Conservative When Crowded:
Social Crowding and Consumer Choice

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Abstract

Might the mere crowdedness of the environment affect individuals’ choices and preferences? In six studies, the authors show that social crowdedness not only leads to greater accessibility of safety-related constructs, but also results in individuals showing a greater preference for safety-oriented options (e.g., preferring to visit a pharmacy to a convenience store), being more receptive towards prevention (rather than promotion) framed messages, and being more risk averse with real money gambles. Supporting the authors’ underlying avoidance motivation perspective, these effects are mediated by participants’ net-prevention focus and are attenuated when the crowd in question consists of in-group members. Both practical and theoretical implications are discussed.

Keywords: Crowding, Personal space, Social cognition, Threat management, Motivation
Whether it be shopping for groceries at a local supermarket, making investment decisions on a trading floor, or eating at a busy restaurant, it is fair to say that many important consumption decisions are made in the physical presence of others. The extent of this social presence—the level of crowdedness—can vary significantly across domains, time, and geography. For example, purchase decisions made in stores vary significantly in their crowdedness, with close to 30% of annual retail sales occurring during the holiday season, precisely when complaints of store crowdedness peak (ICSC 2006). Seasonality aside, store traffic can vary significantly from day to day (e.g., being higher on weekends) as well as over the course of a particular day (e.g., being higher at lunchtime or later in the day). Given this considerable variation, a question of both theoretical and practical importance is whether and how consumer decision-making is influenced by the crowdedness of the prevailing consumption environment. This is the focus of the present research.

The effect of social crowdedness on decision-making has received little attention in the marketing literature. While research has demonstrated that increased crowdedness can reduce shopper satisfaction and precipitate an earlier departure from the store (Eroglu et al. 2005; Hui and Bateson 1991), there is a relative paucity of research examining how being crowded might influence the actual choices consumers make. In a rare exception, Xu, Shen, and Wyer (2011) extend Levav and Zhu’s (2009) work on spatial confinement and variety-seeking by demonstrating that reduced interpersonal distances can threaten consumers’ perceptions of their own uniqueness, leading them to choose more distinctive products as a way of reasserting their individuality. While we find this work on individuality compelling, our view is that the cognitive ramifications of being crowded likely extend significantly beyond it. In particular, we argue that
a broad and important consequence of being socially crowded is the precipitation of a defensive state, which results in the adoption of a regulatory focus that is prevention-oriented.

Perhaps the most germane concept in developing our research is the notion of personal space. Personal space is defined as a moveable boundary around the human body, primarily functioning as a buffer protecting people from potential threats and overstimulation (Hall 1966; Graziano and Cooke 2006; Delevoye-Turrell et al. 2011). Considerable empirical research has demonstrated that personal space violations induce defensive responses (Goffman 1963; Felipe and Sommer 1966; McDowell 1972; Sommer and Becker 1969). For example, office workers show more withdrawal behavior in an office with proximal workstations (Oldham and Fried 1987), and passengers are more likely to experience negative mood and stress on rush hour trains when they feel more crowded by other passengers (Evans and Wener 2007). The current research was envisaged to extend this line of research into the consumption domain. In particular, we hypothesize and demonstrate that socially crowded environments lead to activation of the avoidance system, which results in individuals adopting a more prevention-focused mindset. This, in turn, results in socially crowded individuals being more likely to choose options that provide prevention-related benefits versus neutral-related benefits.

This article is organized as follows. We begin by providing an overview of research on the motivational consequences of social crowding and personal space violations. We then present six experiments designed to explore the choice consequences of being socially crowded. These experiments enable us to make the following claims. First, individuals who are socially crowded are disproportionally more likely to show preference toward safety-oriented choice options, to undertake actual prevention-oriented behaviors, to avoid net present value positive gambles, and to be persuaded by prevention-framed messages. Second, these behavioral outcomes of crowding
are mediated by an increased prevention focus. Third, consistent with our underlying avoidance motivation perspective, these effects are moderated by the composition of the crowd in question and are strengthened/weakened depending on whether the crowd is composed of out-group/in-group members, respectively. We conclude with a general discussion highlighting the theoretical contributions and practical implications of our research.

**CROWDING, DEFENSIVE STATES, AND CHOICES**

*Personal Space Violations Lead to an Avoidance Response*

For the purposes of this research, we define social crowding as a large group of people gathered together such that the likelihood of an individual’s personal space being violated is significantly increased. The study of personal space and spatial perception in social contexts originated from observational research of the flight initiation distance maintained by animals. Hediger (1955) investigated social distance in animal populations and discovered that all species have a certain flight initiation distance below which the presence of others is considered an objective threat. He argued that, for any species, escape (i.e., securing personal safety) is biologically an even more urgent survival necessity than either reproduction or finding nutrition. Furthermore, he observed that the size of this flight initiation distance did not appear to be a simple stimulus-driven reflex, but was determined by animals using their spatial cognition system to construct a boundary of safety around their bodies (Hediger 1955), the penetration of which results in the perception of threat.
This concept of spatial boundaries was later extended to human social behavior and the development of the construct of personal space. Personal space is defined as “a small protective sphere or bubble that an organism maintains between itself and others” (Hall 1966, p.112). Many researchers have noted the existence of this protective space around the human body and have found that violations elicit defensive responses from victims (Dosey and Meisels 1969; McDowell 1972). These responses include flight or withdrawal (Barefoot, Hoople, and McClay 1972; Felipe and Sommer 1966; Baum, Riess, and O’Hara 1974) as well as classic defensive responses such as asocial behavior and increased hostility (Griffitt and Veitch 1971). Indeed, recent neurological research has shown that personal proximity activates the amygdala, the structure known to be involved in the “fight or flight” response (Kennedy et al. 2009).

That personal space violations lead to a fight or flight response seems likely to have been evolutionarily adaptive. After all, throughout history, attacks from other humans have been one of the major threats to human survival (see Neuberg et al. 2011), with surprise attacks being used to impose maximum fatalities to others (Boyer and Bergstrom 2011). As such, it is quite intuitive that personal space violations would activate our defense system, which is thought to have evolved to deal with environmental threats to physical survival (Lang, Bradley and Cuthbert 1997). The activation of this defense system manifests as specific emotional states, such as fear and anxiety (Gray and McNaughton 2000; McNaughton and Corr 2004). Since personal space violations are innately more likely in crowded settings, the abundant evidence showing that social crowding does appear sufficient to trigger an avoidance response is not surprising. For example, being crowded leads to the typical physiological symptoms of anxiety, such as increased skin conductance, high arousal, and low experienced pleasure (Aiello et al. 1977; Worchel and Teddlie 1976; Schaeffer and Patterson 1980).
**Choice Implications of an Avoidance Response**

Substantial empirical evidence demonstrates that anxiety and avoidance motivations are associated with strong prevention goals, whereas happiness and approach motivations are associated with promotion goals (Forster, Higgins and Idson 1998; Forster et al. 2001; Forster and Higgins 2005). A prevention goal, in turn, can influence the valuation of choice options by enhancing relative sensitivity toward potential losses and prevention-related benefits (e.g., being careful about health) as opposed to potential gains and promotion-related benefits (e.g., maximizing pleasure). Therefore, prevention-focused individuals are more likely to seek objects with personal safety connotations because these objects are instrumental in achieving the activated prevention goal (Markman and Brendl 2000). Similarly, from a regulatory fit perspective, prevention-focused individuals experience regulatory fit when they choose objects with safety implications because these alternatives align with their goal orientation (i.e., a prevention goal). As such, individuals may more readily choose these options because it feels appropriate to them to choose an option that fits their regulatory focus (Higgins 2000). The effects of regulatory fit are not narrowly limited to choice effects per se, but can moderate a wide variety of marketing-relevant behavioral outcomes, such as the perceived persuasiveness of messages when there is congruence between regulatory focus and message frame. For example, prior research has demonstrated that when prevention goals are more active, a loss-framed message is more effective than a gain-framed message (Lee and Aaker 2004). Put differently, individuals with a prevention focus are more receptive to a loss-framed message than a gain-framed one, as it leads them to feel greater regulatory fit.
In sum, research on personal space violations and social crowding has essentially converged around the broad finding that being crowded invokes a defensive/avoidant response characterized by stress and anxiety. Furthermore, research on regulatory focus suggests an avoidant response is associated with an increased prevention orientation. Thus, we expect that crowded individuals are more likely to choose options with safety connotations because they feel more comfortable choosing an option that fits their current regulatory focus. More specifically, we hypothesize that people in socially crowded environments will be more likely to choose options that provide prevention- (versus neutral-) related benefits. Furthermore, these choice consequences will be mediated by a measure of individuals’ net prevention/promotion focus.

Research Overview

The current research investigates whether social crowdedness systematically moderates consumer preference regarding product/service alternatives. Specifically, we propose that a prevention-focused mindset invoked by being crowded leads to an increased affinity for safety-oriented choice alternatives. Six studies support our conceptualization. A pilot study demonstrates that individuals who imagine themselves in a crowded (vs. an uncrowded) scene subsequently display a greater relative prevention focus. Study 1 utilizes a naturalistic crowding manipulation to demonstrate that being socially crowded leads to both a greater preference for safety-related choice options and to increased accessibility to safety-related words. Study 2 provides process evidence for our conceptualization and reveals that the effects of crowding on choice are mediated by an increase in net prevention focus. Study 3 identifies a theoretically consistent moderator; that is, the link between social crowding and prevention-oriented choice is
attenuated when the crowd is composed of in-group (as opposed to out-group) members. Study 4 uses a real behavioral choice (whether or not to floss one’s teeth) to demonstrate that being socially crowded leads to greater susceptibility to prevention-framed messages. Finally, extending our investigation to risk tolerance more generally, Study 5 reveals that being crowded results in individuals being more conservative when making real money gambles.

**PILOT STUDY: SOCIAL CROWDING AND PREVENTION FOCUS**

The pilot study was designed as an initial test to assess whether social crowdedness has the potential to influence individuals’ regulatory focus. To this end, we exposed participants to a picture of either a crowded or uncrowded outdoor scene and asked them to imagine how they would feel if they were in the pictured context. A regulatory focus questionnaire was subsequently administered as a supposedly unrelated study.

*Method*

Thirty-four undergraduate students from a North American university participated in this study for payment. First, in a supposed picture perception study, participants were presented with one of the two pictures of an outdoor scene (crowded vs. uncrowded) shown in Figure 1 below, and were asked to spend a few moments looking at the image before briefly describing how they would feel if they were in the presented scene. Next, in an ostensibly unrelated study, a questionnaire designed to measure participants’ incidental regulatory focus was administered (developed by Sengupta and Zhou, 2007, following the approach of Higgins et al., 1994),
presented as research about concerns in daily life. Participants were asked to rate the importance of 14 different issues on a nine-point scale ranging from 1 (totally unimportant) to 9 (extremely important). Seven items captured a promotion focus (e.g., “being smart,” “making new friends”), with the rest measuring a prevention focus (e.g., “not making enemies,” “avoiding getting fat”). Total scores for both prevention and promotion were summed, with the net differences between them serving as the net regulatory focus measure (Sengupta and Zhou 2007).

Results and Discussion

First, given the research linking personal space violations to increased anxiety (e.g., Hall 1966), we counted the number of anxiety-oriented words each participant used in describing how they would feel in the pictured scene. As expected, participants primed with the crowded picture generated more anxiety-related words (M = .89, SD = .76) than did participants primed with the uncrowded picture (M_{uncrowded} = .19, SD = .40; t (32) = 3.30, p < .01).

Turning to the regulatory focus questionnaire, while participants in both conditions indicated a similar level of promotion focus (M_{crowded} = 27.22, SD = 4.61 vs. M_{uncrowded} = 29.25, SD = 3.23), participants in the crowded condition reported higher prevention scores (M = 42.28, SD = 3.95) than those in the uncrowded condition (M = 34.68, SD = 3.61). To create a single measure of regulatory focus, the summed importance scores for the promotion items were subtracted from the equivalent summed prevention item scores (see Lockwood, Jordan, and
Kunda 2002), with higher scores on this index suggesting a greater net-prevention focus (see also Sengupta and Zhou 2007). Using this measure, participants in the crowded condition displayed a stronger net prevention focus \( (M_{\text{crowded}} = 15.05, \ SD = 5.72) \) than did those in the uncrowded condition \( (M_{\text{uncrowded}} = 5.43, \ SD = 5.57; \ t (32) = -4.95, \ p < .001) \). Thus, the mere act of imagining being in a crowded or uncrowded environment was apparently sufficient to substantially alter the regulatory focus of participants. With this baseline result established, in the next study we explore whether this crowding-induced prevention focus results in an increased preference for safety-oriented choice alternatives.

**STUDY 1: SOCIAL CROWDING AND PREFERENCE FOR SAFETY-ORIENTED OPTIONS**

Study 1 had two primary goals. First, since the pilot study relied on a priming task to manipulate social crowdedness, a key objective of Study 1 was to manipulate crowding directly and naturalistically, which was accomplished by having participants complete tasks in a laboratory room that was either crowded or uncrowded with other research participants. Second, as we wanted to explore whether being socially crowded would lead individuals to adopt a more safety-oriented mindset, we examined whether socially crowded individuals would exhibit increased accessibility to safety-related constructs (Bargh et al. 2001; Forster, Liberman and Higgins 2005) and show a greater preference for safety-oriented products.

*Method*
Seventy-three undergraduate students from a North American university participated in this study for payment, participating in two experimental sessions on the same day. In the first session, participants completed a task for an unrelated study and were then asked to return for the pre-scheduled second session. At this time, participants were randomly assigned to either a crowded session (10 participants per room) or an uncrowded session (2 or 3 participants per room), with all sessions being held in the same small laboratory room. Upon arrival, participants were asked to complete a word search task that was presented as a mind clearing exercise in preparation for the experiment, but was in fact designed to assess their accessibility to safety-related constructs. For this task, a grid of letters was presented on a sheet of paper (see Figure 2), with 10 safety-related words (e.g., immunity, insurance, helmet) and 10 neutral words (e.g., melody, speaker, coffee) embedded vertically and horizontally. Participants were asked to write down all the words they could find in 3 minutes.

After the word search task, participants completed two ostensibly unrelated tasks designed to explore their preference toward making choices with prevention-oriented benefits. These tasks were presented as scenarios in which participants indicated their relative preference between two stores they could visit during a delayed flight (pharmacy vs. convenience store) and between two free promotional gifts at a local store (first aid products vs. a box of cookies). Preferences for both the store and product choice were indicated on two seven-point rating scales anchored from 1 (“definitely choose convenience store/cookies”) to 7 (“definitely choose..."
pharmacy/first aid products”). Finally, participants were asked to rate how crowded they found the room to be on a seven-point scale anchored from 1 (not crowded) to 7 (very crowded).

Results and Discussion

Manipulation check. As expected, participants in crowded sessions reported that they felt more crowded (M = 4.87, SD = 1.65) than those in uncrowded sessions (M = 2.95, SD = 1.49; t (71) = 5.15, p < .001).

Word search task. While participants in both conditions found a similar number of non-safety-related words (M_{crowded} = 3.7, SD = 1.42 vs. M_{uncrowded} = 4.16, SD = 1.54; p = .2), participants in the crowded room uncovered a greater number of safety-related words (M = 5.86, SD = 1.81) than those in the less-crowded room (M = 3.77, SD = 1.57; F (1, 71) = 27.8, p < .001). Hence, it appeared that safety-related constructs were indeed more accessible to participants in the crowded room.

Safety-oriented preferences. Participants in the crowded condition reported that they were more likely to choose to go to a pharmacy than to a convenience store (M = 4.53, SD = 1.83) than did those in the uncrowded room (M = 3.63, SD = 1.21; F (1, 71) = 6.45, p < .02). Similarly, those in the crowded condition indicated a stronger preference for first aid products than cookies (M = 4.83, SD = 1.78) compared to those in the uncrowded condition (M = 3.51, SD = 1.47; F (1, 71) = 11.98, p < .001). Thus, for both the store choice and product choice measures, being crowded led participants to report a stronger preference for the safety-oriented option. These data, therefore, build on the pilot study by demonstrating that an individual’s
preferences are predictably influenced by the social crowdedness of the environment. In Study 2, we explore whether these effects are mediated by a prevention focus.

**STUDY 2: MEDIATION BY PREVENTION FOCUS**

Study 2 was designed to build on the preceding studies in three ways. First and most importantly, we wanted to establish whether a greater net-prevention focus mediates the observed effects on safety-oriented choice. Second, we include a true no-prime control condition to better assess baseline preferences toward the choice options. Finally, since a possible (though unlikely) alternative explanation for the results of the first two studies is that the effects were caused not by social crowding but by visual clutter (which is innately confounded with increased crowdedness), Study 2 includes an additional condition to explore the effect of visual clutter.

*Method*

One hundred undergraduate students from a North American university participated in this study for payment. As in the pilot study, a picture priming technique was used to manipulate perceptions of crowdedness. Specifically, participants were randomly assigned to one of four conditions: crowded, uncrowded, cluttered, or no-image control. The crowded and uncrowded images were identical to those used in the pilot study, while the cluttered image (see Figure 1) showed a highly cluttered office scene. As in the pilot study, participants in the three conditions where pictures were presented were asked to imagine themselves in the pictured scene and to briefly describe how they would feel. Participants in the no-image control condition proceeded
straight to the rating tasks. All participants were then presented with the same store and product rating tasks used in Study 1. Finally, participants completed the same regulatory focus questionnaire used in the pilot study.

Results

_Safety-oriented preferences._ The results for both rating tasks are shown in Figure 3. Two ANOVA’s revealed an overall main effect of image condition on both store preference ($F(3, 96) = 4.17, p < .01$) and product preference ($F(3, 96) = 6.33, p < .001$). Follow-up planned comparisons revealed that for both tasks, this effect was primarily driven by responses of participants who imagined themselves in a crowded scene. Specifically, participants in the crowded condition were more likely to prefer the pharmacy to the convenience store ($M = 4.56, SD = 1.45$) compared to those in the no-image control ($M = 3.64, SD = 1.19$), uncrowded ($M = 3.40, SD = 1.26$), or cluttered condition ($M = 3.44, SD = 1.42$; $t(96) = 3.47, p < .001$). Similarly, those in the crowded condition were more likely to prefer first aid products to cookies ($M = 4.92, SD = 1.52$) compared to those in the no-image control ($M = 3.52, SD = 1.08$), uncrowded ($M = 3.44, SD = 1.47$), or cluttered condition ($M = 3.56, SD = 1.50$; $t(96) = 4.34, p < .001$). Finally, participant preferences in both rating tasks showed no significant differences among the no-image control, uncrowded, and cluttered conditions in both choice tasks ($t(72) = -.44, p > .6$).

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Figure 3 about here

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Prevention focus. While participants in all conditions were found to have a similar level of promotion focus ($M_{\text{control}} = 29.56$, $SD = 7.47$; $M_{\text{crowded}} = 28.88$, $SD = 3.17$; $M_{\text{uncrowded}} = 28.56$, $SD = 6.56$; $M_{\text{clutter}} = 28.64$, $SD = 4.13$), participants in the crowded condition had higher prevention scores ($M = 38.80$, $SD = 4.83$) than those in the no-image control ($M = 28.44$, $SD = 6.05$), uncrowded ($M = 27.52$, $SD = 6.45$), or cluttered condition ($M = 28.56$, $SD = 3.23$). In considering the net position, participants in the crowded condition demonstrated a dramatically stronger net prevention focus ($M = 9.92$, $SD = 6.24$) than did those in the uncrowded ($M = -1.04$, $SD = 9.28$), no-image control ($M = -1.12$, $SD = 11.39$), or cluttered condition ($M = -0.08$, $SD = 5.61$); ($t(96) = 5.46$, $p < .001$). Of particular note is that the lack of difference between the no-image control and uncrowded conditions (for both the rating tasks and the prevention focus measure) reveals that the cognitive ramifications of crowdedness are very much a function of high crowdedness, and that no reciprocal effects exist when in an uncrowded environment (i.e., uncrowded environments are not associated with a promotion focus).

Mediation analysis. Following Preacher and Hayes (2004), to better evaluate the underlying mechanism, we examined the indirect effect of the level of crowdedness on preferences for both prevention-oriented choice options through participants’ incidental net prevention focus score. As there are three conditions for crowdedness, we used two dummy variables to represent uncrowdedness and crowdedness in the regressions. Using 5,000 bootstrap samples, these analyses revealed significant indirect effects of the crowdedness dummy on preferences for both of the safety-oriented choice options through the net prevention score with a 95% confidence interval (CI), excluding zero (store preference: -0.44 and -0.05; product preference: -0.54 and -0.08). Specifically, when net prevention score was included in the
regression, the direct effect of the level of crowdedness on safety-oriented choices became nonsignificant \((\beta = -0.23, t = -1.09, p > .27)\). Thus, this analysis shows that the prevention-orientation evoked by personal space violation mediated the influence of crowdedness on safety-oriented choices. See Table 1 for a step-by-step breakdown of the mediation analyses.

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Table 1 about here

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**Discussion**

The results of Study 2 support our hypothesis that being socially crowded leads to a prevention focus, which itself influences preferences toward choice options with safety connotations. These data also rule out an alternative explanation of the core effect by demonstrating that a purely cluttered image has no effect on either the net-prevention focus score or the rating tasks. In fact, both the incidental regulatory focus score and the preference ratings in the cluttered condition were similar to those in the no-image control condition, providing clear evidence that effects of social crowding appear to be distinct from those of visual clutter. With a prevention focus having been established as the mediating process linking social crowdedness and a preference for prevention-oriented products, in the next study we explore an important potential moderator of this core effect, namely the composition of the crowd.

**STUDY 3: DOES THE COMPOSITION OF THE CROWD MATTER?**
Given the early work identifying social distance as an input to a broader threat
evaluation (Hediger 1955) and the later research linking personal space violations to activation
of the avoidance system (Lang, Bradley, and Cuthbert 1997), a reasonable question to ask is
whether the composition of a crowd might affect the degree of threat it is perceived to represent?
Indeed, building on Hall’s (1966) initial conceptualization of spatial violations, Stokols (1972)
argued that an individual’s response to a crowd is determined not only by the innate spatial
restrictions it causes, but also by her relationship (if any) with the members of the crowding
group. Put simply, “social and personal dimensions…interact with spatial factors to mediate the
experience of crowding” (Stokols 1972). More specifically, Stokols suggested that the restrictive
aspects of crowding-induced spatial limitation are rendered less salient when the relationship
with the crowding group is “friendly and cooperative”. Consistent with this theorizing, it is
intuitive to expect that an individual would experience more uncertainty when confronted by a
crowd of strangers compared to a crowd of known individuals, which would likely result in an
assessment of greater potential threat. In this regard, our first three studies mirror much of the
literature on crowding and spatial violations in that our experimental manipulations of
crowdedness relied primarily on exposing participants to crowds of strangers or out-group
members.

This distinction is important, as, in addition to the intuition of strangers representing a
greater threat, prior research is certainly suggestive of individuals’ differing perceptions of
crowds composed of in-group or out-group members. Certainly, a central finding of social
identity theory is that individuals tend to show in-group favoritism and out-group antagonism
(Hogg and Abrams 1988; Turner, Brown, and Tajfel 1979). For example, in a study examining
volitional (rather than imposed) social positioning, Shah, Brazy, and Higgins (2004) found that
participants who were expecting to engage in competition tended to choose a seat closer to an in-group member (their team-mate) than to an out-group member (a competitor). Of more direct relevance to our work, Glick, DeMorest, and Hotze (1988) found that, for individuals in close proximity, out-group members produced more anxiety and less compliance with a small request than did in-group members. Finally, Schultz-Gambard (1977) observed that high-density groups could actually be experienced positively when the group is composed of in-group members. Given all of the above, we hypothesized that a crowding-induced prevention focus, and thus the associated preference for safety-oriented products observed in our first three studies, would be strengthened/(weakened) for a crowd composed of out-group/(in-group) members.

Method

Participants and Design. This study utilized a 2 crowdedness (crowded vs. uncrowded) X 2 group membership (in-group vs. out-group) design with an additional no-crowd control condition. Four hundred participants from a general online subject pool (who passed two attention checks) participated in this study for payment and were randomly assigned to one of the five conditions.

Procedure. Participants first completed a group membership manipulation task (Tajfel et al. 1971) which has previously been shown to reliably manipulate perceptions of whether a certain group is perceived as in-group or out-group. Specifically, participants were told they would be completing an exercise that would test their ability to quickly estimate the total number of dots in different images. They were further told that people can be reliably divided into two cognitive categories (i.e., dot-over-estimators and dot-under-estimators), that these two groups
are distinguished by multiple factors (e.g., analytical problem solving ability, degree of cognitive bias, literacy, mathematical ability, and social competence), and that the dot-estimation task would determine their group classification. Participants were then exposed to ten different pictures comprised of multiple dots for ½ second each, after which they were asked to estimate the number of dots in each image. After the 10 rounds of estimation, all participants were told that they had been classified as dot-under-estimators, thus instantiating the under-estimator/(over-estimator) groups as an in-group/(out-group) respectively.

Next, as in the pilot study and Study 2, in a supposed picture perception task, participants were exposed to the crowded or uncrowded images, shown in Figure 4 below. However, in this case, both pictured groups were presented as consisting of either dot-under-estimators (i.e., in-group members) or dot-over-estimators (i.e., out-group members). To ensure the scenario appeared legitimate, participants were told the pictures were taken at a convention organized by researchers investigating the dot estimation phenomenon and to which they had invited both over- and under-estimators. Participants were instructed to visualize the scenario in as much detail as possible and to describe how they would feel if they were in the scene. Finally, to strengthen the manipulation, participants in the in-group/(out-group) conditions were next asked to describe three ways in which they felt similar/(different) to the dot-under-/over-estimators in the picture. Participants in the no-crowd group, used as a control condition to measure baseline preferences, were not presented with a picture and were directed immediately to the preference task described below.

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Figure 4 about here
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Next, in an ostensibly unrelated task, participants completed the pharmacy vs. convenience store rating task from Studies 1 and 2. Participants once again indicated their preference on a seven-point rating scale anchored from 1 (“definitely choose convenience store”) to 7 (“definitely choose pharmacy”). Finally, participants completed a manipulation check question designed to confirm that they identified more with under-estimators than over-estimators. Responses were captured on a 7-point scale anchored from 1 (“I identify with dot-under-estimators a lot more than I do dot-over-estimators”) to 7 (“I identify with dot-under-estimators a lot less than I do dot-over-estimators”) with 4 representing neutrality (“I identify with dot-under-estimators and dot-over-estimators to about the same degree”).

Results

Data cleaning. Due to the typical data quality issues that arise when dealing with subjects from an online panel, we first cleaned the data by excluding participants whose completion time (vs. an average of 12 minutes) was indicative of a lack of attention. In particular, we conservatively excluded participants who completed the survey too quickly (less than 4 minutes, only achievable via speed completion without paying attention), or too slowly (more than 30 minutes, indicating participant distraction and/or not completing the study in a single sitting). As a result, 20 participants were excluded from the data set, and 380 data points were included in the following analyses. This exclusion of data points marginally strengthened the effects reported below.
Manipulation check. The in-group manipulation appeared to be successful, as participants indicated they identified more with dot-under-estimators (M = 3.33, SD = 1.36, midpoint of scale (neutral) = 4; t (379) = -9.7, p < .001). Moreover, no differences in the manipulation check across the crowding or type of group conditions (both p > .5) were found.

Safety-oriented preferences. As can be seen in Figure 5, the 2 crowdedness (crowded vs. uncrowded) x 2 group membership (in-group vs. out-group) ANOVA, with store preference rating as the dependent variable, revealed no main effect of crowding or type of crowd but a significant interaction between the two (F(1, 300) = 3.89, p < .05).

Simple effect analyses revealed the interaction was primarily driven by participants in the crowded conditions being more likely to choose to go to the pharmacy when the crowd was composed of out-group members (M = 5.26, SD = 2.03) than in-group members (M = 4.47, SD = 2.35; F (1, 300) = 4.72, p < .04). In the uncrowded condition, however, the type of group made no statistically discernible difference (M_{out-group} = 4.61, SD = 2.32, M_{in-group} = 4.84, SD = 2.32; F (1, 300) = .39, p > .5). Finally, turning to the control condition, the only (marginally) significant difference observed was that control condition participants were less likely to visit the pharmacy (M = 4.63, SD = 2.09) than those in the crowded out-group condition (M = 5.25, SD = 2.03; t (150) = 1.9, p = .06). Of particular note is that, since we observed no difference between the crowded in-group condition (M = 4.45, SD = 2.34) and the control condition (M = 4.63, SD = 2.09; t (151) = -4.57, p > .6), this study provides initial evidence suggesting the possibility that
the composition of the crowd can entirely attenuate the avoidance motivation invoked by a crowd of strangers.

Discussion

In summary, when crowds are composed of in-group members (vs. out-group members), the resulting effect on safety-oriented choice is reduced. Given that in-group crowds should be innately less threatening than out-group crowds, this finding thus provides further support for our core theoretical premise that being crowded activates the avoidance system. Moreover, from a practical decision making point of view, the results of Study 3 enable us to make more nuanced predictions regarding where the effects of crowding on choice are likely to be most material. For example, while the results of Study 3 suggest that an individual shopping in a packed retail store is more likely to make safety-oriented choices, the data also suggests this effect would be attenuated in the case of an individual making a purchase online when crowded to a similar degree by friends and family at a social event.

**STUDY 4: MESSAGE FRAME AND ACTUAL BEHAVIORAL CHOICE**

Study 4 had two main objectives. First, recall that prior research has revealed that a prevention focus leads loss-framed messages to be more effective than gain-framed messages (Lee and Aaker 2004). As such, to generalize the main result obtained from the first four studies, we wanted to examine whether social crowdedness influences the persuasiveness of promotion/prevention-framed messages. Second, since the previous studies relied on product
ratings, we wanted to explore the effect of social crowding on actual behavior. Therefore, Study 4 explores whether being crowded/(uncrowded) leads individuals to be more receptive to a prevention/(promotion) framed dental health care message. Furthermore, to assess the general persuasiveness of the messages, we observed whether participants chose to actually floss their teeth when subsequently given the opportunity to do so.

Method

Two hundred thirteen undergraduate students from a North American university participated in this study for payment. The study was a 2 message frame (prevention- vs. promotion-oriented) X 2 crowdedness (crowded vs. uncrowded) between subject design. Participants first completed a supposed snack tasting study to ensure they would be sufficiently motivated to consider flossing later in the study. Participants were told that they had been invited to try a new product from a snack manufacturer in order for the company to learn the opinions of potential targets. Six different snacks that easily become stuck between the teeth (e.g., caramels, dried fruits, and popcorn) were provided, and the participants were instructed to taste them and answer a series of questions (regarding, e.g., texture, sweetness, and saltiness). Once the snack tasting task was completed, in an ostensibly unrelated task, participants were randomly assigned to one of two prime conditions (crowded vs. uncrowded) and were presented with the appropriate crowdedness pictures used in the pilot study and Study 2 (see Figure 1). As was done previously, participants were asked to imagine themselves in the pictured scene and to briefly describe how they would feel.
Participants then completed another supposedly unrelated study, a message evaluation task, which was presented as being a study on the persuasiveness of health care messages. They were presented with one of two dental health messages, both of which were described as having been developed by the association of dental hygiene to educate college students. The message in the prevention condition was framed in terms of preventing loss (i.e., mitigating a health risk - “how you can prevent gingivitis”), while the message in the promotion condition was framed as promoting a gain (i.e., looking better - “how you can get brighter smiles”). Both were adapted from actual dental educational materials. Specifically, participants assigned to the prevention condition read the following message relating to gingivitis prevention:

*Gingivitis is a serious and very common dental condition, but it is 100 per cent preventable…. The condition is caused by an overgrowth of bacteria inside the mouth that converts into plaque and leads to bad breath, bleeding gums and often sore or swollen gums …it can cause more serious conditions such as tooth loss, periodontal disease and even heart disease. You can easily prevent the condition …. By brushing, flossing, and rinsing twice a day at home, using the correct technique …. *

Participants assigned to the promotion condition read the following message describing the benefits of teeth whitening:

*Everyone loves a bright white smile. Fortunately, there are a variety of procedures and products available today that can improve the look of yours. ... Whitening one's teeth is the process of restoring teeth to their natural color. This is done by removing the build-up and dirt collected on the tooth's surface…. *

After reading one of the two messages, participants rated their receptivity on five dimensions—whether it was convincing, appealing, personally relevant, important, and whether they were willing to keep up the suggested behavior—using a 7-point scale anchored from 1 (“strongly agree”) to 7 (“strongly disagree”). Finally, after participants finished the message evaluation task and before they left the lab, an experimenter approached each participant and offered them a chance to floss their teeth in a separate room where dental floss, table mirrors,
napkins, spring water, and a trash bin were provided. The participants who wanted to floss their teeth were guided to the flossing room (for further information, see the Web Appendix).

**Results**

*Message appeal.* The five message ratings were averaged to provide a single message receptivity score ($\alpha = .90$). A two-way ANOVA, with message frame (prevention vs. promotion) and crowding (crowded vs. uncrowded) as the independent variables, and the message receptivity evaluation score as the dependent variable, revealed a main effect of message framing, with participants in both conditions evaluating the prevention-framed message as more persuasive ($M = 4.69, SD = 1.28$) than the promotion-framed message ($M = 4.32, SD = 1.19; F(1, 209) = 4.76, p < .03$). However, this main effect was qualified by the predicted two-way interaction ($F(1, 209) = 4.19, p < .05$). Specifically, for participants in the crowded condition, the prevention-framed message was more persuasive ($M = 4.98, SD = 1.30$) than the promotion-framed message ($M = 4.27, SD = 1.08; F(1, 209) = 9.11, p < .003$). However, the simple effect of message frame was not significant in the uncrowded condition ($M_{\text{prevention}} = 4.40, SD = 1.20, M_{\text{promotion}} = 4.37, SD = 1.30; p > .9$). Thus, the interaction was primarily driven by an increase in the persuasiveness of the prevention-framed message in the crowded condition. See Figure 6 for full results.

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Figure 6 about here

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**Behavioral choice.** Choice to floss across the crowding and message frame conditions is presented in Figure 7. A logistic regression analysis revealed no main effects of either crowding or message frame (both \( p > .4 \)), but did reveal a significant interaction between them (\( \chi^2 = 5.6, p < .01 \)). Consistent with our theorizing, crowded participants were much more likely to floss when exposed to a prevention-framed message (53.7%) than a promotion-framed message (16.4%; \( \chi^2 = 16.7, p < .001 \)). However, the message frame did not appear to influence the decision to floss for uncrowded participants (\( M_{\text{prevention}} = 27.5\%, M_{\text{promotion}} = 22.6\%, \chi^2 = 0.3, p > 0.5 \)).

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**Discussion**

The data from Study 4 builds on the prior studies by extending our findings to message persuasiveness and actual behavior. Not only did self-reported measures indicate that the prevention-framed dental health message was better received in the crowded condition, but actual flossing activity revealed that the increased persuasive effect of the prevention-framed message in the crowded condition was sufficient to influence an actual downstream health behavior.

**STUDY 5: RISK SENSITIVITY IN AN INVESTMENT GAME**
The main goal of this final study was to generalize our findings to risk sensitivity more generally. While our experimental work to this point has focused on safety-oriented choices and message persuasiveness, if being socially crowded does precipitate an avoidant state, then it should result in sensitivity to losses more generally (Idson, Liberman, and Higgins, 2000; Levine, Higgins, and Choi, 2000; Florack and Hartmann, 2007). To explore this, Study 5 utilized a real money sequential gamble paradigm that played out over 10 rounds. This enabled us to examine participants’ motivation to gamble contingent on whether they won or lost in the previous round. If crowded participants are indeed more sensitive to losses than uncrowded participants, they should display a greater reticence to gamble following a loss.

Method

Fifty-six students in a North American university participated in this study for extra credit. The study was held in a regular classroom and was conducted via a paper and pencil survey. As in the pilot study, Study 2 and Study 4, participants were randomly assigned to either the crowded or uncrowded condition and were presented with the crowded or uncrowded images shown in Figure 1. As before, participants were asked to spend a few moments looking at the image and to briefly describe how they would feel if they were in it.

Next, in a supposedly unrelated task, participants were presented with a series of investment decision tasks following a paradigm used by Shiv et al. (2005). Specifically, all participants were told they had been given $10 and were to treat the money as real because there was a 50% chance they would receive a gift card containing the amount of money they earned at the end of the study. They were told they would be making 10 rounds of investment decisions, and must decide whether to invest or save $1 in each round. When they invested a dollar, the
outcome of the investment was determined by the virtual tossing of a coin on a large screen in
the room. If the toss was heads (50% chance), the participant would lose the dollar invested, and
if the toss was tails (50% chance), the participant would be rewarded with $2.50 in his/her
account. Of particular note is that this pattern of outcomes leads the expected value of gambling
to be greater ($1.25) than not gambling ($1). Participants were further incentivized to maximize
their return by being told that gift cards containing the amount won would be awarded to the
50% with the highest balances after 10 rounds.

Results and Discussion

We first examined the overall rejection rate of the gamble across all ten rounds and found
that while participants in the uncrowded condition kept the dollar in only 22% of the rounds on
average, those in the crowded condition kept the dollar in 36% of the rounds ($t (54) = -2.17, p
< .04). Thus, crowded participants were more risk averse on average. To better understand this
risk aversion, we next explored whether the outcomes of the previous round (i.e., winning or
losing) influenced gamble decisions differently across crowding conditions. To this end, the total
number of investments made following a loss or a win in the previous round was counted. A
Wilcoxon signed-rank test revealed that while uncrowded participants invested in 75% of the
rounds immediately following a loss, only 49% of crowded participants did so ($p < .04).
However, in the rounds following a win, there was no difference in the propensity to invest
between the uncrowded (95%) and crowded (97%) participants.

Discussion
The results of Study 5 support our hypothesis that a crowding-induced avoidance motivation leads individuals to become more sensitive to risk cues in their environment. Over ten rounds, not only did crowded participants take part in fewer expected value positive gambles, but this reticence was also primarily driven by an increased rate of rejection of the gamble in rounds immediately following a loss. This particular pattern is consistent with crowded participants being more sensitive to risk cues and thus to overweighting prior losses when making subsequent investment decisions. Moreover, the fact that Study 5 was based on real money gambles provides further support for the Study 4 finding that the degree of social crowdedness can moderate actual important behavioral choices.

**GENERAL DISCUSSION**

The current research identifies an important mechanism via which the crowdedness of an environment can influence consumer decisions made in that environment. Six studies combine to suggest that a higher level of social crowdedness leads individuals to adopt a greater prevention focus and to display a resulting shift in preference toward conservative choice options. In the pilot study, participants who imagined themselves in a crowded scene subsequently displayed a significantly stronger prevention focus. Study 1 built on this finding by demonstrating that individuals in a physically crowded (vs. uncrowded) room displayed both a greater preference for safety-oriented choice options and an increased accessibility of safety-related words. Study 2 brought the first two studies together by revealing that the prevention focus evoked by imagining
being in a crowded environment mediated participants’ preference toward safety-oriented choice options. Study 3 demonstrated that the composition of the crowd serves as an important moderator of the core effect with much stronger effects being observed when the crowd was composed of out-group (as opposed to in-group) members. Study 4 served both to generalize the obtained effects to the persuasiveness of prevention-framed messages, and to demonstrate the potential for social crowding to influence an actual (in this case health-oriented) behavior. Finally, Study 5 revealed that being crowded influences risk aversion more generally by revealing that crowded individuals were much more sensitive to prior round losses in a sequential gamble paradigm.

Theoretical and Practical Implications

We believe these findings add a new dimension to research on crowding, which has to date primarily centered on relatively narrow behavioral outcomes such as task performance or social behavior (e.g., Epstein and Karlin 1975; Evans and Lepore 1993). Similarly, consumer researchers have thus far shown only that store crowding decreases shopping satisfaction (Eroglu et al. 2005), precipitates an earlier departure from a crowded store (Hui and Bateson 1991), and can threaten consumers sense of individuality (Xu, Shen, and Wyer 2011). The current research builds on these findings by demonstrating a specific way in which an avoidance motivational state induced by being socially crowded can influence subsequent information processing and decision-making.

Our research also adds to the emerging literature on the significant (and automatic) effects that features of the consumption environment can have on important (and often
automatically determined) consumer behaviors (e.g., Chartrand et al. 2008; Dijksterhuis et al. 2005; Mandel and Johnson 2002; Ferraro, Bettman, and Chartrand 2009). More specifically, the current research joins a growing body of work chronicling how uniquely social cues, such as behavioral mimicry (Tanner et al. 2008) or facial familiarity (Tanner and Maeng 2012), can influence consumers. In particular, Tanner and Maeng’s (2012) argument that individual faces can automatically invoke approach and avoid motivations is conceptually related to our underlying proposition that crowds induce an avoidant response. In essence, both findings constitute examples of how evolutionarily adaptive outcomes of the primal approach/avoid system can materially impact the behavior of the modern consumer.

More practically, be it a doctor on a ward, a trader on a trading floor, or a voter at a political rally, many risk sensitive decisions are made in environments that can vary considerably in their crowdedness. As such, we believe our research has potentially significant implications for both marketing practitioners and public policy makers desirous of moderating specific behaviors. For example, are there particular advantages to emphasizing one set of product features over another? When is it better to promote healthy behaviors by emphasizing the benefits of adopting healthy actions, and when is it preferable to emphasize the cost of not adopting that behavior? Our data suggests that the crowdedness of the environment in question can materially inform how we go about answering these questions. For example, as far as the retail industry is concerned, Study 4 revealed that different message frames vary in their effectiveness depending on the crowdedness of the environment. As such, in a world where digital signage is enabling more sophisticated and dynamic messaging, it may be in the retailers’ interest to alter both their promotional strategies (e.g., which deals are highlighted) and messaging, depending on how crowded the store is. From a public policy perspective, our data
would suggest that, for example, delivering messages about the harm of not eating vegetables (i.e., a prevention focus) would be more persuasive to shoppers in crowded stores, whereas messages focused on the benefits of eating vegetables (i.e., a promotion focus) would be more effective to shoppers in less crowded stores. Similarly, while a politician at a crowded rally might want to frame certain elements of her policy in avoidance terms, the same policy ideas might be more persuasive if presented with an approach frame when giving a TV interview (where the audience is likely to be uncrowded).

Future Research

A particular promising direction for future research is to identify boundary conditions of the effects presented here. First, it is possible that the link between social crowding and a defensive state is not universal but culture specific. Hall (1966) argued that the actual size of personal space varies as a function of country of origin, such that individuals from cultures with high population-density have smaller personal spaces. Thus, it is certainly possible that the effects we observed might be attenuated, or even reversed, for individuals from highly populated areas.

Second, beyond the in-group/out-group moderation we identified, the influence of social crowding on downstream behaviors might also vary across different crowd types and contexts. Specifically, emerging evidence has documented two functionally discrete threat management systems, one committed to self-protection and the other dedicated to disease avoidance (see Neuberg et al. 2011 for a review). While both systems bias behavior in a risk-averse manner to minimize threats to the individual, they are functionally distinct (being located in different
neurobiological substrates) and are thought to engage different emotions: fear/anxiety for self-protection and disgust for disease avoidance (Cottrell and Neuberg 2005; LeDoux 1990; Oaten et al. 2009). In this article, we proposed and evidenced that the mechanism underlying our data is related to the self-protection system. However, the disease avoidance threat management system may also be activated by crowding, as crowded environments are disproportionally likely to be contaminated. Given that fear and disgust also have been shown to have very different cognitive consequences (Yartz and Hawk 2002), it is possible that variation in the specific type of threat different types of crowds are perceived to represent might actually lead to very different outcomes for choice and decision-making.

Third, further research can explore the degree of crowding required to invoke the effects identified here, and examine whether a relationship (linear or otherwise) exists between the size (and/or density) of the crowd, and the level of avoidance response that results. While outside the scope of the current research, it is of note that while the primary image we used to prime crowdedness featured a very large outdoor crowd, the natural crowdedness manipulation used in Study 1 relied upon only ten people in a small room. As such, these data are certainly indicative of the possibility that the effects we identify can occur in response to various levels of crowdedness.

Finally, research might fruitfully examine other aspects of social crowding, such as the potential for unintended physical contact to occur. For example, it is interesting to contrast our Study 5 finding, that crowding attenuates financial risk taking, with recent research demonstrating that physical contact can actually result in the opposite effect (Levav and Argo 2010). Certainly, given that a direct consequence of a more crowded environment is increased probability of physical contact, these results may initially appear to be potentially in opposition.
However, consistent with emerging research identifying the differing cognitive consequences of deliberate and accidental touch (Gustafsson, Otterbring, Peck, and Webb 2013), a likely resolution is to be found in the type of physical contact that may occur. Specifically, Levav and Argo (2010) examine the effect of a “light comforting pat on the shoulder” which is clearly different from the accidental jostling type contact that can occur in socially crowded environments. While the former is an accepted social expression of comfort and reassurance, and invokes feelings of security (Levav and Argo 2010), the latter is unlikely to carry such positive connotations. That said, we nonetheless find the contrast between the two very interesting, in that it highlights a potential example of how two notionally closely related social stimuli can in fact lead to very different downstream consequences.

Conclusion

Despite the fact that level of social crowdedness varies significantly in many domains in which consequential decisions are made, few studies have examined how being crowded might influence the decisions we make. Building on research suggesting that personal space violations lead to an avoidance response (e.g., Dosey and Meisels 1969; McDowell 1972), this article reveals that being crowded leads to increased preference for safety-oriented products, and to a reduced tolerance for risk more generally. This article, therefore, contributes to a growing body of work suggesting that environmental cues in general, and social cues in particular, can significantly influence downstream consumer behavior.
References


Strength During Goal Attainment: Regulatory Focus and the 'Goal Looms Larger' Effect."


McDowell, Kenneth V. (1972), "Violations of Personal Space," Canadian Journal of


Shah, James Y., Paige C. Brazy, and E. Tory Higgins (2004), "Promoting Us or Preventing Them:..."


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<td>$t(72) = -1.09$</td>
<td>$p &gt; .27$</td>
</tr>
</tbody>
</table>
FIGURE 1

PRIMING STIMULI USED

uncrowded prime\textsuperscript{1}  
crowded prime\textsuperscript{1}  
cluttered prime\textsuperscript{2}

\textsuperscript{1} used in pilot study, study 4, and study 5

\textsuperscript{2} used in study 2
FIGURE 2
STUDY 1: WORD GRID USED

Notes: Answer key appears on the right hand side.
FIGURE 3

STUDY 2: RELATIVE PREFERENCE TOWARD SAFETY ORIENTED OPTIONS BY CONDITION

<table>
<thead>
<tr>
<th>Experimental Conditions</th>
<th>Option Preferences</th>
</tr>
</thead>
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<tr>
<td>Crowded</td>
<td>4.56</td>
</tr>
<tr>
<td>Uncrowded</td>
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</tr>
<tr>
<td>Control</td>
<td>3.64  3.52</td>
</tr>
<tr>
<td>Clutter</td>
<td>3.44  3.56</td>
</tr>
</tbody>
</table>

- ■ preference for pharmacy (vs. convenience store)
- ■ preference for first-aid products (vs. cookies)
FIGURE 4

STUDY 3: PRIMING STIMULI USED

uncrowded prime  crowded prime
FIGURE 5

STUDY 3: OPTION PREFERENCES BY CONDITOINS

<table>
<thead>
<tr>
<th>Experimental Conditions</th>
<th>in-group</th>
<th>out-group</th>
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<td>Uncrowded</td>
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<td>4.6</td>
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<td>Control</td>
<td>4.63</td>
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</tr>
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</table>
FIGURE 6

STUDY 4: MESSAGE RATINGS BY CONDITIONS

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Framing</th>
<th>Measures</th>
<th>M crowded (7-point scale)</th>
<th>M uncrowded (7-point scale)</th>
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</thead>
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<tr>
<td></td>
<td></td>
<td>Loss frame</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Message</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appeal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Convincing</td>
<td></td>
<td></td>
<td>5.07</td>
<td>4.69</td>
</tr>
<tr>
<td></td>
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<td>(1.43)</td>
<td>(1.30)</td>
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<tr>
<td>Appealing</td>
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<td>4.7</td>
<td>4.14</td>
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<td></td>
<td></td>
<td>(1.51)</td>
<td>(1.36)</td>
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<tr>
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<td>4.0</td>
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<td>(1.56)</td>
<td>(1.40)</td>
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<td>(1.59)</td>
<td>(1.52)</td>
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<td>Keeping up</td>
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<td></td>
<td>(1.63)</td>
<td>(1.58)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gain frame</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Message</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appeal</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Convincing</td>
<td></td>
<td></td>
<td>4.42</td>
<td>4.64</td>
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<td>(1.35)</td>
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<td>(1.35)</td>
<td>(1.56)</td>
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<tr>
<td>Speaking</td>
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<td>4.08</td>
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<td></td>
<td>(1.39)</td>
<td>(1.5)</td>
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<td>Importance</td>
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<tr>
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<td></td>
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<td>(1.60)</td>
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<tr>
<td>Keeping up</td>
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<td></td>
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<td>4.68</td>
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<tr>
<td></td>
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<td>(1.21)</td>
<td>(1.45)</td>
</tr>
<tr>
<td>Averaged</td>
<td>Loss frame</td>
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<td>4.40</td>
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<td>Message</td>
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<td></td>
<td>(1.30)</td>
<td>(1.20)</td>
</tr>
<tr>
<td>Appeal</td>
<td>Gain frame</td>
<td></td>
<td>4.27</td>
<td>4.37</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(1.08)</td>
<td>(1.30)</td>
</tr>
</tbody>
</table>

Notes: Standard deviations appear in parentheses.
FIGURE 7

STUDY 4: CHOICE TO FLOSS BY MESSAGE FRAME AND CONDITIONS

Percentage of Choice to Floss

- Promotion-framed
  - crowded: 16.4%
  - uncrowded: 22.6%

- Prevention-framed
  - crowded: 53.7%
  - uncrowded: 27.5%

Message Framing