

Smart Phones, Bad Calls? The Influence of Consumer Mobile Phone Use, Distraction, and Phone
Dependence on Adherence to Shopping Plans

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Smart Phones, Bad Calls? The Influence of Consumer Mobile Phone Use, Distraction, and Phone Dependence on Adherence to Shopping Plans

As mobile phones continue to rapidly expand around the world, marketers are seeking to better understand the impact these devices have on consumer outcomes. One common but understudied area is how mobile phones may influence in-store behaviors. Although prior research has investigated the many shopping related activities consumers undertake on their phones, it is still estimated that nearly half of all in-store mobile phone use is unrelated to the shopping task. Therefore, this paper examines the impact of shopping-unrelated mobile phone use, a frequent but understudied phenomenon, on consumers' ability to accurately manage in-store shopping plans. Using both field and experimental data, we demonstrate that shopping-unrelated mobile phone use negatively affects consumers' ability to accurately carry out in-store shopping plans and is associated with an increase in unplanned purchasing. Furthermore, we find that consumers who are highly dependent upon mobile phones tend to be the most at risk of deviating from a shopping plan while engaging in shopping-unrelated mobile phone use.

Keywords: mobile phones, in-store decision making, distraction, shopper marketing.

The proliferation of mobile phones has significantly altered the world in which we live. With their continual growth, mobile phones have found their way into almost all aspects of everyday life, from our sleep hygiene (e.g., the Sleepbot app) and dietary habits (e.g., the MyFitnessPal app) to our entertainment choices (e.g., mobile gaming, videos, and social media) and work practices (e.g., email, calendar apps). Today, it is estimated that 46% of all Americans check their phones at least 25 times per day (Deloitte 2017) with the average user spending approximately 3 hours and 45 minutes daily on mobile phone use (Brustein 2014).

While the rapid growth of mobile phones has changed our lives, marketers are struggling to fully understand the impact of mobile phones on consumer outcomes (Oddenino 2015). An understudied area is the role that mobile phones play in impacting in-store behaviors. It has been well documented that consumers use their mobile phones in retail environments with 93% of consumers admitting to using their phones while out shopping (Deloitte 2017). While prior work focuses on the many shopping related activities consumers complete on their phones (Google 2013; Nielsen 2015; Skrovan 2017), recent research notes that almost half of all in-store mobile phone use is unrelated to the shopping task (Martin 2016).

Despite the prevalence of mobile phone use in stores, there is a dearth of knowledge on how these devices impact consumers. Therefore, this paper examines the impact of shopping-unrelated mobile phone use, a frequent but understudied phenomenon, on consumers' ability to accurately carry out in-store shopping plans. Shopping-unrelated mobile phone use occurs when a consumer uses her mobile phone in a manner that is not directly related to the focal shopping trip. This includes engaging in private conversations, sending personal text messages, checking emails, surfing the Internet, listening to music, and playing games. Additionally, we are

interested in adherence to shopping plans as this is an important consideration for marketers and retailers' success. It is imperative for marketers to have a better understanding of factors associated with consumers' successful implementation and deviations from their planned shopping behavior (Iyer and Ahlawat 1987).

While consumers have always had to contend with some forms of distraction (e.g. listening to in-store music or shopping with others), it is critical to single out in-store phone use for at least two reasons. First, as we have noted before, mobile phones have become inextricably immersed into modern life, with some arguing that these devices have become necessities rather than luxury goods (Dreyfuss 2017). Given their ubiquity, mobile phones are quickly becoming the principal distractor for many consumers (Poppick 2016). Second, work in other fields suggests that mobile phones offer a unique form of interruption. For example, research on distracted driving notes that mobile phone conversations impact individuals differently in comparison to in-person conversations (Drews, Pasupathi, and Strayer 2008). Therefore, we investigate shopping-unrelated mobile phone use as a factor that can dramatically impact adherence to shopping plans.

More specifically, in this paper we are interested in the following research questions related to shopping-unrelated mobile phone use: 1) Does shopping-unrelated mobile phone use impact consumers' ability to accurately carry out in-store shopping plans? 2) Are some consumers more susceptible to shopping errors while engaging in shopping-unrelated mobile phone use? 3) Does intermittent as opposed to continuous shopping-unrelated mobile phone use impact consumers' ability to carry-out shopping plans?

Before beginning our focal investigation, we conducted a preliminary investigation to examine shoppers' perceptions of positive and negative outcomes tied to shopping-unrelated mobile phone use. We utilized a critical incident technique (Flanagan 1954; Gremler 2004; Keaveney 1995) in which direct recollections and stories were collected from consumers regarding their in-store mobile phone use. We recruited fifty-four participants and asked them to think about a time they used their mobile phone in a shopping-unrelated manner in a retail setting. After recalling the situation in detail, we asked respondents to compare the outcomes of their described shopping trip with a similar trip in which they did not use their phones.

Results showed that participants disagreed that they forgot more items than they normally would have if not using their phone, disagreed that they made more unplanned purchases than they normally would have had they not been using their phone, and disagreed that they lacked sufficient mental resources to focus on their shopping. Finally, participants agreed that there were no significant drawbacks to using their phones during the shopping trip.¹ These results suggest that consumers perceive little impact of shopping-unrelated mobile phone use on their ability to accurately complete their shopping trip.

Building off of consumers' general beliefs about in-store mobile phone use, the goal of this paper is to investigate shopping-unrelated phone use and examine if these devices are really as innocuous as consumers believe. We study the consequences of shopping-unrelated mobile phone use on shoppers' ability to accurately manage their shopping trip. The remainder of this article is organized as follows. In the next section, we review the relevant literature and discuss

¹ All means are compared to the scale midpoint (4 out of 7). Forgot more ($M = 2.85$, $t(53) = -5.29$, $p < .001$); More unplanned purchased ($M = 2.41$, $t(53) = -10.73$, $p < .001$); Lacked mental resources to focus on shopping ($M = 2.03$, $t(53) = -13.80$, $p < .001$); No significant drawbacks to using phone ($M = 5.33$, $t(53) = 8.65$, $p < .001$).

our conceptual framework outlining the use of mobile phones in store environments. Following this, we present the results of a field study investigating consumers' use of mobile phones in a real-world retail setting. We then present the results of two experiments assessing the impact of mobile phone use on consumers' ability to accurately carry out in-store shopping plans. Finally, we close with a discussion of the implications for research and practice.

Theoretical Background

Mobile Devices, Mobile Phones, and Mobile Marketing

Using mobile devices, consumers are now able to access information in almost any location, including homes, offices, and shopping centers. A mobile device is an all-purpose term used to describe any handheld computer including technologies such as tablets, e-readers, mobile phones, PDAs, and personal music players (Viswanathan 2017). The most ubiquitous form of mobile devices are mobile phones, which are owned by 83% of consumers in the United States and 66% of consumers worldwide (Statista 2018).

Given the rapid adoption of mobile phones, managers have become increasingly interested in integrating mobile phones into their marketing strategy. Consequently, research on mobile marketing has been steadily increasing (Lamberton and Stephen 2016; Shankar et al. 2016). Prior work in this area has focused on service delivery via mobile phones (Kleijnen, De Ruyter, and Wetzels 2007), the prediction of mobile app demand (Garg and Telang 2013), mobile phone advertising and promotions (Andrews, Luo, Fang, and Ghose 2015; Bart, Stephen, and Sarvary 2014; Danaher, Smith, Ranasinghe, and Danaher 2015) and mobile shopping (Wang, Malthouse, and Krishnamurthi 2015).

Despite growth in mobile phone use and increasing research on mobile marketing, little research has assessed consumer use of mobile devices in retail environments (Shankar et al. 2016), with a couple of noteworthy exceptions. First, Hui et al. (2013) investigate the impact of in-store travel distance on unplanned purchasing and demonstrate that mobile promotions focusing on increasing distance traveled can be an effective tool to increase unplanned spending. Second, van Ittersum et al. (2013) show that “smart” shopping carts (carts equipped with technology which allows consumers to track real-time spending during the shopping trip) differentially impact budget and non-budget shoppers. These authors find that real-time spending feedback increases spending for budget shoppers due to an increase in national brand purchase, while non-budget shoppers tend to spend less.

While these studies begin to bridge mobile device with in-store environments, the scope of the mobile device use is relatively limited. For example, though the work of Hui et al. (2013) demonstrates the immense potential in mobile promotion technology as a means of influencing travel distance and unplanned purchases, the authors do not actually deliver promotions via mobile phone. Instead, they simulate the delivery of mobile coupons by intercepting shoppers and providing them with the promotion before shopping. In the case of van Ittersum et al. (2013), the focus on shopping cart technology is important, but does not specifically consider mobile phones. Therefore, we build upon this work to address how shopping-unrelated mobile phone use may impact a critical outcome for marketers: consumers’ ability to accurately manage a shopping trip.

Shopping Plan Implementation

Marketing scholars and practitioners have long been interested in factors which impact consumers' ability to accurately carry out in-store shopping plans (Iyer and Ahlawat 1987). Prior research has focused on both planned and unplanned purchases to better understand consumers' implementation of their shopping plans (Bucklin and Lattin 1991; Park, Iyer, and Smith 1989). Planned items are products that have been predetermined by the shopper prior to entering the store environment and can be premeditated to the brand level or category level (Inman, Winer, and Ferraro 2009). Conversely, unplanned items are products which were not planned on being purchased prior to entering the store (Park et al. 1989).

In investigating accurate shopping plan implementation, prior research has considered both in-store and out-of-store elements. For example, factors such as shopper household size, store familiarity, product category hedonicity, shopping time, travel distance, shopping goal abstractness, and store selection motives have all been positively associated with unplanned buying behavior (Bell, Corsten, and Knox 2011; Hui et al. 2013; Inman et al. 2009; Kollat and Willett 1967; Park et al. 1989). Similarly, characteristics such as the use of product coupons, increased shopping frequency, and formalized list generation all help consumers accurately fulfill their shopping as planned (Block and Morwitz 1999; Inman et al. 2009; Thomas and Garland 1993). Taking into account the importance of in-store decisions on retailers' success or failure as well as explicit calls to better understand the impact of mobile phone use on consumer outcomes (e.g. Lamberton and Stephen 2016; Shankar et al. 2011; Shankar et al. 2016), we consider the effect of in-store shopping-unrelated phone use on consumers' ability to accurately adhere to their shopping plans. Specifically, we investigate the impact of shopping-unrelated mobile phone use on unplanned purchasing and missed planned items.

Mobile Phone Use, Mobile Phone Dependence, and Shopping Plan Implementation

When using a mobile phone in a shopping-unrelated manner during a shopping task, consumers engage in a form of concurrent multitasking in which they are completing two significant tasks at the same time. Therefore, in the following sections, we build upon resource theories of information processing to predict the impact of using a mobile phone during a shopping trip on consumers' ability to accurately carry out their shopping plans. In addition, we consider mobile phone dependence, an increasingly worrying phenomenon tied to mobile phone use, as a potential moderating variable. Figure 1 outlines our conceptual framework discussed in the following sections.

Resource Theories of Information Processing and Shopping-Unrelated Mobile Phone Use. The driving premise behind resource theories of information processing is that individuals have a limited amount of cognitive resources to process information (e.g., Kahneman 1973; Lang 2000; Norman and Bobrow 1975; Navon and Gopher 1980; Wickens 1984). Therefore, when engaging in multiple tasks, individuals must allocate processing resources among concurrent tasks. For example, Lang's (2000) limited capacity model of information processing argues that information processing consists of simultaneously occurring sub-processes (encoding, storage and retrieval) that individuals enact on stimuli. Importantly, when processing demands exceed available cognitive resources, multitasking performance often deteriorates (Lang 2000; Mayer and Moreno 2003). Unlike the limited capacity model, Wickens' (1984) multiple resource theory contends that there are multiple pools of processing resources for individuals to tap. However, while the multiple resource theory asserts that processing resources may be conceptually distinct, this theory does not imply that truly

frictionless resource sharing is possible. As the number or complexity of tasks increases, it becomes highly likely that distraction will result in task interference (Wickens 2008).

When consumers use a mobile phone during their shopping, they engage in multiple tasks that may ultimately impact their ability to accurately manage their shopping trip. Consistent with resource theories of information processing, we argue that using a phone in a shopping-unrelated manner during a shopping trip will lead to significant distraction and subsequently impact consumers' ability to accurately carry out their shopping plan. This prediction stems from the fact that both shopping decision making (Inman and Winer 1998; Inman, Winer, and Ferraro 2009) and the use of mobile phones (Drews, Pasupathi, and Strayer. 2008; Strayer, Drews, and Johnston 2003; Strayer and Johnston 2001; Hyman et al. 2010) place significant demands on mental resources. Additionally, both tasks require the use of visual and verbal processing resources and are therefore, likely to compete for the same pool of cognitive resources. Finally, the concurrent tasks being performed are unlikely to share a common goal, which makes the processing of these tasks less effective (Wang, Irwin, Cooper, and Srivastava 2015).

Given that shopping-unrelated mobile phone use can alter shoppers' levels of distraction, it is important to consider its impact on two critical components of accurate shopping plan implementation: unplanned purchases and missed planned items. We first consider the impact of in-store mobile device use on the number of unplanned purchases. Previous research on self-regulation and resource depletion illustrates that acts of volition draw on a common inner resource similar to strength or energy (Baumeister et al. 1998). Evidence suggests that cognitive overload can interfere with individuals' self-regulatory behaviors as demonstrated by people who

deviate from diets while experiencing periods of high stress (Herman and Polivy 2003) or fail at self-control when cognitively taxed (Baumeister et al. 1998; Vohs and Faber. 2007).

As we have already discussed, when using a mobile phone in a shopping-unrelated manner, consumers are often engaging in cognitively demanding tasks that require divided attention and resource allocation. Therefore, we argue that the cognitive and attentional requirements of in-store multitasking will tax consumers' self-regulatory resources and lead to deviations from the shopping plan in the form of increased unplanned purchases. This expectation is consistent with the research of Shiv and Fedorikhin (1999), who find that under conditions of low processing capabilities, individuals' choices are driven by affective reactions to choice options as opposed to cognitions. When relying on affective reactions to products, consumers are likely to make more impulse decisions (Shiv and Fedorikhin 1999).

Turning next to the purchase of planned items, we contend that shopping-unrelated phone use will also affect accurate shopping plan implementation by influencing the number of missed planned items. When not using a shopping list, consumers must actively recall all of the planned items they wish to purchase. Prior research has found that divided attention during recall significantly limits individuals' ability to retrieve information (Craik et al. 1996; Park et al. 1989). For example, Craik et al. (1996) presented participants with a set of common nouns and asked individuals to recall these words while either participating in a demanding secondary task or not participating in a demanding secondary task. The authors found that engaging in a secondary task significantly impaired individuals' ability to recall information, with recall in the divided attention condition approximately 11% lower compared to participants in the full attention condition.

Conversely, when using a shopping list, consumers must accurately identify and process all of the information on the list. Gardiner and Parkin (1990) found that divided attention while reading words impaired individuals' processing of the information and resulted in subsequent failure to recollect seeing words. Moreover, both Craik et al. (1996) and Park et al. (1989) found a significant impact of divided attention on encoding and processing of word lists. Taken together, these results suggest that shopping-unrelated phone use should impact consumers' ability to recall products to be purchased and ability to process and manage shopping lists. Therefore, we predict that distraction from mobile devices will result in consumers failing to purchase planned items.

Mobile Phone Dependence. One increasingly important construct that may impact consumers' ability to accurately manage a shopping task while using a mobile phone is mobile phone dependence. Mobile phone dependence is a form of psychological reliance on a mobile phone and is often characterized by excessive use of and reliance on a mobile phone (Baker 2017). Phone dependence is becoming a progressively worrying phenomenon, with some estimating that over 175 million individuals worldwide are dependent on mobile phones (Feeney 2014). Prior work has found that extraversion, low self-esteem, materialism, emotional instability, and approval motivation are all associated with mobile phone dependence (Bianchi and Phillips 2005; Hong et al. 2012; Takao, Takahashi and Kitamura 2009; Roberts, Pullig, and Manolis 2015).

Currently, we have argued that shopping-unrelated mobile phone use leads to increased cognitive distraction, which negatively impacts consumers' ability to accurately carry out their shopping (both in the form of increased unplanned purchasing and missed planned items).

Furthermore, we argue that mobile phone dependence will moderate this process, with those higher in mobile phone dependence showing greater deviations from their shopping plans. Figure 1 provides a visual presentation of our conceptual framework.

- Insert Figure 1 about here -

As shown in Figure 1, we believe that mobile phone dependence will moderate one of two paths; A) the link between shopping-unrelated mobile phone use and distraction or B) the link between distraction and shopping plan accuracy. Focusing first on the path between shopping-unrelated phone use and distraction, prior work has demonstrated that the mere presence of a mobile phone can inhibit cognitive resources available for tasks with those who are highly dependent on their phones showing the most detriment (Ward et al. 2017). Therefore, mobile phones may generate greater levels of distraction for consumers who are highly dependent on mobile phones, which can result in difficulties accurately managing shopping plans. Alternatively, mobile phone dependence may impact the path between distraction and shopping plan accuracy. In this case, consumers high in mobile phone dependence may find it more difficult to manage multiple tasks, despite experiencing comparable levels of distraction as other consumers. This argument is consistent with prior research that has tied mobile phone dependence to general attentional impulsivity, suggesting that these individuals have trouble focusing on any task, regardless of the presence of an additional distractor (Roberts et al. 2015). This perspective is also supported by research highlighting frequent media multitaskers' difficulty filtering irrelevant environmental stimuli (Ophir, Nass, and Wagner 2009).

Due to the increasing prevalence and interest in mobile phone dependence, it is important to investigate how this factor impacts consumers' ability to adhere to a shopping plan while

using a mobile phone. Moving forward, we report the results of an in-store field study and two experiments designed to test our predications about the impact of shopping-unrelated mobile phone use on consumer shopping plan adherence. In Study 1, we investigate consumer plan adherence in a real in-store environment using shoppers' unplanned items as our focal dependent variable. In Study 2, we further explore the impact of shopping-unrelated mobile phone use, distraction, and mobile phone dependence on consumers' ability to accurately carry out in-store shopping plans by investigating missed planned items. Finally, in Study 3 we examine intermittent shopping-unrelated phone use in which consumers use their phones periodically throughout the shopping trip rather than for the entire duration of the shopping trip.

Study 1

Interestingly, the results of our preliminary investigation revealed that consumers do not appear to recognize any drawbacks to using mobile phone in store environments. Might consumers be correct in believing that in-store mobile phone use plays little role in affecting in-store outcomes? In Study 1, we use a novel data set to examine the impact of shopping-unrelated mobile phone use on actual shopping outcomes. We assess how mobile phone use impacts deviations from planned shopping behavior by considering unplanned purchasing. This focus is consistent with prior research in shopper marketing (Inman et al. 2009; Shankar et al. 2011).

Procedure

Study 1 employs data from the 2013 Point of Purchase Advertising International (POPAI) Shopper Engagement study. POPAI is a global non-profit trade association that conducts research

and offers educational opportunities related to shopper marketing. Working with POPAI, we added a question in the exit interview asking shoppers about their smartphone or cellular phone use during the shopping trip. As part of this research, over 2600 shoppers across four broad US geographic census regions were intercepted before entering mass merchandisers. Shoppers completed a ten-minute entry interview that gathered information on their shopping plans and preliminary shopping information. After completing the shopping trip, interviewers collected information from shoppers on items purchased, store perceptions, and demographics. Previous research has shown that the pre and post shopper interview technique applied in the POPAI study does not affect consumer spending (e.g., Kollat and Willett 1967; Stilley et al. 2010a). Due to missing or incomplete responses, the usable sample of respondents was 2520 (79.1% female).

Focal Measures

Our central focus in this study is the impact of in-store mobile device use on shoppers' unplanned purchasing. We focus on unplanned purchases as this measure provides insight into deviations from the shoppers' plan and therefore is critical to retailers' success (Inman et al. 2009; Iyer 1989; Kollat and Willett 1967; Stilley et al. 2010a). The number of unplanned purchases was operationalized as the total number of items that were purchased by the shopper but were not planned prior to beginning the shopping trip.

We use three variables to capture shopper mobile phone use (Related, Unrelated, and Both). Mobile phone use was classified as shopping-related if the respondent indicated they used their phone to compare prices of products, to compare different retailers for the best price, to look at a manufacturer's website, to look at a retailer's website, to access a retailer's shopping or

loyalty app, to create, store or access a shopping list, to scan a QR code on a package, to use their device as a calculator, and/or to call someone for help with a decision (302 shoppers or 11.98% of the sample was classified as Related). Mobile phone use was classified as shopping-unrelated if the respondent indicated they used their phone to engage in a private conversation with another individual, check or send emails, look at websites unrelated to the shopping trip, send personal text messages, listen to music, and/or to play games (280 shoppers or 11.11% of the sample was classified as Unrelated). Finally, shoppers who indicated that they used their mobile phone in at least one shopping-related and one shopping-unrelated manner during the trip fell into the Both category (157 shoppers or 6.23% of the sample was classified as Both). For all of our analyses, we compare these groups to shoppers not using a mobile phone during their shopping trip (1781 shoppers or 70.67% of the sample was classified as No Phone Use)². See Table 1 for the mobile usage categories collected and number of shoppers within each category.

- Insert Table 1 about here –

Along with these three mobile phone use categories, we included a number of important shopping variables and demographics in our models as controls in line with prior research (Hui et al. 2013; Inman et al. 2009; Stilley et al. 2010a). This included variables such as consumer impulsiveness, trip time, use of a hand written shopping list, basket size, aisles shopped, shopping with others, gender, age, income, and household size. Descriptions of these measures are reported in Appendix A.

Results

² While we included the Related and Both phone use categories in our models to account for all of the ways shoppers used their mobile phones during the shopping, our main focus in this study is on those shoppers using their phones in a shopping unrelated manner.

In modeling the number of unplanned items purchased by shoppers, we estimate a Poisson model with the number of unplanned items as the dependent variable. To account for overdispersion in the model, we include a dispersion parameter which provides a correction term when estimating the model (McCullagh and Nelder 1989). This approach allows for proper inference when overdispersion is modest (Cox 1983) and is the conventional approach when running a Poisson analysis (Pedan 2001). Overdispersion is the occurrence of greater variability than would be expected and occurs frequently in applied analysis of count data (Barron 1992).

Specifically, we include our mobile phone use categories as a single class variable with four levels (Related, Unrelated, Both, and No Use) and our control variables in the model. In our analyses, the comparative reference for our three mobile categories are those shoppers not using a mobile phone (no use). Table 2 shows all of the variables and the results. The ratio of the Pearson χ^2 divided by its degrees of freedom provides a means of assessing the adequacy of the model (Ramsey and Schafer 1997). Ratios that are close to a value of one indicate a good fitting model, whereas ratios significantly above one indicate overdispersion and ratios significantly below one indicate underdispersion. The ratio for our Poisson model is close to one, indicating a good fitting model. In addition, Table 2 illustrates that the full fitting model significantly outperforms the null model ($\chi^2 (15) = 4495.35, p < .001$).

- Insert Table 2 about here -

Previously we argued that shopping-unrelated mobile phone use would negatively impact consumers' ability to manage their shopping. Consistent with this prediction, when compared to those not using a mobile phone, shoppers using their phones in a shopping-unrelated manner purchased significantly more unplanned items ($\beta_{Unrelated} = 0.0906, p < .05$). Using a mobile phone

in a manner unrelated to the shopping task increased unplanned items by an average of 9%. Furthermore, though not the primary focus of this research, we found that shoppers using their mobile phones in a shopping-related manner purchased fewer unplanned items ($\beta_{Related} = -0.1316$, $p < .01$). Using a mobile phone in a shopping-related manner was associated with a decrease in unplanned items by an average of 13%. This result aligns with prior findings that shopping-related mobile phone use may make consumers better shoppers (Google 2013; Nurun 2013).

We note that whether someone used their mobile phone while shopping, and specifically the nature of that use (Related, Unrelated, or Both), could be endogenous due to selection. In other words, consumers self-selected into mobile phone use and how they used it; therefore, it is possible that some consumers might be systematically more or less prone to use a mobile in various ways when shopping. As a robustness check, we addressed this through a control function approach (Petrin and Train 2010). This is a two-stage estimation procedure. In the first stage, the potentially endogenous variable—in this case, type of mobile phone use—is modeled as a function of exogenous covariates (demographic characteristics of the shopper). Since type of use is a categorical variable, the control function was estimated as a multinomial probit model. In the second stage, the response model is estimated with residuals from the first-stage model added as additional covariates. The same type of Poisson regression model was estimated for this purpose. After accounting for type of mobile use, the main results were substantively unchanged; shoppers using their phones in a shopping-unrelated manner purchased significantly more unplanned items and shoppers using their phones in a shopping-related manner purchased significant fewer unplanned items (See Table 3 for control function results). Since this robustness

check indicates that selection of type of mobile use does not change our findings, all subsequent analyses are based on the simpler models (i.e., without control functions).

- Insert Table 3 about here –

Category Analysis: Types of Unplanned Items. While we find results consistent with our main predictions, we are also interested in the *nature* of the unplanned items shoppers purchased. In our conceptualization we argued that shopping-unrelated use would make it more difficult to accurately manage a shopping task due to distraction. Therefore, we would expect that the nature of the unplanned items would differ depending upon mobile phone use. In particular, we assess the degree of hedonicity of unplanned items as prior research has shown that hedonic products are preferred when consumers are distracted (Shiv and Fedorikhin 1999; Vohs and Faber 2007). Hedonic products are often considered to be vices that are decadent, excessive, or impractical (Dhar and Wertenbroch 2000; O’Curry and Strahilevitz 2001). If significant distraction is playing an important role in unplanned items for those using phones in a shopping-unrelated manner, we expect the unplanned items to be more hedonic in nature when compared to shoppers not using a phone.

To investigate the nature of the unplanned items purchased by shoppers, we consider the nature of the category. In the POPAI field data, there were a total of 244 unique categories from which shoppers made purchases. This includes an array of categories such as adhesives, boy’s apparel, dairy, soup, yogurt, etc. To evaluate the nature of these categories, we tasked ten human judges to appraise and code every product category on four specific dimensions: excessiveness of the product category, extravagance of the product category, indulgence of the product category, and the degree to which the product category was a vice. All dimensions were

measured on a seven point scale with 1 corresponding to a low level of the dimension and 7 corresponding to a high level of the dimension. Further, the four items were averaged for analysis ($\alpha = 0.98$). While completing the evaluation task, judges saw the name of the product category (e.g., “adhesives”) and three pictures of example products that would be a part of this category (e.g., clear tape, a hard glue stick, and a bottle of liquid glue). To focus attention on the overall category, judges were told to think about the product category as a whole and not about specific brands that might be within the category. This evaluation task resulted in overall average category hedonicity measures for each of the 244 unique product categories.

We next used these overall evaluations for each product category to assess the degree of hedonicity for the basket of unplanned items purchased by each shopper in the dataset. For example, if a shopper purchased five unplanned items during the trip (e.g., Dannon yogurt, Elmer’s glue, Hershey’s chocolate bar, a women’s blouse, and Green Giant frozen peas), we averaged the category hedonicity values for these five purchases to generate an estimate of just how hedonistic the shopper’s basket of unplanned items was (i.e., we averaged the category ratings for yogurt, adhesives, chocolate candy, women’s apparel, and frozen vegetables). Using this information, we could directly assess the association between differing types of mobile device use and the average hedonistic nature of shoppers’ unplanned purchases.

In modeling the hedonistic nature of unplanned purchases, we estimate a standard OLS regression model with the average category hedonicity for unplanned items as the dependent variable. Consistent with prior models, we include our mobile device usage categories and all control variables in the model. The results of this analysis are reported in Appendix B. As expected, we find a significant relationship between consumer impulsiveness and average

category hedonicity for unplanned items ($\beta_{Impulsiveness} = 0.0562, p < .05$). Importantly, and consistent with our conceptualization, we find that the unplanned items purchased by shoppers using their device in a shopping-unrelated manner are significantly more hedonic than shoppers not using mobile devices ($\beta_{Unrelated} = 0.0774, p < .05$). This finding supports our argument that cognitive distraction associated with shopping-unrelated device use influences the nature of shoppers' decisions. Additionally, when compared to shoppers not using mobile devices, we detect no difference in category hedonicity of unplanned items for those using their mobile devices in a shopping-related manner ($p > .40$).

Discussion

In contrast to consumer lay beliefs, Study 1 demonstrates the considerable impact that shopping-unrelated phone use has on consumers ability to accurately manage a shopping trip. Consistent with prior research, when used in a shopping-related manner, our results suggest that shoppers will be better equipped to stay on track during the shopping trip. However, more critically, when used in a shopping-unrelated manner, our results indicate that shoppers may have a difficult time fulfilling their shopping trip as planned. Furthermore, the increased hedonicity of unplanned purchases made by shoppers using their mobile phone in a shopping-unrelated manner illustrates that this type of in-store mobile phone use is significantly more distracting than consumers believe.

Study 2

Study 1 demonstrated the significant real-world effects of in-store mobile phone use on consumers' ability to accurately complete a shopping trip. In particular, Study 1 analyzed

deviations from shopping plans in the form of unplanned purchasing. As discussed in our conceptual development, another important part of shopping plan adherence is the purchase of planned items. Therefore in Study 2, we utilize a simulated shopping task to further assess consumers' ability to accurately manage a list of planned items while engaging in shopping-unrelated mobile phone use. In particular, we assess the number of planned items that are missed by consumers. Moreover, in this study we directly investigate the mediating role of distraction in driving the results. Finally, in this study we also evaluate the influence that mobile phone dependence plays in influencing consumers' ability to accurately manage a shopping task while using a mobile phone. Specifically, we test the proposed moderated mediation process whereby the mediating effect of distraction is moderated by consumers' mobile phone dependence.

Procedure

One-hundred and sixteen participants (48% female; average age = 35.5 years, range 20 to 64 years) recruited using Amazon Mechanical Turk participated in Study 2 in exchange for a small monetary incentive. Study 2 employed a between-subjects design with two levels of mobile phone use: control (no phone use) and shopping-unrelated phone use. All participants completed a grocery shopping task in which they watched an approximately nine minute first-person perspective shopping video. This video was created using a pair of video recording glasses which captured a real-life first-person perspective grocery shopping trip in high-definition (1080p). In the shopping video, an individual pushed a cart through a grocery store and placed items in the cart to be purchased. Furthermore, the individual in the video picked up and inspected some items but did not put the item in the grocery cart.

Each participant was asked to imagine that they were the person shopping in the video. Prior to beginning the task, participants saw a list of fifteen grocery items that they intended to purchase during the trip. While watching the video, it was the participants' job to keep track of these items and identify which products were placed in the cart and which products were picked up by the shopper but not put in the cart. To do this, participants selected each item from a drop down list (see Appendix C). In total, nine of the items were put in the shopping cart and six of the items were picked but not put in the shopping cart. After reading about the task, participants viewed a layout screen that provided specific directions on the shopping task and demonstrated the arrangement of all parts of the task so that participants could familiarize themselves with the design prior to beginning.

To manipulate mobile phone use, participants were randomly assigned to one of the two conditions (no phone use or shopping-unrelated phone use). Participants in the shopping-unrelated use condition engaged in a simulated phone conversation in which they listened to a phone exchange between two individuals while they completed the shopping task. Simulated conversations have been used in prior research and provide a suitable proxy for real-world mobile phone conversations (Drews et al. 2008). In this condition, the conversation was not applicable to the shopping video being watched and lasted for the entire duration of the shopping trip. The conversation focused on the individuals' professional lives (e.g. how's your job going?), past experiences (e.g. discussing the past weekend), and upcoming plans (e.g. discussing a future vacation). Conversely, participants in the control group completed the focal shopping task without listening to a phone conversation. Therefore, these participants served as a no phone use control.

After completing the focal shopping task, participants completed measures of distraction, mobile phone dependence, and demographics. We used five Likert items (measured on a scale from 1 “strongly disagree” to 7 “strongly agree”) to capture distraction during the shopping task (“I was distracted while keeping track of the shopping items”; “I was totally focused on the shopping trip” [reversed scored]; “I had a hard time focusing on the shopping task”; “I had difficulty maintaining focus on the shopping task”; “It was easy to focus on the shopping task” [reverse scored]) which were averaged for analysis and mean centered ($\alpha = .90$, $M = 3.41$, $s.d. = 1.78$). To measure mobile phone dependence we used Bianci and Phillips’ (2005) 20 item mobile phone use scale (measured on a scale from 1 “not at all true” to 10 “extremely true”), which was also averaged for analysis and mean centered ($\alpha = .96$, $M = 3.48$, $s.d. = 2.01$; sample items: “I can never spend enough time on my mobile phone,” “I find it difficult to switch off my mobile phone,” “I find myself engaged on the mobile phone for longer periods of time than intended”).

Results

Mobile Phone Use and Accurate Adherence to Shopping Plans. To measure adherence to a shopping plan, we assessed the total number of planned grocery items that participants missed during the shopping task. This focal variable was the sum of the number items that participants failed to correctly identify as being placed in the shopping cart as well as the number of items that participants failed to correctly identify as being picked up but not placed in the shopping cart. An ANOVA revealed a significant effect of mobile phone use on adherence to a shopping plan, $F(1, 114) = 7.96$, $p < .01$, such that participants in the shopping-unrelated

condition ($M = 3.30$) missed more planned items when compared to participants in the control condition ($M = 2.18$).

Moderated Mediation Analysis: Distraction and Mobile Phone Dependence.

Previously we argued that shopping-unrelated mobile phone use would differently impact consumers' levels of distraction due to the divergent relationships between the mobile phone use and the shopping task. In Study 1, we observed evidence that shopping-unrelated phone use may be sufficiently distracting to impact shoppers' unplanned items. In addition to the mediating role of distraction, our theoretical development proposed that consumers' mobile phone dependence would moderate this mediating relationship, impacting either the unrelated mobile phone use to distraction path or the distraction to shopping plan adherence path. To directly test this moderated mediation model, we applied a PROCESS Model 58 to test for moderated mediation (Hayes 2013; Preacher and Hayes 2008). Table 4 shows the full results of the moderated mediation analysis. In this analysis, we used a shopping-unrelated effects coded variable (overall mean vs. shopping-unrelated use) as the independent variable, number of missed planned items as the dependent variable, mean centered distraction as the mediator, and mean centered mobile phone dependence as the moderator.

- Insert Table 4 about here -

Overall, the results revealed that mobile phone dependence did not moderate the shopping-unrelated phone use to distraction path, as the index of moderated mediation for this path was nonsignificant ($\beta = -0.03$; 95% CI = $-0.10, 0.03$). However, the index of moderated mediation for the distraction to number of missed planned items was significant ($\beta = 0.25$, 95% CI = $0.08, 0.37$), indicating that mobile phone dependence does in fact moderate the distraction

to number of missed planned items relationship. In this case there was a positive indirect effect of shopping-unrelated mobile use on missed planned items through distraction for participants with average levels of mobile phone dependence ($\beta = 0.52$, 95% CI = 0.21, 0.94), and for participants with high levels of mobile phone dependence ($\beta = 0.92$, 95% CI = 0.34, 1.51). However, there was not a significant indirect effect of shopping-unrelated mobile use on missed planned items through distraction for participants with low levels of mobile phone dependence ($\beta = 0.01$, 95% CI = -0.32, 0.41).

Floodlight Analysis. The results of our moderated mediation analysis demonstrates that consumers moderate to high in mobile phone dependence tend to deviate more from their shopping plans. To better understand the proportion of consumers who may be at risk of this deviation, we conducted a floodlight analysis. A floodlight analysis highlights the range of significance and insignificance for a simple effect (Hayes and Matthes 2009; Spiller et al. 2013). In the context of this study, the floodlight analysis identified the range of mobile dependence values for which there is a significant difference in missed planned items between the shopping-unrelated phone use condition and the control condition and the range of mobile dependence values for which there is not a significant difference in missed planned items between shopping-unrelated phone use condition and the control condition. The results of the floodlight procedure revealed that participants scoring above an average value of 2.78 on the mobile dependence scale missed more planned items when engaging in shopping-unrelated mobile phone use when compared to those in the control condition (all p 's for values over 2.78 < .05). Furthermore, 54% of the sample had values on the mobile phone dependence scale above 2.78.

Discussion

The results of Study 2 replicate and extend the findings from Study 1 and offer a number of important insights. First, we again find evidence that shopping-unrelated mobile phone use interferes with consumers' ability to accurately manage a shopping task. In particular, shopping-unrelated mobile phone use resulted in significantly more missed planned items. Second, our mediation analysis supports our argument that shopping-unrelated phone use is significantly more distracting than consumers realize and negatively impacts consumers' ability to accurately manage the shopping task. Third, our results establish that mobile phone dependence plays an important role in influencing consumers' ability to accurately complete their shopping.

Specifically, the results of our moderated mediation analysis demonstrate that consumers who are higher in mobile phone dependence have a tougher time managing their shopping. Importantly, we did not find evidence that consumers who are average to high in mobile phone dependence find multitasking more distracting than other consumers (i.e., mobile phone dependence did not moderate the shopping-unrelated phone use to distraction path); rather our results suggest that these consumers perform worse with their shopping when dealing with comparable levels of distraction (i.e. mobile phone dependence moderated the distraction to number of missed items path). Thus, when dealing with comparable levels of distraction, those higher in mobile phone dependence exhibit significant decrements in their ability to accurately manage their shopping trips. This finding is consistent with prior work tying mobile phone dependence to attentional impulsivity and research on dual task performance which shows that frequent media multitaskers tend to perform worse when dealing with multiple tasks (Ophir et al.

2009; Roberts et al. 2015). Finally, the results of our spotlight analysis suggest that a sizeable proportion of consumers demonstrate phone dependence levels that put them at risk of deviating from their shopping plans.

Study 3

The results of Study 2 indicate that shopping-unrelated mobile phone use significantly impacts consumers' ability to accurately manage planned shopping items. However, in that study, participants used their phones for the entire shopping trip. What about situations in which shoppers do not use their phones for their entire shopping trip? Might shoppers still struggle to manage their shopping trip if they only use their mobile phones intermittently throughout a trip? In Study 1, it is likely that some shoppers used their mobile phones for the entire duration of the shopping trip while other shoppers only used their phones sparingly. Therefore, the purpose of Study 3 is to investigate situations in which consumers do not use their mobile phones continuously throughout the shopping task.

Procedure

One-hundred and fifteen participants (55% female; average age = 34.4 years, range 19 to 66 years) recruited using Amazon Mechanical Turk participated in Study 3 in exchange for a small monetary incentive. This study used a between-subjects design with two levels of mobile phone use (no phone use and shopping-unrelated phone use) in which participants completed the same grocery shopping task used in Study 2. Once again participants watched a first-person grocery store shopping video and tracked items being placed in the shopping cart and items picked up but not put in the cart.

Participants were randomly assigned to one of the two mobile phone use conditions (no phone use or shopping-unrelated use). In the control condition, participants watched the standard shopping video without the use of a mobile phone. Conversely, participants in the shopping-unrelated phone use condition periodically received a series of push notifications from a mobile news app which were displayed in the upper left hand corner of the shopping video (See Appendix D). A push notification is a message that pops up on a user's mobile phone and is used by mobile apps to bring information to individuals' attention (Nations 2018). These notifications appear as a short message and often play a sound to alert the user of the new information. In total, four news push notifications were sent to participants throughout the shopping trip. For each push notification, participants heard a "ding" to indicate reception of a new mobile phone push notification. Each time a push notification was received, the shopping video froze for a period of 10 seconds, allowing participants time to read the message. Finally, to maintain realism, participants in both conditions were free to pause the shopping video whenever they wished.

After completing the shopping task, participants completed the same measures of distraction, mobile phone dependence, and demographic measures used in Study 2. We averaged and mean centered the measures of distraction ($\alpha = .88$, $M = 3.41$, $s.d. = 1.78$) and Bianci and Phillips' (2005) mobile phone dependence scale ($\alpha = .96$, $M = 3.30$, $s.d. = 2.00$) for our analysis.

Results

Mobile Phone Use and Accurate Adherence to Shopping Plans. To measure consumers' ability to accurately carry out shopping plans, we again evaluated the total number of missed planned grocery items for participants during the shopping task. An ANOVA revealed a

significant effect of mobile phone use on accurate adherence to shopping plans, such that participants in the shopping-unrelated condition ($M = 3.09$) had more missed planned items compared to participants in the control condition ($M = 1.68$), $F(1, 113) = 7.67, p < .01$.

Moderated Mediation Analysis: Distraction and Mobile Phone Dependence. To investigate the impact of mobile phone dependence on the relationship between shopping-unrelated mobile device use and accurate shopping plan adherence through distraction, we used a PROCESS Model 58 to test for moderated mediation (Hayes 2013; Preacher and Hayes 2008). Table 5 shows the full results of the moderated mediation analysis. In accordance with Study 2, we used a shopping-unrelated effects coded variable (overall mean vs. shopping-unrelated use) as the independent variable, number of missed planned items as the dependent variable, mean centered distraction as the mediator, and mean centered mobile phone dependence as the moderator.

- Insert Table 5 about here -

Consistent with Study 2, results revealed that mobile phone dependence did not moderate the shopping-unrelated mobile phone use to distraction path, as the index of moderated mediation for this path was nonsignificant ($\beta = 0.00$; 95% CI = -0.10, 0.14). However, for the distraction to number of missed planned items path, results revealed a significant index of moderated mediation ($\beta = 0.27$; 95% CI = 0.90, 0.45), indicating that mobile phone dependence moderates this relationship. More specifically, we again found a positive significant indirect effect of shopping-unrelated mobile phone use on the number of missed planned items through distraction for participants with average levels of mobile phone dependence ($\beta = 0.43$; 95% CI = 0.08, 0.90) and participants with high levels of mobile phone dependence ($\beta = 0.90$; 95% CI =

0.36, 1.65). Conversely, there was not a significant indirect effect of shopping-unrelated mobile phone use on number of missed planned items through distraction for participants with low levels of mobile phone dependence ($\beta = -0.06$; 95% CI = -0.61, 0.48).

Floodlight Analysis. Once again, we ran a floodlight analysis to further understand the proportion of consumers who may be at risk of deviating from their shopping plans. Results of the floodlight procedure revealed that participants scoring above an average value of 3.48 on the mobile dependence scale missed more planned items when engaging in shopping-unrelated mobile phone use compared to the control condition (all p 's for values over 3.48 < .05). Additionally, 38% of the sample showed mobile phone dependence values above 3.48. Consistent with the results of Study 2, this result suggests that a significant number of consumers show levels of phone dependence putting them at risk of deviating from their shopping plans while using mobile-phones in a shopping-unrelated manner.

Discussion

In line with prior results, the findings of Study 3 offer additional insight into the impact of shopping-unrelated mobile phone use on consumers' ability to accurately manage a shopping task. We again find evidence that mobile phone use unconnected to the shopping trip can interfere with consumers' ability to accurately complete their shopping trip. Furthermore, the results of Study 3 highlight the importance of distraction in driving these results. Interestingly, the results of this study suggest shoppers do not need to use their phones for the entire duration of the trip for their plan adherence to be negatively affected. Alternatively, it appears that intermittent mobile phone use can interfere with consumers' shopping and lead to issues in accurately carrying out in-store shopping plans. Given that participants were allowed time to

read the push notification messages before continuing the shopping trip, the results of this experiment demonstrate that in-store mobile phone use may actually consume attentional resources after use. Therefore, even after putting away a cell phone or smartphone, consumers may be expending cognitive resources thinking about the content of their phone conversations, text messages, push notifications, or emails which may negatively impact their shopping trip (Ward et al. 2017).

Importantly, the results of Study 3 replicate those of Study 2 and demonstrate that mobile phone dependence plays an important role in shoppers' ability to accurately manage their shopping while using a mobile phone. Once again, it appears that consumers high in mobile phone dependence have a more difficult time managing multiple tasks.

GENERAL DISCUSSION

As mobile technologies continue to grow in popularity, it is critical that consumers and marketers understand the impact these technologies have on consumer behaviors. The main objective of our research was to investigate the role that shopping-unrelated mobile device use plays in influencing consumers' ability to accurately manage their shopping. To achieve this, we integrated work on resource theories of information processing, shopper marketing, and mobile phone dependence to explore some of the implications related to mobile phone use in store environments.

This work is important because mobile phones are a fast-growing communications medium and consumers are becoming increasingly reliant on these technologies in their daily lives (Ericsson 2015). Additionally, understanding the role that mobile phones play in shaping

consumers' ability to accurately manage their in-store shopping plans is critical for retailers whose ultimate success is inextricably linked to in-store consumer behaviors. Prior research recognizes the considerable gap in our understanding of consumers' use of mobile technologies (Shankar et al. 2011; Shankar et al. 2016). A major contribution of our research is to identify important limitations associated with mobile technology use when executing a shopping plan. We illuminate the dangers of shopping-unrelated mobile device use, underscoring considerable issues associated with mobile phone distraction. Across three studies, we find evidence that shopping-unrelated phone use results in considerable distraction for consumers, and subsequently poor adherence to their shopping plan. Furthermore, we illustrate that shopping-unrelated phone use is associated with more hedonic unplanned purchases. Methodologically, our research relies on multiple research methods to focus on the phenomena of in-store consumer phone use. The application of a multi-method approach highlights consumers' use of mobile phones by providing data from both field and experimental settings.

Theoretically, this research offers numerous interesting insights. In line with multiple resource theory (Wickens 1984), we find evidence that shopping-unrelated mobile phone use leads to considerable cognitive distraction, thus negatively impacting consumers' ability to accurately manage their shopping trip. To our knowledge, this is the first paper investigating outcomes tied to in-store mobile phone use. Additionally, we show that both continuous and intermittent shopping-unrelated mobile phone use can interfere with consumers' ability to accurately manage shopping plans. This critical finding contradicts prior work advocating the harmless nature of moderate mobile phone use and adds to the nascent literature on carryover

effects of mobile phone distraction (Isikman, MacInnis, Ülkümen, and Cavanaugh 2016; Ward et al. 2017).

Finally, we contribute to the literature on mobile phone dependence and provide evidence that mobile dependence impacts consumers' ability to manage their shopping while using a phone. Prior work on mobile phone dependence has highlighted individual characteristics associated with the development of phone dependence (Bianchi and Phillips 2005; Hong et al. 2012; Takao, Takahashi and Kitamura 2009; Roberts, Pullig, and Manolis 2015) and specific health risks associated with mobile phone reliance (Thomée, Härenstam, and Hagberg 2011). However, to our knowledge, we are the first to establish that mobile phone dependence might actually influence individuals' ability to multitask while using a mobile phone, specifically impacting the accurate completion of a shopping trip.

Managerial Implications

Our research offers significant implications for firms wishing to incorporate mobile phones into their consumer-based strategy (Hamilton 2016). We focus on shoppers' ability to accurately manage a shopping task and assess two managerially relevant variables: unplanned purchasing and missed planned items. Historically, unplanned purchasing has been an important topic for marketing scholars (Iyer 1989; Kollat and Willett 1967) and a central variable in recent research on shopper marketing and retailer decision making (Bell, Corsten, and Knox 2011; Inman et al. 2009; Park, Iyer, and Smith 1989; Stilley et al. 2010a; Stilley et al. 2010b). Additionally, prior research has investigated the purchase and omission of planned items as critical for retailer success. (Cobb and Hoyer 1986; Heilman, Nakamoto, and Rao 2002; Park et al. 1989; Stilley et al. 2010b).

Assessing both variables, our results underscore the importance of how consumers use mobile phones and offer actionable insights. We find that using mobile phones in a shopping-unrelated manner makes it much more difficult for consumers to actively manage their shopping task. In our first study, we find that shopping-unrelated mobile phone use is associated with additional unplanned purchases that are more hedonic in nature. Our second and third studies demonstrate that shopping-unrelated mobile phone use makes it more difficult for consumers to accurately manage their planned shopping, thus resulting in more missed planned items. These findings suggest that the decision to encourage shopping-unrelated mobile phone use in store environments is not as straightforward as it appears. Therefore, we recommend that managers first consider the overall loyalty profiles of customers. See Table 6 for a breakdown of our major findings and the general impact this may have for retail outlets.

- Insert Table 6 about here -

We believe that firms with a highly loyal customer base will find success in encouraging shopping-unrelated mobile device use in store. Shopping-unrelated phone use will lead shoppers to buy more unplanned items and mismanage more planned items than normal. For highly store-loyal shoppers, this result benefits retailers. Not only are retailers maximizing unplanned purchasing during the focal trip, if a shopper misses or forgets an item, this may necessitate a second shopping trip. An additional trip may therefore have positive implications for retailers' bottom lines.

Conversely, our results suggest that firms with less loyal customers may need to rely on a situational analysis to determine the best course of action. Managers need to determine if spending on additional unplanned items due to phone use outweighs losses from missed planned

items due to phone use. If this is not the case, retailers may suffer losses when encouraging mobile use since shoppers are likely to go elsewhere to purchase planned items mismanaged during the initial shopping trip.

Our results clearly indicate that proximity marketing is a double-edged sword. On the one hand, when the messaging is relevant to the shopper, Study 1 shows that shopping-unrelated phone use has a beneficial effect to the retailer. However, when the messaging is not relevant to the shopper (e.g., a blanket promotion for the floral department), Studies 1-3 show the potential downside if the uptick in unplanned purchasing is more than offset by the increase in missed planned items, particularly for more mobile dependent shoppers.

To encourage shopping-unrelated mobile device use in-stores, retailers have many options. First, managers can highlight the availability of Wi-Fi throughout the store and promote the shopping environment as “technology friendly.” Similarly, retailers may entice consumers to use their mobile devices via subtle advertisements or signage reminding shoppers that it is smart to multi-task or catch up on conversations. Second, marketers may incorporate unrelated messages and information into mobile shopping apps, including short news updates, weather alerts, or general shopping information. This may distract shoppers from the focal shopping trip and lead to deviations from their shopping plans.

Along with highlighting the general distractive nature of in-store mobile phone use, our research also identifies the duration of mobile phone use (i.e. continuous vs. intermittent) and the modality of the distraction (i.e. audio vs. visual) as critical considerations in shoppers’ ability to accurately manage their shopping plans. For marketers we show that irregular mobile device use during a shopping trip can interfere with consumers’ plans. Hence, prompting short-duration uses

such as text messaging, checking emails, or listening to voice mails may divert shoppers from accurately completing their shopping. Furthermore, our findings propose that different modalities of input can distract consumers and impact their shopping. While prior research contends that that auditory perception relies on differing processing resources than visual perception (Wickens 1984), our studies show that both modalities of shopping-unrelated mobile phone may affect accurate adherence to shopping plans. For managers this means that many widely used visual mobile marketing tools such as SMS, mobile push notifications, and emails can be viable strategies to distract shoppers currently in store environments.

Finally, our results reveal that shoppers most dependent upon these devices may be the most likely to deviate from their shopping plans while using mobile phones in a shopping-unrelated manner. Therefore, managers can target consumers highly dependent on mobile devices. Managers may heavily promote Wi-Fi availability and unrelated shopping applications to these consumers during shopping trips. This can be accomplished by tailoring emails, store circulars, and receipt alerts to shoppers highly dependent on their mobile phones. Furthermore, variables such as age and mobile usage data collected using store apps or geofencing technology (Michael 2016) can be used to identify shoppers who heavily rely on mobile phones.

Consumer Implications

While our results provide direction for retailers, our findings are also crucial for consumers. Our preliminary analysis suggests that consumers tend to overlook or are unaware of the limitations associated with in-store shopping-unrelated mobile phone use. Consumers tend to view their phones as beneficial and discount the attentional limitations potentially imposed by the use of these devices. Contrary to consumer lay beliefs, our results indicate that mobile phone

use can have substantial negative repercussions when used in a shopping-unrelated manner. More importantly, our results illustrate that those who are most dependent on their phones are most susceptible to the distractive nature of shopping-unrelated phone use. Therefore, we hope that our research will influence consumers' attitudes toward mobile phones and persuade them to reflect on how these devices impact our lives, both positively and negatively. Despite the public's reliance on and praise for new mobile technologies that support supporting a hyper-connected lifestyle, it appears that there are deleterious outcomes associated with in-store mobile distraction.

Limitations and Future Research

The current research elucidates some of the benefits and limitations associated with in-store mobile phone use. While this work begins the investigation, there is considerable opportunity for future research. First, the distractive nature of shopping-unrelated phone use may be further examined. For example, future research can analyze consumers' behaviors using eye-tracking technology to help understand where and how long consumers focus on their mobile devices while in store environments. This may reveal how these devices impact cognitive and visual processing.

Second, additional research is needed to understand the intricacies of each type of phone use. For example, are certain types of shopping-unrelated use more distracting than other types of phone use? While we demonstrated the limitations of shopping-unrelated use, further research is needed to better understand if specific types of phone use may be sensitive to the shopping situation and consumer characteristics. Moreover, research is needed to further investigate shopping trips in which consumers use their mobile phones in both a shopping-unrelated and

shopping-related manner. The results of our first study indicate that this is a relatively common occurrence (157 shoppers engaged in both shopping-unrelated and shopping-related phone use in our dataset) and therefore, merits additional study. For example, future research may evaluate whether shopping-related phone use neutralizes the limitations of shopping-unrelated phone. Similarly, future inquiry can explore if the order of the mobile phone use (shopping-related use followed by shopping-unrelated use or shopping-unrelated use followed by shopping-related use) impacts consumer outcomes.

Third, while we found evidence that consumers higher in mobile phone dependence have a more difficult time accurately managing their shopping plans when engaging in shopping-unrelated phone use, there is some literature that suggests alternative outcomes. For example, prior work proposes that those who frequently rely on mobile phones might find multitasking more automatic given that they regularly engage in multitasking behaviors involving their phone (Bardhi, Rohm, and Sultan 2009). Additionally, some work in cognitive psychology suggests that those who regularly engage in media multitasking behaviors perform better when managing multiple tasks (Alzahabi and Becker 2013; Lui and Wong 2012). Therefore, this warrants additional examination of situations and environments where mobile phone dependence and shopping-unrelated phone use may not negatively impact consumers' shopping.

Fourth, further research may study the types of consumers who are more or less likely to use their mobile phones while making decisions. We have identified consumers who are highly dependent upon mobile devices as one particular group. However, a comprehensive understanding of demographic and personality characteristics tied to mobile phone use can help marketers better integrate mobile technologies into their interactions with consumers. For

example, evaluating when and why consumers reach for mobile phones may help marketers target consumers open to digital interactions, design more efficient shopping applications, and manipulate the manner in which consumers use mobile phones.

Finally, additional research is required on the potential impact of shopping-unrelated mobile device use on in-store stimuli recall. While we have demonstrated that shopping-unrelated mobile phone use is associated with an increase in unplanned purchases, mobile phone use may also alter consumers' attention to in-store promotions and signage. Ultimately, this may limit retailers' ability to communicate with consumers. Therefore, future research should further evaluate how shopping-unrelated mobile device use impacts consumers' explicit memories of external stimuli compared to those not using mobile phones.

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Table 1
Mobile Phone Usage Type and Frequency Study 1

<i>Use</i>	<i>Count</i>
Shopping-related	
Compare prices of products	88
Compare different retailers for best deal	46
Look at manufacturer's website	34
Look at retailer's website	50
Look at retailer's mobile app	41
Look at a retailer's loyalty app	25
Create, store, or access a shopping list	119
Scan a QR code on a package or display	19
Use a calculator	130
Call someone for help with decision	120
TOTAL Related*	672
TOTAL Related Incidence**	459
Shopping-unrelated	
Engage in private conversation	171
Check or send emails	120
Surf the web	37
Send personal text messages	271
Listen to music	54
Play games	41
TOTAL Unrelated*	694
TOTAL Unrelated Incidence***	437

No Mobile Use	1781
Related Use	302
Unrelated Use	280
Both Use	157

Notes: *Shoppers could select more than one category to describe their use of mobile technologies during the shopping trip.

** Total number of shoppers who used their phone in one or more shopping-related ways (related use + both use).

*** Total number of shoppers who used their phone in one or more shopping-unrelated ways (unrelated + both use).

Table 2
Mobile Phone Use and Unplanned Purchases Study 1

	Parameter Estimate		χ^2
Intercept	0.7712	***	45.60
Related	-0.1316	***	9.64
Unrelated	0.0906	**	4.85
Both	0.0792		1.98
Impulsive	0.0156		0.63
Trip Time	0.0022	***	15.37
Shopping List	0.0101		0.45
Basket Size	0.0668	***	2918.80
All Aisles	0.0531	*	3.57
Most Aisles	0.0251	*	2.64
Others	0.0466	***	11.01
Gender	-0.0987	***	26.74
Age	0.0025	***	6.61
Income	0.0000		2.13
Household Size	-0.0576	***	32.75
Shopping Mindset	-0.0350	**	4.30

Scale		1.3999			
Scaled Pearson χ^2	2504.00	Log Likelihood	4671.674	Scaled Deviance Null Model	1846.98
DF	2504	χ^2 Value	4495.35	Scaled Deviance Full Model	3009.28
Value/DF	1.00	<i>p</i> Value	< .001	Pseudo-R^2	0.3862

Notes: Dependent variable = number of unplanned purchases. Results are substantively unchanged without covariates in the models.

* $p < .10$ ** $p < .05$ *** $p < .01$

Table 3
Control and Response Function Results Study 1

<i>Stage One: Control Function</i>					
		Parameter Estimate		χ^2	
Intercept – Related		-0.7567	***	21.3511	
Intercept – Unrelated		-0.3054	*	3.5042	
Intercept – Both		-0.1046		0.4117	
Gender		-0.0079		0.0628	
Age		-0.0156	***	74.4617	
Income		0.0000	**	4.5462	
Household Size		-0.0002		0.0001	
Shopping Mindset		0.0267		0.6303	
AIC	4456.83	BIC	4503.32	Log Likelihood	4440.83
<i>Stage Two: Response Function</i>					
		Parameter Estimate		χ^2	
Intercept		-9.7237	**	6.23	
Related		-13.3784	***	27.50	
Unrelated		83.7667	***	10.07	
Both		0.0607		1.12	
Impulsive		0.0079		0.16	
Trip Time		0.0030	***	26.42	
Shopping List		0.0081		0.28	
Basket Size		0.0659	***	2740.01	
All Aisles		0.0535	*	3.52	
Most Aisles		0.0264	*	2.87	
Others		0.0473	***	11.01	
Gender		-0.0460	*	2.94	
Age		0.1001	***	6.69	
Income		-0.0000	**	5.64	

Household Size	-0.0671	***	41.87
Shopping Mindset	-0.2063	***	9.48
Related Control Function	13.2479	***	26.97
Unrelated Control Function	-83.6711	***	10.05
Scale	1.3382		
AIC	4456.83	BIC	4503.32
		Log Likelihood	4440.83

Notes: For stage one the dependent variable = type of mobile device use and the model is a cumulative probit.
 For stage two the dependent variable = number of unplanned purchases and the model is a Poisson.
 * $p < .10$ ** $p < .05$ *** $p < .01$

Table 4

Moderated Mediation of the Effect of Mobile Phone Use on Number of Missed Planned Items Study 2

<u>Outcome: Distraction</u>			
	<i>Point Estimate</i>	<i>t</i>	<i>p</i>
Constant	0.04	0.31	0.76
Unrelated Phone Use (Effects Coded)	1.16	9.40	< .001
Phone Dependence (Centered)	0.16	2.60	0.01
Unrelated Phone Use x Phone Dependence	-0.05	-0.92	0.36
<u>Outcome: Missed Planned Items</u>			
	<i>Point Estimate</i>	<i>t</i>	<i>p</i>
Constant	2.60	15.22	< .001
Distraction (Centered)	0.44	3.44	< .001
Unrelated Phone Use (Effects Coded)	0.10	0.44	0.66
Phone Dependence (Centered)	0.12	1.37	0.17
Unrelated Phone Use x Phone Dependence	0.22	5.23	< .001
<u>Index of Moderated Mediation</u>			

		95% Confidence Interval		
	Point Estimate	Lower	Upper	
Unrelated Phone Use to Distraction Path	-0.03	-0.10	0.03	
Distraction to Missed Items Path	0.25	0.09	0.38	
<u>Conditional Indirect Effect of Mobile Phone Use On Missed Planned Items Through Distraction at Different Levels of Mobile Phone Dependence</u>				
	Phone Dependence Level	Point Estimate	95% Confidence Interval	
			Lower	Upper
Distraction	-2.01	0.01	-0.32	0.41
Distraction	0.00	0.52	0.21	0.94
Distraction	2.01	0.92	0.34	1.51

Table 5
Moderated Mediation of the Effect of Mobile Phone Use on Number of Missed Planned Items Study 3

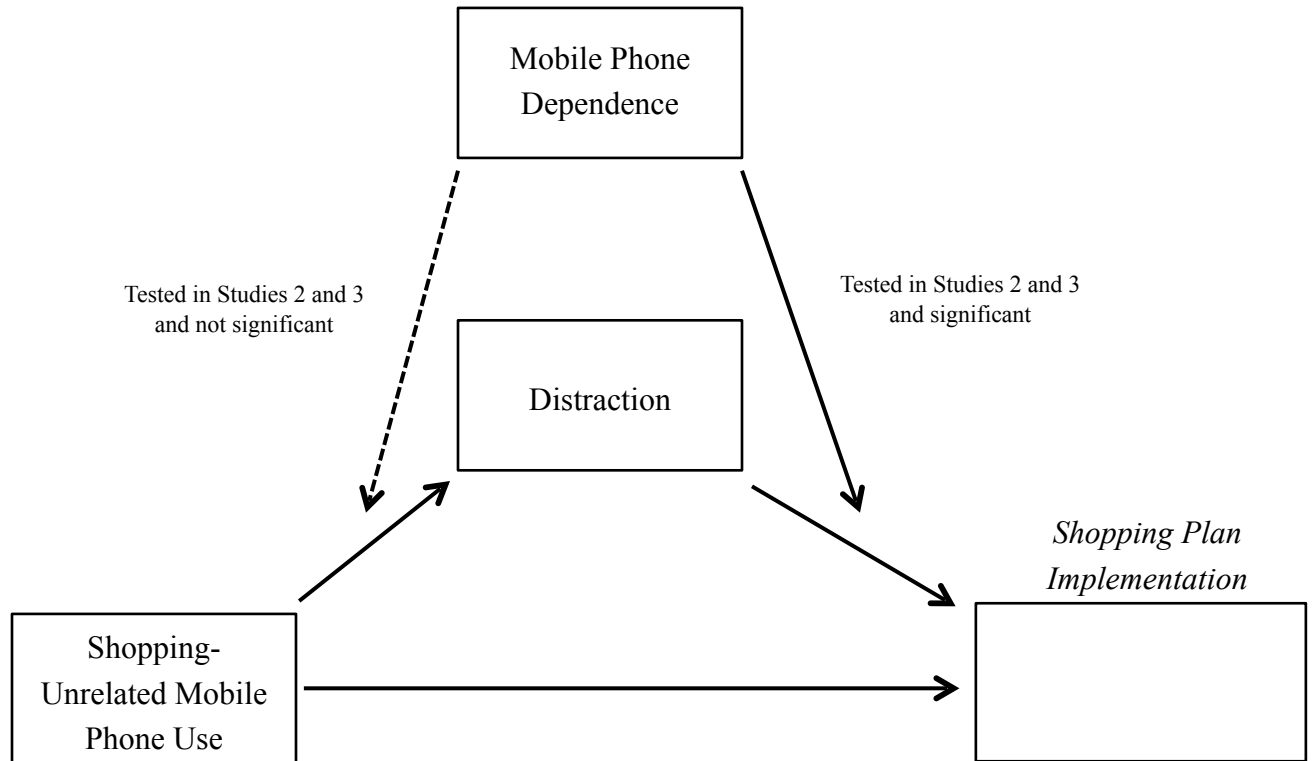
<u>Outcome: Distraction</u>			
	<i>Point Estimate</i>	<i>t</i>	<i>p</i>
Constant	0.06	0.48	0.63
Unrelated Phone Use (Effects Coded)	0.92	7.33	< .001
Phone Dependence (Centered)	0.14	2.06	0.04
Unrelated Phone Use x Phone Dependence	-0.01	-0.07	0.94

<u>Outcome: Missed Planned Items</u>				
	<i>Point Estimate</i>	<i>t</i>	<i>p</i>	
Constant	2.00	8.59	< .001	
Distraction (Centered)	0.47	2.41	0.01	
Unrelated Phone Use (Effects Coded)	0.10	0.32	0.75	
Phone Dependence (Centered)	0.06	0.43	0.67	
Unrelated Phone Use x Phone Dependence	0.26	4.37	< .001	
<u>Index of Moderated Mediation</u>				
	<i>Point Estimate</i>	<i>95% Confidence Interval</i>		
		<i>Lower</i>	<i>Upper</i>	
Unrelated Phone Use to Distraction Path	0.00	-0.10	0.14	
Distraction to Missed Items Path	0.27	0.09	0.45	
<u>Conditional Indirect Effect of Mobile Phone Use On Missed Items Through Distraction at Different Levels of Mobile Phone Dependence</u>				
	<i>Phone Dependence Level</i>	<i>Point Estimate</i>	<i>95% Confidence Interval</i>	
			<i>Lower</i>	<i>Upper</i>
Distraction	-2.00	-0.06	-0.61	0.48
Distraction	0.00	0.43	0.08	0.90
Distraction	2.00	0.90	0.36	1.65

Table 6
Shopper Marketing Implications

Finding	Shopper Marketing Implications
Unrelated mobile phone use associated with increase in unplanned purchases (Study 1)	(+) Consumers buying more items
Unrelated mobile phone use associated with more hedonic unplanned purchases (Study 1)	(+) Consumers buying more hedonic items
Continuous unrelated mobile phone use associated with increase in missed planned items, especially for consumers higher in mobile phone dependence (Study 2)	(-) Forfeiting purchases (+) Additional shopping trips
Intermittent unrelated mobile phone use associated more missed planned items, especially for consumers higher in mobile phone dependence (Study 3)	(-) Forfeiting purchases (+) Additional shopping trips

Figure 1
Shopping-Unrelated Mobile Phone Use Conceptual Framework



Appendix A

Measures and Controls Study 1

Variable	Measure
<i>Impulsiveness</i>	Impulsiveness was measured using a six-item five point Likert scale adapted from Puri (1996). Respondents were provided with six adjectives and asked to indicate their level of agreement with how well each attribute described them: impulsive, easily tempted, enjoy spending, a planner, self-controlled, and restrained, on a scale where 1 = strongly disagree and 5 = strongly agree. The last three attributes were reversed coded for analysis. $\alpha = .62$.
<i>Trip Time</i>	Trip time was calculated as the difference between respondents shopping start times and shopping finish times and was measured in minutes.
<i>Shopping List</i>	This variable captures whether or not the shopper had a hand written shopping list with them while shopping and was contrast coded 1 if the shopper had a written list and -1 if the shopper did not have a written list.
<i>Basket Size</i>	Basket size was measured as the total number of products the shopper purchased during the trip.
<i>Aisles Shopped</i>	Respondents were asked to indicate whether they shopped every aisle in the store, most aisles in the store, or only the aisles they needed. Two contrast-coded variables were used to capture this effect. AllAisles has a value of 1 if the shopper indicated they shopped every aisle and a value of -1 if they had not. MostAisles has a value of 1 if the shopper indicated they shopped most aisles and a value of -1 if they had not.
<i>Others</i>	This variable captures whether or not another individual accompanied the shopper during the shopping trip and was contrast coded to take on a value of 1 if the shopper was with another individual or -1 if the shopper was alone.
<i>Gender</i>	This is a contrast coded variable and is equal to 1 if the shopper is a male and is equal to -1 if the shopper is a female.
<i>Age</i>	Respondents' age was measured in years using eight distinct categories corresponding to a specific age category: (18-24), (25-34), (35-44), (45-54), (55-64), (65-74), and (75+). Consistent with prior research (Stilley et al. 2010b), we generated a continuous age variable by setting respondents age to the midpoint for each of the age categories.
<i>Income</i>	Similar to age, respondents' income was measured using eight distinct categories representing a specific income range: (Under \$25,000), (\$25,000 - \$34,999), (\$35,000 - \$44,999), (\$45,000 - \$54,999), (\$55,000 - \$64,999), (\$65,000 - \$74,999), (\$75,000 - \$99,999), and (\$100,000+). Consistent with prior research we created a continuous variable by taking the midpoint for each of the income categories (Stilley et al. 2010b).

<i>Household Size</i>	Respondents were asked to indicate the number of people, including themselves, living in the household.
<i>Shopping Mindset</i>	A shopping mindset was measured using a two-item five point Likert scale. Respondents indicated their level of agreement with the following statements: My primary aim in shopping is to complete the trip as planned; You should focus on getting the shopping done rather than looking around at whatever catches your fancy, on a scale where 1 = strongly disagree and 5 = strongly agree. $\alpha = .66$.

Appendix B
Category Hedonicity of Unplanned Items Study 1

	Parameter Estimate		<i>t</i>-Value
Intercept	3.7920	***	26.68
Related	-0.0262		-0.84
Unrelated	0.0774	**	2.42
Both	0.0292		0.72
Impulsive	0.0562	**	1.96
Trip Time	-0.0013		-1.24
Shopping List	-0.0402	*	-1.87
Basket Size	-0.0083	***	-2.69
All Aisles	0.0173		0.37
Most Aisles	0.0276		1.26
Others	0.0144		0.69
Gender	-0.0248		-0.98
Age	-0.0012		-0.85
Income	-0.0000	***	-2.40
Household Size	0.0406	***	2.90

Notes: Dependent Variable = category hedonicity of unplanned items.
 * $p < .10$ ** $p < .05$ *** $p < .01$



