extend the previous work on the antecedents of hedonic consumption and suggest that social (dis)connectedness might also influence consumers' hedonic choices by leading them to become more authentic to what they truly wants.

6.2. Managerial Implications

Our findings also have important managerial implications. Ambient lighting is a common sensory experience and can be easily manipulated by marketers. Marketers may wish to brighten the surroundings for utilitarian products but dim the lighting when selling hedonic products. For the same product, marketers can design different advertising appeals that emphasize on either the utilitarian or hedonic benefits. Marketers could consider leveraging our findings and matching the ambient lighting in stores to specific advertisement slogans. Such tactics have a clear advantage over other overt promotion strategies, because altering the lighting is subtle and less likely to induce suspicion and reactance among customers. For example, relatively dark in-store lighting could boost consumers' liking for a product's hedonic (rather than utilitarian) value. More generally, marketers might wish to promote their hedonic products through campaigns that reflect dimmer rather than brighter lighting.

6.3. Limitations and Future Directions

In the current studies, ambient lighting did not alter one's self-reported current feelings. This non-effect on current emotions is not surprising, for two reasons. First, we collected the feeling questions only at the end of the study; therefore, they may have been weakened with delay and influenced by the other measures. Second, the questions were similar to those for which Xu and Labroo (2014) also found null effects and were non-specific and not directly cueing anticipated emotion. Future research could employ measures that directly relate to

anticipated emotions a hedonic choice might evoke, and also counterbalance when these items appeared (e.g., before vs. after the dependent measures). Importantly, we did find that lighting influenced authenticity and hedonic choice, and uncovered evidence for our process through mediation (Study 2) and moderation (Study 3).

Moreover, although we mainly focused on preferences for hedonic options as an important downstream consequence of ambient lighting, future research could examine the other possible downstream consequences the same underlying mechanism might induce. For example, consumers in darkness might feel disconnected from others and therefore may become more likely to take actions to connect with others. For example, consumers might be more likely to conform to majority-endorsed (vs. minority-endorsed) options (cf., Huang, Dong, & Mukhopadhyay, 2014) in dark surroundings.

Lastly, we find that the effects of darkness on hedonic choice are observed even in private settings where choice is always hidden (cf. Study 1). We also find an intervention—thoughts about personal connections—that reduces hedonic choice in public consumption. The findings thus go beyond the previous research showing that people feel "hidden" from others' scrutiny, and suggest a situation that the effect of ambient darkness can emerge regardless the consumption context is public or private. Specifically, we demonstrate that people feel emotionally disconnect with others in the ambient darkness and such effect is not influenced by consumption context. Future research could systematically explore conditions under which the effect of an environmental cue (e.g., ambient lighting) can be more salient in a public versus private consumption context. For instance, high (vs. low) self-monitors who tend to have greater public self-presentation concerns (Snyder & Gangestad, 1986) might be more sensitive to the observability of their actions and therefore the positive effect of ambient darkness on hedonic

choice may be stronger for high (vs. low) self-monitors in public (vs. private) consumption contexts, in line with the findings identified in Zhong et al. (2010). These possibilities await further investigations.

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Table 1. Liking of the Utilitarian and Hedonic Chairs as a Function of Darkness Condition and Consumption-Context Condition: Study 1

	Darkness Condition	Brightness Condition
Public Context		
Hedonic Chair	7.48(1.05)	6.96(0.98)
Utilitarian Chair	6.07(1.41)	6.76(1.72)
Private Context		
Hedonic Chair	7.35(1.06)	7.20(1.04)
Utilitarian Chair	5.85(1.83)	6.28(1.34)
Difference		
Public Context	1.41(1.85)[a]	0.20(1.94)[b]
Private Context	1.50(1.92)[a]	0.92(1.61)[a,b]

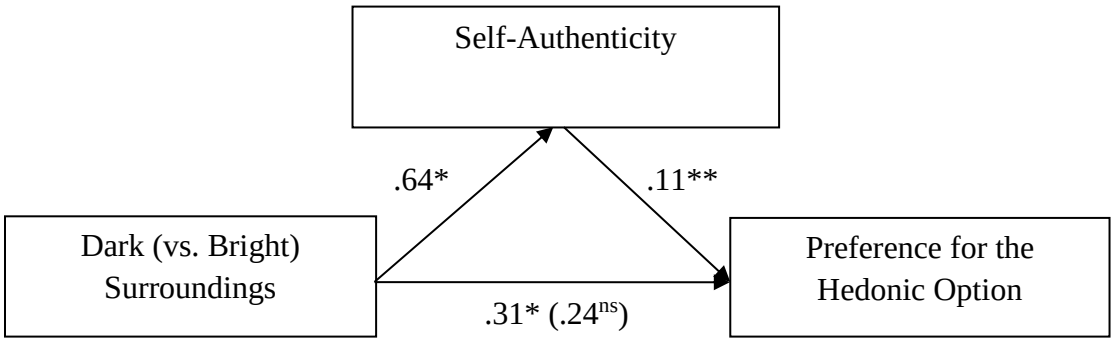
Note: Cells with unlike superscripts differ at $p < .05$. Standard deviations are indicated in parentheses.

Table 2. Liking of the Utilitarian and Hedonic Job Candidate as a Function of Darkness Condition and Reminder Condition: Study 3

	Darkness Condition	Brightness Condition
Control		
Hedonic Job Candidate	6.19(1.73)	5.43(1.97)
Utilitarian Job Candidate	5.15(1.87)	5.55(1.98)
Social Connection		
Hedonic Job Candidate	5.70(1.96)	5.56(2.08)
Utilitarian Job Candidate	5.51(1.84)	5.18(1.91)
Difference		
Control	1.04(2.81)[a]	-0.12(3.26)[b]
Social Connection	0.19(3.02)[a,b]	0.38(3.06)[a,b]

Note: Cells with unlike superscripts differ at $p < .05$. Standard deviations are indicated in parentheses.

Figure 1. Mediation Analysis: Study 2



Note: ** significant at the .01 level; * significant at the .05 level.

Appendix I: Pictures of the Room Lighting (Study 1)

Room Lighting in Study 1

Dim-Room Condition

Bright-Room Condition

Appendix II: Testing the Dependent Measures (Studies 1-3)

To verify our assumption that the hedonic option could better express people's self-identity, we tested all the dependent measures used in this research with 70 participants (36 males; M_{age} = 39.53 years, SD = 37.34) recruited from MTurk. For each choice alternative, we asked participants to indicate (a) the extent to which the choice of this option expressed their identity, and (b) the extent to which the choice of this option expressed who they are, both along a scale from 1 (*not at all*) to 7 (*very much*). We averaged these two items (rs > .79, ps < .001) to create an index of identity-expression level for each choice alternative. We presented the results below according to the order in which they appeared in the paper.

Study 1:

Participants perceived the hedonic choice of the chair as expressing one's self-identity better than the utilitarian choice of the chair ($M_{hedonic}$ = 4.95, SD = 1.71; $M_{utilitarian}$ = 3.96, SD = 1.78; $F(1, 69) = 8.01$, $p = .006$).

Study 2:

(1) Participants perceived the hedonic choice of the job candidate as expressing one's self-identity better than the utilitarian choice of the job candidate ($M_{hedonic}$ = 4.30, SD = 1.82; $M_{utilitarian}$ = 3.46, SD = 1.78; $F(1, 69) = 6.66$, $p = .012$).

(2) Participants perceived the hedonic choice of the mobile app as expressing one's self-identity better than the utilitarian choice of the mobile app ($M_{hedonic}$ = 4.81, SD = 1.66; $M_{utilitarian}$ = 4.03, SD = 1.85; $F(1, 69) = 5.92$, $p = .018$).

(3) Participants perceived the hedonic choice of the laptop as expressing one's self-identity better than the utilitarian choice of the laptop ($M_{hedonic}$ = 4.80, SD = 1.82; $M_{utilitarian}$ = 4.06, SD = 1.79; $F(1, 69) = 4.73$, $p = .033$).

(4) Participants perceived the hedonic choice of the TV program as expressing one's self-identity better than the utilitarian choice of the TV program ($M_{hedonic}$ = 4.72, SD = 1.81; $M_{utilitarian}$ = 3.91, SD = 1.85; $F(1, 69) = 8.12$, $p = .006$).

Study 3:

We have tested the job candidate choice in Study 2.