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How consumers "see" a visually warm store: Differences between affective and cognitive processors

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Abstract

Store atmosphere can influence shoppers' perceptions and behaviors. This research contributes to the literature by showing that a visually warm store atmosphere can induce psychological warmth perception among in-store consumers. An empirical study was conducted to investigate the effect of warmth through a visually warm or cold store atmosphere on consumers' perceptions/behaviors and the moderating role of consumers' processing styles. Results (N = 181) showed that a visually warm (vs. cold) atmosphere induces the perception of intimacy toward the store among affective processors and the perception of assortment similarity among cognitive processors. Such perceptions were found to mediate the effect of the visually warm atmosphere on consumers' approach behaviors toward the store. Based on the grounded cognition theory, this study extends the current knowledge of the warmth experience on psychological perceptions to a retail context. Findings not only contribute to the extant literature of store atmospherics and retailing but they also offer practical guidelines for retailers and designers of store environments.

1 | INTRODUCTION

In a literal sense, warmth refers to the effect of objects' thermal properties to the touch—tactile perception. The figurative meaning of warm this also widely known (e.g., Asch, 1961; Lakoff & Johnson, 1980); the word "warm" is often used to describe abstract psychological concepts such as a warm hug, warm feeling, and warm person. In an architectural context, warmth is commonly identified as describing an environment (Vielhauer, 1970). From an architectural perspective, for an environment to be warm, it would not necessarily be contingent on turning up the heat. Rather, the way a space feels warm is more related to its designin terms of interior color or the texture of the materials (Reagan, 2014; Wastiels, Schifferstein, Heylighen, & Wouters, 2012b). In an article about the warm atmosphere of a café in Mebane, it was reported that customers felt welcome as if they are in someone's personal home not because of the physical temperature, but because of the decorations and furnishings in the shop (Ryan, 2017).

Despite the importance of warmth as one of the aspects of the designed environment (Fernandez, 2006), how people view a visually warm environment has been given scarce research attention. A few studies that covered warm design elements (e.g., color) were conducted to identify the effect of warmth on people's minds and behaviors (e.g., attitudes toward a person, Choi, Chang, Lee, & Chang, 2016); however, little is known about people's perception of the warm object or the environment. Considering the ubiquity of warm atmospheres in retail environments, an empirical research study on shoppers' perceptions to a visually warm environment will provide valuable insight to retailers and designers who have already established warm designs in their stores.

To date, most studies exploring the effect of warmth on consumers' perceptions and behaviors have focused exclusively on the aspects of physical warmth—tactile perception of thermal properties. Based on the concept of warmth in social psychology research on how people perceive others (Asch, 1961; Fiske, Cuddy, & Glick, 2007), empirical studies have found the effect of physical warmth on a wide range of dimensions of psychological warmth. Physical warmth not only leads to positive interpersonal judgment (Williams & Bargh, 2008) but it also develops compatible feelings such as belonging (Bargh & Shalev, 2012), as well as social judgment such as similarity perception (Steinmetz & Mussweiler, 2011). The corresponding effect of physically experienced warmth was also found via the imagined experience without the actual experience of warmth (Macrae, Raj, Best, Christian, & Miles, 2013). This strong relationship between physical and psychological warmth has its roots in the notion of grounded cognition, which articulates that abstract

concepts are grounded by and conveyed through sensorimotor experiences (Barsalou, 2008).

This study posits that warmth experienced via visual design of a store can influence shoppers' warmth-related perceptions that consequently affect approach behaviors toward the store. Our prediction assumes that a store's warm atmosphere created with visual design elements can activate the concept of physical warmth (e.g., temperature), thus inducing compatible perceptions of warmth (e.g., intimacy). Extending what is known about the effects of physical warmth to a visual store atmosphere, we empirically examined how people perceive a visually warm store. This study takes a further step by investigating individual differences in processing style to better understand how stimuli are viewed differently by individuals.

2 | LITERATURE REVIEW AND HYPOTHESES

2.1 | A visually warm store atmosphere

Atmosphere, defined as "the air surrounding a sphere," is used to describe the *quality* of the environment (Kotler, 1973, p. 50). Atmosphere is perceived through the sense, and therefore, the atmosphere of an environment is describable in sensory terms such as sight, sound, scent, and touch (Hyllegard, Ogle, Yan, & Kissel, 2016). Studies on store atmospherics have consistently explored the effect of warmth experience concerning ambient temperature. Regarding warmth, recent retail studies have examined the effect of ambient temperature on consumer behavior based on metaphoric link, unlike past research on ambient temperature to identify the range of optimal temperatures for pleasant shopping experience (Baker & Cameron, 1996; D'Astous, 2000). For example, warm (vs. cold) temperature in a retail space leads to better product evaluation (Zwebner, Lee, & Goldenberg, 2013) and increased (vs. decreased) consumers' perception that the retailer's brand personality is warm (Möller & Herm, 2013). In addition, the feelings of social closeness induced by warm temperatures led to conformity in product preference (Huang, Zhang, Hui, & Wyer, 2014).

A visual atmosphere refers to the color, brightness, size, and anything that one can perceive with the visual sense (Kotler, 1973). Vision is known as the most dominant sense over the other sensory cues in terms of perception, especially for a spatial perception (Welch & Warren, 1986). The visual atmosphere of a store has been found to affect mood and a person's emotional state (Evans, 2002), as well as information processing (Orth & Wirtz, 2014). A *visually warm atmosphere* is defined as a set of visual qualities that imbue warmth perception in the space, independent of the thermal properties. From a store design perspective, previous scholars found that not only the ambient color but also the surface of materials of interior decoration and architecture can produce warmth perception (Wastiels, Schifferstein, Heylighen, & Wouters, 2012a; Wastiels et al., 2012b). Among all design elements, the ambient color of an environment can be the most effective in creating a visually warm atmosphere (Fenko, Schifferstein, & Hekkert, 2010; Yildirim, Akalin-Baskaya, & Hidayetoglu, 2007). It is widely known that colors with long wavelength (e.g., red and orange) are associated with the feeling of warmth, whereas colors with short wavelength (e.g., blue and violet) are associated with the feeling of coldness (Lewinski, 1938; Ross, 1938). When applied to a physical environment, warm colors affect the temperature estimates of that environment; a room with an orange-red color is perceived 3–4 °C warmer than one with blue-greencolors (Itten & Birren, 1970). People perceive the temperature of a liquid as warmer when it is in a red-colored cup rather than in a blue-colored cup (Guéguen & Jacob, 2014) and reported a warmer sensation when they smell red-colored liquid (Michael & Rolhion, 2008). Moreover, specific materials can be viewed as warmer or as colder than the other. Thiis-Evensen, Waaler, and Campbell (1987) stated that people perceived a smooth-surfaced wall as colder than a finely textured one. Wastiels et al. (2012a) also found that wood and bricks seemed to be warmer, compared to steel and glass. This is due to the visual perception of tactile characteristics of materials, for example, roughness, which are known to retain heat longer than smooth surfaces. Therefore, it is suggested that by adding texture to floors and furniture, an environment's warm atmosphere can be enhanced (Reagan, 2014).

2.2 | Social perceptions related to the experience of warmth

When a stimulus is detected by people's sensory systems, people tend to activate associative memories in the brain (J. R. Anderson & Bower, 1973) to form perceptions based on the cues available to them (Huber & McCann, 1982; Monroe & Krishnan, 1985). Ever since Williams and Bargh (2008) empirically explored incidental physical experiences of warmth influencing individuals' interpersonal judgment and behaviors, a wide range of scholarly literature has examined the bodily experience of warmth on social perceptions and behaviors (e.g., Bargh & Shalev, 2012; Zhong & Leonardelli, 2008). People who experience physical warmth showed greater intimacy perception for a given relationship (Ijzerman & Semin, 2009) or with a given product (Zwebner et al., 2013). The warmth experience can also induce greater similarities between self and others (Ijzerman & Semin, 2009) or the given object pairs (Steinmetz & Mussweiler, 2011).

The link between warmth and social perceptions has been developed from the metaphor in common languages using physical experiences to describe abstract concepts and vice versa (Asch, 1961; Lakoff & Johnson, 1980). According to grounded cognition, which focuses on the roles of simulation rather than bodily states in cognition (i.e., embodied cognition), simulation occurs once the experience with the world, body, and mind induced perceptual, motor, and introspective states, which were then stored in memory (Barsalou, 2008). Therefore, for example, when people view an image of a fireplace, their brains simulate certain states across the modalities that were stored in memory (e.g., hot feeling, the action of warming their bodies, and introspections of comfort and relaxation). Grounded cognition explains that such stored associations can be activated even without the bodily experience of warmth; the imagination of experiencing warmth (Macrae et al., 2013) or the mere exposure to the concept of temperature via pictures or sentences (Rai, Lin, & Yang, 2017) was effective, leading to compatible psychological and behavioral responses.

Recent research in multisensory perspective found that metaphoric associations were replicated with neither bodily experience nor the direct association but indirectly priming physical warmth concept via other sensory experience. Warm scent (e.g., vanilla vs. peppermint) within a store exerts customers with the perception of social density (Madzharov, Block, & Morrin, 2015). Warm color in an environment leads to warmth stereotype, trust, and positive attitudes and behavioral intentions toward the target, such as the advertiser, website, and hospital (Choi et al., 2016), as it can induce the experiences that correspond to the effects of physically experienced warmth (Choi & Singh, 2011; Mehta, Chae, Zhu, & Soman, 2011).

2.3 | Individual differences in processing style: Affective versus cognitive processors

Individuals have differences in their tendency to predominantly use either affective or cognitive information as their guiding attitude (Haddock & Zanna, 1993). Such individual differences can cause wide variations in the way people respond to messages (Moore, Harris, & Chen, 1995). For example, when exposed to equal levels of affect-producing stimuli, some people respond with greater magnitude of emotional intensity than others (Aaker, Stayman, & Hagerty, 1986; Larsen & Diener, 1987). Individuals with high affect intensity presented significantly stronger emotional responses to an emotional appeal in advertisement (Moore et al.,1995). On the other hand, for some individuals, messages that have mainly emotional information are not considered to be important (Ruiz & Sicilia, 2004). Such people showed positive responses to more information-rich messages (Geuens & De Pelsmacker, 1998). A tendency to engage in or enjoy cognitive processing can be measured with the Need for Cognition (NFC) Scale, which indicates the degree that individuals use cognitive information when making decisions (Cacioppo & Petty, 1982). Analogous to the Cognitive Processing Scale (i.e., NFC), the Preference for Affect (PFA) Scale was developed by Sojka and Giese (1997), which measures the tendency for affective processing in various situations. Consequently, those who have a high tendency of affective processing are called *affective processors*, whereas those with a high tendency of cognitive processing are called *cognitive processors*. Individual differences in processing styles significantly predict attitudes toward messages or products and provide a rationale for the reason that some people differ in their responses to a stimulus (Ruiz & Sicilia, 2004).

3 | HYPOTHESES DEVELOPMENT

We proposed that a visually warm store atmosphere will induce psychological warmth perception to customers. This is based on the notion that people tend to associate visual sensations of warmth to temperature based on their associative network memory (J. R. Anderson & Bower, 1973). People will then make an inference from the stimuli (a store environment, in this case) by incorporating the semantic associations of visual elements (e.g., color and surface) into psychological perceptions (Huber & McCann, 1982; Monroe & Krishnan, 1985).

Based on a thorough literature review, we found that extant psychological constructs such as social connectedness, intimacy, and similarity have been used to reflect the concomitant perception of experiencing warmth, which is based on the metaphoric link between temperature (physical warmth) and social proximity(psychological warmth; Ijzerman & Semin, 2010; Lakoff & Johnson, 1980). Social proximity is defined as similarity with and intimacy to a person or an object in a relationship (Aron, Aron, & Smollan, 1992; Reis & Shaver, 1988). Social proximity can be applied to diverse contexts beyond the interpersonal; Zwebner et al. (2013) found that warmth experience induces intimate feelings toward a product, resulting in positive evaluations of that product. Steinmetz and Mussweiler (2011) also found that warmth experience provokes a general similarity focus that increases perception of similarity for object pairs. For example, participants in a warm condition (vs. cold condition) perceived a diversity of object pairs (e.g., white wine–red wine and bicycle–motorcycle) to be more similar.

Applied to a store context, we suggest a warmth experience via the store's visual atmosphere can increase consumers' intimacy and similarity, namely, psychological warmth perception, in relation to a store. We consider intimacy, the feeling in a relationship that promotes closeness and connectedness (Sternberg, 1986), as the self-evaluative consequence of social comparison with the store. On the other hand, we regard similarity to be an evaluative attribute that applies to a physical aspect of a store such as product assortment, as the consequence of comparison between products. Product assortment is the complete set of products offered by a retailer and is the focal strategic factor for retailers to deliver the concept and image of the store to shoppers and the primary reason for shoppers to visit the store (de Vries-van Ketel, 2006). Consumer perceptions of variety (i.e., perceived variety) are not necessarily contingent on the actual assortment present (Broniarczyk, Hoyer, & McAlister, 1998; Hoch, Bradlow, &Wansink, 1999; Kahn & Wansink, 2004) and can be affected by external variables such as the presence of categorization (Mogilner, Rudnick, & Iyengar, 2008) or display structure (Deng, Kahn, Unnava, & Lee, 2016). Based on the notion that a warmth experience can foster a similarity focus and increase similarity perception of object pairs (Steinmetz & Mussweiler, 2011), we predict that products in a visually warm store, compared with those in a visually cold store, will also be perceived as more similar despite the same amount/arrangement of assortment.

Taken together, we predict that warmth perceptions due to a visually warm atmosphere can manifest in two constructs: (a) intimacy perception of a store and (b) similarity perception of the provided assortment in a store. Therefore, we posit the following:

> **H1a.** *A visually warm (vs. cold) store will increase store intimacy perception.*

> **H1b.** *A visually warm (vs. cold) store will increase assortment similarity perception.*

It is important to note that the same stimuli can be processed differently by individuals. That is, the effectiveness of the warm atmosphere on perceptions can vary depending on a group of individuals. In this study, we consider the literature on individual differences

in processing style that is either dominant in affective or cognitive information (e.g., Haddock & Zanna, 1993). Affective processing, derived from value-expressive or affective motives, is related to processing of symbolic quality and image dimensions. On the other hand, cognitive processing, induced by utilitarian or cognitive motives, is more associated with intense processing of product-feature information (Mittal, 1987; Park & Young, 1986). Applied to the two possible perceptions of a visually warm store, we posit that the effect of a visually warm (vs. cold) store on intimacy perception will be found for the affective processor, whereas the effect of the same store on assortment similarity perception will be found for the cognitive processor. Consequently, we propose a moderating role of an individual's processing style on the effect of a visually warm store on perceptions:

> **H2a.** *A visually warm (vs. cold) store atmosphere will generate greater intimacy perception for affective processors than for cognitive processors.*

> **H2b.** *A visually warm (vs. cold) store atmosphere will generate greater assortment similarity perception for cognitive processors than for affective processors.*

Store environment research has measured behavioral responses to an environment as approach behaviors (Donovan & Rossiter, 1982). Approach behaviors are associated with a willingness to move toward, stay in, explore, interact, or return to the environment. Many studies using the Mehrabian–Russell model have significantly established the downstream effect of positive emotion on approach behaviors. Indeed, positive affect is related to behaviors such as patronage intention (Oliver, Rust, & Varki, 1997), preference (Rosen & Purinton, 2004), and approach (Eroglu, Machleit, & Davis, 2003; Orth & Wirtz, 2014). In line with prior research, we expect intimacy perception to be positively related to approach behaviors. Given that the expected interactive effect of a visually warm (vs. cold) environment and processing type on intimacy (suggested in H2a), the mediating role of intimacy is predicted to be conditional or moderated mediation (Muller, Judd, & Yzerbyt, 2005). Therefore, we posit the following:

> **H3a.** *Intimacy perception will mediate the positive effect of the visually warm (vs. cold) atmosphere on the approach behaviors of affective processors, but not cognitive processors.*

Previous literature on assortment variety has primarily examined the mediating role of perceived variety, which positively affects store choice, satisfaction (Broniarczyk et al., 1998; Hoch et al., 1999), and consumption quantity (Kahn & Wansink, 2004). As higher perceived variety of assortment leads to positive evaluation, it is expected that higher similarity of assortment leads to negative evaluation. Based on previous studies, we posit that higher similarity perception of assortment in a visually warm (vs. cold) atmosphere will decrease approach behaviors. Moreover, considering the interactive effect suggested in H2b, the mediating role of similarity perception is conditional. Accordingly, we posit the following:

> **H3b.** *Assortment similarity will mediate the negative effect of the visually warm (vs. cold) atmosphere on the approach behaviors of cognitive processors, but not affective processors.*

Overall, Figure 1 describes the overall conceptual model of the research.

3.1 | Pretest

To examine whether a store created with design elements (i.e., color and materials) produces warm (vs. cold) perception and activates the concept of physical warmth (temperature), a pretest was conducted before the main experiment. For an empirical test, two types of virtual stores were created using 3D computer simulation tools (i.e., 3DStudio Max with V-ray) by a professional interior designer. The dimensions, layout, and design of the store environment were determined based on the pictures and measurements taken in a real store environment, and furniture, props, and merchandise were added. Brand information was removed to avoid any potential effect derived from brand preference. For the two test conditions, that is, visually warm and cold store conditions, appropriate colors and materials were chosen based on the previous research (Fenko et al., 2010; Wastielset al., 2012a, 2012b). Visually warm materials, such as wood and bricks, were used for walls, floor, and furniture for the warm condition, whereas visually cold materials, such as steel and marble, were used for the cold condition. All other attributes, including merchandise, were made consistent between the two store conditions to avoid any confounding effects. The finalized stimuli used in the experiment are shown in Figure 2.

The pretest used a single-factor (store visual warmth condition: warm vs. cold) between-subjects design. Fifty-five South Korean undergraduate/graduate students participated in this study in exchange for a small gift (43.6% men, M_{age} = 22.89 years, age range: 19–31 years). The experiment was conducted in a controlled lab with individual monitors for each participant using Qualtrics software (location, company associated with the software). Upon arrival, participants were randomly assigned to one of the two store conditions, and they were shown an image of either visually warm or cold store with a brief shopping scenario (e.g., "Imagine that while going shopping, you find a store as shown in the picture"). Participants were first asked to report quality perception about the storeona 7-pointbipolar scale (low to high). Next, they

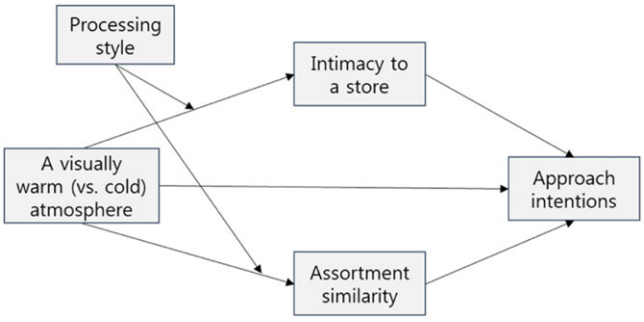

FIGURE 1 Conceptual model of the study [Colour figure can be viewed at wileyonlinelibrary.com]

FIGURE 2 Virtual store stimuli (left: Warm, right: Cold) [Colour figure can be viewed at wileyonlinelibrary.com]

were asked to estimate the temperature of the provided store image in a 40-sliding scale (0–40 °C), which was referred from Ijzerman and Semin (2010) and Zhong and Leonardelli (2008). The given range was based on the assertion that the temperature where people feel comfortable can vary from 20–28 °C (AF Handbook, 2009). Participants were then asked to answer the perception of each color and materials used (1 = *cold* to 7 = *warm*). After answering demographic details, participants were thanked and debriefed.

A series of independent *t* tests by store type were performed on the perceptions of design elements (i.e., color and materials), the temperature estimate, and quality perception of the store. The results on design elements confirmed that the color of the warm store was perceived to be significantly warmer than that of the cold store (M_{warm} = 5.96, standard deviation [*SD*] = .95, M_{cold} = 2.24, *SD* = .96, *t*(53) = 14.43, $p < .001$) and that the warmth perception of the materials of the warm store was also significantly higher than that of materials of the cold store (M_{warm} = 5.77, *SD* = 1.11, M_{cold} = 2.34, *SD* = .94, *t*(53) = 12.43, $p < .001$). Moreover, all perceived values were significantly different from the median value (i.e., 4 = *neutral*;$p < .001$).

The results of the temperature estimate indicate that people assigned to a warm store condition perceived significantly higher temperature (22.64 °C, *SD* = 3.68) than did those who were in a cold store condition (17.72 °C, *SD* = 3.74, *t*(53) = 4.89, $p < .001$). There was no difference in temperature perception by sex ($p = .639$). The value for each store condition is also deemed to be acceptable, considering that most of the previous studies examining the effect of physical warmth via room temperature used a cold temperature as 15–18 °C and warm temperature as 22–24 °C (Ijzerman & Semin, 2009).

The result of quality perception indicates that there was no significant difference of quality perception about the store by the store condition (M_{cold} = 4.71, *SD* = 1.34, M_{warm} = 4.69, *SD* = 1.26; *t*(179) = .109, $p = .913$). This eliminates the alternative explanation of the effect of quality perception and not warmth perception and provides robustness to the manipulation of design elements in the creation of the visually warm and cold stores.

Taken together, these results show that manipulations on the warm (vs. cold) design elements worked, and the activation of the temperature concept via a warmly (vs. coldly) designed atmosphere was also successful; therefore, we conducted the main experiment using the pretested stimuli.

4 | METHODOLOGY/EXPERIMENT

4.1 | Research design and procedure

A two (store type: warm vs. cold) between-subjects experiment was designed. One-hundred eighty-one undergraduate/graduate students (85.1% women) voluntarily participated in the study for a small monetary reward. Respondents were all aged 18–35 years (M_{age} = 22.3 years).

The experiment was conducted in the same setting used for the pretest. In the first session, participants were asked to complete questionnaires about processing type consisting of NFC and PFA. In the second session, participants were randomly assigned to one of the two store conditions, where an image of either a visually warm or cold store was shown to the participant with a brief shopping scenario, the same as described in the pretest. Participants were asked to reply to a series of questions pertaining to dependent variables followed by the manipulation item for temperature estimate. After answering demographic details, participants were thanked and debriefed.

4.2 | Measurements

We adopted measures that were validated in previous research. Measures for approach behaviors were originally from eight items used in Orth and Wirtz (2014) and Mattila and Wirtz (2001); however, two items regarding social factors (e.g., "This is a place where I would feel friendly" and "talkative to a stranger who happens to be next to me") were removed because the current stimuli do not include any social cues. The remaining six items were found to be reliable (? = .86). Individuals completed the PFA (Sojka & Giese, 1997) and NFC (Cacioppo & Petty, 1982) using the original items from the literature. Intimacy perception was measured with two items that Zwebner et al. (2013) used as affective warmth (e.g., "I feel (1) close and (2) intimate to this environment," (? = .84). All these measures were made on 7-point Likert scales ranging from 1 = *strongly disagree* to 7 = *strongly agree*. Assortment similarity was measured with three items adopted from perceived variety of assortment in Mogilner et al. (2008). Those consisted of "how (1) different and (2) similar were the merchandises from each other, and (3) to what extent do you feel that merchandises are distinct from each other?" (1 = *not much*, 7 = *very much*). Two items were reversed to reflect similarity construct (? = .76). All measures

within each construct indicated satisfactory levels of internal consistency.

Next, we conducted a confirmatory factor analysis using SPSS AMOS18 to assess the convergent and discriminant validity of the constructs. After dropping items with standardized parameter estimates below 0.5 (Hair, Black, Babin, & Anderson, 2010), 11 items for the NFC and 6 items for the PFA remained for the final analysis (Table 1). Standardized loadings of the remaining items were all significant, with values greater than 0.5, suggesting convergent validity of the factors (J. C. Anderson & Gerbing, 1988). Composite reliability indices and the average variance extracted for each construct exceeded the recommended minimum standard of 0.7 and 0.5, respectively (Hair et al., 2010). The average variance extracted for any construct was greater than the squared correlation estimates of any two constructs (Fornell & Larcker, 1981), suggesting discriminant validity (J. C. Anderson & Gerbing, 1988). The final measurement model indicated a reasonable fit and allowed us to proceed with the analyses (χ^2[316, N = 181] = 673.83, p < .001; comparative fit index = .865; Tucker-Lewis index = .860; incremental fit index = .866; root mean square error of approximation = .079). Table 1 shows the values and the description of items used in the analyses. Based on the evidence of the convergent and discriminant validity of the constructs used in this study, we prepared the data for further analyses by computing composite scores for the PFA, NFC, approach behaviors, assortment similarity, and intimacy scales.

5 | RESULTS

5.1 | Manipulation checks

Participants in the warm store condition estimated higher temperature (M = 23.09, SD = 3.46) than did those in the cold store condition (M = 18.91, SD = 4.21; t(179) = 7.28, p < .001); therefore, the manipulation check was successful.

5.2 | Hypotheses testing

Before testing the hypotheses, we defined individuals' processing style with whether one was relatively an affective processor or a cognitive processor. Previous studies on cognitive and affective processors used an index of processing style by calculating the difference between the aggregated ratings of the PFA and NFC and dividing people into groups (e.g., high in affect and high in cognition; Ruiz & Sicilia, 2004; Sojka & Giese, 1997). However, recent studies have strongly recommended to avoid splitting data because it results in a substantial loss of statistical power (e.g., Irwin & McClelland, 2001, 2003). Consequently, we created a continuous index of processing style by subtracting the mean score of the NFC from that of the PFA (PFA − NFC) to identify one's relative tendency in affective or cognitive processing (M = −.11, SD = 1.43). Based on this continuous index of processing style, which indicates a continuum of affective processing to cognitive processing, we conducted a floodlight analysis following the procedures outlined by Spiller, Fitzsimons, Lynch, and McClelland (2013). A floodlight analysis identifies the point, known as the Johnson-Neyman (JN) point, of the moderator at which the effect of independent variable is significant (Hayes & Matthes, 2009; Johnson & Neyman, 1936).

To test H1a and H2a, intimacy perception was regressed on the store visual warmth condition (warm vs. cold) and the continuous predictor of individuals' processing style using PROCESS macro Model 1. In support of H1a, the main effect of store visual warmth was significant, t(1,177) = 4.10, p < .001. The results also revealed a significant interaction, t(1,177) = 2.17, p = .031. The JN point for p < .05 (t = 1.98) for processing style occurs above a value of −1.12 (see Figure 3). In support of H2a, the visually warm store was perceived as more intimate than was the visually cold store at a processing style score at or above −1.12—namely, as individuals become more like affective processors than cognitive processors. A shaded area in Figure 3 indicates the region of processing style in which the effect of visually warm (vs. cold) store is significant. There was no significant difference by store visual warmth below the JN point, owing to the larger confidence interval at lower values of processing style. The results are consistent with the conclusion that people with a relatively higher tendency of affective processing perceive intimacy to be significantly higher for a visually warm (vs. cold) store.

Next, tests for H1b and H2b were conducted in the same way we did for H1a and H2a; assortment similarity perception was regressed on the store visual warmth condition (warm vs. cold) and the continuous predictor of individuals' processing style using PROCESS macro Model 1. The results revealed no significant main effect on the perception of assortment similarity, rejecting H1b (p = .379); however, the interaction was significant, t(1,177) = 2.043,p = .042. The JN point for p < .05 (t = 1.98) for processing style occurs below the value of −1.01 (see Figure 4). There was no significant difference by store visual warmth above the JN point, due to the larger confidence interval at lower values of processing style. The results suggest that people with a relatively higher tendency for cognitive processing perceive assortment similarity to be significantly higher for a visually warm (vs. cold) store.

Given the moderation effect of processing style, we tested for a moderated mediation analysis using both intimacy and assortment similarity as mediators on approach behaviors. A bootstrapping analysis was conducted using PROCESS SPSS macro (Model 7, n = 5,000 resamples; Hayes, 2013). In the analysis, store visual warmth was the independent variable, intimacy and assortment similarity perceptions were mediators, and individuals' processing style was the moderator. The analysis revealed that there was no direct effect of store visual warmth on approach behaviors (p = .709); however, the moderated mediation effect of store visual warmth on approach behaviors was significant for both mediators (intimacy: indirect effect = .781, $CI_{95\%}$ = .0044, .1812; assortment similarity: indirect effect = .034, $CI_{95\%}$ = .0019, .1074). Such moderated mediation effects indicate that the mediating effect is conditional on individuals' processing style. The mediating effect of intimacy perception was significant at the mean value (β = .203, $CI_{95\%}$ = .0916, .3411) and 1SD above the mean value (β = .315, $CI_{95\%}$ = 1525, .5314) of the "PFA − NFC" continuum outlined above, positively affecting approach behaviors (β = .286, p < .001). On the other hand, the perception of assortment similarity mediated the effect of store visual warmth on approach behaviors at 1SD below the mean value of processing style (β = −.075, $CI_{95\%}$ = −.2298,

TABLE 1 Psychometric properties of the scales

Construct	Items	Mean (*SD*)	CR	AVE
PFA(α = .859)	(1) I like being around sensitive people. (2) I am a feeling person. (3) I am more of a "feeler" than of a "thinker." (4) When I recall a situation, I usually recall the emotional aspects of the situation. (5) I prefer a task that is emotional and important to a task that is intellectual and important. (6) Feeling comes naturally to me.	4.47 (1.06)	.766	.527
NFC(α = .912)	(1) I would prefer complex to simple problems. (2) I like to have the responsibility of handling a situation that requires a lot of thinking. (3) Thinking is my idea of fun. (4) I would rather do something that is sure to challenge my thinking abilities than something that requires little thought. (5) I try to anticipate and avoid situations where there is likely a chance that I will have to think in depth about something (r). (6) I find satisfaction in deliberating hard and for long hours. (7) I really enjoy a task that involves coming up with new solutions to problems. (8) Learning new ways to think excites me very much. (9) I prefer my life to be filled with puzzles that I must solve. (10) I would prefer a task that is somewhat important but does not require much thought to one that is intellectual, difficult, and important. (11) I feel satisfaction rather than relief after completing a task that required a lot of mental effort.	4.59 (0.95)	.757	.500
Approach behaviors(α = .894)	(1) I would enjoy shopping in this store. (2) I like this store' environment. (3) I would avoid visiting this store (r). (4) I would like to spend time browsing in this store. (5) I want to avoid looking around or exploring the store (r).	4.03 (1.14)	.820	.629
Assortment similarity(α = .760)	(1) How different were the merchandises from each other? (2) How similar were the merchandises to each other? (3) To what extent do you feel that merchandises are distinct from each other?	3.81 (1.17)	.700	.585
Intimacy(α = .840)	(1) I feel close to this environment. (2) I feel intimate to this environment.	3.75 (1.26)	.750	.750

Note. AVE = average variance extracted; CR = composite reliability; NFC = Need for Cognition; PFA = Preference for Affect.

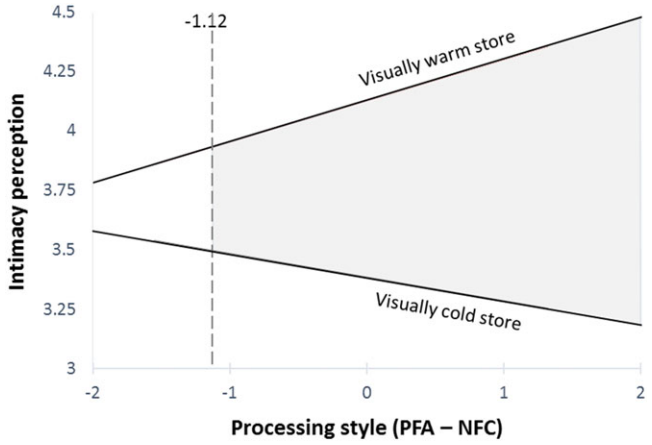

FIGURE 3 The interaction of store type and individuals' processing style (affective vs. cognitive) on intimacy perception.
PFA = Preference for Affect; NFC = Need for Cognition [Colour figure can be viewed at wileyonlinelibrary.com]

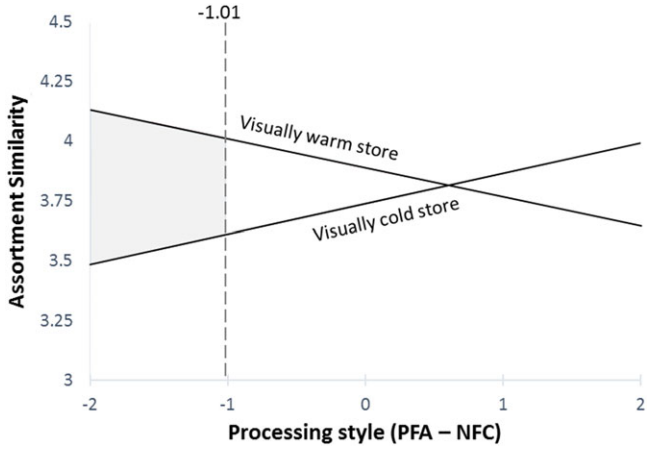

FIGURE 4 The interaction of store type and individuals' processing style (affective vs. cognitive) on assortment similarity perception.
PFA = Preference for Affect; NFC = Need for Cognition [Colour figure can be viewed at wileyonlinelibrary.com]

−.0084), negatively affecting approach behaviors (β = −.139, p = .011). These results support both H3a and H3b.

6 | DISCUSSION AND CONCLUSIONS

6.1 | Discussions

Based on the insights from the effect of physical warmth on social perception in grounded cognition theory, our study extends the current knowledge to retail contexts by providing warmth experience through a store atmosphere. With the use of design elements such as interior color and materials that are known to provide warmth perception (e.g., Fenko et al., 2010), we found the visually warm (vs. cold) store atmosphere was also associated to warm (vs. cold) temperature consistent with the finding by Rai et al. (2017). We further investigated the effect of visually warm (vs. cold) store atmosphere on consumers' perception based on the metaphoric link between warmth experience and perceptions. Applying previously revealed psychological constructs to a store context, we examined intimacy perception toward a store and assortment similarity perception in that store as psychological consequences of warmth experience.

Findings support our prediction regarding intimacy perception—People in a visually warm (vs. cold) store perceived higher intimacy toward a store, consistent with the findings of the effect of physical warmth on intimacy in the extant literature (e.g., Zwebner et al., 2013). However, the prediction on assortment similarity perception of a visually warm store was not supported without considering individual differences in processing style. We believe perception on assortment similarity, in comparison with intimacy perception, may require a higher level of processing to be a consequence of warmth experience. There are three distinct levels of experience triggered by design: visceral, behavioral, and reflective reactions (Norman, 2004). We believe intimacy perception to a visually warm store is more closely related to the quick visceral reaction that characterize affective reactions. Meanwhile, assortment similarity perception is more associated with the reflective reaction that occurs at cognitive and intellectual level, resulting from an interaction with individual differences.

When individual differences in processing styles are considered, the difference in the intimacy perception between the visually warm and the cold store also were observed, but only among affective processors, not among cognitive processors. For affective processors, the visually warm (vs. cold) store induced the intimacy perception that positively influenced their approach behaviors toward the store. In contrast, for cognitive processors, the visually warm (vs. cold) store did not induce such perceptions. Instead, for cognitive processors, the visually warm(vs. cold) store induced the perception of assortment similarity, in line with the previous finding of Ijzerman and Semin (2009, 2010)and Steinmetz and Mussweiler (2011)on the relationship between temperature and similarity perception. Our mediation analysis reveals that the perception of higher similarity in the merchandise assortment induced by the visually warm atmosphere lowers approach behaviors toward the store. This result also supports previous findings that the perception of assortment variety (vs. similarity) enhances merchandise evaluation and satisfaction and positively influences store choice (e.g., Broniarczyk et al., 1998; de Vries-van Ketel, 2006; Hoch et al., 1999). Building on these findings, the present research successfully demonstrates how a visual atmosphere of a store can evoke perceptions of that store in terms of cognitive and affective information processing.

6.2 | Theoretical and managerial contributions

The current study offers both theoretical and managerial contributions. First, we found that a store atmosphere that is designed to provide warmth perception using design elements can influence consumers in the same way that the physical warmth is known to affect psychological perceptions. Extending the established evidence on psychology to a retail context, we demonstrate that warmth experience, induced by a store's atmospherics, influences shoppers' perceptions, not only about the store image but also product assortment, which subsequently affects approach behaviors toward the store. Particularly, our study demonstrates two ways that a visually warm atmosphere influences a shopper by an individual's processing style. The effectiveness of a

visually warm (vs. cold) store on intimacy perception was revealed only for affective processors, which leads to higher approach behaviors. The assortment similarity of a visually warm store was perceived as higher than was that of a visually cold store; however, this was found only for cognitive processors, resulting in lower approach behaviors. These findings suggest that the effect of warmth experience can be diverse depending on distinct groups of individuals.

Second, this study approached the warmth experience holistically (i.e., a store atmosphere). Although several atmospheric researchers have demonstrated the significant role of an ambient environment in changing consumer behaviors (Dijksterhuis, Smith, van Baaren, & Wigboldus, 2005), recent findings on the effect of visually perceived warmth merely considered color (Choi et al., 2016) or pictures that depict warmth (Rai et al., 2017). Extending the range of stimulation to a store environment, we find a visual warm atmosphere to be an ambience that influences consumers' evaluation of the store, as well as the products—even when the merchandise and its assortment are identical. This finding provides insight to retailers: Designing a store as either warm or cold can change consumer perceptions significantly. Retailers can effectively create an inviting atmosphere with warm design elements or increase the perception of assortment variety with cold design elements. Examples can be found in practice, with some retailers dealing with high-priced luxury products trying to create a cold store atmosphere while providing a limited assortment. Other retailers (e.g., TOMS shoes) might decorate to induce warm feelings so that shoppers can easily remain in the store and enjoy a cup of coffee while shopping.

Third, this study provides meaningful insights into how environmental factors interact with consumer characteristics. Although many studies have suggested that consumers' responses to the same store environment vary by consumer characteristics (e.g., Dijkstra, Pieterse, & Pruyn, 2008; Kwallek, Soon, & Lewis, 2007; Rompay, Vonk, & Fransen, 2009), very few studies have investigated consumer characteristics as the sources of the variations (Arnold, Reynolds, Jones, Tugut, & Gabler, 2014; Morrin &Chebat, 2005). To better understand the effects of store atmosphere, we examined individual differences in information processing styles as affective or cognitive processors. From a practical perspective, the knowledge of target shoppers' characteristics can help retailers design their store by understanding why the design of a specific atmosphere is effective for some customer segments over other segments.

The findings of this study will be of interest to interdisciplinary researchers from diverse fields, including design, hospitality, and marketing/retailing. Despite evidence that certain colors and materials are perceived as warm in design research (e.g., Fenko et al., 2010), little attention has been given to incorporating the findings with consumer behaviors. This study empirically bridges the gap that exists across design and marketing studies on warmth by providing evidence that a visually warm atmosphere can activate warmth-related concepts in individuals. This is consistent with scholarly findings on the effect of physical warmth.

6.3 | Limitation and future research

Despite its theoretical and practical contributions, this study has some limitations that should be addressed by future research. First, the scenario and stimuli used were more women-oriented, even though both men and women participated. When creating a virtual store, we referred to an actual retail store of an existing brand of unisexual leather goods, including watches, bags, and wallets. Considering this store has more female shoppers, despite the unisexual brand concept, it is not surprising that the products and store design seem more female-oriented. Pretest analyses also showed that there was no significant change when the sex variable was included to control for the potential effect. As a result, the sex variable was removed from the main study. We suggest future exploration with a sex-specific design or context may prove meaningful.

Second, future research can provide generalizability by replicating the same experiment under different contexts in terms of product category or brand. Because the current study was designed to primarily investigate the effect of a visually warm store atmosphere, we tried to make the characteristics of the products or brand as simple as possible. If features of products are considered, particularly in terms of visual aspects, for example, products made with warm or cold materials such as leather goods or jewelry, respectively, the product characteristics can interact with the visually warm or cold store atmosphere, leading to more dynamic results. Additionally, the congruency of a store's warm atmosphere may be associated with the concept of "vintage. "Vintage, known to evoke nostalgic and authentic feelings, can be congruent with a visually warm atmosphere that induces intimacy perception. On the other hand, vintage is also related to a unique and exclusive feeling, in contrast to regular products (Gladigau, 2008), which makes the product seem a rare, genuine piece (Gerval, 2008). In this aspect, a visually cold atmosphere that lowers intimacy perception may be more congruent with vintage products. Regardless, the concept of vintage should be explored in future work.

In conclusion, our study calls for further investigation of more diverse effects of visually warm and cold store atmospheres on shopper behaviors. As a fundamental approach, exploration of how store visual warmth affects shoppers' emotions (e.g., pleasure, arousal, and dominance) will be meaningful to understanding the downstream consequences of such emotions on preference and choice. Furthermore, based on ample findings available of the consequences of warmth experience with respect to grounded cognition, one example we suggest for future research is the investigation of whether the visual temperature of a store influences spatial proximity, based on the findings of Ijzerman and Semin (2009). The replication and application of previous findings to a retail context could offer interesting and practical guidelines for retailers and designers of a store environment.

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