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In-Store Mobile Phone Use and Customer Shopping Behavior: Evidence from the Field

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In-Store Mobile Phone Use and Customer Shopping Behavior: Evidence from the Field

Abstract

This research examines consumers' general in-store mobile phone use and shopping behavior. Anecdotal evidence has suggested that mobile phone use decreases point-of-purchase sales, but the results of the current study indicate instead that it can increase purchases overall. Using eye-tracking technology in both a field study and a field experiment, matched with sales receipts and survey responses, the authors show that mobile phone use (versus nonuse) and actual mobile phone usage patterns both lead to increased purchases, because consumers divert from their conventional shopping loop, spend more time in the store, and spend more time examining products and prices on shelves. Building on attention capacity theories, this study proposes and demonstrates that the underlying mechanism for these effects is distraction. This article also provides some insights into boundary conditions of the mobile phone use effect.

Keywords: in-store mobile phone use, distraction, retail purchases, attention capacity, eye tracking.

According to the Pew Research Center (2017), 95% of U.S. consumers own a mobile phone, and nearly 77% own a smartphone; the rates are even higher among young consumers. Penetration rates have reached approximately 65% worldwide and 84% in Europe (GSMA 2017). For many consumers, their mobile devices are tools "they couldn't live without" (Horrigan and Duggan 2015), relying on them for texting, voice or video calls, accessing the Internet, email, social networks, and games. Adults spend nearly six hours daily consuming digital media, and almost half of that consumption comes from mobile devices (eMarketer 2017). In turn, retailers and brands use mobile channels to communicate with consumers.

Consumers depend so much on their mobile devices for information and engagement though that they may become distracted from reality. According to the National Safety Council (2015), mobile phone use causes 3 million automobile crashes annually, prompting the need for digital highway signs that remind drivers "No texting and driving." This form of distraction stems from an inability of the human brain to focus on multiple tasks simultaneously; it also implies some negative impacts for retailers, especially those that rely on impulse purchases. That is, rather than browsing impulse offerings (e.g., candy, magazines, beverages) while waiting in line at checkout counters, modern consumers often use the downtime to scan information on their mobile devices (i.e., mobile blinders), without ever looking up to notice the point-of-purchase displays.

Other negative effects of in-store mobile phone usage have been reported too, including reduced consumer recall of in-store marketing stimuli (Bellini and Aiolfi 2017), a failure to accomplish shopping goals (Atalay, Bodur, and Bressoud 2017), and loss of trust in brick-and-mortar stores if consumers find lower prices through their phones (Broeckelmann and Groeppel-Klein 2008). In contrast, in-store mobile phone usage might evoke positive effects, such as expanded information search capabilities, wider evaluations of alternatives (Burke 2002), and greater redemption of coupons sent to mobile devices (Hui et al. 2013a;

Klabjan and Pei 2011). However, we know of no studies that investigate the influence of consumers' general in-store mobile phone usage on sales, such that the pertinent effects throughout the store (not just on impulse purchases near checkout) remain uncertain.

Consumers often multitask by reviewing information on their mobile phones while they are shopping. Some retailers might seek to discourage this behavior, fearing the same type of negative effects that arise in impulse categories. But we propose that mobile phone use could increase retailer sales, due to consumer distraction. That is, because consumers perform multiple tasks (shopping and using mobile devices), their processing abilities diminish, such that these distracted consumers spend more time in stores, spend more time in front of product and information displays on shelves, and wander away from a set path more often when using their mobile devices. For retailers, these behaviors can translate into additional sales, especially to consumers who have diminished abilities to multitask due to their limited attentional capacity.

In examining these generalized effects of mobile phone usage in greater detail, we also establish some boundary conditions. For example, as we noted in the opening paragraph, the adoption of mobile devices in everyday life is vast and spans all demographic groups. Approximately 80% of U.S. customers older than 65 years of age own a mobile phone, and nearly half of them use smartphones (Pew Research Center 2017). But demographic characteristics strongly influence consumer behaviors (Mittal and Kamakura, 2001), so we consider the influence of age. We also examine how the purpose of the mobile phone usage (i.e., related to the shopping task or not) and the location in the store where consumers use their mobile phones (e.g., different food departments) affects shopping. Finally, we assess whether the distractions provided by phones decrease shopping satisfaction, because consumers sense they have spent or wasted more time in the store, or increase their satisfaction, because they can multitask and engage in enjoyable diversions while shopping.

In this research, we address the following research questions: Does mobile phone use in stores influence purchases? What mechanisms are responsible for this effect? What are the boundary conditions for the mobile phone effect? Does distraction due to mobile phone use decrease or increase customer satisfaction with the shopping experience? To explore these questions, we use eye-tracking technology and conduct two studies in six retail stores. By combining a field study with a field experiment, we address the potential limitations of each type of study. These data pertain to 424 complete shopping trips, recorded by more than 110 hours of eye-tracking videos that provide complete information about customers' visual fields (i.e., what they look at) and their movements throughout the store, from the moment they enter until they exit. We match these data with sales receipts and survey responses.

In turn, we make several theoretical and managerial contributions. First, from a theoretical perspective, we apply attention capacity theories to demonstrate that distractions, due to in-store mobile phone use, increase consumers' purchases. Second, we identify the behavioral mechanisms that lead to increased purchases. Distraction leads to increased purchases because consumers divert from their conventional shopping loop, spend more time in the store, and spend more time examining products/prices on shelves. Third, we reveal some boundary conditions. Accordingly, this study extends prior literature by illustrating how and when in-store mobile phone use results in greater purchases.

From a managerial perspective, our results suggest that retailers can increase purchases by encouraging customers to engage with their mobile phones while shopping, such as by adding quick-response codes that give consumers access to useful information through their mobile phones or making wi-fi readily available. As a critical takeaway for managers, we show that the effects of in-store mobile phone use on consumers' behaviors do not harm their satisfaction with the shopping experience; these levels are no different than those reported by consumers who do not use their phones. Encouraging customers to use their phones (related to the shopping task or not) thus can increase store purchases, without detracting from the shopping experience.

Theoretical Foundations

Mobile Literature Review

Recent calls for research on mobile shopping focus on the need to understand how these devices influence the shopping process (Shankar et al. 2016). Research on mobile devices tends to address mobile promotions or advertising (e.g., Bart, Stephen, and Sarvary 2014; for a review, see Grewal et al. 2016) or factors that influence mobile coupon redemption, such as delivery strategies for coupons (Bues et al. 2017; Danaher et al. 2015; Klabjan and Pei 2011), or physical crowding (Andrews et al. 2016). Other research streams explore predictors of mobile phone use (Broeckelmann and Groeppel-Klein 2008; Burke 2002) or the perceived ease of use of mobile phone interfaces (Kowatsch and Maass 2010). An overview of studies of *in-store* mobile phone uses appears in Table 1.

Insert Table 1 About Here

As we show in Table 1, most studies explore mobile promotion and redemption issues (e.g., Danaher et al. 2015; Fong, Fang, and Luo 2015; Hui et al. 2013a; Klabjan and Pei 2011) or how different types of handheld devices affect information searches and purchase intentions (Burke 2002; Kowatsch and Maass 2010). For example, Hui et al. (2013a) demonstrate that in-store mobile phone promotions encourage consumers to walk more circuitous routes; they specify that targeted mobile promotions for consumers in a store increase the distance they travel, the amount of time they spend, and their unplanned spending in the store. By offering mobile advertising concurrently with consumers' shopping experiences, retailers seemingly can engage consumers with the brand and drive purchases.

In contrast, little research explores *general* mobile phone use when shopping, such as talking, texting, or answering e-mails, or how these general uses determine overall purchases in the store. This latter question is critical to store managers, even more so than purchase intentions or customer preferences simulated through online experiments. We know of only two studies that consider general mobile phone use, though neither of them addresses the effect of mobile phone use on total purchases, nor do they directly measure the mechanisms responsible for any impact of mobile phone use on consumers' behaviors. Rather, Sciandra and Inman (2016) identify the activities for which mass merchandise shoppers use their phones and test the impacts on unplanned purchases and omissions of planned purchases. When customers use their mobile phones for shopping task–related activities (e.g., shopping lists, calculations), they report shopping less for unplanned items, whereas customers using their mobile devices for unrelated tasks increase their unplanned spending. Thus, mobile devices seemingly can increase or decrease shoppers' cognitive resources and thus the quality of their decision making. In a survey-based study in a supermarket, Bellini and Aiolfi (2017) instead find no differences in unplanned purchases according to the type of cell phone usage. These results highlight the need to explicate and test underlying mechanisms that might explain the effects of mobile phone usage on overall shopping expenditures.

Conceivably, when consumers focus more on their phones, they pay less attention to products on the shelves, and these mobile blinders might lead to reduced purchases overall. Alternatively, when they are distracted by tasks on their phones, consumers might pay less attention to their shopping goals or the time they have spent in the store and therefore buy more, in line with evidence that shows that when consumers deviate from their shopping goals, they purchase more unplanned items (Inman, Winer, and Ferraro 2009; Sciandra and Inman 2016; Thomas and Garland 1993). The behavioral mechanisms responsible for any such impact on purchases are highly relevant from theoretical and managerial perspectives. That is, if general mobile phone usage facilitates deviations, retailers might benefit from increased purchases. These types of deviations also might reflect age effects, especially if they are a function of consumers' attention. Attention to a given task relates to working memory, which is susceptible to aging processes (Hertzog et al. 2003; Park et al. 2002) (as we discussed in detail subsequently). Therefore, increased purchases due to general mobile phone use might vary as a function of consumers' age. As Table 1 indicates though, age effects rarely have been explored. We seek to provide an expanded test of whether in-store mobile phone usage prompts consumers to take less direct routes through stores and increase their purchases (Hui et al. 2013a), by investigating the impact of general phone use on retail purchases and its related mechanisms, while also highlighting some boundary conditions of these effects.

Limited Attentional Capacity Theories and Distraction Literature Review

Limited attentional capacity theories apply to research contexts ranging from product placement in video games (Lee and Faber 2007) to retrieval differences in auditory versus visual distractions (Choi, Lee, and Li 2013) to less deliberate processing in distracting circumstances (Chaiken 1980; Petty, Cacioppo, and Schumann 1983). These studies consistently point to the same basic premise: Distraction diverts people's attention from a focal task, so their processing of that focal task slows to some degree. We adopt this basic premise in our study and predict that, due to limited attentional abilities, shoppers are unable to process multiple streams of information concurrently (Repovš and Baddeley 2006).

There are many reasons people experience limited attentional capacity (e.g., involvement in a focal task limits the resources available to process another task; Lee and Faber 2007), but distraction is the focus of this study. Most research on distraction and consumer behaviors (see Table 2) relies on artificial laboratory settings, pertains to areas unrelated to mobile phone usage, and does not include purchases or consumer spending as outcome variables. Moreover, though working memory and distraction effects are very susceptible to aging processes (Hertzog et al. 2003; Park et al. 2002), none of the articles in

Table 2 explore age effects. Instead, they focus on consumers' evaluations of products (Biswas, Biswas, and Chatterjee 2009; Janiszewski, Kuo, and Tavassoli 2013; Lerouge 2009; Posavac et al. 2004) or food preferences (Nowlis and Shiv 2005; Shiv and Nowlis 2004) when those consumers are distracted.

Insert Table 2 About Here

Table 2 shows that studies offer mixed results regarding the effects of consumers' distraction. The outcomes appear to depend on whether distraction limits the rehearsal and retrieval of necessary information to make an informed decision (i.e., negative effect; Biswas, Biswas, and Chatterjee 2009), heightens an affective component of the consumer experience (positive effect; Shiv and Nowlis 2004), or does not invoke intended counterarguments that might have exerted an effect (no effect; Nelson, Duncan, and Frontczak 1985). As these examples illustrate, understanding the mechanisms underlying the distraction effect is critical, and it represents one of the contributions of this study.

Various theories seek to describe the limited attention of shoppers and the boundaries of their cognitive abilities in stores and elsewhere. For example, bottleneck theories (Broadbent 1958; Fagot and Pashler 1992) describe serial processing of one piece of information at a time. When people try to process multiple pieces of information simultaneously, their information processing slows down, due to the restricted bottleneck of available attention. In other words, people can try to process multiple tasks simultaneously (Navon and Gopher 1980; Norman and Bobrow 1975), but at some point, their attentional capacity restricts this processing.

Theories about working memory also are informative (Unsworth and Robison 2016). Working memory is a consumer's cognitive ability to store, process, and manipulate information, generally described as "the set of mechanisms capable of retrieving a small amount of information in an active state for use in ongoing cognitive tasks" (Cowan et al.

2005, p. 43). It influences critical features such as reading comprehension, overall intelligence, and general reasoning; it forms people’s ability to reason, make decisions, and engage in appropriate behaviors. In the model proposed by Repovš and Baddely (2006), working memory functions across information modalities (e.g., visual, verbal). Working memory might process language (phonological loop), process visual and spatial issues (visio-spatial sketchpad), and solve problems (central executive) simultaneously, through its different parts. However, if several tasks take up the same component of working memory, they cannot be executed successfully.

When people try to perform two tasks simultaneously, learning of the primary task diminishes, because working memory enables people to stay focused on a task while blocking out distractions. In a retail setting for example, it would not be possible to spatially navigate in the store while simultaneously looking at photos on Instagram or to undertake careful evaluations of products while talking with someone on the phone. However, a strong working memory capacity implies that a person can avoid distractions and achieve task goals (Engle 2002), likely because he or she streamlines cognitive functions to focus on task-relevant behaviors while avoiding task-irrelevant distractors (Conway, Cowan, and Bunting 2001).

In line with this reasoning, Garaus, Wagner, and Bäck (2017) show that simultaneous exposures to mobile ads and other marketing materials reduce shoppers’ attention to a target stimulus. In a retailing context, Stilley, Inman, and Wakefield (2010) claim that shoppers' inability to process all existing information in a store is an outcome of their limited processing capacity. For grocery retailers, the challenge is to capture shoppers' attention and develop tactics to influence their habitual in-store behavior (Mehta, Hoegg, and Chakravarti 2011). In addition, Baddeley (2010) highlights how working memory can be easily overloaded by sensory input. In a shopping context, a shopper’s working memory seemingly could be hindered by sensory inputs, such as looking at displays on a mobile phone.

Hypotheses

Mobile Phone Usage. On the basis of information processing and distraction theories, we predict that when consumers allocate information processing capacity to their mobile phones, the attention that they allocate to other focal tasks (e.g., shopping) diminishes, which hinders their performance on that task. If their focal task is shopping, consumers might assign less attention to their shopping goals or lists, for example, and deviate from them more frequently than they would if they were not using their phones. Shopping goals and lists keep consumers on track, in terms of both budgets and time spent in the store (Block and Morwitz 1999; Inman, Winer, and Ferraro 2009; Thomas and Garland 1993). The more attention consumers devote to the shopping task, the less likely they are to deviate from their planned purchases. According to attention capacity theories though, if some other task captures consumers' attention (i.e., mobile phone use), they have less information capacity remaining to allocate to the shopping task, which likely hinders the efficiency of the trip. Because consumers spend more time in the store, their purchases likely increase. Therefore, we hypothesize:

H_1: Mobile phone use in stores increases consumers' (a) total time spent in the store and thus (b) purchases.

When consumers use their mobile devices, and devote more information processing resources to them, they also assign fewer resources to proceeding through the store at a brisk pace; they might stop momentarily or slow down, to enable them to focus on their phones. The slower pace gives consumers more time to examine products and information on shelves in their immediate proximity. Imagine a person stopping in the middle of a grocery store to talk to a client on the phone. This shopper might be stationary for 30 seconds longer than normal; while talking, she or he likely glances around and examines information in the visual field, such as product and pricing information. In turn, the likelihood that this consumer sees products she or he might want or need increases.

This effect might occur even when consumers look at their phones more intensely to complete a task (e.g., typing an e-mail or text). Humans can fully analyze items within 2 degrees of the epicenter of their eye fixation—about the size of a thumbnail at arm's length (Anstis 1998; Pieters and Wedel 2012). Thus, even when closely engaged with their phones, consumers must look up occasionally (or stop walking) to avoid bumping into fixtures and other people. Even if just for a moment, this action forces them to fixate their eyes elsewhere, such as on products and pricing information on nearby shelves. Therefore, mobile phone use may increase the attention that people devote to shelves and displays, increasing the likelihood that the displayed products may appeal to shoppers. Thus,

H_2: Mobile phone use in stores increases (a) shelf attention and thus (b) purchases.

The perimeter of the supermarket is prime real estate, in that it encourages purchases of products located there (Hofbauer 2016; Strom 2012); popular media also suggest that the perimeter features healthier items and encourages consumers to stick to this outer loop (Escobar 2016). To minimize their cognitive effort, many consumers follow scripts (Bower, Black, and Turner 1979; Schank and Abelson 1977), including spatial scripts in a grocery shopping context to define how they move throughout the store. The more well-defined shoppers' scripts are for how to proceed during a specific type of shopping trip, the more they rely on these schemas, which get stored in long-term memory (Bettman, Luce, and Payne 1998; Block and Morwitz 1999) and influence where shoppers go in the store and which products they consider. The conventional consumer loop around grocery stores represents a natural path, from which consumers are unlikely to deviate unless something distracts them. For example, distracted consumers might mindlessly walk by needed items without placing them in their basket. Once they refocus on their shopping task, they may realize what they missed and turn around to obtain it. When customers backtrack, or deviate from their spatial script, they may see products that otherwise would have gone unnoticed. Therefore, distractions caused by mobile phone use may increase customer purchases by diverting them from their loop. Formally:

H_3: Mobile phone use in stores increases customers' (a) loop diversion and thus (b) purchases.

Finally, it is not mobile phone use itself that causes increased purchases but rather its effects, namely, the reduced information processing capacity that diminishes shoppers' ability to adhere to their shopping goals, spatial scripts, and the task at hand. In turn, the previously hypothesized outcomes of mobile phone use—total time spent in the store, shelf attention, and customer loop diversion—should constitute independent mechanisms that explain why mobile phone use increases consumers' purchases. Formally:

H_4: (a) Total time spent in the store, (b) shelf attention, and (c) customer loop diversion mediate the relationship between mobile phone use and increased purchases.

Boundary Conditions on the Effect of Mobile Phone Usage. We also examine potential boundary conditions related to in-store mobile phone usage. One key variable is customer age. Attention to a given task relates to working memory; working memory is very susceptible to aging processes (Hertzog et al. 2003; Park et al. 2002), such that consumers' processing capabilities and choices shift with age. For example, older people have more difficulty processing large amounts of information than younger people (Cole and Houston 1987; Roedder John and Cole 1986). When assigned a specific search task (e.g., pick out products using pertinent nutrition information), older shoppers are less accurate, in terms of finding the right products, than younger shoppers (Cole and Gaeth 1990), even if they think they have devoted equal effort to the task (Cole and Balasubramanian 1993).

A supermarket setting, with its tens of thousands of unique stockkeeping units (SKUs) competing for shoppers' attention, is likely to prompt age-related effects among shoppers. Such limitations imply that older consumers may become more distracted from focal tasks when they use mobile phones, whereas younger consumers can multitask more easily, due to their greater attention capacity. The postulated mechanisms for the current study (total time spent in store, shelf attention, and customer loop diversion) then may be more pronounced for older consumers. Specifically, relative to younger consumers, older consumers distracted by their mobile phones may be less inclined to keep their shopping goals in mind, thereby increasing the time they spend in a store; more likely to look up or stop walking, thereby increasing the likelihood that they fixate their attention on shelf information; and more likely to skip needed items, thereby increasing the likelihood that they turn around to retrieve them and deviate more in their shopping path.

We also examine in an exploratory fashion several other factors, such as mobile phone use (whether related to the shopping task or not) and the location in the store (i.e., grocery department) where consumers engage in their mobile phone usage. Finally, we examine how mobile phone usage might influence purchases differently in specific departments.

Study 1: Eye-Tracking Study of In-Store Shopping

Method

Grocery retailers often display thousands of different SKUs, such that the effects on consumers' attention vary, so we consider it essential to conduct this study with real-life data and real consumers. Testing the effects of mobile phones for just a few products in a laboratory experiment might enhance reliability, but it lacks sufficient ecological validity to test the hypotheses. Therefore, we obtained a data set of consumers of four grocery stores located in suburban areas of Stockholm, Sweden, which feature similar offerings. The stores in Studies 1 and 2 are large-scale retailers for Sweden but not supercenters; their average area was 36,140 square feet.[1]

Previous research uses different approaches to examine how customers behave inside

[1] In comparison, the average size of a U.S. grocery store is 45,000 square feet, though chains like Aldi and Trader's Joe are typically less than 20,000 square feet (Tuttle 2014). Thus, the grocery stores we study are about 20% smaller than typical U.S. grocery stores.

stores, such as tracking them with RFID chips on shopping carts (Hui et al. 2013a, 2013b) or providing customers with portable video recorders (Hui et al. 2013b; Zhang et al. 2014). To obtain information about what customers explicitly fixate on, we asked them to use eye-tracking devices as they completed their shopping trips. Specifically, research associates of a marketing research company randomly contacted consumers across the four stores and asked them to participate in an eye-tracking research study on shopping behaviors. The 393 recruited participants were asked to shop as they usually do. Some minor issues with poor video quality, dead batteries in the eye-trackers, or eye-trackers mistakenly turned off led to 359 full customer store visits for the analysis. An additional 65 participants did not complete the questionnaire required in the study, leaving a total of 294 participants (see the Appendix for the demographic profiles of Study 1 participants), who ranged in age from 18 to 73 years (M = 41.51 years), and 39.46% of whom were women. The demographic data gathered from the questionnaires revealed no significant differences across the four stores (or use or not of mobile phone) in customers' age, gender, or number of children living at home.

Tobii Pro portable eye-tracking glasses recorded the eye movements of the participants and their visual field. Eye tracking accurately captures what consumers do in the store and is well suited to examining the role of elements that might distract consumers from finishing their shopping trips as efficiently as possible (Wedel and Pieters 2008). The test administrators sat at the entrance of each store on different days of the week (Mondays–Sundays) during daytime hours (9:00 a.m.–5:00 p.m.). All consumers passing by the entrance were asked if they would be willing to participate in a research study and offered a coupon as compensation. No specific information about the purpose of the study was provided. Participants also had to respond to a short questionnaire, with items related to their demographic information. After they had shopped, the participants' glasses were collected by the test administrators, who also made copies of their purchase receipts. At this point, participants stated their satisfaction with the store visit too.

Measures

The eye-tracking software displayed both consumers' visual fields and where they fixated their eyes for the entire time they spent in the store (see Figure 1). The raw videos, consisting of more than 90 hours of video, were manually coded by the test administrators, using an extensive coding matrix that measures what the customer looks at and for how long. Coding quality checks were conducted by an additional researcher, using logic checks in the coded data and visual inspection as necessary. The quality checks that were conducted about mobile phone usage revealed no discrepancies with the coding. In turn, we could code and convert the measures into our key variables.

Insert Figure 1 about here

First, we measured how long the customer spent in the store, starting from the time he or she entered the store and ending when he or she reached the checkout line (in minutes and seconds). This variable is labeled "total time in the store."

Second, the visual attention measures included the number of analytical fixations a customer made on unique products on shelves and items directly attached to shelves, such as price tags. This approach is consistent with previous in-store research that relies on eye tracking (Chandon et al. 2009). The design of the portable eye-tracking glasses enables us to use the total number of fixations to operationalize attention (Hong, Misra, and Vilcassim 2016; Meißner, Musalem, and Huber 2016). A fixation was deemed analytical if the data coder assessed the length of the fixation and the scan path leading up to it as evidence of a conscious evaluation of the focal product or price tag. Every fixation on a product and price tag was recorded once; if a customer shifted his or her attention repeatedly between two products, those two products were recorded as one fixation each, for example. This variable was labeled "shelf attention."

Third, with the eye-tracking software, customer movements in the store could be assessed. The videos were coded, according to whether the customer diverted from the main customer loop, mapped as the natural path customers usually take through the different departments in the store. If a participant decided to turn around in the natural path, it was coded as a "customer loop diversion."

Fourth, we coded each participant according to whether she or he used a mobile phone (1) or not (0) during the shopping trip; we also calculated the total time participants used their mobile phones during the trip. Participants using their mobile phones used them for an average of .93 minutes (SD = .89), or 5.34% of their total time in the store. The exit survey gathered demographic variables, as well as overall satisfaction using a 7-point scale for the question item, "How satisfied are you with your store visit today?" We found no significant differences in satisfaction between customers who use their phones or not.

Fifth, we assessed customer spending from their actual receipts; we checked the number of items they purchased to affirm the robustness of the findings from our mediation and moderated mediation models for both studies (see Web Appendix A1). In unreported results, we find no significant indirect or direct effects if we use the average item price as the dependent variable (i.e., purchases/number of items). That is, mobile phone usage appears to drive incremental purchases by leading customers to buy more items, rather than more expensive items.

Results

Mobile Phone Usage, Direct and Mediation Effects. The direct effects of mobile phone usage in Table 3 reveal positive and significant main effects on purchase amounts, number of items purchased, time spent in store, shelf attention, and customer loop diversions. We tested three distinct mediation models with a bias-corrected bootstrap procedure (Model 4; Hayes 2013; Zhao, Lynch, and Chen 2010). In these models, mobile phone use (used/did not use) is the independent variable; total time spent in the store, shelf attention, and customer loop diversion are mediators; and total purchases is the dependent variable (see Figure 2).

Insert Figure 2 and Table 3 about here

In support of H_1, mobile phone use significantly influences total time spent in the store ($\beta = 4.59$, $p < .001$), and total time spent in the store influences total purchases ($\beta = 21.76$, $p < .001$). Furthermore, mobile phone use increases shelf attention (H_{2a} $\beta = 17.42$, $p = .01$) and customer loop diversion (H_{3a} $\beta = .97$, $p < .001$), both of which enhance total purchases (H_{2b} $\beta_{attention} = 3.97$, $p < .001$; H_{3b} $\beta_{diversion} = 69.41$, $p < .001$). In support of H_4, (a) total time spent in the store, (b) shelf attention, and (c) customer loop diversion each mediate the relationship of mobile phone use and increased purchases. All bootstrapping analyses include 100,000 iterations. We report 95% confidence intervals (CI) throughout all tests (unless noted). The CI for these indirect paths do not include 0, suggesting significant indirect effects (H_{4a} mobile phone use ⟶ total time spent in store ⟶ increased purchases, indirect effect = 99.92, CI [41.43, 163.33]; H_{4b} mobile phone use ⟶ shelf attention ⟶ increased purchases, indirect effect = 69.14, CI [13.35, 128.75; H_{4c} mobile phone use ⟶ customer loop diversion ⟶ increased purchases indirect effect = 66.99, CI [26.61, 118.62).[2] For the remaining direct effects, the coefficients are insignificant for all models: time spent in store ($p = .47$), shelf attention ($p = .08$), and customer loop diversions ($p = .17$).

If we adopt actual time spent on the mobile phone (in minutes) as the independent variable (as opposed to a dichotomous mobile use variable), the indirect effects again are significant (H_{4a} indirect effect = 80.98, CI [39.12, 126.27]; H_{4b} indirect effect = 59.77, CI

[2] Undoubtedly, the mediators could correlate. To assess if each mediator still can explain the relationship, when taking the others into account, we reexamined the mediation models with PROCESS Model 4 when all three mediators appeared simultaneously. The total indirect effect for all three mediators included simultaneously is significant, both here and in Study 2. Specifically, the individual pathways, while controlling for the other two paths, reveal that mobile phone use → time in store → sales is still significant in both Studies 1 and 2, and mobile phone use → shelf attention → sales is significant in Study 1 and directional in Study 2. However, the customer loop diversion pathway becomes insignificant in both studies.

[18.01, 102.52]; H_{4c} indirect effect = 33.63, CI [8.74, 79.67]). The direct effect coefficients again are insignificant for time spent in store (p = .81) and shelf attention (p = .22), but they are marginally significant for customer loop diversions (p = .06)

Boundary Condition: Age Moderation. Using PROCESS Model 1, we test the interaction effects between mobile phone use and standardized age on (a) time spent in the store, (b) shelf attention, and (c) customer loop diversion. We find significant interaction effects for time spent in store ($t_{(290)} = 2.16$, $p < .05$) and customer loop diversion ($t_{(290)} = 3.63$, $p < .001$), as well as marginal significance for shelf attention ($t_{(290)} = 1.84$, $p < .07$). Because the age measure is continuous, we also could determine the ages at which mobile use significantly affects customer outcomes. To find the absolute value of the age at which the effects become significant (p = .05), we use the Johnson-Neyman technique (Hayes 2013) and present the results in Figure 3. Specifically, 76.19% of the sample exhibited significant effects on time spent in the store, 63.61% on shelf attention, and 79.93% on customer loop diversions.

Insert Figure 3 about here

Discussion

Using eye-tracking field data, matched with survey and actual purchasing data, we determine that customers who use their phones while in stores spend more. These results confirm a positive effect for retailers when shoppers use mobile devices. The mechanisms responsible include more time in the store, more shelf attention, and greater customer loop diversion, in line with attention capacity theories (Broadbent 1958; Fagot and Pashler 1992; Navon and Gopher 1980; Norman and Bobrow 1975). It is likely that mobile phone use influences increased purchases through a distraction-based mechanism.

Furthermore, our finding of moderation by age supports attention capacity theories that acknowledge the susceptibility of working memory to the aging process (Hertzog et al.

2003; Park et al. 2002). Older consumers are more susceptible to the effects of in-store phone use, such that they spend more time in the store, divert from their path more often, and devote more attention to examining shelves than do younger consumers. Despite these influences, consumers who use their mobile devices in stores report no differences in their satisfaction levels, suggesting that retailers can safely encourage in-store mobile phone use without risking a decline in customer satisfaction.

Despite the real-world nature of these data, Study 1 suffers two key weaknesses. First, respondents self-selected into either the mobile phone use or nonuse group, implying a potential for self-selection biases. That is, our result might be due to some common unobserved factor that causes respondents to self-select into one group or the other (e.g., low self-control, high level of variety seeking in experiences). Second, we infer, rather than directly measuring, customers' distraction, based on their other in-store behaviors. With Study 2, we seek to replicate the results from Study 1 while addressing these concerns.

Study 2: Field Experiment with Mobile Phone Use

First, we aim to replicate the Study 1 results, including those related to the three mediating elements that explain an increase in purchases when customers use their mobile phones. Second, to deal with the potential issue of self-selection bias, we adopted an experimental design for Study 2 in which every participant was randomly assigned to a mobile phone use or nonuse group, encouraged to use, or discouraged from using their mobile phone during the shopping trip, regardless of what they usually did while shopping. Third, with a four-item scale to measure consumers' distraction levels across conditions, we undertake a more direct test of our theoretical framework pertaining to limited attention capacity. When consumers in the mobile phone use condition use their phones, it diverts their attention from the focal task (i.e., shopping) and slows processing of that task, so consumers should acknowledge feeling more distracted in this situation, because their attention capacity is spread across different tasks. Therefore, with Study 2 we test a serial mediation model that explicitly captures consumers' distraction levels and how those levels influence behavioral responses: increased time spent in the store, shelf attention, and customer loop diversion, which ultimately affect purchases.

Method

Study 2 took place in two different grocery stores. We recruited 121 participants and asked them to shop as they usually do. Four participants were omitted due to technical issues with the eye-tracking videos, resulting in 117 participants and approximately 24 hours of eye-tracking video footage. Participants ranged in age from 19 to 80 years (M = 42.94 years), and 52.14% were women. The Appendix contains the demographic profiles of the Study 2 participants. The field data collection was conducted by field associates of the same marketing research company that provided the Study 1 data.

The approach was similar to Study 1, with a few minor differences. The test administrator randomly approached every fifth customer who walked past a predefined point and asked them to participate in a study on consumer behavior, with a scratch-off lottery ticket offered as compensation. Customers who agreed were asked if they had a mobile phone with them; only four did not, and they were disqualified from participating further. Next, each participant was assigned randomly to either the mobile phone use or nonuse group and received instructions relevant for this experimental group.

The instructions to the mobile phone group were, "We are interested in your shopping behavior when you are using your smartphone. This includes sending e-mails, sending or reading text messages, searching online, playing games, or any other use of the phone in any place of the store. Please use your smartphone during this shopping trip when you want, based on your own needs." The instructions to the no-mobile phone group instead were, "We are interested in your shopping behavior when you are NOT using your smartphone. Could we ask you to please put it away for this shopping trip? This means that we would want you to avoid sending e-mails, sending or reading text messages, searching online, playing games, or any other use of the phone. Please do not use your phone at all, if possible." After receiving these instructions, each customer was asked to shop as usual. Then, after he or she was done shopping, the eye-tracking glasses were collected by the test administrator; copies were taken of the customer's receipt, and the customer was asked to complete the demographic and satisfaction survey items, as in Study 1. Furthermore, participants completed the new distraction measure at this point.

Measures and Data Analysis. The measures were the same as in Study 1,[3] except that we added a measure of customers' distraction levels, with four items (Cronbach's α = .90): "I felt distracted during my shopping trip today," "I felt I was multi-tasking during my shopping trip today," "I was preoccupied with other tasks during this shopping trip," and "I kept getting sidetracked with other issues during this trip."

Two satisfaction items were measured on a seven-point semantic differential scale (1 = "very dissatisfied" to 5 = "completely satisfied"): "How satisfied were you with today's shopping trip?" and "How satisfied were you with the service in the store today?" There were no differences across the phone use groups in shopping trip satisfaction or service satisfaction. Nor did we find differences across customers using mobile phones in terms of age, gender, or household size.

Manipulation Checks. In the post-purchase questionnaire, participants indicated whether they used their mobile phones. Of 64 participants in the nonuse group, 96.9% followed the instructions and did not use their phones. Two used their phone and noted that they did so because they received a call that they "had to take." In the use group, of 53

[3] To assess the quality of the coding, a random sample of 24% of the eye-tracking videos from Study 2 were coded on the variables "time in store" and "time spent on mobile phone" by an independent coder. Both variables had high correlation with the original coding (r = .95 and r = .93).

participants, 96.2% used their phones. Participants in the mobile use condition used their phones for an average of .74 minutes (SD = 1.36), or 4.82% of their total time in the store. These high compliance rates indicate that the experimental design worked well. Thus, all cases were included to represent these experimental groups.[4]

Results

Mobile Phone Usage, Direct and Mediation Effects. With regard to the direct effects of mobile phone use (for the t-test results, see Table 4), we find significant, positive effects on distraction, number of items, time spent in store, and shelf attention, as well as marginally significant effects on customer loop diversions and purchase amounts.[5]

Insert Table 4 about here

We next assess the three mediation models with a bias-corrected bootstrap procedure (Model 4; Hayes 2013). In support of H_1, mobile phone use again significantly influences total time spent in the store ($\beta = 4.45$, $p < .05$), and total time spent in the store influences total purchases ($\beta = 31.45$, $p < .001$). Mobile phone use increases shelf attention (H_{2a} $\beta = 25.84$, $p = .001$) and customer loop diversion (H_{3a} $\beta = .28$, $p < .07$), which both increase total purchases (H_{2b} $\beta = 7.13$, $p < .001$; H_{3b} $\beta = 238.39$, $p < .001$). Finally, total time spent in the store, shelf attention, and customer loop diversion all mediate the relationship between mobile phone use and increased purchases, in support of H_4.

The results from the bootstrapped CIs for the indirect effects are similar to those from Study 1, suggesting significant indirect effects for H_{4a} and H_{4b} and marginal indirect effects for H_{4c} (mobile phone use ⟶ total time spent in store ⟶ increased purchases, indirect effect

[4] We also ran the models without the noncompliant users. The results remained generally the same, except that we needed to apply a 90% CI for the moderating effect of age when mediated through shelf attention.

[5] To assess if the additional purchases came from certain departments, we consider five departments that reflect the stores' structures: fresh fruits & vegetables, fresh foods, staple foods, frozen foods, and non-food. Using regression analyses, we checked whether respondents in the mobile phone use condition shopped more in certain departments than did those in the nonuse condition. The results show that increased time spent on the phone exerts a positive impact on purchases in the fruits & vegetables department ($\beta = 31.88$, $p < .001$) and a marginal positive impact on staple food purchases ($\beta = 17.07$ $p < .09$). The effects in the other departments are not significant.

= 139.85, CI [14.58, 273.61]; mobile phone use ⟶ shelf attention ⟶ increased purchases, indirect effect = 184.27, CI [69.36, 312.31]; mobile phone use ⟶ customer loop diversion ⟶ increased purchases, indirect effect = 66.87, 90% CI [5.80, 139.05]). For the remaining direct effects, the coefficients are insignificant for time spent in store (*p* = .83), shelf attention (*p* = .35), and customer loop diversions (*p* = .38).

Similarly, when using actual time spent on the mobile phone (in minutes) as the independent variable, the indirect effects are significant (H_{4a} indirect effect = 84.76, CI [42.74, 207.11]; H_{4b} indirect effect = 78.20, CI [37.94, 187.41]; H_{4c} indirect effect = 79.76, CI [14.14, 151.25]). The direct effect coefficients are insignificant for all models: time spent in store (*p* = .89), shelf attention (*p* = .91), and customer loop diversions (*p* = .97). These results are consistent with the findings from Study 1.

Distraction as the Underlying Theoretical Mechanism. Using Model 6 in PROCESS to examine serial mediation paths, we test distraction as the underlying construct to explain the behavioral effects obtained in the mediation models of Studies 1 and 2. The result for the phone use → distraction → time spent in store → purchases path does not include 0, in support of both mediating mechanisms (indirect effect = 116.63, CI [29.89, 231.30]). Similarly, the paths of phone use → distraction → shelf attention → purchases (indirect effect = 79.94, CI [12.84, 172.71]) and phone use → distraction → customer loop diversion → purchases (indirect effect = 42.50, CI [6.60, 93.45]) do not include 0. Other possible indirect effects in the three models instead contain 0 in their CIs (i.e., phone use → distraction → purchases; phone use → time in store/shelf attention/customer loop diversion → purchases). The direct effect (phone use → purchases) is insignificant (Table 5). Therefore, the behavioral mediators in Studies 1 and 2 can be explained further by increased distraction caused by mobile phone use, providing support for the distraction-based mechanism.

Insert Table 5 about here

We also examine the mediating effects through distraction when using actual time spent using the phone as the independent variable. In these models, the serial mediation models again indicate that time spent using the mobile phone produces higher levels of distraction, which lead to the predicted behavioral effects (time spent in store, shelf attention, and customer loop diversions), and then to higher purchases. In this case though, the customer loop diversion model is only marginally significant (time using mobile phone → distraction → time spent in store → purchases, indirect effect = 66.98, CI [18.63, 140.76]; time using mobile phone → distraction → shelf attention → purchases. indirect effect = 48.60, CI [7.09, 100.18]; time using mobile phone → distraction → customer loop diversion → purchases, indirect effect = 18.16, 90% CI [1.68, 43.41]).

Boundary Condition: Age Moderation Effects. Using PROCESS Model 1, we test for interaction effects between mobile phone use and standardized age. We uncover significant interaction effects of age and mobile phone use on time spent in store ($t_{(113)} = 2.46$, $p < .05$), shelf attention ($t_{(113)} = 1.99$, $p < .05$), and customer loop diversion ($t_{(113)} = 3.00$, $p < .01$). Another significant interaction emerges between age and mobile phone use on distraction ($t_{(113)} = 2.25$, $p < .05$). Again, with our continuous measure of age, we check the point at which mobile phone use starts to have direct significant impacts on the customer measures, using the Johnson-Neyman technique (Hayes 2013). As we detail in Figure 4, 74.36% of the sample reveal effects on their distraction levels, 50.43% on time spent in the store, 66.67% on shelf attention, and 45.30% on customer loop diversions.

Insert Figure 4 about here

Location and Type of Usage Effects. Without explicit manipulations, we conduct exploratory analyses of other potential boundary conditions for the influence of mobile phone usage on distraction, such as where participants were when they used their phone and what they used it to achieve. First, for the regression to test the effect of different locations in the store, we again consider the different store departments: fruits & vegetables, fresh foods, staple items, frozen foods, non-food, and checkout. We coded these locations according to usage (1) or no usage (0) in that department. The results indicate that participants who used their phone in the fruits & vegetables ($\beta = 1.06$, $p < .01$) and fresh foods departments ($\beta = .77$, $p < .01$) were significantly more distracted (see Table 6). The effects of mobile usage in these departments on purchases also are significant, through distraction (as the first-stage mediator) and the three behavioral mediators (as second-stage mediators).[6]

Insert Table 6 about here

Second, we examined the activities for which shoppers used their phones, to determine how they affected distraction levels, using a similar regression analysis (1 = using the phone for a certain task, 0 = not using the phone for that task). We organized different activities into either store-related (e.g., shopping lists, retailer app use, handling transactions, searching for product information on the web) or non–store-related (all other) uses. Both types reveal positive coefficients on distraction levels, but only non–store-related activities significantly affect them ($\beta_{nonrelated} = .78$, $p < .001$; $\beta_{related} = .46$, $p = .22$; see Table 6). The effects of non–shopping-related mobile usage are significant on purchases, through distraction (first-stage mediator) and the behavioral mediators (second-stage mediators).[7]

With a separate field study, we considered the possibility that mobile phones function more like blinders in the checkout line, where customers are relatively immobile. For this field study, conducted in two grocery stores, observers were positioned behind the checkout

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[6] Specifically, in the fruits & vegetables department, distraction → time spent in store (indirect effect = 135.90, 95% CI [22.60, 289.52]), distraction → shelf attention (indirect effect = 96.30, 95% CI [7.47, 203.13]), and distraction → customer loop diversions (indirect effect = 42.25, 95% CI [2.68, 114.73]). In the fresh foods department, distraction → time spent in store (indirect effect = 133.48, 95% CI [26.17, 260.94]), distraction → shelf attention (indirect effect = 93.50, 95% CI [11.46, 202.90]), and distraction → customer loop diversions (indirect effect = 42.55, 90% CI [5.27, 80.55]), such that this latter effect is marginally significant.

[7] The mediation analysis reveals an effect of using the mobile phone for non–store-related activities on sales that is serially mediated by distraction and the three behavioral mediators: distraction → time spent in store (indirect effect = 114.18, 95% CI [28.89, 224.59]), distraction → shelf attention (indirect effect = 80.83, 95% CI [14.13, 170.71]), and distraction → customer loop diversions (indirect effect = 40.68, 95% CI [6.29, 87.41]).

areas, to watch how customers interacted with merchandise placed alongside the queues. The observers were instructed to remain as inconspicuous as possible; researchers took positions behind the checkout areas to examine how customers interacted with merchandise placed nearby. Of the 972 customers observed, 132 were using their mobile devices. A chi-square test, between mobile phone use and purchases from the shelf near the checkout area, reveals a significant association ($\chi^2_{(1)} = 6.69$, $p < .01$). On average, mobile phone use decreases purchases in the checkout area, from 13.2% (among customers not using phones) to 5.3% (among customers using their mobile phones). This effect highlights another potential boundary condition for the positive purchase effect of using a mobile phone while shopping.

Discussion

Study 2 serves several purposes. First, using an experimental design, we replicate the results from Study 1, which increases the internal validity of our findings. Second, the random assignment of participants to mobile phone use/nonuse conditions negates any self-selection bias issues and thus provides more support for our finding that mobile phone use increases purchases through several behavioral mediators. Third, we provide more direct support for our theoretical framework by showing that it is not phones per se that cause increased purchases; rather, phone use causes consumers to become distracted from a focal task, and this distraction leads to other behavioral responses (i.e., more time in the store, shelf attention, customer loop diversion), which then lead to increased purchases. Fourth, we offer initial, exploratory insights into several boundary conditions on these mobile phone usage effects.

The manipulation we imposed, regarding whether shoppers could use their mobile phones or not while shopping, could evoke potential demand effects. For example, consumers could feel more rushed in their purchase decisions. However, the consistency of the results with Study 1 mitigates this concern about demand effects to some extent. That is, the combination of our two studies overcomes each study's potential biases.

General Discussion

This study was motivated by four research questions, which structure this discussion.

Does Mobile Phone Use in Stores Influence Purchases? Prior research indicates both positive and negative effects of in-store mobile phone usage, such that anecdotal evidence implies the detrimental effects of mobile phone use on impulse purchases, due to the influence of mobile blinders. Across two studies, using extensive eye-tracking field data matched with customer receipts and surveys, we show that customers who use their phones in stores spend more, with positive overall effects for retailers—even if gum and candy purchases might decrease. In our studies, mobile phone use translated into greater purchases in both studies.

What Mechanisms Are Responsible for the Effect on Purchases? A simple explanation, consistent with attention capacity theories, is that mobile phone use causes consumers to get distracted from their shopping task. Once distracted, they spend more time in the store, attend to shelf information more, and divert from their normal path more often, which ultimately increases the amount they purchase. These results are consistent with findings from prior attention capacity research that indicate declines in task performance (e.g., recall, less deliberate processing) when consumers are distracted and divide their attention across tasks (Chaiken 1980; Craik et al 1996; Park et al. 1989; Petty, Cacioppo, and Schumann 1983). We extend these findings by showing that mobile phone use not only distracts consumers but also leads to increased store purchases as a result. The additional intervening processes, such as the use of mobile phones, likely prompt less deliberative processing, an effect that deserves further research attention.

One question that might arise is whether other forms of distraction could have similar influences. We investigate this issue post hoc by exploring consumers who shop with others versus alone. Several studies imply that the presence of others acts as a distractor from the task at hand (Baron, Moore, and Sanders 1978; Groff, Baron, and Moore 1983; Sanders 1980;

Sanders, Baron, and Moore 1978). For example, Baron, Moore, and Sanders (1978) find that the presence of others is a distraction because it causes attentional conflict between attending to a task and attending to others. In our study context, shopping with others might distract a consumer from the shopping task, just as mobile phone usage does, so we test this element and thereby provide a generalization of our predicted distraction mechanism to another in-store shopping factor.

Across both studies, we find that shopping with others leads to more purchases than shopping alone (Study 1: M_{alone} = 283.64 SEK, $M_{withothers}$ = 473.05 SEK, $p < .001$; Study 2: M_{alone} = 319.77 SEK, $M_{withothers}$ = 591.67 SEK, $p < .01$). The behavioral mechanisms responsible for these effects are distraction, increased time in store, shelf attention, and customer loop diversions—consistent with the mobile phone usage results (see Web Appendix A3).

What Are the Boundary Conditions for the Mobile Phone Effect? Consistent with research that shows that working memory is susceptible to the aging process (Hertzog et al. 2003; Park et al. 2002), we find that consumers older than 32 years become more distracted due to in-store mobile phone use, which ultimately increases their purchases. Again, it is not the use or distraction that directly increases purchases among older consumers but rather what getting distracted by their mobile phones does to them: It leads them to deviate from their shopping tasks (e.g., goals, lists), such that they ignore time efficiency goals, try to multitask, slow their pace through the store to focus on their phones, and move outside their conventional paths through the store. All these behavioral responses help explain why older consumers are more susceptible to the distractions that result from in-store mobile phone use.

We also highlight other boundary conditions in Study 2, related to where in the store consumers use their mobile phones and for what uses. Specifically, we highlight which departments benefit from people's use of mobile phones while in those areas (e.g., fresh fruit

& vegetables) and which do not (the checkout area). We also highlight how in-store uses of mobile phones for non–shopping-related activities enhance these mobile use effects.

Does Distraction Due to Mobile Phone Use Affect Customers' Shopping Experience? Our final research question reflects the interests of the managers we worked with in the stores, who were intrigued by our findings but concerned about potential pitfalls associated with encouraging in-store mobile phone use. In Study 1, we find no differences in satisfaction levels, indicating that mobile phone use does not increase or decrease customers' satisfaction with their shopping experiences. In Study 2, use of the mobile phone marginally lowers overall satisfaction but does not influence service satisfaction. Mobile phone use increases the amount of time and backtracking consumers do in stores, so the benefits that consumers get from their mobile phone use may make up for any inefficiencies caused by their multitasking.

Implications

Theoretically, this study extends limited attention capacity theory by applying it to the unique context of in-store mobile phone use. Consumers use their mobile phones for more than just voice calls or texts, so it is important to understand how these uses affect consumers' daily lives and alter their abilities to perform day-to-day tasks. Substantial research suggests ways to use mobile technology to communicate with customers (e.g., Andrews et al. 2016; Danaher et al. 2015; Grewal et al. 2016), but little investigation to date has explained how general mobile phone use might interfere with customers' performance of traditional activities, such as shopping. In addressing this gap, our results identify distraction as a key mechanism responsible for increased customer purchases, such that it leads to increased time in the store, shelf attention, and customer loop diversion—consistent with attention capacity theories. Finally, we identify boundary conditions of these effects, such that in-store mobile phone use causes older consumers to become distracted and increases the amount they purchase. We also provide preliminary evidence for the boundary roles of what consumers use their mobile phones to do and where they use them in the store.

From a managerial perspective, we demonstrate the practical benefits when customers use their mobile phones while shopping. The use of mobile phones increases their time in the store, alters their perceptions of the merchandise, and changes their shopping path. These in-store behaviors in turn result in a significant increase in purchases. Furthermore, this study shows that mobile blinders exist only in certain parts of the store (e.g., checkout aisle); they do not limit overall spending. Retailers thus might encourage in-store mobile phone use, such as through direct interactions that offer coupons or targeted advertising (Hui et al. 2013a) or by rewarding customers for their participation in a mobile game or app while in stores.

Another option might be to offer phone charging devices on customer carts, which could encourage use but also prompt customers to stay longer in the store, while they wait for their batteries to get boosted. Even providing free wi-fi service and encouraging customers to use it through signage could increase purchases. Coffee shops and restaurants offer free wi-fi services to prompt customers to linger and perhaps buy more. Other types of retailers should take notice; getting customers to use their mobile devices seems to work for not only coffee shops but grocery stores too—and likely other retail outlets as well. Ultimately, the goal must be to create a shopping experience that benefits both the customer and the retailer; our results show that retailers can gain increased shares and drive new purchases, simply by granting customers the freedom and means to remain connected during their shopping trips.

Limitations and Conclusions

Eye-tracking technology enables researchers to analyze behavior effectively and minimize self-reported bias and inflated survey responses. However, we lack access to measures of previous shopping behaviors, which could be of use for comparing behaviors. Additional research might seek a more comprehensive picture of not only the shopping situation but the shopper as well, by gaining access to loyalty card information or net promoter score measures. Research also might focus on visual scanpaths, which can be collected by eye-tracking glasses too, to detail the apparent differences in the cognitive processing of products that customers perform when they use mobile phones during their shopping trips or not. As we have argued, customers may be less analytical when distracted, and this effect could be explored with even deeper eye-tracking analyses.

Another key limitation of our novel use of portable eye-tracking glasses involves coding capacity: If the entire shopping trip is the subject of interest, the videos cannot be coded using automated scripts. Most studies that rely on eye tracking in a retail setting designate a single shelf or area of interest, which can be coded automatically by computer software (e.g., Chandon et al. 2009). Our coding had to be conducted manually, which inherently creates the potential for coding errors.

The present research focuses on the general effects of mobile phone use in physical stores. But our exploratory analyses suggest that mobile phone use has distinct influences in different parts of the store; for example, in fresh food areas (fruits, vegetables, meats, seafood, dairy, baked breads), this use leads to more distraction. One reason might be the actual location of produce departments (i.e., front of stores) in our retail settings. Consumers might not feel rushed when they start their grocery shopping trip, which allows them to be distracted more easily here than in other departments. The atmospherics of the fresh food areas also might be influential. They tend to offer more space, so consumers can more easily stop and use their mobile phones, without fear of blocking the aisles. Moreover, not all types of mobile phone use provide similar benefits (e.g., store- versus non–store-related tasks), such that non–store-related activities exert stronger effects on distraction levels. Non–store-related tasks include using mobile phones to listen to music or chat with friends. However, because of the scarcity of these activities among our sample respondents, our power to make meaningful comparisons across types of activities is limited. Additional research is needed to explore these ideas in more depth.

Further research also could extend our efforts to determine precisely what happens, for example, when customers are not moving (e.g., checkout line, deli counter) or when they are interacting with digital displays, in-store demonstrations, and service employees. Eye-tracking methodology can continue to provide greater insights into customer experience management. In line with Sciandra and Inman (2016), we anticipate a potential moderating effect of store-related uses (e.g., shopping lists, price comparisons), relative to non–store-related uses (e.g., social networking), of mobile phones. Additional research might prime customers with different mobile phone use activities to assess their effects on in-store shopping behaviors.

Finally, continued research should include different types of retailers (e.g., department stores). In the grocery store setting, in which our studies took place, price comparisons might be somewhat less important than in stores with higher priced merchandise, such as department stores or electronic retailers. For example, the eye-tracking data in our Study 2 (mobile phone use condition) indicate vast differences, such that only 18.9% of shoppers use their phones for shopping-related tasks, but 92.5% use them for unrelated tasks. The distribution of mobile uses for mass merchandisers appears more evenly split (Sciandra and Inman 2016). Furthermore, if some stores function like showrooms, mobile phones might enable consumers to purchase merchandise from the web while in the store (Rapp et al. 2015).

In conclusion, mobile phone use can lead to increased purchases for retailers, without detracting from customer satisfaction levels. We hope these results stimulate additional research on in-store mobile phone use, the role of age for customer interactions with in-store technologies, and how retailers can encourage customers' in-store mobile phone uses.

References

Andrews, Michelle, Xueming Luo, Zheng Fang, and Anindya Ghose (2016), "Mobile Ad Effectiveness: Hyper-Contextual Targeting with Crowdedness," *Marketing Science*, 35 (2), 218–33.

Anstis, Stuart (1998), "Picturing Peripheral Acuity," *Perception*, 27 (7), 817–25.

Atalay, Selin A., H. Onur Bodur, and Etienne Bressoud (2017), "When and How Multitasking Impacts Consumer Shopping Decisions," *Journal of Retailing*, 93 (2), 1–14.

Baddeley, Alan (2010), "Working Memory," *Current Biology*, 20 (4), R136-40.

Baron, Robert S. (1986), "Distraction-Conflict Theory: Progress and Problems," in *Advances in Experimental Social Psychology*, Vol. 19, Leonard Berkowitz, ed. Orlando, FL: Academic Press, 1-39.

Baron, Robert S., Danny L. Moore and Glenn S. Sanders (1978), "Distraction as a Source of Drive in Social Facilitation Research," *Journal of Personality and Social Psychology*, 36 (8), 816-824.

Bart, Yakov, Andrew T Stephen, and Miklos Sarvary (2014), "Which Products Are Best Suited to Mobile Advertising? A Field Study of Mobile Display Advertising Effects on Consumer Attitudes and Intentions," *Journal of Marketing Research*, 51 (3), 270–85.

Bellini, Silvia and Simone Aiolfi (2017), "The Impact of Mobile Device Use on Shopper Behaviour in Store: An Empirical Research on Grocery Retailing," *International Business Research*, 10 (4), 58.

Bettman, James R., Mary Frances Luce, and John W. Payne (1998), "Constructive Consumer Choice Processes," *Journal of Consumer Research*, 25 (3), 187–217.

Biswas, Dipayan, Abhijit Biswas, and Subimal Chatterjee (2009), "Making Judgments in a Two-Sequence Cue Environment: The Effects of Differential Cue Strengths, Order Sequence, and Distraction," *Journal of Consumer Psychology*, 19 (1), 88-97.

Block, Lauren G. and Vicki G. Morwitz (1999), "Shopping Lists as an External Memory Aid for Grocery Shopping: Influences on List Writing and List Fulfillment," *Journal of Consumer Psychology*, 8 (4), 343–75.

Bower, Gordon H., John B. Black, and Terrence J. Turner (1979), "Scripts in Memory for Texts," *Cognitive Psychology*, 11 (2), 177–220.

Broadbent, Donald E. (1958), *Perception and Communication*, Elmsford, NY: Pergamon Press.

Broeckelmann, Philipp and Andrea Groeppel-Klein (2008), "Usage of Mobile Price Comparison Sites at the Point of Sale and its Influence on Consumers' Shopping Behaviour," *International Review of Retail, Distribution and Consumer Research*, 18 (2), 149–66.

Bues, Mirja, Michael Steiner, Marcel Stafflage, and Manfred Krafft (2017), "How Mobile In-

Store Advertising Influences Purchase Intention: Value Drivers and Mediating Effects from a Consumer Perspective," *Psychology & Marketing*, 34 (2), 157–74.

Burke, Raymond R. (2002), "Technology and the Customer Interface: What Consumers Want in the Physical and Virtual Store," *Journal of the Academy of Marketing Science*, 30 (4), 411–32.

Chaiken, Shelly (1980), "Heuristic Versus Systematic Information Processing and the Use of Source Versus Message Cues in Persuasion," *Journal of Personality and Social Psychology*, 39 (5), 752–66.

Chandon, Pierre, J. Wesley Hutchinson, Eric T. Bradlow, and Scott H. Young (2009), "Does In-Store Marketing Work? Effects of the Number and Position of Shelf Facings on Brand Attention and Evaluation at the Point of Purchase," *Journal of Marketing*, 73 (6), 1–17.

Choi, Yung Kyun, Sung Mi Lee, and Hairong Li (2013), "Audio and Visual Distractions and Implicit Brand Memory: A Study of Video Game Players," *Journal of Advertising*, 42 (2-3), 219–27.

Cole, Catherine A. and Siva K. Balasubramanian (1993), "Age Differences in Consumers' Search for Information: Public Policy Implications," *Journal of Consumer Research*, 20 (1), 157–69.

Cole, Catherine A. and Gary J. Gaeth (1990), "Cognitive and Age-Related Differences in the Ability to Use Nutritional Information in a Complex Environment," *Journal of Marketing Research*, 27 (2), 175–184.

Cole, Catherine A. and Michael J. Houston (1987), "Encoding and Media Effects on Consumer Learning Deficiencies in the Elderly," *Journal of Marketing Research*, 24 (1), 55–63.

Conway, Andrew R. A., Nelson Cowan, and Michael F. Bunting (2001), "The Cocktail Party Phenomenon Revisited: The Importance of Working Memory Capacity," *Psychonomic Bulletin & Review*, 8 (2), 331–35.

Cowan, Nelson, Emily M. Elliott, Scott J. Saults, Candice C. Morey, Sam Mattox, Anna Hismjatullina, and Andrew R. A. Conway (2005), "On the Capacity of Attention: Its Estimation and its Role in Working Memory and Cognitive Aptitudes," *Cognitive Psychology*, 51 (1), 42–100.

Craik, Fergus I. M., Richard Govoni, Moshe Naveh-Benjamin, and Nicole D. Anderson (1996), "The Effects of Divided Attention on Encoding and Retrieval Processes in Human Memory," *Journal of Experimental Psychology: General*, 125 (2), 159–80.

Danaher, Peter J., Michael S. Smith, Kulan Ranasinghe, and Tracey S. Danaher (2015), "Where, When, and How Long: Factors that Influence the Redemption of Mobile Phone Coupons," *Journal of Marketing Research*, 52 (5), 710–25.

eMarketer (2016), "U.S. Time Spent With Media: Updated Estimates and Forecast for 2014–2019," https://www.emarketer.com/Report/US-Time-Spent-with-Media-eMarketers-Updated-

Estimates-Forecast-20142019/2002021

Engle, Randall W. (2002), “Working Memory Capacity as Executive Attention,” *Current Directions in Psychological Science*, 11 (1), 19–23.

Escobar, Michal Christine (2016), "Make the Most of the Perimeter," *Store Brands*, 38(5), 22-23.

Fagot, Clark and Harold Pashler (1992), “Making Two Responses to a Single Object: Implications for the Central Attentional Bottleneck,” *Journal of Experimental Psychology*, 18 (4), 1058–79.

Fong, Nathan M., Zheng Fang, and Xueming Luo (2015), “Geo-Conquesting: Competitive Locational Targeting of Mobile Promotions,” *Journal of Marketing Research*, 52 (5), 726–35.

Garaus, Marion, Udo Wagner, and Anna-Maria Bäck (2017), “The Effect of Media Multitasking on Advertising Message Effectiveness,” *Psychology & Marketing*, 34 (2), 138–56.

Gardner, David M. (1970), “The Distraction Hypothesis in Marketing,” *Journal of Advertising Research*, 10 (6), 25-30.

Grewal, Dhruv, Yakov Bart, Martin Spann, and Peter Pal Zubcsek (2016), “Mobile Advertising: A Framework and Research Agenda,” *Journal of Interactive Marketing*, 34 (May), 3–14.

Groff, Bradford D., Robert S. Baron and Danny L. Moore (1983), “Distraction, Attentional Conflict, and Drivelike Behavior,” *Journal of Experimental Social Psychology*, 19 (4), 359-380.

GSMA (2017), “The Mobile Economy 2017,” *GSMA Intelligence* [available at: https://www.gsma.com/mobileeconomy]

Hayes, Andrew F. (2013), *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach.* New York: The Guildford Press.

Hertzog, Christopher, Roger A. Dixon, David F. Hultsch, and Stuart W. S. MacDonald (2003), “Latent Change Models of Adult Cognition: Are Changes in Processing Speed and Working Memory Associated with Changes in Episodic Memory?” *Psychology and Aging*, 18 (4), 755–69.

Hong, Sungtak, Kanishka Misra, and Naufel J. Vilcassim (2016), “The Perils of Category Management: The Effect of Product Assortment on Multicategory Purchase Incidence,” *Journal of Marketing*, 80 (5), 34–52.

Horrigan, John B. and Maeve Duggan (2015), “Home Broadband 2015,” *Pew Research Center,* [available at: http://www.pewinternet.org/2015/12/21/home-broadband-2015/]

Hui, Sam K., J. Jeffrey Inman, Yanliu Huang, and Jacob Suher (2013a), “The Effect of In-Store Travel Distance on Unplanned Spending: Applications to Mobile Promotion Strategies,” *Journal of Marketing*, 77 (2), 1–16.

Hui, Sam K., Yanliu Huang, Jacob Suher, and J. Jeffrey Inman (2013b), “Deconstructing the

'First Moment of Truth': Understanding Unplanned Consideration and Purchase Conversion Using In-Store Video Tracking," *Journal of Marketing Research*, 50 (4), 445–62.

Inman, J. Jeffrey, Russel S. Winer, and Rosellina Ferraro (2009), "The Interplay among Category Characteristics, Customer Characteristics, and Customer Activities on In-Store Decision Making," *Journal of Marketing*, 73 (5), 19–29.

Janiszewski, Chris, Andrew Kuo, and Nader T. Tavassoli (2013), "The Influence of Selective Attention and Inattention to Products on Subsequent Choice," *Journal of Consumer Research*, 39 (6), 1258-1274.

Kim, Soo and Derek D. Rucker (2012), "Bracing for the Psychological Storm: Proactive versus Reactive Compensatory Consumption," *Journal of Consumer Research*, 39 (4), 815-830.

Klabjan, Diego and Jinxiang Pei (2011), "In-Store One-to-One Marketing," *Journal of Retailing and Consumer Services*, 18 (1), 64–73.

Kowatsch, Tobias and Wolfgang Maass (2010), "In-store Consumer Behavior: How Mobile Recommendation Agents influence Usage Intentions, Product Purchases, and Store Preferences," *Computers in Human Behavior*, 26 (4), 697–704.

Lee, Mira and Ronald J. Faber (2007), "Effects of Product Placement in On-Line Games on Brand Memory: A Perspective of the Limited-Capacity Model of Attention," *Journal of Advertising*, 36 (4), 75–90.

Lerouge, Davy (2009), "Evaluating the Benefit of Distraction on Product Evaluations: The Mind-Set Effect," *Journal of Consumer Research*, 36 (3), 367-379.

Mandel, Naomi and Dirk Smeesters (2008), "The Sweet Escape: Effects of Mortality Salience on Consumption Quantities for High- and Low- Self-Esteem Consumers," *Journal of Consumer Research*, 35 (2), 309-323.

Mehta, Ravi, Joandrea Hoegg, and Amitav Chakravarti (2011), "Knowing Too Much: Expertise-Induced False Recall Effects in Product Comparison," *Journal of Consumer Research*, 38 (3), 535–54.

Meißner, Martin, Andres Musalem, and Joel Huber (2016), "Eye Tracking Reveals Processes That Enable Conjoint Choices to Become Increasingly Efficient with Practice," *Journal of Marketing Research*, 53 (1), 1–17.

Mittal, Vikas and Wagner A. Kamakura (2001), "Satisfaction, Repurchase Intent, and Repurchase Behavior: Investigating the Moderating Effect of Customer Characteristics," *Journal of Marketing Research*, 38 (1), 131–42.

National Safety Council (2015), "Motor Vehicle," in *Injury Facts® 2015 Edition.* Itasca, IL: National Safety Council, 103–39.

Navon, David and Daniel Gopher (1980), "Task Difficulty, Resources, and Dual-Task Performance," in *Attention and Performance VIII*, R. S. Nickerson, ed. Princeton, NJ:

Lawrence Erlbaum Associates, 297–315.

Nelson, James E., Calvin P. Duncan, and Nancy T. Frontczak (1985), “The Distraction Hypothesis and Radio Advertising,” *Journal of Marketing*, 49 (1), 60-71.

Norman, Donald A. and Daniel G. Bobrow (1975), “On Data-Limited and Resource-Limited Processes,” *Cognitive Psychology*, 7 (1), 44–64.

Nowlis, Stephen M. and Baba Shiv (2005), “The Influence of Consumer Distractions on the Effectiveness of Food-Sampling Products,” *Journal of Marketing Research*, 42 (2), 157-168.

Park, Denice C., Gary Lautenschlager, Trey Hedden, Natalie S. Davidson, Anderson D. Smith, and Pamela K. Smith (2002), "Models of Visuospatial and Verbal Memory Across the Adult Life Span," *Psychology and Aging.* 17 (2), 299–320.

Park, Denise. C., Anderson D. Smith, William N. Dudley, and Vincent N. Lafronza (1989), “Effects of Age and a Divided Attention Task Presented During Encoding and Retrieval on Memory,” *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 15 (6), 1185–91.

Petty, Richard E, John T Cacioppo, and David Schumann (1983), “Central and Peripheral Routes to Advertising Effectiveness: The Moderating Role of Involvement,” *Journal of Consumer Research*, 10 (2), 135–46.

Pew Research Center (2017), Pew Research Center Mobile Fact Sheet, [available at: http://www.pewinternet.org/fact-sheet/mobile/].

Pieters, Rik and Michel Wedel (2012), “Informativeness of Eye Movements for Visual Marketing,” in *Visual Marketing: From Attention to Action*, M. Wedel and R. Pieters, eds. New York: Lawrence Erlbaum Associates, 43–71.

Posavac, Steven S., David M. Sanbonmatsu, Frank R. Kardes, and Gavan J. Fitzsimons (2004), “The Brand Positivity Effect: When Evaluation Confers Preference,” *Journal of Consumer Research*, 31 (3), 643-651.

Rapp, Adam, Tom Baker, Daniel Bachrach, Jessica Ogilvie, and Lauren Beitelspacher (2015), “Perceived Customer Showrooming Behavior and the Effect on Retail Salesperson Self-Efficacy and Performance,” *Journal of Retailing*, 91 (2), 358-369.

Roedder John, Deborah and Catherine A. Cole (1986), “Age Differences in Information Processing: Understanding Deficits in Young and Elderly Consumers,” *Journal of Consumer Research*, 13 (3), 297.

Sanders, Glenn S. (1980), “Driven by Distraction: An Integrative Review of Social Facilitation Theory and Research,” *Journal of Experimental Social Psychology*, 17 (3), 227-251.

Sanders, Glenn S., Robert S. Baron, and Danny L. Moore (1978), “Distraction and Social Comparison as Mediators of Social Facilitation Effects,” *Journal of Experimental Social Psychology*, 14 (3), 291–303.

Schank, Roger C. and Robert P. Abelson (1977). *Scripts, Plans, Goals and Understanding: An Inquiry into Human Knowledge Structures*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Sciandra, Michael and Jeffrey Inman (2016) "Digital Distraction: Consumer Mobile Device Use and Decision Making," [Available at SSRN: https://ssrn.com/abstract=2439202 or http://dx.doi.org/10.2139/ssrn.2439202]

Shankar, Venkatesh, Mirella Kleijnen, Suresh Ramanathan, Ross Rizley, Steve Holland, and Shawn Morrissey (2016), "Mobile Shopper Marketing: Key Issues, Current Insights, and Future Research Avenues," *Journal of Interactive Marketing*, 34, 37–48.

Shiv, Baba and Stephen M. Nowlis (2004), "The Effect of Distractions While Tasting a Food Sample: The Interplay of Informational and Affective Components in Subsequent Choice," *Journal of Consumer Research*, 31 (3), 599-608.

Spielmann, Nathalie (2014), "How Funny Was That? Uncovering Humor Mechanisms," *European Journal of Marketing*, 48 (9-10), 1892-1910.

Stilley, Karen M., J. Jeffrey Inman, and Kirk L. Wakefield (2010), "Planning to Make Unplanned Purchases? The Role of In□Store Slack in Budget Deviation," *Journal of Consumer Research*, 37 (2), 264–78.

Strom, Stephanie (2012), "In Grocery Stores, the Perimeters Take Center Stage," *New York Times,* August 10 [available at http://www.nytimes.com/2012/08/11/ business/in-grocery-stores-the-perimeters-take-center-stage.html]

Thomas, Art and Ron Garland (1993), "Supermarket Shopping Lists: Their Effect on Consumer Expenditure," *International Journal of Retail & Distribution Management*, 21 (2), 8–14.

Tuttle, Brad (2014), "Your Grocery Store May Soon Be Cut in Half," *Time*.com, Money section, June 2.

Unsworth, Nash and Matthew K. Robison (2016), "The Influence of Lapses of Attention on Working Memory Capacity," *Memory & Cognition*, 44 (2), 188–96.

Wedel, Michel and Rik Pieters (2008), "A Review of Eye-Tracking Research in Marketing," in *Review of Marketing Research*, N. K. Malhotra, ed. Bradford: Emerald, 123–47.

Zhang, Xiaoling, Shibo Li, Raymond R. Burke, and Alex Leykin (2014), "An Examination of Social Influence on Shopper Behavior Using Video Tracking Data," *Journal of Marketing*, 78 (5), 24–41.

Zhao, Xinshu, John G. Lynch Jr., and Qimei Chen (2010), "Reconsidering Baron and Kenny: Myths and Truths about Mediation Analysis," *Journal of Consumer Research*, 37 (2), 197–206.

TABLE 1. LITERATURE ON IN-STORE MOBILE PHONE USAGE

Source	Setting	Area	Scope	General Use	Behavioral Mechanism Measured	Age Effects on Purchases	Overall Purchases as DV	Mobile Effect (+ or –)	Findings
Burke (2002)	Survey	Role of handheld devices	es of handheld devices	Y	N	N	N	Pos	Younger adults are significantly more interested in using handheld devices to assist them in information searches and evaluations of alternatives.
Broeckelmann and Groeppel-Klein (2008)	Electronics stores	Price comparisons	Retailer evaluation	N	N	N	N	Neg	Participants' skills in using mobile phones determine how likely they are to use their phone for comparing prices. The greater the online price advantage, the lower the trust in the offline retailer.
Kowatsch and Maass (2010)	Fictive store selling mobile navigation units	Role of handheld devices	Sales intentions Return intentions	N	N	N	N	Pos	The perceived ease of using the portable device leads to higher perceived usefulness, which then increases purchase and patronage intentions.
Klabjan and Pei (2011)	Supermarket	Ads/ coupons	Redemption rates	N	N	N	N	Pos	Customers use different strategies to take the most optimal route throughout the store. A perceived optimal route to get to the advertised product makes the customer more tolerant of the time needed to retrieve it, so redemption rates increase.
Hui et al. (2013a)	Supermarket	Ads/ coupons	Redemption rates Unplanned spending	N	N	Y	N	Pos	Targeted mobile promotions that appear inside the store increase willingness to walk further into the store, where the customer otherwise would not have visited. An in-store experiment with physical coupons indicates increased total unplanned spending by 16.1%.
Danaher et al. (2015)	Mall	Ads/ coupons	Redemption rates	N	N	N	N	Pos	The time when coupons are delivered and distance to the store are crucial determinants of redemption rates. Face value and product type (especially snacks) are the most important factors for redemption rates.
Fong, Fang, and Luo (2015)	Movie theatres	Ads/ coupons	Redemption rates	N	N	N	N	Pos	When mobile (text) coupons are sent in the proximity of the movie theater, redemption rates go up, versus when not in this proximity. When coupon values are high, competitors also benefit from geotargeted coupons that are redeemable only at the focal movie theater.
Sciandra and Inman (2016)	Mass merchandiser (POPAI)	Customer decision making	Unplanned spending Omitted planned spending	Y	N	N	N	Mixed	Customers using mobile devices for task-related activates (e.g., shopping list) buy fewer unplanned items. Customers using mobile devices for non–task-related activities (e.g., text messages) conversely increase their unplanned purchases but forget more of their planned purchases. Mobile device usage for non–task-related activities may act as a source of distraction and make customers more dependent on external cues as heuristics.
Atalay, Bodur, and Bressoud (2017)	Supermarket	Role of handheld devices	Calories purchased Stress	N	Y	N	N	Neg	When people are in a mindset to consider the purpose of buying a product, multitasking on cell phones negatively affects their ability to accomplish their shopping goal.
Bellini and Aiolfi (2017)	Supermarket	In-store marketing effectiveness	Unplanned spending Recall of marketing	Y	N	N	N	Neg	In a survey of 84 customers, mobile phone users recalled less in-store marketing stimuli after purchase. There was no effect on the amount of unplanned purchases.
Bues et al. (2017)	Fictive supermarket	Ads/ coupons	Redemption rates	N	Y	N	N	Pos	The location of the customer in the store when the mobile ad is received is the strongest value driver. Personalized ads close to the product have little impact on purchase intentions.
Present study	Supermarket	General usage	Retailer sales	Y	Y	Y	Y	Pos	Mobile phone use leads to increased sales. The effect is mediated by increased time spent in the store, product fixations, and customer movement patterns. The effect increases with age.

Notes: Some studies report on several settings, but for this table, we focus solely on the physical retail store settings they investigate.

TABLE 2. LITERATURE PERTAINING TO DISTRACTION AND CONSUMER BEHAVIOR

Paper	Setting[a]	Area	Scope	Mobile Usage Leads to Distraction	Age Effects	Overall Purchases as DV	Effect of Distraction (+ or –)	Findings
Gardner (1970)	Lab experiment	Movies	Desirability ratings and recall	N	N	N	No effect	The results do not support the idea that being distracted while hearing a persuasive marketing communication influences consumers' desire for a promoted movie.
Nelson, Duncan, and Frontczak (1985)	Lab experiment	Radio commercial	Message acceptance	N	N	N	No effect	The results do not support the hypothesis that distraction interferes with counterarguments, such that a receiver would accept a message discrepant with his or her beliefs.
Posavac et al. (2004)	Lab and mall intercept experiments	Product evaluations	Purchase intention and choice	N	N	N	Neg	More positive evaluations of products occur when a brand is evaluated in isolation; such brand positivity effects diminish when consumers are distracted, because processing resources for brand information diminish under distraction conditions.
Shiv and Nowlis (2004)	Lab experiments	Taste testing	Product preference	N	N	N	Pos	Higher levels of distraction lead to a preference for sampled foods, because distraction increases the affective component of somatosensory experiences, rather than the informational component.
Nowlis and Shiv (2005)	Lab experiments	Taste testing	Product preference	N	N	N	Pos	Tasting food while distracted increases the intensity of the pleasure experience and thus preference for the food sampled.
Mandel and Smeesters (2008)	Lab experiments	Mortality Salience	Food and drink consumption	N	N	N	Pos	Consumption of food and drinks distracts consumers from mortality self-awareness, especially among low self-esteem consumers.
Biswas, Biswas, and Chatterjee (2009)	Lab experiments	Product evaluations	Product quality	N	N	N	Neg	Distraction negatively affects short-term memory rehearsal and retrieval, such that strong product cues presented first with distraction lead to lower product quality judgments than strong product cues presented more recently. Without distraction, the opposite is true: Strong product cues presented first are better and more diagnostic.
Lerouge (2009)	Lab experiment	Product evaluation	Attribute ratings and recall	N	N	N	Pos	Distraction after exposure to product information positively influences product differentiation for consumers with a configural mind-set but not those with a featural mind-set.
Kim and Rucker (2012)	Lab experiments	Proactive compensatory consumption	Use of products	N	N	N	Pos	Reactive, rather than proactive, compensatory consumption of products is more likely as a means to distract from an experienced self-threat.
Choi, Lee, and Li (2013)	Lab experiment	Video games	Implicit brand memory	N	N	N	Neg	When consumers are involved in highly immersive environments, like video games, audio distractions in the game inhibit implicit brand memory, whereas visual distractions have no effect. This result only holds for familiar brands.
Janiszewski, Kuo, and Tavassoli (2013)	Lab experiments	Selective attention of products	Product preference	N	N	N	Pos	Selective attention to products increases preference for them later, because people allocate attention to the product; visual distraction heightens this effect, because neural responses to selectively attended to products increase.
Spielmann (2014)	Lab experiment	Print media	Attitudes toward ad and brand	N	N	N	Pos	Humorous ads about arousal-safety issues are effective at distracting consumers, which leads to heightened attitudes toward the brand and the ad.
Present study	Supermarket	General mobile usage effects	Retailer sales	Y	Y	Y	Pos	Mobile phone use leads to increased sales. The effect is mediated by increased time spent in the store, product fixations, and customer movement patterns. The effect increases with age.

TABLE 3. MEAN DIFFERENCES OF USING VERSUS NOT USING MOBILE PHONE (STUDY 1)

	Using Mobile Phone (I)	Not Using Mobile Phone (J)	Mean Difference (I –J)	t	*p*
Participants	n = 71	n = 223			
Purchases (SEK)	414.40 (332.56)	293.83 (272.78)	120.57 (43.49)	2.77	.007
Items purchased (#)	20.61 (14.51)	14.24 (12.70)	6.36 (1.92)	3.31	.001
Time spent in store (min)	17.39 (10.92)	12.80 (8.71)	4.59 (1.42)	3.23	.002
Shelf attention	73.13 (55.99)	55.71 (47.43)	17.42 (7.37)	2.37	.020
Customer loop diversion	1.62 (1.78)	.66 (1.17)	.97 (.22)	4.29	.000
Trip satisfaction	6.25 (.91)	6.32 (1.00)	.07 (.13)	.49	.626

Notes: For the phone usage columns, the brackets contain standard deviations. For the difference column, the brackets contain standard errors. Welch's t-test was used to correct for inequality between group variances, except for trip satisfaction.

TABLE 4. MEAN DIFFERENCES DUE TO USING VERSUS NOT USING MOBILE PHONE (STUDY 2)

	Using Mobile Phone (I)	Not Using Mobile Phone (J)	Mean Difference (I –J)	t	*p*
Sample size	n = 53	n = 64			
Purchases (in SEK)	444.28 (436.31)	314.37 (416.67)	129.91 (79.06)	1.64	.103
Items purchased (#)	20.85 (19.47)	13.22 (13.95)	7.63 (3.19)	2.39	.019
Distraction	2.40 (1.52)	1.55 (.65)	.85 (.22)	3.79	.000
Time spent in store (min)	15.37 (12.44)	10.92 (9.56)	4.45 (2.03)	2.19	.031
Shelf attention	63.23 (50.39)	37.39 (34.84)	25.84 (8.18)	3.16	.002
Customer loop diversion	.63 (.98)	.35 (.65)	.28 (.16)	1.78	.078
Overall trip satisfaction	4.09 (.90)	4.36 (.76)	.27 (.15)	1.72	.088
Service satisfaction	4.19 (.81)	4.23 (.68)	.05 (.14)	.33	.741

Notes: For the phone usage columns, the brackets contain standard deviations. For the difference column, the brackets contain standard errors. Welch's t-test was used for purchases, distraction, shelf attention, and customer loop diversions as dependent variables, due to inequalities in the variances between groups.

TABLE 5. DIRECT AND INDIRECT EFFECTS OFF SERIAL MEDIATION MODELS WITH DISTRACTION AS THE FIRST MEDIATOR

	Time Spent in Store (M_2)		Shelf Attention (M_2)		Customer Loop Diversion (M_2)	
	Effect	95% CI	Effect	95% CI	Effect	95% CI
Mobile phone use → Distraction → Purchases	-30.22	-93.28, 21.04	6.46	-55.18, 74.14	43.90	-32.42, 141.60
Mobile phone use → Distraction → M_2 → Purchases	116.63	29.89, 231.30	79.94	12.84, 172.71	42.50	6.60, 93.45
Mobile phone use → M_2 → Purchases	30.21	-93.26, 161.99	102.49	-8.80, 172.71	17.91	-43.86, 96.92
Mobile phone use → Purchases	13.30	-84.91, 111.51	-58.99	-179.05, 61.08	25.59	-123.27, 174.46

Notes: Confidence intervals (CI) were obtained using 100,000 bootstrapping iterations for all indirect effects. Conventional ordinary least squares regression procedures provide the CIs for the direct effects.

TABLE 6. BOUNDARY CONDITIONS, STUDY 2

Department Used	b	*p*	n[a]
Constant	1.59	.000	.
Fruits & vegetables	1.06	.001	20
Fresh foods	.77	.010	25
Staple items	-.21	.524	20
Frozen foods	-.02	.970	5
Non-food	-.41	.520	4
Checkout	.51	.163	11
	$r^2 = .21$; $F_{(6, 110)} = 4.91$; $p < .001$		
Type of Phone Usage	**b**	***p***	**n[a]**
Constant	1.57	.000	.
Shopping-related activities	.46	.224	10
Non–shopping-related activities	.78	.000	49
	$r^2 = .12$; $F_{(2, 114)} = 8.04$; $p = .001$		

[a]The mobile phone usage sample size is greater than 53 (number of people using their mobile device), because respondents could use their phones in different parts of the store or for both shopping-related and -unrelated activities

Notes: These analyses are possible only for Study 2, because Study 1 did not include the relevant distraction measures.

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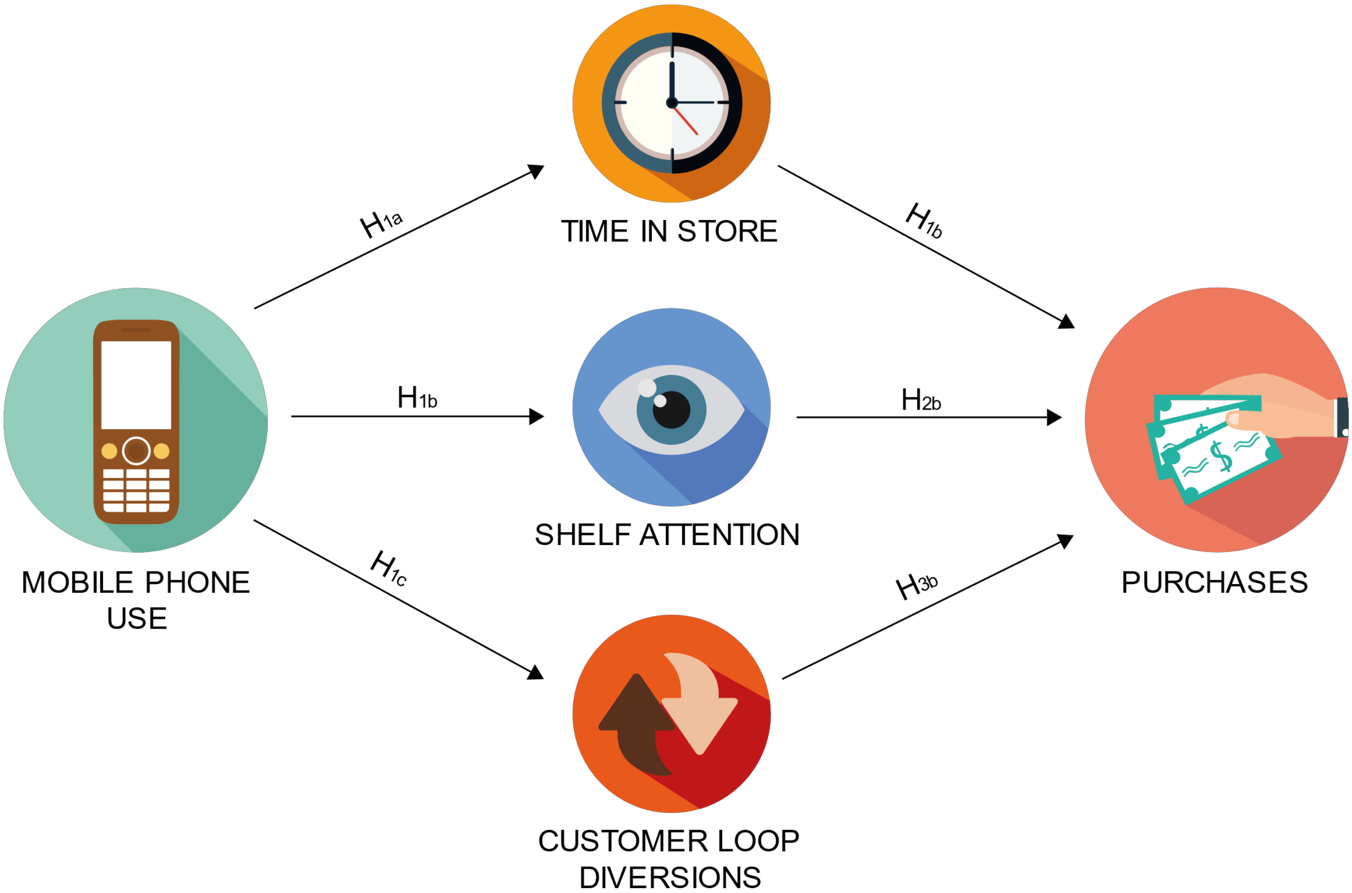
FIGURE 1

SAMPLE SCREENSHOTS OF THE VISUAL FIELD AND FIXATIONS, DISPLAYED BY THE EYE-TRACKING SOFTWARE

FIGURE 2

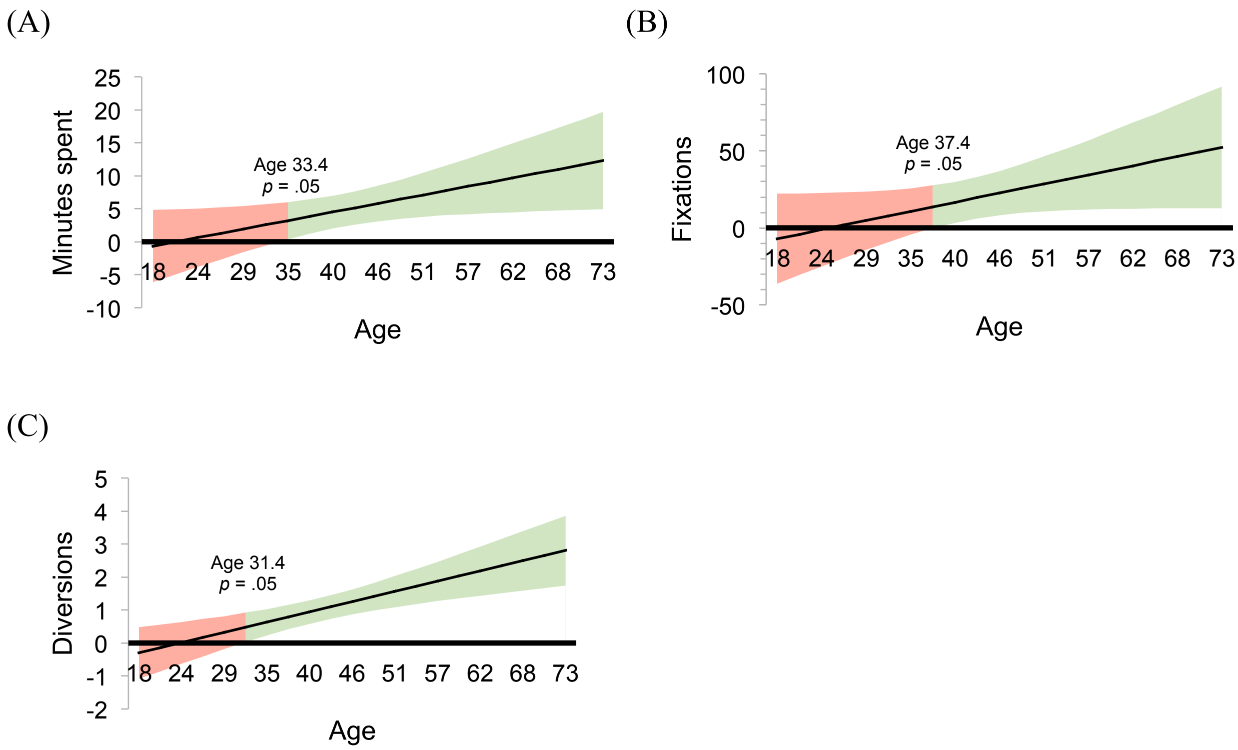
MODELS TESTED IN STUDY 1



Note: Each mediation pathway was run as a separate mediation model [Hayes' (2013) model 4].

FIGURE 3

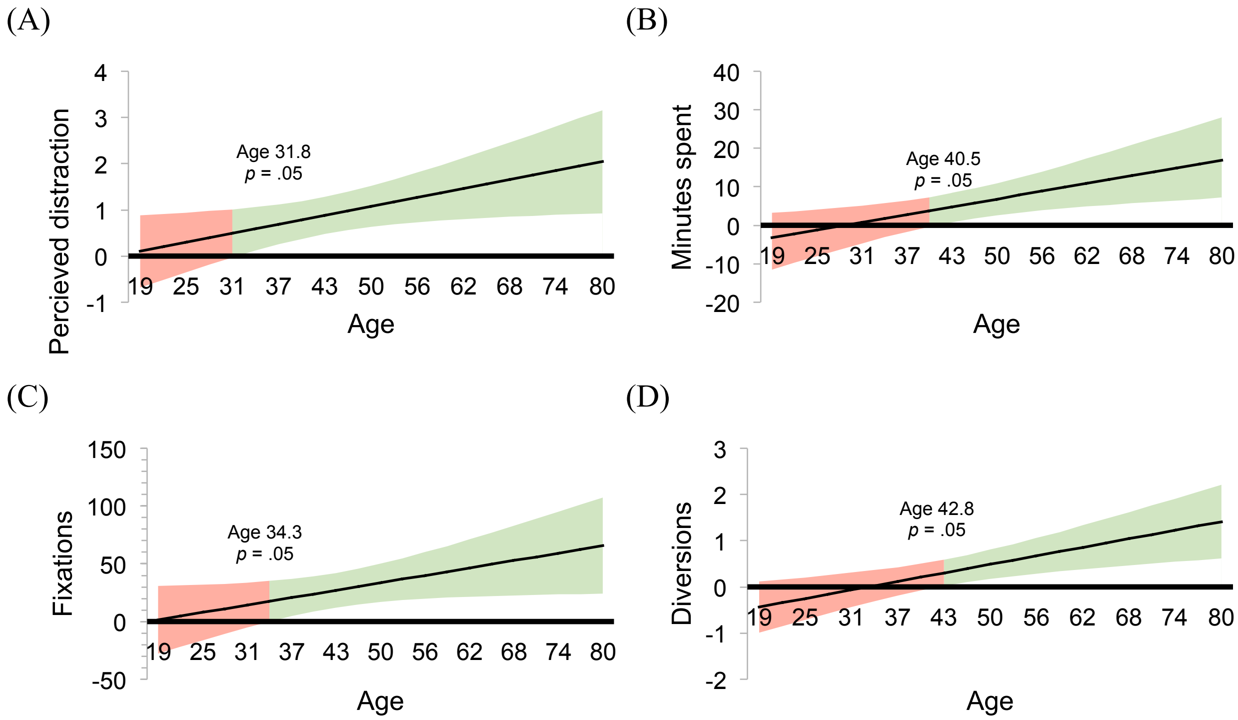
JOHNSON-NEYMAN SIGNIFICANCE REGIONS (STUDY 1)



	Age When Relationship Is Significant	Percentage of Sample Not Significantly Affected	Percentage of Sample Significantly Affected
Time spent in store	33.37	23.81	76.19
Shelf attention	37.41	36.39	63.61
Customer loop diversion	31.42	20.07	79.93

FIGURE 4

JOHNSON-NEYMAN SIGNIFICANCE REGIONS (STUDY 2)



	Age When Relationship Is Significant	Percentage of Sample Not Significantly Affected	Percentage of Sample Significantly Affected
Distraction	31.79	25.64	74.36
Time spent in store	40.46	49.46	50.43
Shelf attention	34.30	33.33	66.67
Customer loop diversion	42.83	54.70	45.30

Appendix
Study Information

Study 1

A. Demographics of Study Participants by Store

	Chain	n	Age	Gender (F/M %)	Number of Children
Supermarket A	1	69	42.57	36.23/63.77	1.01
Supermarket B	1	70	40.71	38.57/61.43	1.31
Supermarket C	1	83	40.47	44.58/55.42	1.35
Supermarket D	2	72	42.46	37.50/62.50	1.35

B. Demographics of Study Participants by Condition

	n	Age	Gender (F/M %)	Number of Children
Using mobile phone	71	40.39	38.03/61.97	1.35
Not using mobile phone	223	41.86	39.91/60.09	1.23

Notes: The demographic data gathered from the questionnaires revealed no significant differences across stores in customers' age ($F_{(3, 290)} = .63$, $p = .59$), gender ($\chi^2_{(3)} = 1.35$, $p = .72$), or number of children living at home ($F_{(3, 290)} = 1.48$, $p = .22$). Similarly, there were no differences between customers using (or not using) mobile phones with regard to their age ($t_{(292)} = .90$, $p = .37$), gender ($\chi^2_{(1)} = .08$, $p = .78$), or number of children living at home ($t_{(292)} = .78$, $p = .44$).

Study 2

A. Demographics of Study Participants by Store

	Chain	n	Age	Gender (F/M %)	Household size
Supermarket E	1	69	43.59	43.48/56.52	2.48
Supermarket F	1	48	42.01	64.58/35.42	2.52

B. Demographics of Study Participants by Condition

	n	Age	Gender (F/M %)	Household size
Using mobile phone	53	42.38	47.17/52.83	2.60
Not using mobile phone	64	43.41	56.25/43.75	2.41

Notes: There were no differences between customers using (or not using) mobile phones or not in terms of age ($t_{(115)} = .39$, $p = .70$), gender ($\chi^2_{(1)} = .96$, $p = .33$), or household size, ($t_{(115)} = .91$, $p = .36$).