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How Do Consumers Make Behavioral Decisions on Social Commerce Platforms? The Interaction Effect between Behavior Visibility and Social Needs

Abstract

The online phenomenon of social commerce (i.e., *s-commerce*) platforms has emerged as a combination of online social networking and e-commerce. On s-commerce platforms, consumers can observe others' behavioral decisions and can distinguish those made by their friends from those made by their *followees* (i.e., the people a focal consumer follows but who do not follow that consumer back). Given this distinction, our study examines how consumers' behavioral decisions—regarding, for example, purchases, ratings, or "likes"—are made on s-commerce platforms, with a focus on how they are influenced by prior decisions of friends and followees. Combining panel data from a large s-commerce platform and two controlled experiments, we identify a strong normative social influence pattern in which consumers tend to follow others' prior decisions to gain social approval. Because the occurrence of normative social influence depends on both consumer behaviors with high public visibility and strong consumer needs to establish social ties, the unique information concerning behavior visibility and consumers' social needs in the panel data allows us to identify normative social influence and to distinguish it from informational confounding mechanisms. Our panel data results show that on a *friend network*, where consumers' behavioral decisions are visible, females exhibit a greater tendency to follow others' prior decisions than males. We attribute this result to the stronger social needs of females. However, on a *followee network*, where behavioral decisions are invisible, these differences become less evident. Moreover, the two experiments demonstrate that making decision contexts private or activating social needs via a priming procedure can thwart (or even turn off) normative social influence. Our findings challenge prior research that identifies informational social influence as the predominant driver of conformity behaviors and thus have important implications for practice related to normative social influence, such as the development of techniques for satisfying consumers' different social needs depending on their gender or any other situational factors on s-commerce platforms.

Keywords

social commerce (s-commerce); online platforms; social influence; social needs; gender; behavior visibility; consumer purchase decisions; social networking; friends; followees

1. Introduction

Prior decisions made by others often play a significant role in influencing consumers' behavioral decisions. Whereas theoretical discussion about social influence has been abundant in other contexts, limited attention has been paid to social influence in the context of s-commerce. Unlike traditional e-commerce, s-commerce is defined as the combination of social of commercial interactions that involve using social networking technology to support online interactions and user contributions to facilitate the acquisition of products and services (Liang & Turban, 2011). As on social networking sites, consumers on s-commerce platforms can form their own ego networks, which consist of a focal consumer, the people the focal consumer follows but who do not follow that consumer back (i.e., *followees*), the people who follow the focal user but whom the focal user does not follow back (i.e., *followers*), and the people who have both a followee and a follower relationship with the focal consumer (i.e., *friends*) (Everett & Borgatti, 2005; Mitchell, 1969). Empowered by social networking functions, s-commerce allows consumers to observe their friends' or followees' information (e.g., ratings, purchases, "likes," comments), but not the behavioral decisions made by their followers. Their followers' decisions therefore have little influence. This leads us to focus only on the influence of the information generated by friends and followees on consumers' subsequent decisions. In addition to the information provided by others, on s-commerce platforms, consumers' anticipation that friends will later read their information can create social pressure that may also exert an influence on their subsequent decisions (here, the decision context is *public*). Such information, however, is not directly accessible to followees (here, the decision context is *private*).

Previous research on social influence has explored different aspects of social influence in various contexts, ranging from technology adoption (Venkatesh & Morris, 2000; Wang et al., 2013; Yi & Davis, 2003) to social networking (Kuan et al., 2014; Lee et al., 2016; Qiu et al., 2021). More germanane to the present investigation, another stream of research focuses on social influence in online consumer behaviors and uses observational data to find that prior information provided by others, especially friends, exerts a consistently positive influence on people's subsequent behavioral decisions (Dewan et al., 2017; Lee et al., 2015a; Moretti, 2011; Qiu et al., 2018; Wang et al., 2018). For example, a study on discovering restaurants found that the effect of a friend's check-in on a consumer's check-in is much stronger than that of a stranger's check-in (Qiu et al., 2018). This occurs because consumers are more likely to infer and rely on quality from a friend's decisions than a stranger's decision. Studies of online movie and book ratings have made similar conclusions that users' ratings are more positively influenced by their friends' ratings than that of strangers or homophily (e.g., taste similarity among friends) (Lee et al., 2015a; Wang et al., 2018). We summarized prior key studies published on social influence in the past two decades in **Appendix A TABLE A.1**.

This research discourse predominantly interprets its findings through the theoretical lens of

informational social influence (Burnkrant & Cousineau, 1975; Cohen & Golden, 1972) or *observational learning* (Bandura, 1977). That is, individuals' decision-making processes are posited to be influenced by their observation of the information shared by others, operating on the presupposition that such external cues serve as salient indicators for optimizing judgments pertaining to the correctness, propriety, or efficacy of a given course of action (Tseng et al., 2023). Nevertheless, it is theoretically and methodologically challenging to categorically exclude *normative social influence*, which emanates from an individual's susceptibility to conform to prevailing social norms to accrue social capital or avert punitive social consequences (Burnkrant & Cousineau, 1975; Cohen & Golden, 1972). In the context of s-commerce platforms, for example, users' propensity for conformity to others can be attributed either to informational social influence in which users believe that others' information is more valid and diagnostic than their own private information, or to normative social influence in which users experience an anticipatory social pressure; that is, because users know their own behavioral decisions (e.g., their rating or "liking") may be discovered and evaluated by others (e.g., friends), they conform to others to gain social acceptance (e.g., Sun et al., 2019; Wang et al., 2024). Although prior research has been prolific in exploring the former type of social influence across various contexts, the latter paradigm has amplified salience in s-commerce platforms. This heightened relevance can be attributed to the platform's architecture, which intrinsically facilitates the real-time visibility of users' behavioral choices to their social network. Moreover, only a small portion of this research discourse has examined gender effects on conformity behaviors with a notable exception by Venkatesh and Morris (2000) in technology adoption. However, this study, which concerned the differential consequences of subjective norms (i.e., others' expectation about what an individual should perform) on men' and on women' adoption of a technology, did not investigate the influence of others' specific opinions or behaviors on subsequent users' behavioral decisions, not even to mention whether different groups of others might make a different gender effect.

In synthesizing the extant literature on social influence, focus has been principally directed toward the examination of friend-generated information. This predisposition underrepresents the complex informational milieu of social commerce (s-commerce) platforms, which facilitate consumer access to information from both friends and followees. The lack of empirical scrutiny into the differential effects of these disparate informational networks represents a conspicuous research gap. Moreover, although theoretical discourses on informational social influence have proliferated, normative social influence remains comparatively marginalized, both conceptually and empirically. Conceptually, although both forms of social influence engender congruent behavioral outcomes—specifically, amplifying behavioral similarity between inaugural and subsequent users—the underlying mechanisms differ. Normative influence hinges on social conformity to extant expectations, whereas informational influence arises from the internalization of perceived authoritative or reliable information. These divergent mechanisms have

discrete managerial implications. For instance, if normative influence underpins user conformity, behavioral alignment may not signify genuine endorsement of shared opinions, attenuating concerns for platform operators. In contrast, when driven by informational influence, early user behaviors could function as influential heuristics, shaping later users' substantive product attitudes and warranting strategic managerial oversight of initial user interactions. Empirically, the methodological framework commonly employed in prior studies leans heavily on observational data (e.g., Lee et al., 2015a; Qiu et al., 2018; Wang et al., 2018), complicating empirical validation of the causative mechanisms driving behavioral similarity. This methodological limitation obfuscates the identification of the predominant form of social influence governing observed behavioral patterns. Lastly, the existing body of work presents a conspicuous absence of gender-specific analyses, a shortfall that is especially salient in research concerning behavioral conformity within s-commerce platforms.

Motivated by these identified lacunae in the extant literature, our research aims to augment prior studies by incorporating an intersectional analysis focused on gender, and by extending the information sources under scrutiny to include both friends and followees on s-commerce platforms. To bolster the empirical rigor of our investigation, we advocate a multi-methodological framework that amalgamates observational data with controlled experiments. This methodological pluralism is designed to furnish empirical validation of the causative mechanisms underlying behavioral similarity and to delineate the operative domains of normative versus informational social influence within s-commerce ecosystems. To this end, our paper poses several targeted research questions aimed at untangling the complexities of social influence in an s-commerce context. Specifically, we raise the following research questions:

> **RQ1.** Is the observed behavioral similarity on s-commerce platforms principally driven by normative social influence or informational social influence?
>
> **RQ2.** Does gender modulate the propensity for behavioral conformity, with females exhibiting greater congruence with their friends' behavioral decisions compared to males?
>
> **RQ3.** How is this propensity for conformity influenced when behavioral cues are proffered by followees, who lack the ability to directly recognize and evaluate an individual's conforming behaviors?

Leveraging *social influence theory* (SIT) (Burnkrant & Cousineau, 1975; Deutsch & Gerard, 1955), we find that the identification of normative social influence hinges on people's ability to disclose their decisions to others and their need for social acceptance. S-commerce platforms provide an excellent testing ground for these conditions. On s-commerce platforms, consumers' behavioral decisions are visible to their friends but not their followees. In addition, female consumers consistently exhibit a stronger need for social acceptance than males (e.g., Awad & Ragowsky, 2008; Bakan, 1966; Chai et al., 2011). Consequently, if a sharp decline in decision similarity is observed when the two unique conditions are *not* satisfied, this decline will be consistent with significant normative social influence. By analyzing the observational data that use

proxy variables and conducting two additional experimental studies that directly manipulate the two unique conditions suggested by SIT (Burnkrant & Cousineau, 1975; Deutsch & Gerard, 1955), we demonstrate a consistent drop in decision similarity when either of the two conditions is unsatisfied. This finding therefore validates the influence of normative as opposed to informational social influence on consumers' behavioral decisions on s-commerce platforms. Crucially, e-commerce success depends on an awareness of these unique factors.

2. Theoretical Background

In this section, we first briefly review SIT, with a focus on the theoretical distinction between informational and normative social influence. Based on this distinction, we propose two important conditions for normative social influence on a consumer that are absent from informational social influence: (1) the high visibility of a consumer's behavior on a social network and (2) the strong social needs of that consumer. We also propose that informational social influence occurs when people believe the information held by others is valid and thus that conformity is beneficial, regardless of the two conditions. These propositions form the theoretical basis of our hypotheses.

Social influence has been described as one of the primary drivers of consumer decisions. A key form of social influence generally referred to as *conformity* is the act of changing one's beliefs and behaviors to socially follow people around them or members of a group (Hong et al., 2016; Jahoda, 1959). Scholars have distinguished between two types of social influence: informational and normative (Deutsch & Gerard, 1955). According to Kelman (1961), however, social influence can also operate through three distinct processes: internalization, identification, and compliance. Importantly, each of these processes relate to one of the social influence types identified by Deutsch and Gerard (1955); that is, informational social influence is accomplished through the internalization process, and normative social influence is accomplished through the process of either identification or compliance (Burnkrant & Cousineau, 1975). To simplify our conceptualizations, we focus on the distinction between informational and normative social influence rather than the more specific processes underlying them.

2.1. Social Influence: Informational versus Normative

Informative social influence relates to a person's use of the information provided by others to determine what is likely to be right, proper, or effective (Burnkrant & Cousineau, 1975; Cohen & Golden, 1972). Much of the work on informative social influence is based on *observational learning theory*. This theory predicts that people learn by observing the behaviors of others and that a driving force of their conformity is the desire to avoid the competitive disadvantages of rejecting others' choices (Banerjee, 1992; Bikhchandani et al., 1992; Çelen & Kariv, 2004; Hao et al., 2018; Lee et al., 2015a; Qiu et al., 2018; Zhang et al., 2015).

Thus, when a focal consumer observes the rating or purchase decisions of prior consumers, they believe

the information possessed by others is valid and may help them avoid making a poor decision. Such publicly observed information outweighs the focal consumer's private information in shaping their attitudes and judgments, leading them to make a choice consistent with total ratings or purchases. This is especially the case when they are uncertain about the quality of products (Dulleck & Kerschbamer, 2006) or the trustworthiness of others (Zhang & Liu, 2012); when they make material, rather than experiential, purchases (Dai et al., 2019; Shi & Whinston, 2013); or when they have features in common with others (e.g., personal characteristics, interests, geographical locations) (Dewan et al., 2017; Lee et al., 2016; Qiu et al., 2018; Shi & Whinston, 2013).

Unlike informational social influence, *normative social influence* is the pressure to conform to certain expectations held by others to acquire social benefits or avoid social punishments (Burnkrant & Cousineau, 1975; Cohen & Golden, 1972). Research has shown that people tend to comply with others to facilitate social affiliation (Baumeister & Leary, 1995; Hong et al., 2016) or to avoid being disliked, rejected, and unwanted (Levine, 1989; Wyer Jr, 1966). Thus, people who have been socially excluded are tempted to cultivate similarities with and conformity to others to reduce their chances of rejection and ostracism (Brewer, 1991; Griskevicius et al., 2006), and people who need social support from others demonstrate a stronger tendency to conform to others (Galinsky et al., 2008).

2.2. The Role of Behavioral Visibility in Normative Social Influence

It is self-evident that normative social influence differs from informational social influence in that it occurs only when people believe their behavior will be visible to or observed by others (Amini et al., 2017; Burnkrant & Cousineau, 1975; Chen et al., 2011; Sun et al., 2019). *Signaling theory* posits that for a signal to be effective, it must be observable by others (Feltovich et al., 2002; Spense, 1973). Thus, if a person wishes to signal that they are philanthropic, they are more likely to make a donation when they will receive public recognition for doing so (Bénabou & Tirole, 2006; Harbaugh, 1998). Likewise, to signal their desire to connect with the majority, lonely consumers tend to report a stronger preference for majority-endorsed products only in public but not in private (Wang et al., 2011).

Our study focuses on two types of networks on s-commerce platforms that exert social influence on subsequent consumer choices: (1) *Followee networks* comprise consumers whom a focal consumer follows but who do not follow that consumer back. On such networks, a consumer's connection to a followee is typically regarded as a one-way relationship in which the consumer follows updates on a followee's activities (Bae & Lee, 2012). However, the followee is personally aware of few, if any, of the updates or activities that appear in the focal consumer's feed. (2) *Friend networks*, by contrast, are mutually exclusive social connections between two consumers in which the interactions are typically bidirectional, such that the consumers can access each other's updates and activities (Lee et al., 2016; Lee et al., 2015a; Sun et al., 2019). On such networks, the consumers therefore influence each other significantly. Thus, a consumer's

behavior will be visible on a friend network but not on a followee network.

2.3. The Role of Social Needs in Normative Social Influence

Like behavioral visibility, strong social needs also distinguish normative from informational social influence; that is, the former affects only people who have strong social needs. Human social needs are fundamental to individual survival and personal development (Baumeister & Leary, 1995), and they facilitate social connection (Pickett et al., 2004). For example, people with strong social needs tend to seek out interpersonal contacts and cultivate interpersonal relationships (Baumeister & Leary, 1995), and they seek to cultivate a good public image (e.g., by engaging in prosocial behaviors) (Lee & Shrum, 2012). Because conformity is often rewarded with group acceptance and social inclusion (Baumeister & Leary, 1995; Cialdini & Goldstein, 2004; Wyer Jr, 1966), people with strong social needs are more likely to conform to others' opinions and behaviors to satisfy their need for social acceptance.

Notably, chronic individual differences in social needs exist. For example, relative to males, females have a stronger chronic need for social acceptance and to build social affiliations with others. Extant studies have suggested that males and females chronically differ in their agency–communal (aka communion) orientations (Awad & Ragowsky, 2008; Bakan, 1966; Chai et al., 2011; Eagly & Wood, 1991; Gabriel et al., 2018; Kurt et al., 2011; Zheng et al., 2018). That is, females are relatively high in *communal orientations*, which are focused primarily on social needs and protect their connection with others, whereas males are relatively high in *agentic orientations*, which are focused primarily on personal status and achievement. Such communal-agentic orientations can be partially attributed to the gender division of labor (Masi et al., 2023; Wood & Eagly, 2012).

People's social needs can also be situationally activated. For example, social exclusion or loneliness can induce a strong need for social acceptance (Lee & Shrum, 2012; Maner et al., 2007; Mead et al., 2010). Consequently, exclusion or loneliness causes people to prefer products that can signal or reinforce affiliation with others (Mead et al., 2010; Mourey et al., 2017; Wan et al., 2013). For example, socially-excluded people may seek our new sources of affiliation both directly with other people (Maner et al., 2007) and indirectly through prosocial behavior (Lee & Shrum, 2012). To satisfy their social needs and forge affiliations with others, they engage in compensatory consumptions, such as consuming anthropomorphic products (i.e., products integrated with human attributes; Mourey et al., 2017).

In summary, because conformity serves as a signal of the desire to gain social acceptance (Baumeister & Leary, 1995; Cialdini & Goldstein, 2004; Wyer Jr, 1966), consumers are more likely to conform to prior evaluations of others when they have a high need for social affiliations and their conformity behaviors are visible to others who are perceived as the mediators of social rewards and punishments. Otherwise, they are less likely to engage in conformity behaviors. Thus, our study is driven by two SIT-based propositions: (**P1**) A combination of (a) the high visibility of a consumer's behavior on a social network and (b) the

strong social needs of that consumer leads to *normative social influence* (Burnkrant & Cousineau, 1975). (**P2**) By contrast, *informational social influence* occurs when people believe the information held by others is valid and thus that conformity is beneficial for their decision-making regardless of the decision context (public vs. private) or the degree of social needs (low vs. high).

3. Hypothesis Development

Substantial IS research has found support for the existence of informational social influence but has left open the questions of whether normative social influence exists and, if it does, how to distinguish it from informational social influence. These questions are especially crucial to answer in the context of s-commerce. Addressing these questions empirically is complex, and they cannot be resolved with observational data alone, because it is well known that informational and normative social influence are often intertwined and that they can shape people's behavior in an analogous manner. However, we can leverage our two SIT-derived propositions (P1 and P2) to tease apart the roles of these two forms of influence in the s-commerce context. Specifically, normative social influence should occur in s-commerce under two conditions: (1) Consumers believe their s-commerce activities will be known to others (i.e., *visibility*), and (2) consumers have strong social inclinations and want to gain the social approval of and develop rewarding social relationships with others (i.e., *social needs*) (Bond & Smith, 1996). Using these principles, researchers can determine post hoc whether normative social influence is involved by examining consumers' behavior for the presence of these conditions. Their presence should indicate normative social influence; their absence should indicate informational social influence. **FIGURE 1** illustrates our research framework.

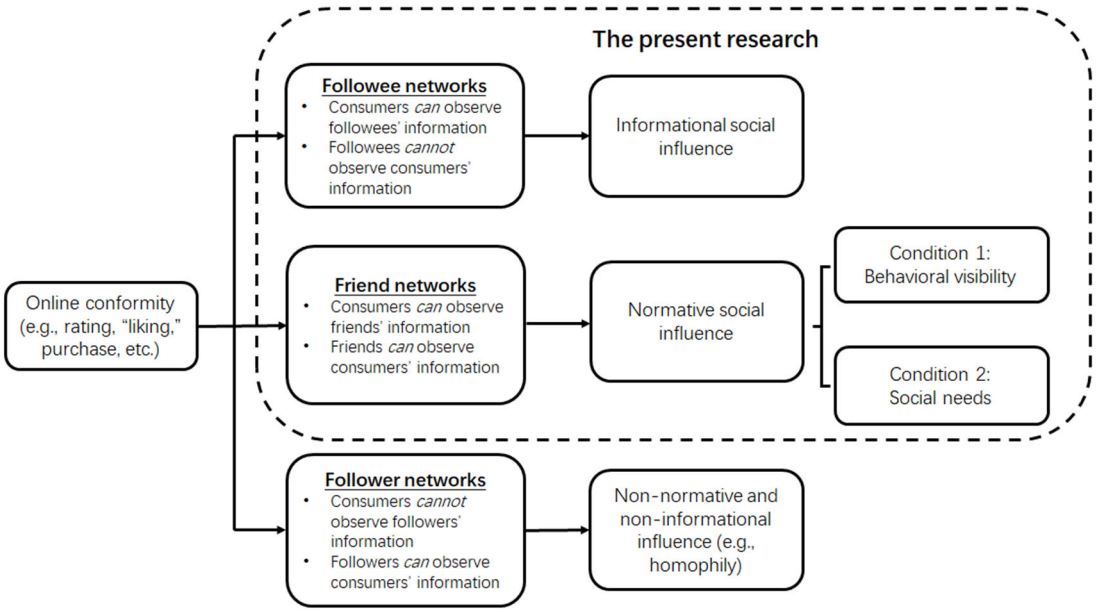

FIGURE 1. Research Framework

3.1. Visibility: Friend versus Followee Networks

Because the visibility of behavior is a necessary condition of *normative* social influence (e.g., Burnkrant & Cousineau, 1975; Ratner & Kahn, 2002; Schlager et al., 2018; Wang et al., 2011), conformity to the information generated by a friend enables a consumer to manage their public image and signal their desire to develop social intimacy with the friend. By contrast, conformity to the information generated by a followee will not be visible to the followee, so such conformity is not conducive to maintaining social bonds with the followee.

We thus posit that information from friend networks is more likely to affect consumers' behavioral decisions through normative social influence than information from followee networks. However, behavior visibility per se does not ensure the occurrence of normative social influence. Prior research has suggested that normative social influence occurs only if consumers also possess strong social needs and are motivated to build meaningful social ties (Burnkrant & Cousineau, 1975; Deutsch & Gerard, 1955). In this way, engaging in conformity enables them to signal to others that they want to be liked and accepted.

Next, we explain how social needs are activated and subsequently shape consumer behaviors on s-commerce platforms. In recap, social needs can be activated in two ways: (1) by chronic individual differences and (2) by situational stimulation. Research has suggested that either process can effectively activate social needs and lead people to engage in behaviors consistent with such needs. We thus first predict chronic differences based on gender (H1–H2); then, we explain situationally stimulated differences based on the priming of social need (H3).

3.2. Chronic Gender-Based Differences in Social Needs

As agency is higher among males than females, whereas communal interaction is higher among females than males, females possess relatively higher social needs than males (Awad & Ragowsky, 2008; Bakan, 1966; Chai et al., 2011; Eagly & Wood, 1991; Gabriel et al., 2018; Hora et al., 2022; Kanwal et al., 2022; Kurt et al., 2011; Nicolaou & Kilduff, 2023; Taylor et al., 2023; Zheng et al., 2018). Likewise, prior studies have indicated that females tend to care more about others and to have a stronger need for social connection than males and that their behaviors reflect these differences. For example, females rated a mouthwash more favorably when it featured a social-oriented message ("the product provides pleasing fresh breath, and it prevents common staining of the teeth") than when it featured a self-oriented message ("the product kills germs and bacteria that cause decay, and it gently stimulates the gums") (Meyers-Levy, 1988). Similarly, in the domain of prosocial behaviors, women preferred a cancer-prevention-charity appeal that focused on helping others, whereas men preferred a utilitarian appeal that focused on helping themselves and their in-group (Brunel & Nelson, 2000). Finally, women's general dislike of sexualized ads can be mitigated when such ads are framed in terms of the social resources offered by men to women (e.g., when sexualization is framed as a source of commitment to a valued relationship) (Dahl et al., 2009).

The different social orientations of men and women can influence their use of various IT artifacts. For example, when using a new software product, women might perceive a higher level of social presence and are more strongly influenced by others' expectations (i.e., subjective norms) than men (Gefen & Straub, 1997; Venkatesh & Morris, 2000). Likewise, in a blogging community, women's stronger communal characteristics and stronger "open cooperativeness" lead them to place a higher value on social ties, reciprocity, and trust—resulting in the occurrence of more knowledge-sharing behaviors than is the case among men (Chai et al., 2011). Finally, whereas men are more likely to use social networking sites to gain general information, women are more likely to do so for social purposes, such as maintaining close ties and accessing social information (Krasnova et al., 2017).

Summarizing this section females demonstrate a relatively higher need for social affiliation with others than males and thus are more disposed to engage in conformity behaviors to establish such affiliations. However, the occurrence of conformity behaviors hinges not only on social needs but also on behavioral visibility. In s-commerce, information about consumers' conformity can be easily shared with their friends, who are more likely to establish social affiliations with them. This information can then influence females' conformity behavior, as they are more likely to conform to the norms of their social groups. However, this gender-based difference is less pronounced on followee networks, where consumers' conformity is invisible to their followees. We thus posit that females will conform more frequently to others' prior behavioral decisions in s-commerce than males. However, this gender difference will only be evident on friend networks, where friends can observe the focal consumer's conformity behaviors. On followee networks, this difference should be less evident. Thus, we hypothesize:

H1. On s-commerce platforms, females are (a) more likely to conform to their friends' behavioral decisions than males but (b) no more likely to conform to their followees' behavioral decisions than males.

H2. On s-commerce platforms, females' greater conformity to their friends' behavioral decisions is driven by their possession of consistently stronger social needs than males.

3.3. Situationally Induced Differences in Social Needs

Situationally induced social needs also exist; this section focuses on the situationally activated social needs by episodic recall, in a process known as priming. Generally, *priming* is understood as the facilitative effects of certain stimuli, events, or actions on subsequent associated responses (e.g., Molden & Dweck, 2006; Tulving, 1983). The methodological rationale for using priming effects is that such stimuli, events, or actions can activate people's stored knowledge, which shapes their behaviors and responses in a consistent manner (Higgins, 1996; Higgins & Eitam, 2014). For example, Galinsky et al. (2008) introduced a power manipulation in the form of a simple writing task. They asked their participants to recall and write about an experience in which they had power over another person and examine and explain the influence of the induced power on their subsequent behaviors. Likewise, to stimulate feelings of social exclusion and

investigate whether social exclusion strengthens the motivation to forge interpersonal reconnection, Maner et al. (2007) asked their participants to write about a time when they felt rejected or excluded by others. In a study that is particularly germane to ours, Waytz and Epley (2012) activated the social needs of their participants by asking them to relive and write about a personally relevant experience with social connection. Such recall and priming tasks allow researchers to activate social needs in a way that is meaningful to participants without altering other, irrelevant factors (Molden & Dweck, 2006). To improve the internal validity of our findings, we thus adopt a similar priming procedure (i.e., by asking people to recall and relive an experience of social connection) and examine the consistent effects of different ways of stimulating social needs.

On s-commerce platforms, if females conform more to their friends' behavioral decisions because they have stronger social needs than males, then activating participants' social needs through other methods should eliminate this difference. This would result in no gender difference in the behavioral similarity between users and their friends. That is, both females and males should conform to their friends' behavioral decisions to the same extent when their social needs are situationally activated by a priming procedure. This would make the gender-based difference in conformity to friends' behavioral decisions less evident. We therefore predict:

> **H3.** On s-commerce platforms, females are (a) more likely to conform to their friends' behavioral decisions than males but (b) no more likely to conform to their friends' behavioral decisions than males when both females' and males' social needs are activated.

4. Research Methods and Analyses

To test our theoretical model, we used a multiple-methods approach in which a large-scale quantitative panel study (Study 1) was followed by two experiments (Studies 2 and 3). A review and critique of the general "statistical crisis" in scientific research caused by one-time collection-specific results suggested that researchers should perform follow-up studies to address the pervasive issues of internal and external validity (Gelman & Loken, 2014). We responded to this critique by demonstrating the basic effects in the panel study and then introducing a pair of more stringent experimental studies to replicate, extend, and further explain the findings of the panel study. Accordingly, the three studies complemented each other and provided a more stringent test of our hypotheses that improved both internal and external validity.

4.1. Study 1: Large-Scale Quantitative Panel Study

4.1.1. Study 1: Data collection

The data for this study were scraped in November 2012 from an s-commerce platform that focuses on sales and social networking of *personal-care* products in Asia.[1] The platform organizes products by brands and provides basic information about each product. Then, as now, there were around 100 brands of beauty products available on the platform in 2012. As **FIGURE 2** illustrates, the platform allows consumers to share their experiences with various products, make recommendations about certain products, and socially

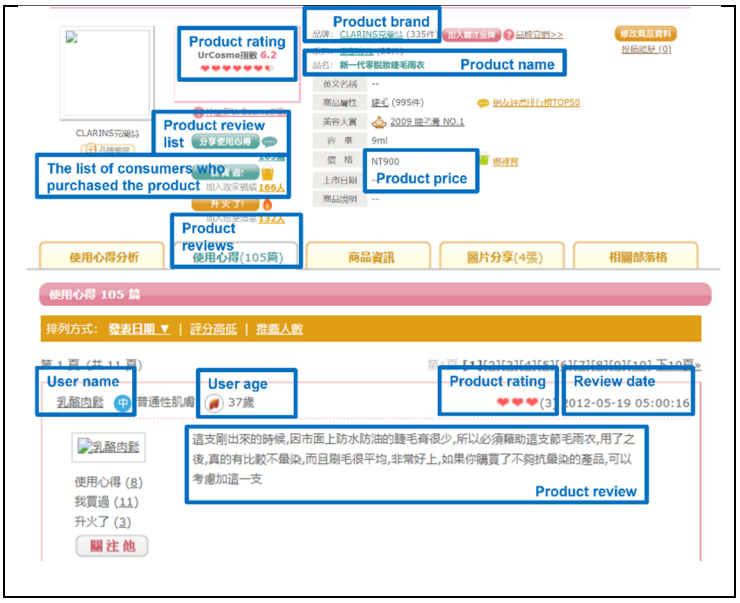

FIGURE 2. Screenshot of Product Information on the Platform in 2012

interact with other consumers interested in the same products. Moreover, the platform also allows consumers to check other consumers' opinions about certain products before making a purchase. When they find a product that they are interested in they can click the "buy" button, which typically links to the product page on the website, where they can complete the purchase.

Consumers on the s-commerce platform can indicate which products they have purchased, post about their product experiences, or provide general product evaluations on a 7-point Likert-type rating scale.[2] Each consumer has a purchase profile (i.e., a list of products they have purchased) and a wish list (i.e., a list of products they wish to buy). **FIGURE 3** illustrates a consumer's profile on the platform in 2012. Consumers can choose to follow other consumers whose posts or ratings they consider useful for their purchase decisions. By default, this relationship is *unidirectional* in that it does not require mutual consent and does not have to be reciprocal. However, if the followed consumer chooses to follow the focal consumer back, the relationship becomes *bidirectional* (i.e., a friendship), such that the consumers in this relationship can see each other's activities on the platform; thus, friendship is established when the relationship becomes bidirectional.

In 2012, the platform offers 43 high-end brands and 58 drugstore brands, and we collected all the consumer-profile information for users who purchased products of the high-end brands. Specifically, we scraped 226,938 valid consumer records for platform users who purchased such products. **Appendix A TABLE A.2** indicates the total number of consumers associated with each brand. The ratio of male to female consumers in the dataset was around 1:30, indicating that the dataset was imbalanced. Prior research has used various resampling techniques to handle imbalanced data and create balanced datasets (Anand et al., 2010). Resampling techniques can be conducted by oversampling the minority class or under-sampling

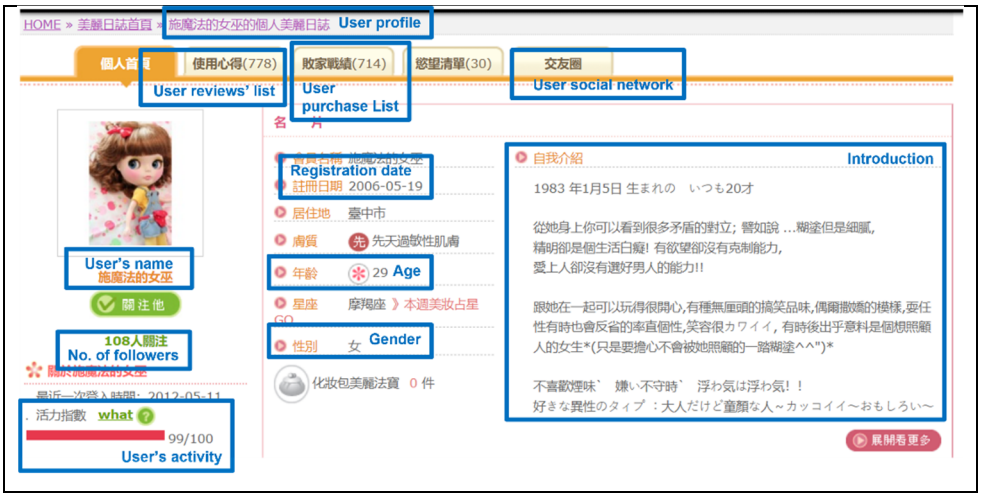

FIGURE 3. Screenshot of a User Profile on the Platform in 2012

the majority class. Given the importance of gender in our research, we used the under-sampling technique to generate a matched sample for Study 1 (Anand et al., 2010; Wendler & Gröttrup, 2021; Yen & Lee, 2009). Specifically, we used the randomization process to select 6,533 female consumers in the female group to generate a balanced dataset that included 6,533 male consumers (50%) and 6,533 female consumers (50%).[3] In addition, the under-sampling technique may lead to information loss and biased results (Anand et al., 2010). To address this concern, we first conducted a data analysis based on the balanced dataset (13,066 samples), which is presented in sections 4.2.1, and then conducted a data analysis based on the imbalanced dataset (226,938 samples), which is presented in section 4.2.2.

In Study 1, we examined how consumer purchase decisions were influenced by the product ratings of other consumers—that is, ratings provided by both their friends and their followees. Based on consumer IDs, we crawled the network data for each consumer. First, we carefully identified each person a consumer was following as either a followee or friend. We then crawled *friendship-based behaviors* using friends' ratings and *followee-based behaviors* using followees' ratings.

4.1.2. Study 1: Measures

As a straightforward measurement approach, we used social networking research to determine who was a followee and who was a friend (Cheung et al., 2014). The simple heuristic we used was that when a consumer followed a person who did not follow the consumer in return, they were not friends. Such a connection in a consumer's ego network was termed a "followee." Conversely, when a followee followed a consumer in return (i.e., in a "reciprocal followee relationship"), this was termed a "friendship" in which each person in the dyadic relationship considered the other a "friend." For example, suppose consumer A was a followee of the focal consumer whereas consumer B was a friend of the focal consumer. Our measures for a given consumer's ego network were thus calculated as follows (Cheung et al., 2014):

- The *followee rating* variable was measured using the total score of the ratings of a brand's products

provided by the consumer's followees, but it excluded reciprocal followee relationships (i.e., friendships). The *followee rating* included only ratings that had been provided by followees before a product of the same brand was added to the consumer's list of purchases.

- The *friend rating* variable for a given consumer was measured using the total score of only the brand ratings provided by consumers in a reciprocal followee relationship with the consumer. The *friend rating* included only the brand ratings provided by friends before a product of the same brand was added to the consumer's list of purchases.
- The *consumer purchase decision* variable was calculated using a count variable that summed all the products of a brand purchased by a given consumer.
- The consumer's age, social network size, and activity (which indicated the consumer's degree of engagement on the platform) were included as control variables in our data analysis.

4.2. Study 1: Data Analysis

We generated a balanced dataset from 13,066 members of the s-commerce platform and randomly stratified the sample to ensure that 50% of the analyzed members were male consumers and 50% were female consumers. **TABLE 1** summarizes the descriptive statistics for each variable we measured.

TABLE 1. Descriptive Statistics (n = 13,066)

Gender	Variable (Parameters)	Min	Max	Mean	SD
Female	**Friend rating**	0	941	2.914	30.013
	Followee rating	0	270	0.409	5.690
	Number of followers	0	204	1.141	7.149
	Age	18	60	25.570	6.099
	Network size	0	1011	25.749	24.788
	Activity	0	766	4.938	25.211
	Consumer purchase decision	0	533	16.371	47.685
Male	**Friend rating**	0	580	1.082	15.973
	Followee rating	0	163	0.215	3.576
	Number of followers	0	189	0.521	4.845
	Age	18	60	25.860	6.983
	Network size	0	603	15.745	37.876
	Activity	0	482	6.188	23.743
	Consumer purchase decision	0	969	15.742	50.2768

For this study, we adopted generalized estimating equations with negative binomial regression for two reasons. First, the dependent variable in Study 1 was a count variable, and negative binomial regression is particularly apt for analyzing count data (Kwon et al., 2017; Stieglitz & Dang-Xuan, 2013). Second, the data were not normally distributed, and the standard deviations of friend rating and consumer purchase decision were large. Because the data range was wide, the data followed a right-skewed distribution. Negative binomial regression is a method for handling skewed-distribution data (Cohen et al., 2014).

4.2.1. Study 1: Three-way interaction of rating, gender, and social network

The three-way interaction of total ratings, participant gender (i.e., males vs. females), and social network (i.e., friend vs. followee) was tested through three models: Models 1, 2, and 3. In Model 1, the effect of total ratings was considered for the combined group, the friend subgroup, and the followee subgroup. In

addition, consumers' age, social network size, and activity on the platform were considered control variables. In Model 2, the effects of friend and followee ratings were considered, together with consumers' age, social network size, and activity on the platform as control variables. In addition, we tested the effects of friends and followee ratings on consumer purchase decisions in different gender groups in Model 2. The results of Model 1 indicated that total ratings had a significant effect on consumer purchase decision. **TABLE 2** details the path coefficients for the combined group, the friend subgroup, and the followee subgroup in Model 1. The path loadings of total ratings on consumer purchase decisions were significant in all three groups.

TABLE 2. Results of Regression Analysis for the Three Groups of Ratings (Model 1)

Parameters	**DV = consumer purchase decision**					
	Combined group		**Friend subgroup**		**Followee subgroup**	
	β	***p*-value**	**β**	***p*-value**	**β**	***p*-value**
Total rating	**0.321** (0.050)	0.000				
Friend rating			**0.681** (0.114)	0.000		
Followee rating					**0.218** (0.062)	0.000
Age	0.009 (0.007)	0.331	0.009 (0.007)	0.159	0.009 (0.007)	0.161
Network size	0.001 (0.0009)	0.187	0.001 (0.0009)	0.368	0.001 (0.0007)	0.155
Activity	**0.023** (0.001)	0.000	**0.022** (0.001)	0.000	**0.024** (0.001)	0.000
QICC	14046.540	0.000	14016.597	0.000	14101.373	0.000

Note: The standard error is in parentheses; corrected quasi-likelihood under independence model criterion (QICC). Effect size interpretation: Each total rating is associated with an average 32.1% increase in consumer purchase decision, all else constant. Each friend rating is associated with an average 68.1% increase in consumer purchase decision, all else constant. Each followee rating is associated with an average 21.8% increase in consumer purchase decision, all else constant.

The three-way interaction effect was tested by comparing the path coefficients of the same relationship for the friend and followee subgroups based on the negative binomial regression (Keil et al., 2000). The method we used to compare coefficients is expressed by the following formula (Keil et al., 2000):[4]

$$t = \frac{Path_{sample1} - Path_{sample2}}{\left[\sqrt{\frac{(m-1)^2}{(m+n-2)} * SE^2_{sample1} + \frac{(n-1)^2}{(m+n-2)} * SE^2_{sample2}}\right] * \left[\sqrt{\frac{1}{m} + \frac{1}{n}}\right]}$$

The Model 2 results indicated that friends' ratings had a much stronger effect on consumer purchase decisions in the female group than in the male group ($\Delta\beta = 0.883$, $t = 6.146$) (see

TABLE 3). In addition, the Model 2 results showed that the effect of followees' ratings on consumer purchase did not significantly differ between the female and male groups ($\Delta\beta = 0.135$, $t = 1.464$) (see

TABLE 3. This implied that although females showed a stronger tendency to follow friends' reviews compared to males (H1 supported), their tendency to follow their followees' reviews was not stronger than that of males.

TABLE 3. Results of Regression Analysis for Followee Rating (Model 2)

Parameters	DV = consumer purchase decision					
	Female		Male		Female vs. Male	
	β	*p*-value	β	*p*-value	Δβ	*t*-statistic
Friend rating	**1.177** (0.138)	0.000	**0.294** (0.041)	0.002	**0.883**	**6.146**
Followee rating	**0.133** (0.068)	0.003	**0.268** (0.059)	0.000	0.135	1.464
Age	-0.001 (0.002)	0.952	**-0.002** (0.002)	0.000	n/a	n/a
Network size	**0.047** (0.002)	0.000	**0.020** (0.001)	0.000	n/a	n/a
Activity	**0.019** (0.001)	0.000	**0.010** (0.006)	0.000	n/a	n/a
QICC	3774.181	0.000	4292.951	0.000	n/a	n/a

Note: Effect size interpretation: Each friend rating is associated with an average 117% increase in consumer purchase decision for female consumers, all else constant. Each friend rating is associated with an average 29.4% increase in consumer purchase decision for male consumers, all else constant. There is a significant different influence (t = 6.146) of friend rating on consumer purchase decision between female and male consumers. The standard error is in parentheses; corrected quasi-likelihood under independence model criterion (QICC).Each followee rating is associated with an average 13.3% increase in consumer purchase decision for female consumers, all else constant. Each friend rating is associated with an average 26.8% increase in consumer purchase decision for male consumers, all else constant. There is no significant different influence of followee (t = 1.464) rating on consumer purchase decision between females and males.

4.2.2. Study 1: Robustness checks

We tested the robustness of the results in two ways. First, we used the alternative dependent variable of consumer purchase intention to test H1. The platform allowed consumers to add products to their wish lists that they wanted to purchase in the future. We thus calculated a consumer's purchase intention by counting the number of products of a brand that were added to their wish list. **TABLE 4** summarizes these regression results. The results were consistent with those of our previous analysis and were thus robust.

TABLE 4. Influence of Rating on Purchase Intention

Parameters	DV = consumer purchase intention					
	Female		Male		Female vs. Male	
	β	*p*-value	β	*p*-value	Δβ	*t*-statistic
Friend rating	**1.187** (0.161)	0.000	**0.733** (0.142)	0.045	**0.454**	2.115
Followee rating	**0.179** (0.073)	0.014	**0.177 (0.053)**	0.001	0.002	0.022
Age	**0.025** (0.004)	0.000	**-0.024** (0.004)	0.000	n/a	n/a
Network size	**0.008** (0.002)	0.000	**0.006** (0.01)	0.000	n/a	n/a
Activity	**0.001** (0.001)	0.000	**0.001** (0.001)	0.000	n/a	n/a
QICC	740.199	0.000	1300.685	0.000	n/a	n/a

Note: The standard error is in parentheses; corrected quasi-likelihood under independence model criterion (QICC).

Second, we used the imbalanced dataset, which consisted of 226,938 valid samples, to test H1, as summarized in **TABLE 5**. The results were consistent with our previous analysis and were therefore robust.

TABLE 5. Influence of Friend Rating on Purchase Decision (226,938 samples)

Parameters	DV = consumer purchase decision					
	Female		Male		Female vs. Male	
	β	*p*-value	β	*p*-value	Δβ	*t*-statistic
Friend rating	**0.672** (0.011)	0.000	**0.294** (0.041)	0.000	**0.539**	3.325
Followee rating	**0.245** (0.015)	0.000	**0.268** (0.059)	0.000	0.023	0.723
Age	**0.0002** (2.56e-5)	0.000	**-0.002** (0.0002)	0.000	n/a	n/a
Network size	**0.031** (0.0002)	0.000	**0.020** (0.001)	0.000	n/a	n/a
Activity	**0.016** (0.0002)	0.000	**0.010** (0.01)	0.000	n/a	n/a
QICC	107979.882	0.000	4292.915	0.000	n/a	n/a

Note: The standard error is in parentheses; corrected quasi-likelihood under independence model criterion (QICC).

4.2.3. Study 1: Post-hoc analysis

In addition, we tested the interaction effect between followee rating and friend rating. The results showed that this interaction negatively influenced consumer purchase decisions (β = -0.216, $p < 0.05$; see **TABLE 6**). This finding indicated the presence of substitutability or negative synergy (Titah & Barki, 2009), which can be explained by Edgeworth–Pareto substitutability (Samuelson, 1974; Titah & Barki, 2009). *Edgeworth–Pareto substitutability* (negative synergy) that reflects a situation in which the interaction effect of two variables is less than the sum of each variable's effect (Titah & Barki, 2009).

TABLE 6. Influence of the Followee Rating × Friend Rating on Purchase Decision (n = 13,066)

Parameters	**DV = consumer purchase decision**					
	Female & Male		**Female**		**Male**	
	β	***p-value***	***β***	***p-value***	***β***	***p-value***
Friend rating	**0.614** (0.066)	0.000	**1.182** (0.139)	0.000	**0.280** (0.078)	0.000
Followee rating	**0.282** (0.014)	0.000	**0.143** (0.076)	0.006	**0.306** (0.063)	0.000
Friend rating × followee rating	**-0.216** (0.013)	0.000	-0.058 (0.173)	0.736	**-1.455** (0.107)	0.000
Age	**-0.009** (0.0001)	0.000	0.0002 (0.002)	0.958	**-0.022** (0.002)	0.000
Network size	**-0.037** (0.0009)	0.000	**0.047** (0.002)	0.000	**0.034** (0.001)	0.000
Activity	**0.011** (0.001)	0.000	**0.019** (0.001)	0.000	**0.008** (0.001)	0.000

Note: The standard error is in parentheses.

To further decompose the interaction, we tested the relationship between friend rating and consumer purchase decision at different levels of followee rating (high vs. low) as well as the relationship between followee rating and consumer purchase decision at different levels of friend rating (high vs. low). As shown in **TABLE 7** the influence of friend rating on consumer purchase decision is reduced when followee rating increases, indicating a substitution effect of followee rating. Similarly, as shown in **TABLE 8** the influence of followee rating on consumer purchase decision is reduced when friend rating increases, indicating a substitution effect of friend rating. The results indicated that the existence of substitution effect between friend rating and followee rating. In addition, this negative synergy effect is significant in male group but not in female group (see **TABLE 6**). The null effect in female group might be attributable to the fact that females place higher weight to their friend ratings than to their followee ratings, thus leading the substitution effect to be less evident.

TABLE 7. Friend rating: Consumer purchase decision relationship at different levels of followee rating

Parameters	**DV = consumer purchase decision**			
	Followee rating (Low)		**Followee rating (High)**	
	β	***p-value***	***β***	***p-value***
Friend rating	**1.480** (0.073)	0.000	**0.391** (0.066)	0.074

Note: The standard error is in parentheses.

TABLE 8. Followee rating: Consumer purchase decision relationship at different levels of friend rating

Parameters	**DV = consumer purchase decision**			
	Friend rating (Low)		**Friend rating (High)**	
	β	***p-value***	***β***	***p-value***
Followee rating	**0.606** (0.572)	0.000	**0.092** (0.123)	0.459

Note: The standard error is in parentheses.

4.3. Study 2: Online Confirmatory Experiment

To further test the internal validity and generalizability of the predictions that were supported by Study 1, we conducted a controlled online experiment to examine the effects of gender and networks on normative social influence in another context. Study 2 extended Study 1 in several meaningful ways. *First*, despite the promising results of Study 1, a potential counterexplanation for the gender-difference results is that in most cultures females are more interested in personal-care consumer products than males (as demonstrated by the presence of nearly twice as many women as men in the original sample of Study 1). Consequently, the different results for the male participants could be attributable to their lower interest in the personal-care products used in Study 1. Accordingly, Study 2 aimed to replicate the results of Study 1 and thus to demonstrate the generalizability of our findings by using a more gender-neutral product: a coffee maker.

Second, because Study 1 used observational data from an s-commerce platform, its results likely suffered from multiple alternative explanations. For example, on the s-commerce platform, a friend's ratings could have been influenced not only by the friend's personal product experience but also by the behavioral decisions of the people the friend followed (i.e., the friend's followees). To this end, followees' behavioral decisions could have exerted both a direct and an indirect effect (through affecting friends' behavioral decisions) on users' decisions. Moreover, the results of Study 1 could be attributable to consumers happening to have made the same behavioral decisions as others without considering others' ratings and opinions (i.e., the homophily effect). Finally, participants' different behavioral decisions between friend networks and followee networks could be attributable to the greater number of opportunities for interactions on the former network than on the latter one. Thus, to increase experimental control and better address these alternative explanations, Study 2 used a vignette-based decision context and manipulated behavioral visibility by providing direct information about the observation structure (i.e., visible vs. invisible) without specifying other information that could elicit these alternative explanations. In this way, we attempted to replicate the results of Study 1 with greater control.

Although our theory suggests that social needs underlie the gender difference in behavioral similarity on friend networks (H2), the observed effect in Study 1 could be due to other gender differences, such as personality traits or cognitive style. To rule out these alternative explanations, Study 2 directly measured consumers' normative/social and informational considerations when making behavioral decisions. This approach allowed us to more directly test the underlying mechanisms of behavioral similarity (normative vs. informational social influence) by providing direct evidence for the mediating role of social needs.

4.3.1. Study 2: Experimental design

We recruited 443 US Twitter users from Amazon's Mechanical Turk (MTurk). We selected Twitter as our experimental setting because Twitter recently rolled out e-commerce features that have made it an ideal s-commerce platform. MTurk is widely used for data collection in various research domains, including social

psychology, marketing, and IS, because the diversity of MTurk's participant pool is greater than that of typical undergraduate college samples, and if basic data-quality procedures (e.g., screening, randomization, data audits, attention traps, careful pilot testing) are followed, the data can be as reliable as the data collected using other platforms (Buhrmester et al., 2016; Lowry et al., 2016a). Moreover, we used Qualtrics software to implement a 2 (networks: friend vs. followee) × 2 (participant gender: male vs. female) mixed factorial design in which the first variable was manipulated and the second was measured. The participants were randomly assigned either to the friend-network or the followee-network condition, and each received US$0.50 for about 10 minutes of their time.

Because Study 2 involved human subjects, we conducted this experiment with the approval of the corresponding institutional review board (IRB), and the subjects participated with informed consent. Our study used a mild form of deception to increase the likelihood of obtaining valid results that were not biased by hypothesis guessing. We told the participants we were working with Twitter to help the company better understand US users' needs and thus to improve their service quality. We purposefully did not tell the participants that the actual purpose of the experiment was to test whether friends or followees had a stronger influence on their decisions. Instead, they were told to imagine themselves in a Twitter-use scenario in which they had been involved and to indicate how they felt about and reacted to the scenario. Based on this pretense, we asked the participants to name another user on Twitter. In the friend-network condition, we asked them to name one of their Twitter friends, explaining that in this relationship, the participant and friend could follow each other and see each other's activity. In the followee-network condition, we asked them to name one of their Twitter followees, explaining that this was someone they followed but who did not follow them in return. This question was intended to increase the participants' involvement and make their subsequent decisions appear more consequential.

All participants were then asked to imagine that they wanted to buy a new coffee maker to replace their old one. It was explained that although they had searched for some product information on the Internet, they were still unsure about which brand to choose or which model to buy. They were told to imagine that they would soon log on to Twitter and discover that, coincidentally, the user they named had just shared their experience with a new Mueller coffee maker. Subsequently, the participants in both conditions viewed an Amazon product link (see **FIGURE 4**) accompanied by a tweet posted by the named user stating, "Last thing before the weekend. . ..You're going to be hearing a LOT about coffee from me in the weeks to come. Initial verdict on the Mueller Programmable 12-Cup Coffee Maker: Admirably easy to use, super-affordable at $44.97."

Based on this scenario, the participants were then asked to answer three questions that measured their behavioral decisions concerning the coffee maker: (1) "How likely would you be to purchase the coffee maker?" (2) "How likely would you be to click the 'like' button on the tweet?" and (3) "How likely would

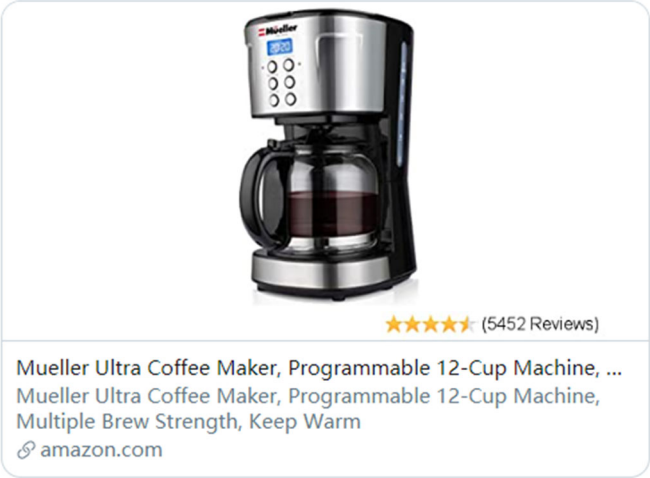

FIGURE 4. Product Viewed on Amazon

you be to share the tweet on your personal page?" Importantly, to further anchor behavioral visibility, the participants in the friend-network condition were reminded that all these activities could be seen by the named user on Twitter, whereas those in the followee-network condition were reminded that none of these activities could be seen by the named user. Their responses to the three questions, which ranged from 1 (not at all) to 7 (very much) on a 7-point Likert-type scale, were averaged to form a single index of behavioral decisions (α = .80).

To evaluate the proposed underlying mechanism of normative considerations, we next asked the participants to report their motives for making such decisions by responding to the following items: (1) "I tend to buy a product that [xx] likes"; (2) "I would choose a product that [xx] likes to impress or entertain him/her"; and (3) "In order to get along to be liked, I tend to be what [xx] expects me to be rather than anything else." To create a personal survey experience, we displayed the name the participant had provided where the bracketed text appears in the three items. Their responses to the three items, which lay on a 7-point Likert-type scale from 1 (strongly disagree) to 7 (strongly agree), were averaged to form a composite index of normative considerations (α = .84). We also examined the role played by informational considerations by asking participants to respond to the following items: (1) "I would consider [xx]'s opinions to make sure I buy the right product" and (2) "If I had little experience with a product, I would follow [xx]'s opinions." Again, we inserted the name provided by the participant into each of the items. Their responses to the two items, which lay on a 7-point Likert-type scale, were averaged for high correlation (r = .80).

Finally, as a check of the information-source manipulation, we asked the participants to indicate whether they agreed with the statement "in the scenario, my activities on Twitter are visible to [name provided by the participant]." They were debriefed and paid after answering a few questions about demographic characteristics, including their gender, age, and ethnicity.

4.3.2. Study 2: Sample characteristics

All 443 participants in the sample passed the attention-check question (i.e., "This question is just to make sure that you are paying attention to this survey. Please do not click on the scale items that are labeled from 1 to 9), and 13 reported having participated in similar studies before; these participants were excluded, leaving 430 valid cases for data analysis. Of these participants, 50.2% were male, 81.9% were Caucasian Americans, 4.4% were African Americans, 4.0% were Latino Americans, 6.3% were Asian Americans, 0.7% were Indian Americans, 0.5% were Native Americans, and 2.3% indicated that their race/ethnicity was "other;" the average age was 40 years (SD = 11.87).

4.3.3. Study 2: Manipulation and control checks

The random assignment of participants was successful, because the F-tests revealed that the participants did not differ in age (Fs < 2.80, ps > .10) or ethnicity (Fs < 1.76, ps > .10) across the experimental conditions. Our manipulation of networks was also successful. Namely, participants believed their activities on Twitter were more visible to their friends (M = 6.57, SD = .98) than to their followees (M = 1.86, SD = 1.61). Neither participant gender nor its iteration with networks reached a level of significance (Fs < 1).

4.3.4. Study 2: Results of public behavioral decisions

Because both participant gender and networks were categorical variables, several analyses of variance (ANOVA) models were used to test the hypotheses. The analysis of the participants' behavioral decisions regarding the product as a function of participant gender and networks revealed a significant main effect of networks ($F_{(1, 426)}$ = 6.66 p = .01) and a significant main effect of participant gender ($F_{(1, 426)}$ = 3.92, p = .05). More importantly, and consistent with our hypothesis, this analysis revealed a significant interaction effect between the two variables ($F_{(1, 426)}$ = 5.82, p = .02). As **FIGURE 5** illustrates, the planned contrasts suggested that female participants were more likely to publicly follow the opinion provided by a friend (M = 4.30, SD = 1.58) than male participants (M = 3.62, SD = 1.54; $F_{(1, 426)}$ = 9.60, p = .002), representing a strong effect size (Cohen's d = .435). By contrast, if the opinion was provided by a followee, female participants' public evaluations of the product (M = 3.53, SD = 1.56) were not significantly different from those of male participants (M = 3.60, SD = 1.66; F < 1), representing a trivial effect size (Cohen's d = -0.043). Consequently, the results for behavioral decisions in Study 2 replicated those in Study 1, albeit in starkly different contexts.

Alternatively, for female participants, they were more likely to follow the opinion provided by a friend (M = 4.30, SD = 1.58) than that provided by a followee (M = 3.53, SD = 1.56; $F_{(1, 426)}$ = 12.40, p = .000), representing a strong effect size (Cohen's d = 0.492). For male participants, however, their public evaluations of the product did not significantly differ no matter whether the prior opinion was provided by a friend (M = 3.62, SD = 1.54) or by a followee (M = 3.60, SD = 1.66; F < 1), representing a trivial effect size (Cohen's d = 0.013). The further analysis suggests that females, relative to males, are more capable of

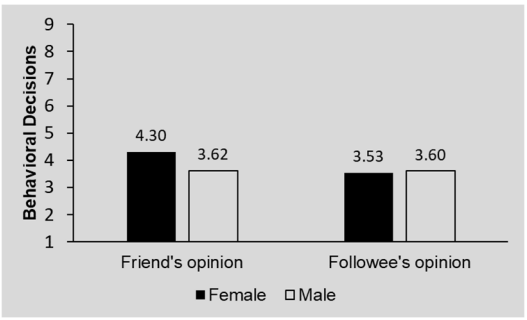

FIGURE 5. The Gender × Networks Interaction Effect on Public Evaluation

identifying people from different social groups and tend to differentially weight the opinions provided by different groups of people when forming their own evaluations. These findings broadly align with existing research, which indicates that females with communal objectives exhibit stronger in-group favoritism, such as a pronounced affinity towards friends and family. In contrast, males, driven by agentic ambitions, tend to focus on themselves and treat others in a more uniform manner (e.g., Berg, 1984; Hetty van Emmerik & Jawahar, 2005; Winterich et al., 2009). Whereas these previous studies primarily concentrate on prosocial behaviors, our research extends this gender distinction to the realm of online conformity behaviors.

4.3.5. Study 2: Results of normative considerations

A similar analysis of normative considerations as a function of participant gender and networks revealed only a significant interaction effect ($F_{(1, 426)} = 5.45$, $p = .02$). The planned contrast suggests that female participants were more likely to follow friends' opinions for normative considerations ($M = 3.16$, $SD = 1.61$) than males ($M = 2.74$, $SD = 1.21$; $F_{(1, 426)} = 4.06$, $p < .05$). By contrast, female participants' normative considerations ($M = 2.62$, $SD = 1.57$) did not significantly differ from those of male participants when they were deciding whether to follow their followees' opinions ($M = 2.88$, $SD = 1.61$; $F_{(1, 426)} = 1.65$, $p > .10$).

We also ran a moderated-mediation analysis using the PROCESS SPSS macro (Model 8; Preacher & Hayes, 2008). In the regression model, the dependent variable was participants' behavioral decisions, the independent variable was participant gender, the mediator was normative considerations, and the moderator was networks (illustrated in **FIGURE 6**). The analysis revealed that when the proposed mediation was included in the model, it had a significant effect on behavioral decisions ($\beta = .56$, $t = 12.85$, $p < .001$). However, the direct interaction effect of participant gender and networks, which had been significant in the absence of the proposed mediation ($\beta = .68$, $t = 2.34$, $p = .02$), became nonsignificant ($\beta = .36$, $t = 1.38$, $p > .10$). Importantly, and in support of our hypothesis, a conditional indirect effects analysis using the bootstrapping procedure with 10,000 resamples revealed that participants' normative considerations mediated the effect of participant gender on behavioral decisions in the friend-network condition, because the 95% confidence interval (CI) excluded zero (indirect effect = -.30; 95% CI = [-.54, -.06]). However, normative considerations did not mediate the effect of participant gender on behavioral decisions in the followee-network condition, because the 95% CI included zero (indirect effect = .08; 95% CI = [-.12, .30]).

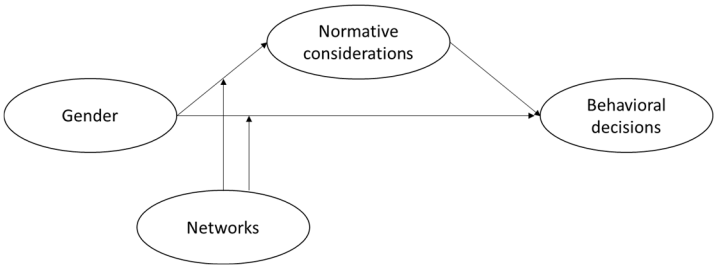

FIGURE 6. The Mediation Effect of Normative Considerations on Public Evaluation

4.3.6. Study 2: Results of informational considerations

A similar analysis of participants' informational considerations as a function of participant gender and networks showed only a main effect of networks ($F_{(1, 426)} = 4.29$, $p = 1.50$); that is, for informational considerations, participants were more likely to follow friends' opinions ($M = 4.29$, $SD = 1.50$) than followees' opinions ($M = 3.76$, $SD = 1.70$). However, neither the main effect of participant gender nor its interaction with networks reached the level of significance (Fs < 1.90, ps > .10), so we rejected informational considerations as a valid mediator of the influence of the observed networks × participant gender interaction on participants' behavioral decisions in the s-commerce context.

4.4. Study 3: Online Confirmatory Experiment

Study 3 extended Studies 1 and 2 in two important ways. First, it was designed to reveal the underlying mechanisms of social needs via a moderation approach. In the first two studies, we found that gender could alter a consumer's social needs, which could in turn determine the extent to which their behaviors resembled their friends' prior behaviors. Our reasoning was that participants with strong social needs were highly motivated to establish social connections with others and that the friend network's behavior visibility provided an excellent opportunity for them to develop social ties by engaging in public conformity. Consequently, these people were more likely to conform to their friends' decisions than the other way around. We reasoned that if this explanation were correct, priming the participants' social needs through another task—to increase the likelihood that both female and male participants would have equally strong social needs—should eliminate the gender effect on conformity. In this way, Study 3 evaluated the mediating role played by social needs via a moderation approach (Spencer et al., 2005).

Moreover, in the first two studies, we used gender to capture a consumer's social needs. However, it was desirable to increase the internal validity of the findings by situationally inducing social needs. In Study 3, therefore, we employed the priming procedure mentioned above to operationalize social needs and examine whether the observed effects would hold. Notably, unlike the first two studies, Study 3 examined the role played by social needs rather than behavior visibility in normative social influence. To keep behavior visibility constant across the conditions, we examined conformity behaviors only on the friend network.

4.4.1. Study 3: Experimental design

For Study 3, we recruited an entirely new set of 220 US Twitter users from MTurk. As in Study 2, we used Qualtrics software to implement a 2 (social need: primed vs. baseline) × 2 (participant gender: male vs. female) mixed factorial design, in which the first variable was manipulated and the second was measured. Using Qualtrics software, we randomly assigned the participants to either the social need primed condition or the baseline condition, and each received US$0.50 for about 10 minutes of their time. Because Study 3 involved human subjects, as in Study 2, we conducted the experiment with the approval of the corresponding IRB, and the subjects participated with informed consent.

To manipulate social need, we used a task similar to that developed by Waytz and Epley (2012). The participants were asked to relive and write about an experience of social connection. Those assigned to the "priming" condition were first asked to "name someone close to you whom you interact with often, such as a close friend, a significant other, or a family member." They were then asked to write about how they met, knew, and were supported by the person and to describe the circumstances under which they might contact the person for social support in the future. Those in the baseline condition were asked to "name someone who you see in your daily life, but whom you do not interact with, such as a person you often pass on the street, someone who you see around work or school, or a total stranger." These instructions served as a baseline condition in the sense that although the participants wrote about another person, they did not have a personal connection with that person. In both conditions, they were then asked to write about when they first saw the person, how long they had seen the person around, a single occasion on which they saw the person, how the person behaved, and the circumstances under which they might see the person again.

After processing their assigned condition, the participants proceeded to an ostensibly unrelated study that resembled the friend condition of Study 2. The participants were asked to imagine that one of their Twitter friends shared a tweet about their use of a coffee maker. The same tweet contents and product stimuli were provided. Based on this scenario, the participants reported their behavioral decisions regarding the coffee maker by responding to the same set of questions used in Study 2. Likewise, the participants were reminded that all their activities could be seen by the named user on Twitter. Their responses to the three questions, which ranged from 1 (not at all) to 7 (very much) on a 7-point Likert-type scale, were averaged to form a single index of their behavioral decisions (α = .82). Moreover, to check the success of the social priming, we asked participants to report how much they currently felt connected with, felt socially supported by, and felt they had companionship with others on a scale from 1 (not at all) to 7 (very much). The three items were averaged for the manipulation check (α = .90). Finally, they answered a few questions about demographic characteristics, including their gender, age, and ethnicity.

4.4.2. Study 3: Sample characteristics

Of the 220 participants, 14 who failed the same attention-check question were excluded, leaving 206 valid

cases for data analysis. Of these participants, 106 (51.5%) were male; 100 (48.5%) were female; 74.8% were Caucasian Americans; 6.8% were African Americans; 3.4% were Latino Americans; 12.1% were Asian Americans; 1.5% were Native Americans; and 1.5% reported a race/ethnicity of "other." The average age was 40.0 years (SD = 13.35).

4.4.3. Manipulation and control checks

The random assignment of participants was successful, because the F-tests revealed that the participants did not differ in age (Fs < 1.58, ps > .10) or ethnicity (Fs < .15, ps > .10) across the experimental conditions. Our manipulation of social priming was also successful. The F-tests showed that only the main effect of social priming on perceived social connection was significant (F = 10.06, p = .002); that is, participants in the social priming condition felt more connected with others (M = 5.25, SD = 1.23) than those in the control condition (M = 4.64, SD = 1.51). Moreover, neither the main effect of gender nor its interaction with social priming reached the level of significance (Fs < 2.69, ps > .10).

4.4.4. Study 3: Results of behavioral decisions

Because both participant gender and social need were categorical variables, several ANOVA models were used to test the hypotheses. The analysis of the participants' behavioral decisions regarding the product as a function of participant gender and social need revealed a significant interaction effect between the two variables ($F_{(1, 202)}$ = 3.99, p = .05). As **FIGURE 7** illustrates, the planned contrasts suggested that female participants were more likely to follow the opinion provided by a friend (M = 4.41, SD = 1.73) than male participants (M = 3.75, SD = 1.61; $F_{(1, 202)}$ = 4.47, p = .04) when their social needs were not activated (i.e., in the baseline condition), replicating the results of friend-network conditions in prior studies. This phenomenon of females more strongly following friends yielded a strong effect size (Cohen's d = 0.40), indicating the phenomenon yields strong and meaningful differences. However, when female participants' social needs were activated by recalling previous experiences of social connection, their public evaluations of the product (M = 4.27, SD = 1.42) were not significantly different from those of male participants (M = 4.49, SD = 1.49; F < 1), resulting in a trivial effect size (Cohen's d = -0.15). In addition, neither the main effect of gender ($F_{(1, 202)}$ = 1.04, p > .10) nor that of social need ($F_{(1, 202)}$ = 1.92, p > .10) was significant. Thus, both H3a and H3b were supported.

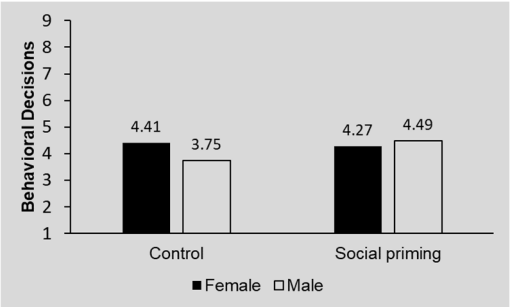

FIGURE 7. The Gender ×Social Priming Interaction Effect on Public Evaluation

Alternatively, for males, they were more likely to follow the opinions provided by friends when their social needs were activated ($M = 4.49$, $SD = 1.49$) than when the social needs were not met (i.e., the baseline condition) ($M = 3.75$, $SD = 1.61$; $F_{(1, 202)} = 5.89$, $p = .02$), representing a strong effect size (Cohen's $d = 0.477$). By contrast, for females, their public evaluations of the product did not significantly differ between the social-needs activated condition ($M = 4.27$, $SD = 1.42$) and the baseline condition ($M = 4.41$, $SD = 1.73$; $F < 1$), resulting in a trivial effect size (Cohen's $d = 0.089$). These results support our assumption that females have a persistently high social need regardless of the social priming procedure, whereas males' social needs are activated only after the social priming procedure.

5. Discussion

Recent research has established that a consumer's behavioral decisions regarding a product may be influenced by other community members' total ratings of that product (e.g., Lee et al., 2015a; Li & Hitt, 2008; Waytz & Epley, 2012; Xie & Lee, 2015). This stream of research has focused mainly on the informational aspects of social influence, according to which people follow others' opinions because they believe the information others possess is valid. Businesses have capitalized on this relationship by fostering *influence marketing*. Our study differs from this emerging stream of research because it shows that the influence in question might be normative in nature instead of informational.

In line with SIT (Burnkrant & Cousineau, 1975; Deutsch & Gerard, 1955), our three studies find that the occurrence of normative social influence depends on (1) whether a consumer's behavioral decisions are visible to others (public vs. private) and (2) whether that consumer has strong social needs. A consumer's behavioral decisions are visible to friends but invisible to followees. Moreover, female (vs. male) consumers, and consumers who are primed with (vs. without) social needs are expected to have stronger social needs. Study 1, which analyzes large-scale data collected from an s-commerce platform, provides the key finding that prior information provided by a friend has a greater influence on female consumers' behavioral decisions (i.e., purchasing, and making a wish list) regarding personal-care products than it does on male consumers' purchase decisions; however, this gender difference dissipates when the information was provided by a followee. In addition, we find that the interaction between followee rating and friend rating negatively influences consumer purchase decisions, indicating substitutability or negative synergy.

Study 2, a controlled experiment, replicates the findings of Study 1 but with a different, gender-neutral product stimulus and a better control of all the other confounding types of noise mentioned above. After reading a friend's positive review of a coffee maker, female participants are more likely to publicly express a favorable opinion of the product than are male participants. However, their favorable opinion of the coffee maker does not significantly differ when the positive review was provided by a followee, to whom the participants' responses are not visible. The results suggest that although the information provided by friends elicits greater conformity among females, such conformity is more often based on public compliance than

on private acceptance. Importantly, Study 2 provides more direct evidence for the occurrence of normative social influence on s-commerce platforms by validating the mediating role of participants' normative/social considerations in their behavioral decisions.

Finally, in Study 3, we use a moderation approach to validate the underlying mechanisms of social needs, thus extending the results of both Study 1 and Study 2. Our theorization suggests that females' greater conformity to their friends compared to their male counterparts should be attributed to females' stronger social needs. If this proposition is correct, activating participants' social needs via other approaches should turn off the effect, resulting in a null effect of gender on behavioral similarity between users and their friends. We find empirical evidence that this is the case. Namely, our results show that when female participants read a friend's positive evaluation of a product, they report a stronger liking for the product in public than do male participants. However, when a priming procedure activates strong social needs in both male and female participants, female participants' public evaluations of the product are no more positive than those of male participants. The consistency among the results of Studies 1, 2, and 3 therefore rules out confounding effects caused by other differences between the two networks.

5.1. Contributions to Research and Theory

Our study advances existing knowledge in three ways. *First*, it provides empirical evidence for the occurrence of normative social influence on s-commerce platforms. Existing research has focused mainly on the informative aspects of social influence, such as through observational learning theory (Banerjee, 1992; Bikhchandani et al., 1992, 1998; Cai et al., 2009; Qiu et al., 2018; Wang et al., 2018; Zhang et al., 2015). However, our study provides support for the importance of *normative social influence* as well. Normative and informational social influence both lead to conformity, but they have different underlying mechanisms (Burnkrant & Cousineau, 1975; Deutsch & Gerard, 1955). A few studies have attempted to conceptually distinguish between normative and informational social influence. For example, Kuan et al. (2014) found that the number of consumers who buy a product (i.e., group-buying information) exerts an informational social influence on attitude and intention, whereas the number of consumers who "like" a product (i.e., "like" information) exerts a normative social influence Similarly, Cai et al. (2009) found that consumers' observation of others' private consumption serves as a source of informational social influence, whereas consumers' observation of the consumption of culturally popular products serves as a source of normative social influence.

Second, our study improves the understanding of the influence of user-generated product information provided by different social network types on consumer purchase behaviors. Previous research has produced mixed findings on this topic. Some studies have found that online consumers are more likely to conform to the opinions of their friends than to the opinions of members of other social communities (Dey, 1997; Lee et al., 2015a; Moretti, 2011; Qiu et al., 2018; Wang et al., 2018). These conformity behaviors

have been attributed to the incidental preference similarity between friends (i.e., *homophily*) (Gallivan & Ahuja, 2015; Gu et al., 2014; Lazarsfeld & Merton, 1954; Lee et al., 2016; McPherson et al., 2001; Song et al., 2019) or to the trust engendered in friendships with stronger social ties (Bapna et al., 2017; Sykes & Venkatesh, 2017). However, few studies have considered the different levels of behavior visibility on distinct types of social networks. On s-commerce platforms, consumers can observe both their friends' prior information and their followees' prior information. However, their behavioral reactions to this information are visible only to their friends but not to their followees. Our study provides a nuanced perspective by revealing the different degrees of influence exerted by information provided by friend networks and that provided by followee networks on s-commerce platforms. We found that consumers are more likely to conform to the opinions of their friends than to the opinions of their followees. This is because the conformity behaviors of consumers are more visible to their friends than to their followees. Our findings have important implications for research in marketing, as well. Marketers should be aware of the different levels of influence exerted by different types of social networks. They should also consider the different levels of behavior visibility when designing their marketing campaigns.

Relatedly, our study is the first to consider the influence of gender-based differences on consumers' behavioral decisions based on others' prior information. We found that female consumers are more likely to follow friend-network information than male consumers, but they do not follow the information generated by the followee network more than male consumers. Existing research (e.g., Carli, 1999; Venkatesh & Morris, 2000) has showed that females are more likely to be influenced by others' expectations than males, but has not categorized the "others" into different social groups and has not identified in which group such gender differences exist. Consequently, if gender effects in different social groups are not accounted for in theory and practice, the underlying explanations and predictions will be inaccurate. The present research distinguishes friend groups from followee groups and suggests that on a friend network, consumers can observe their friends' choices and vice versa, enabling them to strengthen social ties by behaving like their friends. This implication, coupled with prior findings that female consumers have a stronger need for social bonds than male consumers (Awad & Ragowsky, 2008; Bakan, 1966; Chai et al., 2011; Eagly & Steffen, 1984; Eagly & Wood, 1991), suggests that friend-network information is more influential in purchase decisions for females than males.

Third, although there have been frequent calls for methodological pluralism in the IS discipline, multimethod designs that embrace this pluralism have been difficult to execute and have not been widely embraced by IS researchers (Sarker et al., 2018; Venkatesh et al., 2013). We respond to these calls by employing a multiple-methods approach to test our theoretical model in two different contexts and with two different methods. First, we crawled data from a popular s-commerce platform in Asia that enables consumers to share with others their personal experience of using personal-care products. Second, to

increase the internal validity of our findings, we conducted two online experiments to replicate and extend the findings in another setting (i.e., purchasing a coffee maker on Twitter) using US participants. This allowed us to control some of the contextual factors that may have influenced the results of the first study. The findings generated by our model, which uses culturally and contextually different settings with two different methods, provide converging evidence for our premise. This strengthens the validity of our findings and makes them more generalizable to other contexts.

5.2. Managerial and Practice Implications

The findings of our three studies can provide platform designers, market researchers, and firms with a more accurate and comprehensive understanding of how prior consumer ratings or purchases influence subsequent consumer purchase decisions. Assuming our findings hold over time, at least in similar contexts, they have several important implications for management and practice.

First, our results suggest that friend-network information is more likely to exert an influence on females' purchase decisions than on those of males. This is because female consumers have a stronger tendency than male consumers to conform to friends' actions to make themselves desirable to and subsequently build or maintain intimate social relationships with those friends. These results have important implications for the design of s-commerce platforms. Although many s-commerce platforms, including Taobao and Amazon, have begun to integrate social networking functions, the original purpose of social-network-based designs was to convince consumers to spend more time on a platform and consequently make more online purchases. Our study indicates, however, that such social networking functions have an unexpected outcome for s-commerce platforms. That is, the ability of such functions to exert a direct positive influence on online sales derives from their capacity to satiate consumers' normative needs, not necessarily from their influence on consumer engagement with the platform.

Managers of s-commerce platforms should thus consider adding more social networking functions to their platforms, such as a feed of friends' recent updates or links to games, picture albums, surveys, and other applications that are prominent on Facebook. These functions can help to create a sense of community and belonging among users, which can in turn lead to increased conformity to the norms of the group and, ultimately, increased sales. In addition to adding social networking functions, managers of s-commerce platforms should also consider targeting their marketing campaigns to female or male consumers specifically. For example, for females, this can be done by highlighting the social benefits of using the platform, such as the ability to connect with friends and share product recommendations. By taking these steps, s-commerce platforms can tap into the power of social influence to drive sales.

Moreover, the design of IT artifacts needs to be more effective in catering to consumers with different social needs. A one-size-fits-all approach to s-commerce platforms is generally not sufficient to satisfy consumers' social needs. For example, our findings suggest that to facilitate females' purchase decisions,

firms could give priority to friend-network information. This is because female consumers have a stronger need for social connection than male consumers. In fact, some platforms have already begun to do this. Yelp, for example, gives priority to the reviews provided by a consumer's friends when sorting and displaying reviews. However, this approach might not be helpful for male consumers, whose social needs are typically weaker than those of women. Thus, an effective strategy would be to design different views for consumers with different social needs. For example, a platform could offer a "social" view that prioritizes friend-network information and a "personal" view that prioritizes other information, such as product reviews. This approach would allow consumers to choose the view that best meets their needs, which would likely lead to a more positive user experience and increased sales.

Finally, consumers' normative needs might be influenced by situational factors as well as gender. The results of Study 3 provide direct evidence for this possibility. Research in both social psychology and marketing has shown that consumers' need for social affiliation is often heightened when they feel lonely, regardless of gender (e.g., Loveland et al., 2010; Wang et al., 2011; Zhou et al., 2008). Loneliness is a major concern in contemporary society, because many people move away from their personal networks for extended periods to achieve professional or educational goals (Matook et al., 2015). A growing body of research has shown that social media can be a key driver of depression, addictive and compulsive behaviors, stress and anxiety, envy and fear of missing out, exploitative behavior, cyberharassment, and other maladaptive outcomes (e.g., Ho et al., 2017; James et al., 2017; LaRose et al., 2014; Lowry et al., 2019; Zhang et al., 2019). This is partially because the IT artifacts and interaction affordances involved often do not satisfy human social needs. Thus, managers and designers of s-commerce platforms may benefit from integrating social networking functions into their platforms and giving priority to the information generated by friend networks to cater to lonely consumers or those who need more human intimacy. This lack of intimacy and meaningful connection could be the *holy grail* of s-commerce IT artifact design because present designs are suboptimal, and often deleterious, in addressing human social and communication needs.

5.3. Limitations and Future Research Opportunities

Our research has several limitations and unanswered questions that suggest interesting future research opportunities. *First*, although we provide evidence for the occurrence of normative social influence, we do not invalidate the likelihood of the occurrence of informational social influence. In fact, normative and informational social influence are compatible. Both could account for people's conformity to others' prior choices. However, the relative dominance of the two forms of social influence in affecting people's behavioral decisions may depend on various situational factors. For example, Cai et al. (2009) has suggested that the experience of others' consumption of culturally popular products might influence an individual's choice through normative social influence, whereas that of private consumption might exert an effect

through informational social influence. Likewise, we surmise that normative social influence, as documented in the present study, might occur only on s-commerce platforms but not on traditional e-commerce platforms, because consumers' behavioral reactions to others' prior information on the latter platforms cannot be observed by others, such that normative social influence is unlikely to occur.

This dichotomy between platform types offers fertile ground for future research. Specifically, examining the interplay between normative and informational social influence across different commercial platforms could provide nuanced insights into the relative potency of these influences under varying conditions. Furthermore, it would be advantageous to explore the contextual factors that modulate these influences, including but not limited to cultural nuances, the nature of the product, and the design interface of the platform. By dissecting these complexities, future research can not only extend the theoretical frameworks on social influence but also offer actionable insights for platform developers and marketers striving to optimize user engagement and conversion rates.

Second, given the correlational nature of Study 1, one might question the causal relationship between others' opinions and consumers' behavioral decisions. However, we argue that if consumers simply want to buy something without considering others' opinions, it is unnecessary for them to log on to the s-commerce platform; instead, they can complete the purchase on the product's website. To provide further evidence for the causality issues, we use a vignette-based decision context in Studies 2 & 3 that directly informs participants about others' opinions and examines how these opinions affect participants' subsequent behavioral decisions. The results of the latter two studies perfectly replicate those of Study 1 and therefore validate the causal relationship between others' opinions and consumers' behavioral decisions.

Notwithstanding this evidence, the domain of causality within consumer decision-making on s-commerce platforms remains a topic rich for further exploration. Future research could delve into employing more rigorous experimental designs, such as longitudinal studies or randomized controlled trials, to definitively establish causality. Such studies could also examine moderating and mediating variables that could influence the strength and direction of this causal relationship. For instance, the role of individual differences in susceptibility to social influence could be a variable worth investigating. Additionally, the nature and quality of the opinions themselves—whether they are based on factual evidence, personal anecdotes, or other forms of persuasive rhetoric—could be another layer of complexity worth dissecting. By focusing on these nuanced areas, future research can further illuminate the intricate mechanics of how social factors influence consumer choices, thereby contributing to a more comprehensive understanding of user behavior on s-commerce platforms. This, in turn, would hold considerable implications for both theoretical advancements and practical applications in the realm of digital commerce.

Finally, has a third limitation related to its generalizability across various demographic, cultural, social,

or legal settings, including potential interaction effects with gender. Our study was conducted in the largest s-commerce market in the world; this market has distinct cultural characteristics and is situated in a distinct legal and social environment. We expect differences to emerge in s-commerce settings that feature different social, cultural, and even legal conditions. Individual-level and nation-level cultural effects related to considerations such as uncertainty avoidance or collectivism, which have been shown to be relevant in other technology contexts, are a particularly promising area of inquiry (LaRose et al., 2014; Lowry et al., 2011; Srite & Karahanna, 2006). Moreover, the monitoring and regulation of s-commerce activities in different countries or related legal systems could have important effects not accounted for in our study. For example, cross-cultural and cross-national differences could emerge from differences in government monitoring of social media, regulations concerning what is considered appropriate content, and variations in consumer fraud and privacy laws.

Thus, future research endeavors can richly benefit from dissecting these contextual variables. A cross-cultural comparative analysis would offer nuanced perspectives on how these diverse factors interact with gender and social influence mechanisms to shape consumer choices. Such research would not only deepen our theoretical understanding of s-commerce but could also inform policymakers and industry practitioners about the multifaceted factors that affect consumer behavior across varying cultural and legal landscapes.

6. Conclusion

As e-commerce platforms increasingly incorporate social networking functionalities, the landscape of social influence in shaping consumer purchase decisions has become more complex than ever before. Our research serves as an initial foray into understanding the nuanced roles of different types of social influence—namely, normative, and informational—in guiding consumer behavior. Our investigation further dissects these influences across various social network types—distinguishing between friends and followees—and considers the moderating effect of gender. Our findings elucidate that information emanating from a friend network exerts a more potent influence on female attitudes and purchasing choices compared to males. Interestingly, this gender disparity diminishes when the information originates from a network of followees. Crucially, our data indicate that these gender-specific patterns are predominantly attributable to normative social influence rather than informational influence. This offers valuable insights into the mechanisms by which different social networks shape the consumer decision-making process and provides actionable guidelines for s-commerce platform developers and operators.

Looking forward, the complexity and dynamic nature of social influence in s-commerce settings necessitate further in-depth study. The limitations of our research—ranging from questions of causality to the influences of diverse cultural, social, and legal contexts—serve as catalysts for future scholarly exploration. Examining these variables could yield invaluable insights into how these multifaceted factors interact to drive consumer behavior in an increasingly interconnected digital marketplace. Moreover, as

regulatory frameworks evolve and as cultural norms shift, staying abreast of these changes will be paramount for both researchers and practitioners.

As we stand at the intersection of commerce and social interaction in an increasingly digital age, understanding the variegated tapestry of factors that influence consumer choices is more critical than ever. Our research represents a steppingstone, inviting future research to delve deeper and to explore broader, thereby contributing to a richer, more nuanced understanding of consumer behavior in the realm of s-commerce.

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Appendix A: Supplementary Materials

TABLE A.1. Summary of Prior Key Studies Involving Social Influence

Context	Authors	Purpose of Study	Types of Social Influence	Method
Online consumer behaviors	Chen et al. (2011)	Investigates three different effects of others' opinions and others' actions on consumers' purchase decisions: (1) product sales; (2) lifetime effect; and (3) interaction effects	• Observational learning/informational social influence	Quasi-experiment
	Dewan et al. (2017)	Studies two types of social influence (popularity influence and proximity influence) in an online music community.	• Observational learning/informational social influence • Homophily	Quasi-experiment
	Lee et al. (2015b)	Studies the impact of social reference systems like Facebook likes on sales in social commerce	• Informational social influence	Empirical model
	Moretti (2011)	Quantifies the influence of social learning on consumer decisions in the context of movie sales	• Social learning/informational social influence	Empirical model
	Qiu et al. (2018)	Focuses on observational learning from friends' check-ins in location-based social networks	• Informational causal mechanism	Empirical model
	Wang et al. (2018)	Investigates the social influence of online friends in online product ratings	• Observational learning/informational social influence • Homophily	Quasi-experiment
Social networks and work networks	Gwebu et al. (2020)	Examines how negative social influence can foster information security policy noncompliance	• Normative social influence	Survey
	Hur et al. (2023)	Examines how social influence changes with information source changes in crowdfunding networks.	• Information social influence • Normative social influence	Panel data
	Kuan et al. (2014)	Examines how group-buying information affects consumer opinions and emotions	• Normative social influence • Informational social influence	Experiment
	Lee et al. (2016)	Analyzes the formation of networks in location-based social networks, with a focus on homophily	• Observational learning/informational social influence	Empirical model
	Lowry et al. (2016b)	Examines how negative social influence is a key factor in adult choosing to engage in cyberbullying in their social networks	• Observational learning • Social learning theory	Survey
	Qiu et al. (2021)	Examines how product characteristics and the type of information provider jointly impact purchase decisions in a social network setting	• Observational learning/informational social influence	Experiment
	Yazdanmehr et al. (2020)	Studies how individual-level and organizational-level social influence around ethical behavior improve employee security policy compliance in organizations.	• Normative social influence	Survey

Context	Authors	Purpose of Study	Types of Social Influence	Method
Technology adoption, use, and engagement	Gong et al. (2024)	Examines impact of social network embeddedness, including social influence, on mobile massively multiplayer online games play	• Normative social influence • Informational social influence	Longitudinal field study
	Leng et al. (2024)	Studies how long-range social influence in phone communication networks affects offline adoption decisions	• Observational learning • Observed homophily • Latent homophily	Panel data; social network analysis
	Venkatesh and Morris (2000)	Explores gender differences in technology acceptance and sustained usage in the workplace, using the Technology Acceptance Model (TAM)	• Subjective norms/normative social influence	Survey
	Wang et al. (2013)	Investigates how social influence mechanisms like identification and internalization affect the use of knowledge management systems in a management consulting firm	• Identification/normative social influence • Internalization/informational social influence	Survey
	Yi and Davis (2003)	Develops a new model of the underlying observational learning process by which modelling-based training interventions influence computer task performance	• Observational learning/informational social influence	Experiment
	Zhang et al. (2023)	Conducts longitudinal study on social gamification effects on group use and cooperation in fitness apps.	• Normative social influence • Informational social influence	Longitudinal experiment
	Zhang et al. (2024)	Examines how to engage learners in online learning without external incentives, by leveraging social influence:	• Normative social influence • Informational social influence	Field experiment

TABLE A.2. Brand Information for Study 1

Brand ID	Total number of consumers
101.0	3083
102.0	10851
103.0	2897
104.0	6630
105.0	5636
106.0	8854
107.0	12190
108.0	3900
109.0	5877
110.0	8517
111.0	1926
112.0	913
113.0	678
114.0	2333
115.0	1254
116.0	6484
117.0	5964
118.0	5299
119.0	2120
120.0	3860
121.0	2232
122.0	3316

Brand ID	Total number of consumers
123.0	3647
124.0	9887
125.0	6026
126.0	8273
127.0	3321
128.0	9543
129.0	1956
130.0	6781
131.0	1967
132.0	9458
133.0	2507
134.0	2919
135.0	5152
136.0	3532
137.0	16127
138.0	10392
139.0	2182
140.0	3588
141.0	1503
142.0	4985
143.0	8378
Total	**226938**

[1] Personal-care consumer products for men and women consisted of a wide range of products, including hair-care products (e.g., shampoo, conditioner, coloring, shaving, and hair-removal products, haircutting tools, combs, brushes, blow dryers), perfume and cologne, oral-care products (toothbrushes, teeth-whitening products, mouthwash), personal- hygiene products (deodorant, antiperspirants, soaps), skin-care products (lotion, bath soap, lip balm, skin-care tools), cosmetics, and the like.

[2] The Likert-type scales for products ranged from 1 (absolutely, I would not recommend this product to you) to 7 (absolutely, I would recommend this product to you).

[3] To generate a matched sample, we tested the gender difference on consumer age, consumer's social network size (i.e., the sum of number of friends, number of followees, and number of followers), consumer's activity, consumer's total prior purchase in the platform, and consumer's experience sharing in the platform. The results showed that there is no difference between male and female consumers on consumer's purchase in the platform and consumer's experience sharing. Then we added consumer's age, social network size, and activity in the platform as control variables in the data analysis.

[4] Where t is the t-statistic with m + n – 2 degrees of freedom, where m and n are the sample sizes of the datasets for each group; SE_i is the standard error of the path in the model of each group; and $Path_i$ is the path coefficient in the model of each group.