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When Social Cues Ease the Pain of Paying: The Role of Self-Construal in Online Shopping

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Abstract

This study examines the effects of social cues in online shopping environments on consumer purchases, investigates the underlying psychological mechanisms, and examines the role of consumers' self-construal. To this end, we conducted one field study in an actual online shopping environment and two experimental studies. The field study revealed increases in actual product purchases and sales revenue following the introduction of a purchase-count social cue. Study 1 ($n = 83$) supported a sequential indirect effect whereby additional social cues were associated with reduced perceived uncertainty, lower pain of paying, and higher purchase intention. Study 2 ($n = 146$), which examined the role of temporarily activated self-construal, revealed that these effects were stronger in the interdependent self-construal condition than in the independent self-construal condition. This study provides field evidence of changes in actual purchase behavior following the introduction of social cues and identifies perceived uncertainty and the pain of paying as underlying psychological mechanisms, alongside the role of self-construal, thereby offering both theoretical and practical implications for research on online consumer behavior.

Keywords: social cues; perceived uncertainty; pain of paying; self-construal; online shopping

1. Introduction

With the rise in online consumption, consumers increasingly rely on information regarding other consumers' purchase experiences and behaviors as an essential basis for their purchase decisions [1,2]. In particular, online environments, where consumers struggle to directly inspect products and experience limited face-to-face communication with sellers, entail significant uncertainty regarding purchase outcomes. Thus, information reflecting other consumers' actual purchase experiences holds substantial informational value for consumers [3]. Certainly, most consumers utilizing online shopping platforms to purchase products refer to other consumers' online reviews, and such information has been demonstrated to significantly influence product evaluations and purchase decisions [4].

Furthermore, firms have recognized the significance of other consumers in the purchase process and present social cues in various forms, including online reviews, ratings, review counts, and purchase counts, which convey information concerning others' purchase experiences. These social cues can influence consumer judgments by indicating how other consumers have evaluated and responded to a product. Specifically, information indicating that many others have purchased or positively evaluated a particular product can act as social proof and directly influence consumers' purchasing behavior. Marketing strategies

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aimed at influencing social norms to guide consumer behavior are known as social norms marketing [5,6]. Social norms marketing is particularly salient in online shopping contexts, characterized by frequent social interactions [7]. By presenting social cues pertaining to other consumers' product experiences in online shopping environments, firms can mitigate consumers' perceived risk and uncertainty, thereby promoting purchases [8]. Accordingly, social cues have become a significant marketing tool for stimulating consumer purchases.

This study investigates the influence of social cues in online shopping on consumers' actual purchasing behavior. Prior research suggests that when social cues indicate that many others have engaged in a particular behavior, consumers use this information as a basis for their judgments and tend to follow others' behavior [9,10]. Despite recognition that social cues influence consumers' product evaluations and purchase intentions, relatively limited attention has been given to how social cues may alleviate the psychological barriers associated with purchase decisions. To address this gap, we introduce a purchase-count social cue within an actual online retail environment and examine changes in purchase quantities and sales revenue. We further investigate the psychological mechanisms associated with social cues' effects on purchase intention, focusing particularly on perceived uncertainty and the pain of paying. Consumers may hesitate to purchase a product despite positively evaluating it. Such hesitation may stem from lingering uncertainty regarding the product, making the act of paying for it feel uncomfortable [11–13]. Specifically, this study examines whether additional social cues are associated with higher purchase intention through sequential reductions in perceived uncertainty and the pain of paying. Thus, we ask whether social cues alleviate these psychological barriers.

In addition, this study proposes self-construal as a key moderating variable to examine whether the positive effects of social cues differ according to consumers' self-construal orientations. Prior research indicates that consumers with an interdependent self-construal exhibit heightened sensitivity to social information, including others' behavior, compared to those with an independent self-construal. Moreover, such consumers tend to focus more strongly on avoiding negative outcomes and losses [14–16]. Consequently, during the purchase process, we expect consumers with an interdependent self-construal to experience greater uncertainty and pain of paying, and to be more strongly influenced by social cues that help alleviate these psychological barriers.

This study aims to examine the effects of social cues in online shopping environments on consumer purchases. Thus, we conducted a field study in an actual online retail environment, followed by two experimental studies. In the field study, social cues were incorporated into product information within an actual online retail environment, and purchase quantities before and after the introduction of these cues were analyzed to examine changes in actual purchase behavior following their introduction. Study 1 examined the psychological mechanism through which social cues enhance purchase intention by sequentially reducing perceived uncertainty and the pain of paying. Finally, Study 2 investigated the influence of temporarily activated self-construal to ascertain whether the positive effects of social cues differ between independent and interdependent self-construal conditions, thereby offering additional practical insights for firms. In doing so, this study builds upon prior research on online consumer behavior by providing evidence of changes in actual purchase behavior following the introduction of social cues and identifying the psychological mechanisms underlying these effects, as well as the consumer-specific boundary conditions that influence them. Additionally, the findings offer significant insights for firms aiming to formulate marketing strategies that effectively leverage social cues.

2. Theoretical Background

2.1. Social Cues in Online Shopping

Social norms are the standards that guide individuals in determining which behaviors are common or appropriate in a given context. They exert a significant influence on individual judgments and behaviors [17]. When deciding how to behave, people tend to rely on others' judgments and behaviors, especially when they are uncertain about their own judgments or face ambiguous situations [18]. They may also be influenced by prevailing views even in circumstances where objective judgments are possible [10]. Specifically, information regarding how others actually behave conveys descriptive norms [19] and can provide a valuable informational foundation for assessing a situation and developing personal judgments. Moreover, in uncertain situations, others' choices and behaviors can serve as social proof for assessing the appropriateness of one's own judgment [17].

Firms also recognize the significant impact of social norms and provide consumers with various social cues in online shopping environments. Despite the inability of consumers to directly observe others' behavior in online shopping environments, they can learn about others' purchase experiences and product evaluations via different social cues, such as online reviews, ratings, review counts, and purchase counts [20]. Online shopping represents a consumption context characterized by relatively high levels of perceived uncertainty and risk because consumers cannot directly inspect products and encounter limited face-to-face communication with sellers [3]. In such contexts, social cues can substantially influence consumer purchases because consumers rely on other consumers' purchase experiences and product evaluations to reduce their perceived uncertainty [21,22]. In this regard, Dagogo-Jack and Watson [21] demonstrated that social cues such as "most read" and "most shared" can act as signals for consumers to evaluate the value or quality of a target in online contexts. The influence of these social cues was especially significant in situations of high uncertainty. Similarly, Ahn and Lee [9] examined the informational and social influence of social cues in online shopping, identifying diagnosticity and belongingness as mechanisms underlying consumer responses. Their findings highlight the informational and relational roles of social cues, while the role of the pain of paying warrants further examination.

Thus, social cues indicating that other consumers have purchased or positively evaluated a specific product can reduce uncertainty regarding purchase outcomes by offering additional product-relevant information and enhancing consumers' confidence in their judgments. Accordingly, we assert that the additional presentation of social cues near the point of purchase in online shopping environments diminishes consumers' perceived uncertainty concerning product purchases, thereby increasing their purchase intentions.

Hypothesis 1 (H1). *Consumers' purchase intentions will be higher when additional social cues are presented near the point of purchase than when they are not additionally presented.*

Hypothesis 2 (H2). *Consumers' perceived uncertainty will be lower when additional social cues are presented near the point of purchase than when they are not additionally presented.*

2.2. Pain of Paying

Consumers may experience psychological pain when spending money to acquire a product. The pain of paying denotes the negative emotions consumers experience when spending money [13,23] and is considered a key psychological factor that inhibits purchase behavior [11,24]. Neuromarketing research has also demonstrated that monetary losses can stimulate brain areas linked to physical pain [25]. This indicates that, besides the utility derived from acquiring a product, the act of paying can impose a psychological burden on consumers.

During the purchase process, consumers experience both the pleasure of acquiring a product and the pain of paying for it. Thus, purchase decisions are shaped not only by the benefits consumers anticipate from a product but also by the psychological pain they must experience to acquire it [13]. Because greater pain of paying makes consumers more hesitant to purchase, promoting purchases necessitates both enhancing product benefits and alleviating the psychological pain associated with the payment process [26].

Prior research on the pain of paying has identified various factors that can exacerbate this psychological phenomenon. For instance, when consumers perceive a transaction as unfair, they are more likely to view the associated cost as excessive and experience greater pain of paying [23]. Thinking about opportunity costs may also exacerbate consumers' pain of paying [27]. In addition, various factors—including payment methods and price sensitivity [28] and product type [26,29]—have been shown to influence the pain of paying.

One significant factor known to increase the pain of paying is perceived uncertainty. When consumers perceive high uncertainty in a consumption situation, they may lack sufficient reasons or confidence to evaluate a product or make a purchase decision [12]. This complicates consumers' ability to justify paying for the product, thereby increasing the pain of paying. Indeed, prior research has demonstrated that the pain of paying is greater when a purchase is difficult to justify [26]. For example, Rick et al. [24] discovered that consumers experience greater pain of paying for hedonic goods than for utilitarian goods because hedonic purchases are more difficult to justify and may evoke guilt. Thus, the perceived uncertainty in a consumption situation can increase consumers' pain of paying and diminish their propensity to purchase.

Importantly, perceived uncertainty and the pain of paying represent conceptually distinct psychological responses. Perceived uncertainty concerns consumers' uncertainty about a product's expected performance and actual quality, whereas the pain of paying refers to the psychological discomfort associated with spending money. When consumers are uncertain about whether a product will meet their expectations, they may experience greater discomfort about paying for it because the value of the expenditure is less certain. Thus, perceived uncertainty provides a theoretically relevant antecedent to the pain of paying in the purchase decision process. Accordingly, the present research proposes a sequential mechanism in which social cues reduce perceived uncertainty, thereby alleviating the pain of paying and increasing purchase intention, rather than treating these psychological responses as independent parallel mechanisms or assuming the reverse sequence.

This study proposes that social cues in online shopping contexts can alleviate consumers' pain of paying and subsequently increase their likelihood of making a purchase. As discussed earlier, online shopping represents a consumption context characterized by relatively high uncertainty concerning product evaluations and purchase decisions [3]. However, social cues that convey insights regarding other consumers' purchase experiences and product evaluations can alleviate perceived uncertainty by offering additional informational signals for product judgments [9]. Consequently, consumers may develop greater confidence in their product judgments and experience less psychological pain related to paying for the product. This suggests a sequential process in which additional social cues may reduce perceived uncertainty, thereby alleviating the pain of paying and increasing purchase intention. Accordingly, we propose the following hypotheses:

Hypothesis 3 (H3). *Consumers will experience diminished pain of paying when additional social cues are presented near the point of purchase than when they are not additionally presented.*

Hypothesis 4 (H4). *Perceived uncertainty and the pain of paying will sequentially mediate the influence of social cues on purchase intention.*

2.3. Self-Construal

Self-construal refers to whether individuals perceive themselves as independent or connected to others via social relationships [30]. Self-construal can be classified into independent and interdependent types [31]. Individuals with an independent self-construal perceive themselves as distinct from others. They prioritize their unique attributes and personal goals, value autonomy, and prefer assertive communication styles [32]. Conversely, individuals with an interdependent self-construal view themselves as connected to others. They emphasize social harmony and value relationships, belongingness, and conformity [33,34]. Self-construal may indicate a chronic individual tendency or be temporarily activated by specific situations or stimuli [35]. In this study, we focus on temporarily activated self-construal rather than consumers' chronic self-construal.

Variations in self-construal also influence how consumers process information and make decisions. Particularly, self-construal influences the extent to which consumers focus on positive versus negative purchase outcomes. Independent self-construal correlates with a promotion focus, which emphasizes achievement and gains and encourages consumers to adopt approach strategies to attain positive outcomes. In contrast, interdependent self-construal closely correlates with a prevention focus, which emphasizes avoiding negative outcomes and losses, thereby encouraging avoidance strategies [14,35]. This greater focus on negative outcomes may cause consumers with an interdependent self-construal to encounter increased uncertainty and negative emotions during purchase decisions. Aligned with this reasoning, Choi and Yoo [15] discovered that consumers with an independent self-construal were more inclined to perceive positive technology-related characteristics, such as optimism and innovativeness, whereas those with an interdependent self-construal exhibited diminished trust in technology and greater anxiety. Collectively, these findings indicate that consumers with an interdependent self-construal may experience greater perceived uncertainty and pain of paying than those with an independent self-construal.

Accordingly, this study expects that the effects of social cues in alleviating perceived uncertainty and the pain of paying will be stronger among consumers in an interdependent self-construal condition than among those with an independent self-construal. Specifically, because consumers in an interdependent self-construal condition are particularly inclined to emphasize potential negative outcomes during the purchase process, they are more likely to experience uncertainty about purchasing a product and the pain of paying for it. However, when social cues concerning other consumers' purchase experiences and evaluations are presented, the uncertainty surrounding the purchase should decrease, thereby alleviating the pain of paying and increasing purchase intention. Thus, we anticipate the indirect effect of social cues on purchase intention—via sequential reductions in perceived uncertainty and the pain of paying—to be stronger among consumers in an interdependent self-construal condition than among those with an independent self-construal.

Hypothesis 5 (H5). *The effects of additional social cues on (a) perceived uncertainty, (b) pain of paying, and (c) purchase intention in online shopping contexts will be stronger in the interdependent self-construal condition than in the independent self-construal condition. (d) The sequential indirect effect of additional social cues on purchase intention through perceived uncertainty and the pain of paying will be stronger in the interdependent self-construal condition than in the independent self-construal condition.*

3. Field Study

3.1. Method

To examine the effect of social cues at the point of purchase on consumers' purchasing behavior, we conducted a field study utilizing actual sales data from a company. With

the support of Company A—which is a well-known Korean beauty and personal care company—the experiment was conducted with consumers visiting an online shopping platform. The field study focused on two of the company's primary product categories: body care and oral care products. When consumers visited the product pages to purchase Company A's products on the shopping platform of a major online portal, they encountered a social cue displayed next to the "Purchase" button. The social cue indicated the number of consumers who had purchased the product, such as "Over 70 people have purchased this product".

The social cue was displayed for two weeks, from 11 January to 24 January 2024. During this period, purchase data were compared with data from the preceding two-week period, spanning 28 December 2023 to 10 January 2024, during which this additional purchase-count cue was not displayed. We gathered purchase data before and after the introduction of the social cue for 40 body care product pages and 50 oral care product pages. Across the 90 product pages and both two-week periods, a total of 5214 units were sold. The same product pages were observed in both periods, without a concurrent control group or random assignment.

Products were selected from items with an established sales history rather than products with little or no prior purchasing activity. The displayed purchase counts reflected actual prior purchases and therefore varied across product pages. Company A implemented the cues on its own website and coordinated their implementation with the online shopping platforms through which its products were sold. According to the company, the promotional conditions, reward points, and cashback offers remained unchanged across the two observation periods. Data were analyzed using IBM SPSS Statistics 30.0 (IBM Corp., Armonk, NY, USA).

3.2. Results

To examine changes in consumers' actual purchase behavior, we compared purchase quantities and payment amounts before and after the introduction of the social cue. Purchase quantity refers to units sold per product page during each two-week period, and payment amount refers to the total sales revenue per product page during the corresponding period. Paired-samples *t*-tests were conducted using one-tailed tests based on the directional prediction. For both body care and oral care products, the results indicated that both purchase quantities and payment amounts increased after the social cue was introduced.

The analysis of purchase quantity revealed a significant increase following the introduction of the social cue. For body care products, purchase quantity was significantly higher after the introduction of the social cue ($M = 19.70$) than before its introduction ($M = 13.45$; $t(39) = 2.922$, one-tailed $p < 0.01$). Similarly, for oral care products, purchase quantity was significantly higher after the introduction of the social cue ($M = 43.04$) than before its introduction ($M = 34.72$; $t(49) = 2.216$, one-tailed $p < 0.05$).

The analysis of payment amounts also revealed higher sales revenue following the introduction of the social cue. Payment amounts were markedly higher following the introduction of the social cue for both body care products (before: KRW 159,875 vs. after: KRW 201,293; $t(39) = 2.581$, one-tailed $p < 0.01$) and oral care products (before: KRW 513,768 vs. after: KRW 628,379; $t(39) = 1.969$, one-tailed $p < 0.05$).

3.3. Discussion

The results of the field study, which utilized actual company data, showed increases in purchase quantities and sales revenue following the introduction of a purchase-count social cue. However, because this study compared two successive periods without a concurrent control group, these changes cannot be attributed solely to the social cue. The field evidence

therefore complements the experimental studies, which examine purchase intentions and the proposed psychological mechanism.

4. Study 1

4.1. Method

Data collection for Study 1 was conducted on 13 September 2026, with participant recruitment and data collection completed within a single day, after the IRB exemption was obtained. The study was conducted after an institutional review exemption was obtained from the Kongju National University Institutional Review Board (Exemption No. KNU_IRB_2026-13, 13 September 2026). Participants provided informed consent before beginning the online survey.

Study 1 examined the mechanism underlying the positive effects of social cues. A between-subjects design with two conditions (additional social cue: presented vs. not presented) was employed. We recruited 83 U.S. participants via Amazon Mechanical Turk (52 males, 62.7%; M_age = 38.35 years, range = 28–58). Participants were randomly assigned to one of two experimental conditions based on the additional presentation of social cues.

Participants were requested to envision themselves shopping on Amazon and were provided with a scenario that included information about a product. The focal product was hand cream, a product commonly purchased in daily life, from the real brand TISLO by Aekyung. Upon reviewing the product information, participants encountered varying information based on their assigned condition. Both conditions contained basic product information, including some social information. In the additional-social-cue condition, product rating and number of ratings were additionally displayed below the "Purchase" button, whereas no such additional cues appeared in that location in the comparison condition (see Appendix A). Participants subsequently completed measures of brand familiarity (covariate), perceived uncertainty, pain of paying, and purchase intention. Finally, they provided demographic information. A sensitivity analysis using G*Power 3.1.9.7 indicated a minimum detectable effect size of Cohen's f = 0.311 for a one-way ANOVA with two groups ($N = 83$, $\alpha = 0.05$, power = 0.80).

The shopping procedure involved two successive screens: all participants first viewed the same product information, including the social information ordinarily shown on the product page, and then proceeded to a purchase-decision screen. The experimental manipulation concerned whether social information was additionally displayed near the purchase button on that subsequent screen, not whether participants had encountered any social information at all.

4.2. Measures

Perceived uncertainty was assessed through two items adapted from Chen et al. [1] using a seven-point scale (e.g., "I am afraid that the products on this online website will not perform as I expect"; $\alpha = 0.838$).

The pain of paying was assessed through five items from Xu et al. [26] using a seven-point scale (e.g., "It would be painful to spend money on this product"; $\alpha = 0.938$).

The dependent variable, purchase intention, was assessed through three items from Lee et al. [36] using a seven-point scale (e.g., "I will purchase this product"; $\alpha = 0.962$).

Finally, brand familiarity, incorporated as a covariate, was assessed through a single item ("familiar") from Yoo and Lee [37] utilizing a seven-point scale.

4.3. Results

Before the main analyses, brand familiarity, initially included as a covariate, demonstrated no significant effect on perceived uncertainty, pain of paying, or purchase intention; therefore, it was excluded from subsequent analyses.

A one-way ANOVA on perceived uncertainty revealed a significant effect of social cues ($F = 24.309$, $p < 0.001$). Perceived uncertainty was lower when additional social cues were presented ($M = 4.01$) than when they were not additionally presented ($M = 5.37$). Thus, social cues reduced the uncertainty that consumers perceived during purchase decisions.

A one-way ANOVA on pain of paying revealed a significant effect of social cues ($F = 26.888$, $p < 0.001$). The pain of paying was less when additional social cues were presented ($M = 3.66$) than when they were not additionally presented ($M = 5.23$). These results indicate that social cues reduced consumers' pain of paying.

A one-way ANOVA on purchase intention, the dependent variable, revealed a significant effect of social cues ($F = 12.036$, $p < 0.001$). Purchase intention was higher when additional social cues were presented ($M = 5.28$) than when they were not additionally presented ($M = 4.09$). Collectively, these findings support H1–H3.

Finally, a mediation analysis was conducted to assess the proposed mechanism. Social cues (coded 1 = additional cues presented, 2 = no additional cues presented) were designated as the independent variable, perceived uncertainty as the first mediator, pain of paying as the second mediator, and purchase intention as the dependent variable. PROCESS Model 6 was used with 10,000 bootstrap resamples [38]. The results revealed a significant sequential indirect effect of social cues on purchase intention via perceived uncertainty and the pain of paying (indirect effect = −0.50, 95% CI [−0.85, −0.02]). Thus, H4 was supported.

4.4. Discussion

The results of Study 1 further demonstrate that the additional presentation of social cues positively influences consumers' purchase intentions. Moreover, this positive effect appears to be associated with a reduction in perceived uncertainty and the pain of paying that consumers experience when making purchase decisions. The sequential indirect effect is consistent with the proposed mechanism, although the temporal ordering of the mediators was not directly established.

5. Study 2

5.1. Method

Data collection for Study 2 was conducted on 14 September 2026, with participant recruitment and data collection completed within a single day. Data collection took place after the institutional review exemption was obtained from the Kongju National University Institutional Review Board (Exemption No. KNU_IRB_2026-13, 13 September 2026). Participants provided informed consent before beginning the online survey.

Study 2 was conducted to examine the hypotheses concerning the effects of social cues and self-construal. A 2 (additional social cue: presented vs. not presented) × 2 (self-construal: independent vs. interdependent) between-subjects design was employed. We recruited 146 U.S. participants through Amazon Mechanical Turk (97 males, 66.4%; M_age = 36.48 years, range = 27–63). Participants were randomly allocated to one of the four experimental conditions.

The procedure was identical to that of Study 1, except for the manipulation of self-construal. Participants' self-construal was temporarily activated using the priming procedure advanced by Gardner et al. [39]. Participants were instructed to read a short paragraph and tally the number of pronouns present in the passage. In the independent self-construal condition, all pronouns pertained to "I," whereas in the interdependent self-construal condi-

tion, all pronouns pertained to "we." Subsequently, participants completed a manipulation check for self-construal using six items adapted from Aaker and Lee [14]. Three items assessed the degree to which participants thought about themselves while completing the priming task, functioning as the manipulation check for independent self-construal ($\alpha = 0.960$). The other three items assessed the degree to which participants thought about themselves and their family, functioning as the manipulation check for interdependent self-construal ($\alpha = 0.947$).

The priming task was presented separately from the subsequent shopping scenario and did not explicitly refer to self-construal, social cues, or purchase decisions, thereby helping to minimize potential demand effects.

Subsequently, participants were instructed to envision themselves shopping on Amazon. In Study 2, a sofa was selected as the focal product based on Wu et al. [40]. As in Study 1, after reviewing the product information, participants encountered various stimuli based on their assigned condition. Both conditions contained basic product information, including some social information. In the additional-social-cue condition, product rating and number of ratings were additionally displayed beneath the "Purchase" button, whereas no such additional cues appeared in that location in the comparison condition (see Appendix B). Subsequently, participants completed measures of brand familiarity (covariate), perceived uncertainty (two items; $\alpha = 0.842$), pain of paying (five items; $\alpha = 0.966$), and purchase intention (three items; $\alpha = 0.935$). All measures were identical to those used in Study 1 and were assessed on seven-point scales. A sensitivity analysis using G*Power indicated a minimum detectable interaction effect size of Cohen's f = 0.233 for a 2 × 2 between-subjects ANOVA (N = 146, $\alpha = 0.05$, power = 0.80).

5.2. Results

Before the main analyses, brand familiarity, initially included as a covariate, did not exhibit a significant effect in any of the analyses; therefore, it was excluded. The following analyses were conducted using 2 × 2 ANOVAs.

5.2.1. Manipulation Check

A 2 (social cue) × 2 (self-construal) ANOVA was conducted to assess the manipulation of independent self-construal, with thoughts about the self as the dependent variable. The results indicated a significant main effect of self-construal ($F = 86.333$, $p < 0.001$). Participants in the independent self-construal condition ($M = 5.71$) reported thinking more about themselves during the priming task than those in the interdependent self-construal condition ($M = 3.48$). No other effects were significant.

A 2 (social cue) × 2 (self-construal) ANOVA was conducted to assess the manipulation of interdependent self-construal, with thoughts about themselves and others as the dependent variable. The results indicated a significant main effect of self-construal ($F = 74.986$, $p < 0.001$). Participants in the interdependent self-construal condition ($M = 5.46$) reported thinking more about themselves and others during the priming task than those in the independent self-construal condition ($M = 3.58$). No other effects were significant. According to these results, self-construal was effectively manipulated.

5.2.2. Perceived Uncertainty

A 2 (social cue) × 2 (self-construal) ANOVA on perceived uncertainty indicated a significant main effect of social cues ($F = 22.091$, $p < 0.001$). Perceived uncertainty was less in the presence of social cues ($M = 3.99$) than in their absence ($M = 4.94$). The main effect of self-construal was likewise significant ($F = 4.298$, $p < 0.05$). Participants with

an independent self-construal perceived less uncertainty (M = 4.25) than those with an interdependent self-construal (M = 4.66).

Similarly, the two-way interaction between social cues and self-construal was significant (F = 7.893, $p < 0.01$) (Figure 1). Contrast analyses demonstrated that among participants with an independent self-construal, perceived uncertainty remained statistically unchanged regardless of the presence (M = 4.07) or absence (M = 4.44; F = 1.786, $p > 0.1$) of social cues. In contrast, participants with an interdependent self-construal perceived significantly less uncertainty when additional social cues were presented (M = 3.92) than when they were not additionally presented (M = 5.42; F = 28.218, $p < 0.001$). Thus, the effect of social cues on diminishing perceived uncertainty was stronger among participants with an interdependent self-construal than among those with an independent self-construal. Therefore, H5a was supported.

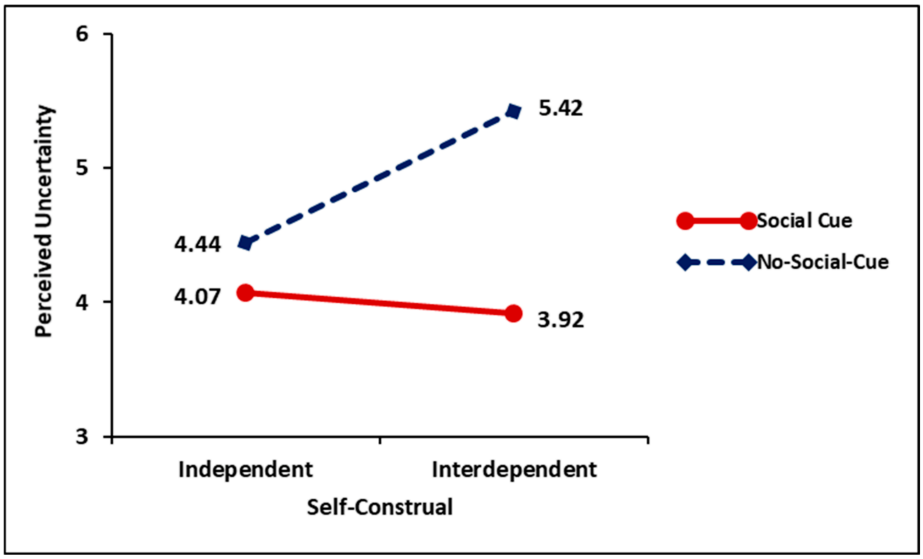


Figure 1. Interaction effects on perceived uncertainty.

5.2.3. Pain of Paying

A 2 (social cue) × 2 (self-construal) ANOVA on pain of paying demonstrated a significant main effect of social cues (F = 14.813, $p < 0.001$). The pain of paying was less when additional social cues were presented (M = 3.99) than when they were not additionally presented (M = 4.89). The main effect of self-construal was not statistically significant (F = 2.867, $p = 0.093$). Participants with an independent self-construal experienced less pain of paying (M = 4.24) than those with an interdependent self-construal (M = 4.62).

The two-way interaction between social cues and self-construal was notably significant (F = 10.051, $p < 0.05$) (Figure 2). Contrast analyses indicated that for participants with an independent self-construal, the pain of paying did not vary significantly regardless of whether additional social cues were presented (M = 4.16) or absent (M = 4.32; F = 0.230, $p > 0.1$). In contrast, participants with an interdependent self-construal reported significantly less pain during paying when additional social cues were presented (M = 3.82) than when they were not additionally presented (M = 5.44; F = 24.652, $p < 0.001$). Thus, the effect of social cues in reducing the pain of paying was more pronounced among participants with an interdependent self-construal than among those with an independent self-construal. Therefore, H5b was supported.

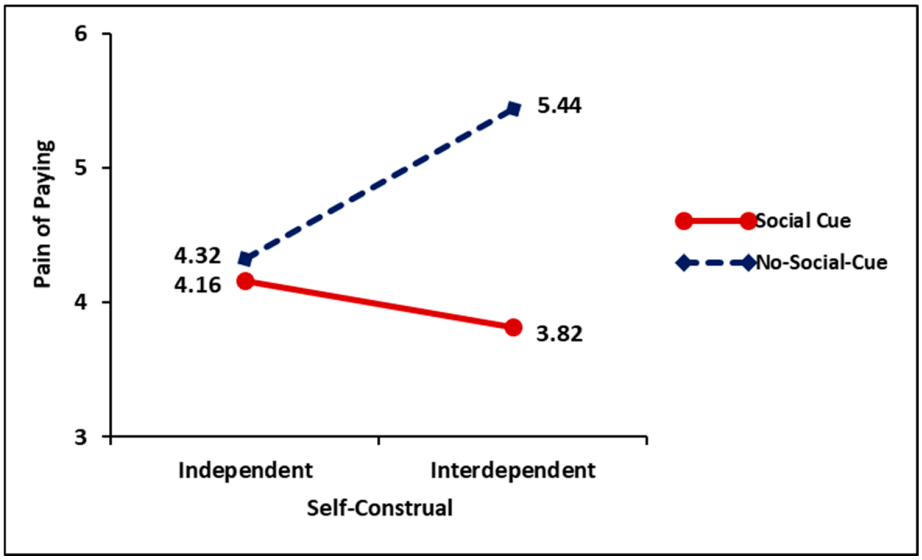


Figure 2. Interaction effects on pain of paying.

5.2.4. Purchase Intention

A 2 (social cue) × 2 (self-construal) ANOVA on purchase intention indicated a significant main effect of social cues ($F = 27.074$, $p < 0.001$). Purchase intention was higher when additional social cues were presented ($M = 5.58$) than when they were not additionally presented ($M = 4.66$).

The two-way interaction between social cues and self-construal was also significant ($F = 9.798$, $p < 0.01$) (Figure 3). Contrast analyses indicated that for participants with an independent self-construal, the purchase intention did not vary significantly regardless of whether additional social cues were presented ($M = 5.38$) or absent ($M = 5.01$; $F = 2.147$, $p > 0.1$). In contrast, for participants with an interdependent self-construal, purchase intention was significantly higher when additional social cues were presented ($M = 5.79$) than when they were not additionally presented ($M = 4.31$; $F = 34.749$, $p < 0.001$). Thus, the positive effect of social cues on purchase intention was stronger among participants with an interdependent self-construal than among those with an independent self-construal. Therefore, H5c was supported.

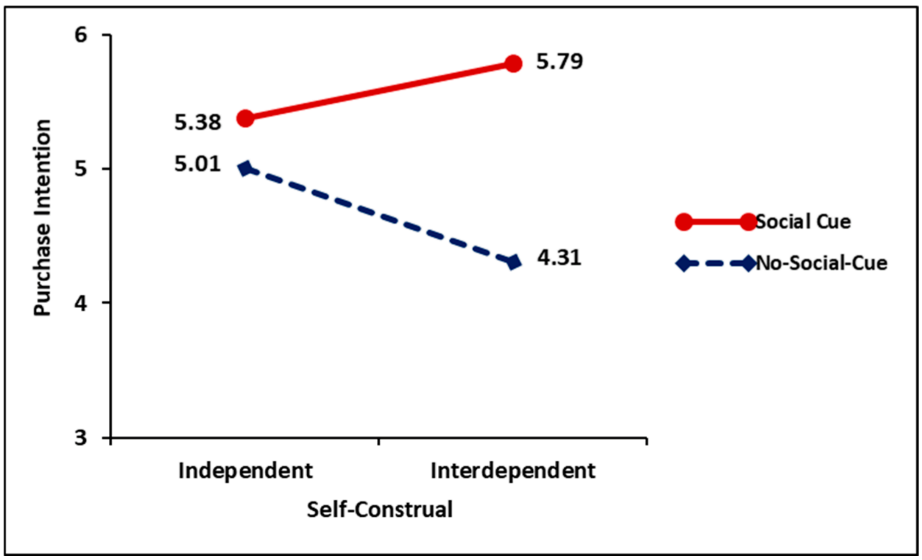


Figure 3. Interaction effects on purchase intention.

5.2.5. Mediation Analysis

A moderated serial mediation analysis was conducted using PROCESS macro Model 85 to test the proposed mechanism. Social cues served as the independent variable (coded 1 = additional social cues presented; 2 = no additional social cues presented), self-construal as the moderator (coded 1 = independent; 2 = interdependent), perceived uncertainty as the first mediator, pain of paying as the second mediator, and purchase intention as the dependent variable. The results indicated that the sequential indirect effect of social cues on purchase intention, mediated by perceived uncertainty and the pain of paying, varied significantly as a function of self-construal (index of moderated mediation = −0.13, 95% CI [−0.33, −0.02]).

Specifically, an analysis of the conditional indirect effects revealed a significant sequential indirect effect of social cues on purchase intention via perceived uncertainty and the pain of paying in the interdependent self-construal condition (indirect effect = −0.18, 95% CI [−0.39, −0.02]). However, this indirect effect was not significant in the independent self-construal condition (indirect effect = −0.05, 95% CI [−0.16, 0.02]). These results indicate that the mechanism by which social cues influence purchase intention, by sequentially reducing perceived uncertainty and the pain of paying, was stronger in the interdependent self-construal condition than in the independent self-construal condition, supporting H5d.

5.3. Discussion

Study 2 demonstrates that the effects of additional social cues vary based on temporarily activated self-construal. Specifically, the positive effects of additional social cues in reducing perceived uncertainty and the pain of paying, as well as increasing purchase intention, were stronger in the interdependent self-construal condition than in the independent self-construal condition. The conditional sequential indirect effect was also stronger in the interdependent self-construal condition.

6. General Discussion

6.1. Summary

This study examines the effects of social cues in online shopping environments on consumer purchases, investigates the psychological mechanisms underlying these effects, and examines how they vary across consumer characteristics. To evaluate the proposed hypotheses, we conducted a field study in an actual online retail environment, followed by two experimental studies.

First, in the field study, a social cue reflecting the number of purchasers was displayed alongside actual product information, and sales data before and after the introduction of the social cue were compared. For both body care and oral care products, the results indicated that purchase quantities and payment amounts increased after the social cue was introduced, providing evidence of increased sales performance following the introduction of social cues in an actual online shopping environment. Study 1 examined the psychological mechanism underlying the positive effects of social cues. When additional social cues were presented, the results revealed that consumers perceived less uncertainty about purchasing the product, experienced less pain of paying, and reported higher purchasing intention. Moreover, the sequential indirect effect of social cues on purchase intention, mediated by perceived uncertainty and the pain of paying, was significant. Finally, Study 2 examined whether the effects of social cues varied based on temporarily activated self-construal. The results indicated that the effects of social cues in reducing perceived uncertainty and the pain of paying, as well as in increasing purchase intention, were stronger among consumers in the interdependent self-construal condition than among those in the independent self-construal condition.

Collectively, these findings suggest that social cues can be associated with increased actual purchases in online shopping environments and can positively influence consumers' purchase intentions. Furthermore, the findings support a sequential indirect effect involving reductions in perceived uncertainty and the pain of paying, with these effects differing based on temporarily activated self-construal.

6.2. Theoretical Implications

This study presents several theoretical implications. First, it builds upon prior research examining changes in consumers' actual purchase behavior following the introduction of social cues. Although prior research has consistently demonstrated that social cues influence consumers' product evaluations and purchase decisions [9,12], this study directly introduced social cues within an actual online retail context and examined changes in purchase quantities and payment amounts. Consequently, this study provides field evidence that complements prior findings based on consumers' perceptions and behavioral intentions by documenting changes in actual purchase behavior following the introduction of social cues.

Second, this study elucidates the psychological mechanism by which social cues influence purchase intention, focusing on perceived uncertainty and the pain of paying. Specifically, the findings support a sequential indirect effect in which social cues are associated with lower perceived uncertainty, which, in turn, is associated with reduced pain of paying and greater purchase intentions. This finding extends prior explanations emphasizing the informational influence of social cues by identifying the pain of paying as an additional psychological barrier associated with consumers' purchase decisions. Thus, social cues may not only provide information that helps consumers evaluate products but also alleviate the psychological discomfort associated with spending money.

Third, this study identifies temporarily activated self-construal as a boundary condition for the impact of social cues. The sequential indirect effect, through which social cues were associated with higher purchase intention via lower perceived uncertainty and the pain of paying, was notably pronounced among consumers in the interdependent self-construal condition. This finding indicates that understanding the effects of social cues requires acknowledging both the psychological barriers consumers experience during the purchase process and the self-construal orientations activated in a given situation.

6.3. Practical Implications

Further, this study provides practical implications for firms aiming to stimulate consumer purchases in online shopping environments. First, firms should recognize social cues, such as online reviews, ratings, review counts, and purchase counts, not only as supplementary information reflecting other consumers' responses but also as potentially significant marketing instruments for facilitating purchase decisions. Particularly, firms may consider presenting relevant social cues near the point of purchase, thereby enabling consumers to easily incorporate other consumers' choices and evaluations into their own purchasing decisions. The present findings suggest the potential value of this approach, although the relative effectiveness of different presentation locations was not examined.

Second, to stimulate purchases, firms should focus not only on highlighting their products' positive attributes but also on addressing the psychological factors that cause consumers to hesitate. Despite positively evaluating a product, consumers may refrain from purchasing it in an online shopping environment because they lack confidence in the purchase outcome or feel uncomfortable about spending money. In such contexts, social cues can foster an environment where consumers feel more confident about making a purchase by presenting information about other consumers' choices and experiences. Thus, firms should leverage social cues not only to emphasize product popularity or positive

evaluations but also to potentially alleviate the psychological barriers that emerge during the purchase process.

Third, instead of presenting social cues uniformly to all consumers, firms may benefit from tailoring their use based on consumers' purchase hesitation and psychological burden. Specifically, providing clearer information about other consumers' purchases and evaluations may be particularly effective when an interdependent self-construal is activated, as consumers in this condition were more responsive to social cues in reducing perceived uncertainty and the pain of paying. This approach emphasizes the importance of more segmented online marketing strategies that adjust the presentation and salience of social cues based on consumer responses and purchase contexts.

Finally, the discovery that the effectiveness of social cues differs across self-construal conditions indicates that firms should cultivate a deeper comprehension of their core and target customers. Firms can continuously gather and analyze customer purchase and behavioral data to gain a deeper comprehension of their key customers' purchase patterns and responses to social information and leverage these insights to differentiate how they present and emphasize social cues. More broadly, systematic customer data management may provide a valuable foundation for developing personalized online marketing strategies that consider consumers' purchase contexts and responses to social information.

6.4. Limitations and Future Research

This study has several limitations that indicate avenues for future research. First, although the field study examined changes in consumers' actual purchase behavior following the introduction of social cues in an actual online retail environment, it relied on a before-and-after comparison without a concurrent control group. The same products and product pages were used during both periods, and the retailer reported no changes in promotional terms, reward points, or cashback offers. Furthermore, the products examined were regular body care and oral care products rather than holiday gift sets, and the second period ended more than two weeks before the Lunar New Year. Nevertheless, the absence of a concurrent control group makes it difficult to entirely rule out the influence of time-varying factors, such as seasonal demand, pricing, or website traffic. Future research could more rigorously establish the causal effect of social cues by randomly assigning consumers to social-cue-present and social-cue-absent conditions during the same period.

Second, although this study broadly discussed various forms of information as social cues, including online reviews, ratings, review counts, and purchase counts, it did not specifically address variations among different types of social cues. The field study examined the introduction of purchase-count information, whereas the two experimental studies manipulated the additional presentation of product ratings and rating counts near the purchase button. The information conveyed by cues indicating the choices of many other consumers, such as purchase counts and review counts, may differ from that conveyed by cues reflecting product evaluations, such as ratings and review content. Therefore, future research should differentiate among various types of social cues and examine whether and how their effects on perceived uncertainty and the pain of paying differ. Future research could also examine whether the effectiveness of these cues varies depending on their placement within the product page.

Third, the two experimental studies relied on U.S. participants recruited through Amazon Mechanical Turk and measured perceived uncertainty, pain of paying, and purchase intention using self-report measures in the same survey session. Although the results supported the proposed sequential indirect effect, the temporal ordering of the two mediators was not directly established. Moreover, the use of self-report measures may have introduced common-method bias, and the experimental procedures may have been subject

to demand effects. Future research could measure the proposed mediators at different time points and employ alternative measurement methods to provide stronger evidence for the proposed sequential mechanism. In addition, although the field study was conducted in South Korea and the two experiments involved U.S. participants, providing evidence from different national contexts, the moderating role of self-construal was examined only in the U.S. experimental sample. Thus, while the findings suggest that the positive relationship between social cues and purchase-related outcomes may extend across different national contexts, the cultural generalizability of the moderating effect of self-construal remains to be established. Future research could directly compare cultural contexts using more diverse samples to determine whether the proposed sequential mechanism and the moderating effect of self-construal are culturally invariant.

Fourth, Study 2 examined temporarily activated self-construal rather than consumers' chronic self-construal. Although the priming procedure allowed us to examine differences between independent and interdependent self-construal conditions, the findings do not necessarily indicate that the same effects would emerge based on consumers' stable self-construal orientations. In addition, the priming procedure may have influenced participants' awareness of the experimental context. Future research could examine chronic self-construal and compare its moderating effects with those of temporarily activated self-construal.

Finally, the effects of social cues may also differ based on product and purchase characteristics. This study examined different product categories across the field study and the two experiments, including body care products, oral care products, hand cream, and a sofa. Although the findings were observed across these product contexts, differences in product characteristics were not systematically examined. In this study, social cues reduced perceived uncertainty and the pain of paying; therefore, their effects may be particularly pronounced for high-priced products or for products whose quality is difficult for consumers to assess directly, as these psychological barriers are likely to be greater. Future research could identify the conditions under which social cues are most effective by examining variables such as product price, product type, and consumer involvement.

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Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki. Ethical review and approval for Studies 1 and 2 was waived by the Kongju National University Institutional Review Board because the study was determined to involve no more than minimal risk to participants. (Exemption No. KNU_IRB_2026-13, 13 September 2026). The field study involved analysis of company sales records and was not included in the IRB exemption.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data are available from the corresponding author upon request.

Conflicts of Interest: The authors declare no conflicts of interest.

Appendix A. Experimental Stimuli of Study 1

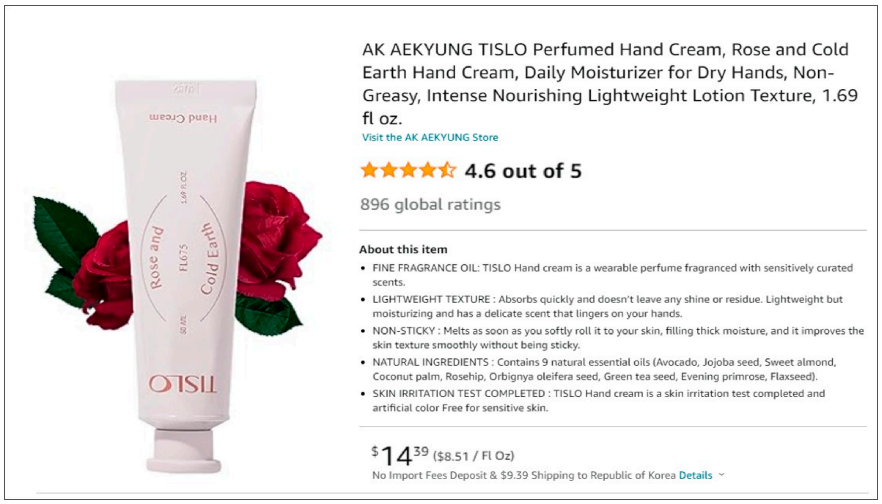


Figure A1. Product Information (All Conditions).

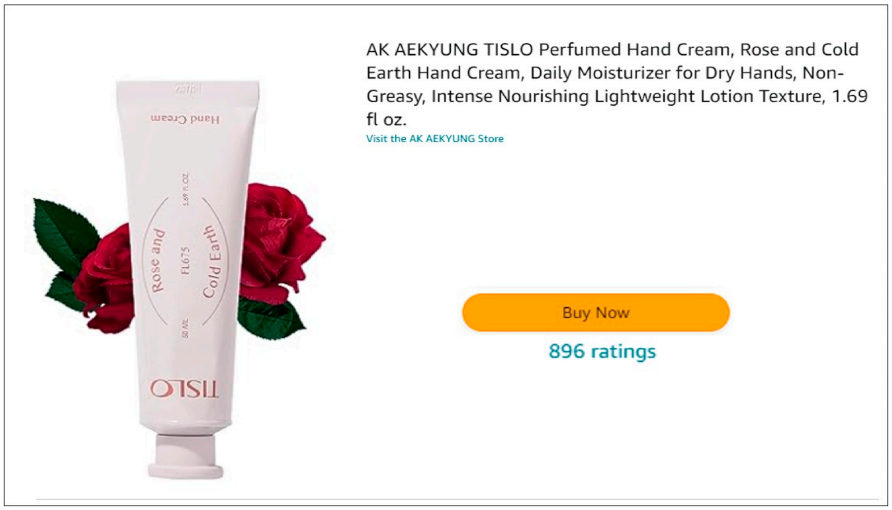


Figure A2. Social Cue Condition.

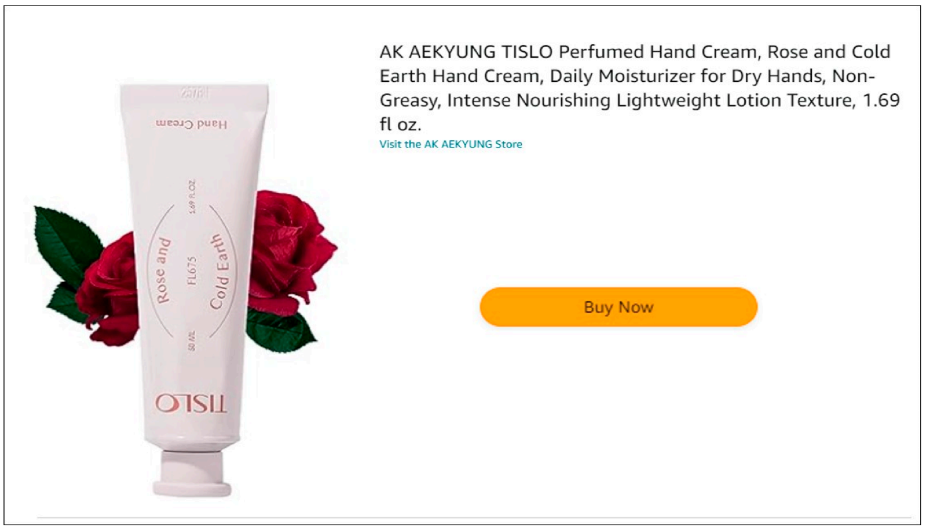


Figure A3. No-Social-Cue Condition.

Appendix B. Experimental Stimuli of Study 2

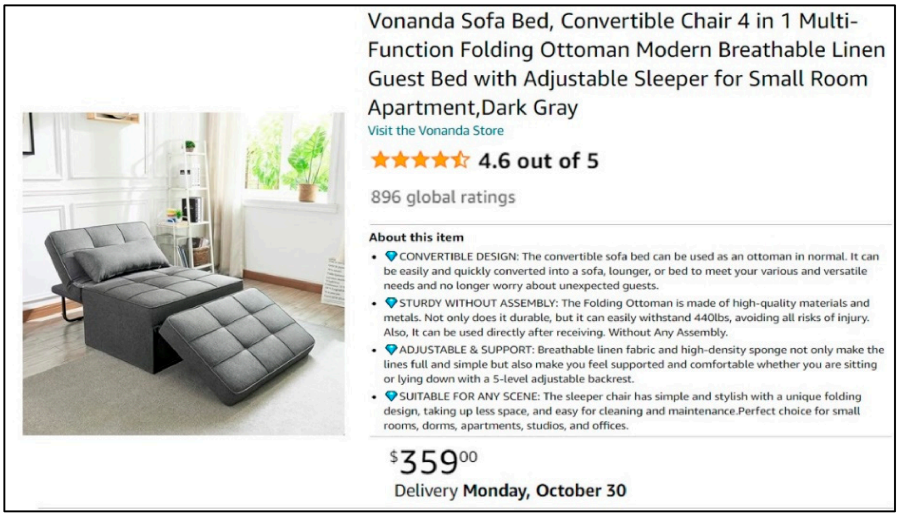


Figure A4. Product Information (All Conditions).

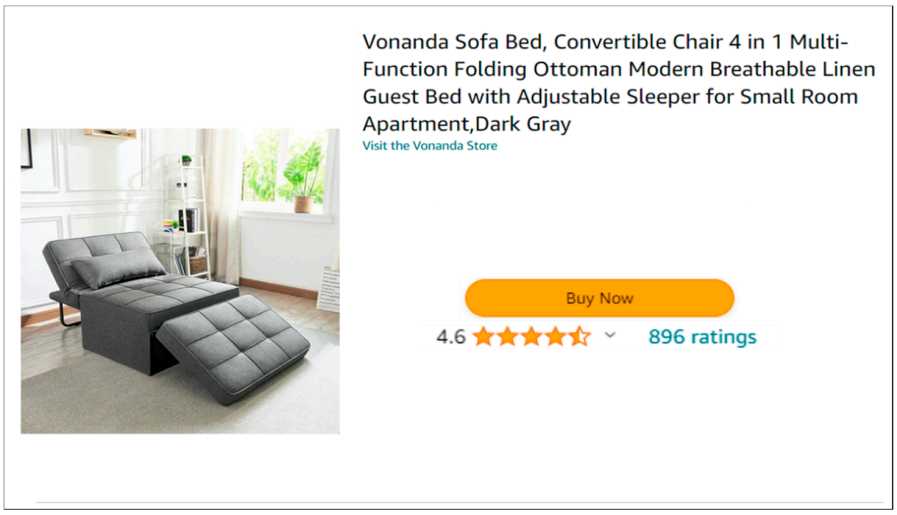


Figure A5. Social Cue Condition.

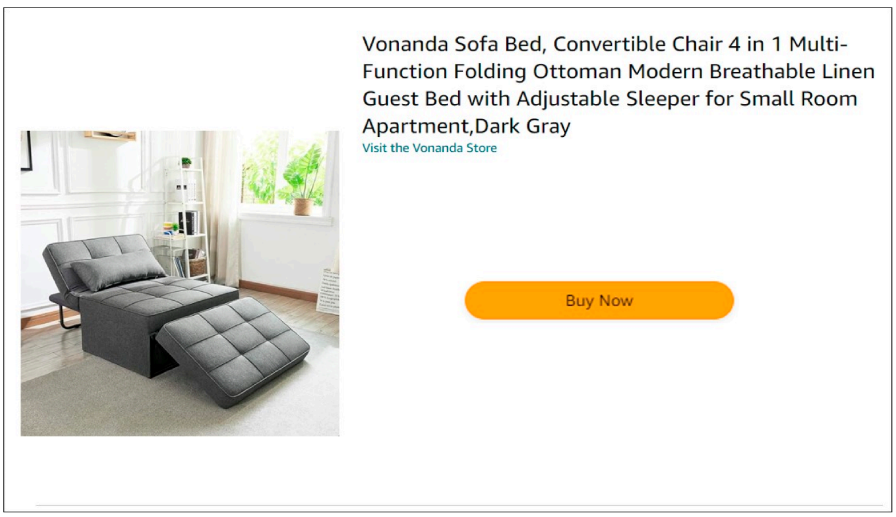


Figure A6. No-Social-Cue Condition.

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