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# Mobile Location-Based Advertising: How Information Privacy Concerns Influence Consumers' Attitude and Acceptance

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**This study investigates the effect of information privacy concerns on consumers' attitude toward and acceptance of mobile location-based advertising (LBA), and the moderating role of the type of mobile LBA, namely push versus pull. Using an online experiment ( $N = 224$ ), it was found that consumers' attitude toward mobile LBA has a direct positive effect on their intention to accept it, and information privacy concerns have a direct negative effect on acceptance intentions. Moreover and most important, the findings indicate that information privacy concerns influence consumers' attitude only in the case of push, but not pull, LBA. In conclusion, the type of mobile LBA (i.e., push versus pull) is crucial in understanding consumers' attitudes and acceptance of mobile LBA.**

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**Keywords** mobile location-based advertising, push LBA, pull LBA, privacy concerns, attitude, acceptance intentions

In the past few decades the functions and capabilities of mobile phones have expanded from simple voice telephony to multimedia support and broadband services (Cleff 2007; Park, Shenoy, and Salvendy 2008). In the context of marketing, these technological advances, combined with the high penetration rate of mobile phones, have paved the way for mobile advertising, which can be defined as the delivery of advertising messages to consumers' mobile devices (Cleff 2007; Haghirian and Madlberger 2005; Park, Shenoy, and Salvendy 2008; Petty 2003). A recent report by eMarketer (2014a) indicates that global mobile

advertising expenditure increased by 105.9% in 2013, and a 62.1 % growth is expected in 2014. Furthermore, it is estimated that by 2017, marketers will spend \$72.32 billion on mobile advertising worldwide—almost 10 times as much as the \$8.41 billion spent in 2012.

With mobile advertising growing rapidly, advertisers are continuously searching for innovative means to exploit the medium. Here, positioning technologies, such as GPS and Cell ID, represent important tools that enable marketers to incorporate real-time, location-based data to target consumers anywhere, anytime, based on their proximity to places of relevance and interest (Unni and Harmon 2007). Mobile advertising that utilizes and is tailored to the geographic location of the consumer is generally termed mobile location-based advertising (LBA) (Bruner and Kumar 2007; Unni and Harmon 2007; Xu et al. 2009). At present, there are two main types of mobile LBA: pull and push. The former refers to advertising that is delivered to the consumer's mobile phone upon his or her request, whereas the latter involves advertising sent by the marketer without the explicit request from the consumer. In other words, the difference between pull and push mobile LBA lies in who initiates the advertising process (Barnes 2002; Okazaki, Molina, and Hirose 2012; Unni and Harmon 2007; Xu et al. 2009).

While mobile LBA has the potential to bring value to the consumer by placing advertising in a location-specific context, privacy concerns may arise. To be more specific, given that mobile phones are generally considered highly personal devices (Okazaki, Li, and Hirose 2009; Park, Shenoy, and Salvendy 2008) and due to mobile LBA involving tracking and profiling of the consumer's geographic location, mobile LBA may be perceived as intrusive and raise privacy concerns (Cleff 2007; Unni and Harmon 2007; Xu et al. 2009). Hence, privacy concerns may potentially hinder user acceptance and thus the effectiveness and growth of mobile LBA (Merisavo et al. 2007; Vatanparast and Asil 2007; Wu and Wang 2005). It is therefore essential to understand the role of privacy concerns in determining consumers' attitude toward and acceptance of mobile LBA.

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Privacy concerns in the context of mobile LBA might, however, differ between pull and push LBA. Given that pull and push LBA are initiated by the consumer and marketer, respectively, privacy concerns may be less salient in the former than in the latter (Unni and Harmon 2007). Consequently, the effect of privacy concerns on consumers' responses to mobile LBA may be stronger in the case of push as opposed to pull LBA. Despite its apparent importance, the distinction between the different types of mobile LBA has received little attention in empirical research.

The present research aims to provide insight into the role of consumer privacy concerns in determining mobile LBA attitude and acceptance, and the moderating role of the type of LBA in this relationship. With mobile LBA becoming an increasingly important part of the marketing mix as indicated by it being expected to account for 32.8% of the total mobile advertising expenditure in 2017 (Berg Insight 2013), an understanding of how consumers' concern for privacy drives their attitude toward and intention to accept mobile LBA across push versus pull not only helps scholars comprehend the theoretical underpinnings of mobile LBA but can also help practitioners understand their audience and develop effective mobile marketing campaigns.

To be more specific, the present study contributes to theory and practice in two important ways. First, while it is a popular notion that information privacy concerns play a crucial role in the context of mobile advertising (Cleff 2007; Unni and Harmon 2007; Xu et al. 2009), little empirical knowledge exists about whether information privacy concerns do indeed influence attitude toward and acceptance of mobile LBA in particular. Such insight is important for practitioners to determine the extent to which privacy concerns have to be addressed when using mobile LBA.

Second, it is not yet clear whether the potential effect of information privacy concerns on consumer responses (i.e., attitude and acceptance intentions) toward mobile LBA varies across the different types of mobile LBA. This, however, is an important insight for scholars and practitioners alike. For scholars, knowledge of potential differences across push and pull LBA is important to determine whether it is necessary to include the type of mobile LBA in theories on mobile LBA and information privacy concerns. For practitioners, such insight is crucial to determine which type of mobile LBA (i.e., push or pull) to use for marketing efforts and to determine whether privacy concerns should be addressed in communication to consumers.

## THEORETICAL BACKGROUND

### Mobile Location-Based Advertising

Mobile LBA involves placing marketing messages in a location-specific context by tracking and utilizing the consumer's real-time geographic location (Bruner and Kumar 2007;

Unni and Harmon 2007; Xu et al. 2009). In doing so, mobile LBA offers benefits and adds value to both marketers and consumers. For marketers, mobile LBA provides the marketer with the ability to reach consumers anywhere and anytime. Hence, consumers can be targeted in the right context, that is, based on their proximity to places of relevance. Not surprisingly, mobile LBA is thus commonly regarded as an inexpensive and promising alternative to other forms of advertising in terms of breaking through the advertising clutter (Cleff 2007; Petty 2003). For consumers, mobile LBA represents a time-efficient tool as it minimizes the time they spend on sifting through and identifying relevant messages or assortments of goods and services (Baek and Morimoto 2012; Unni and Harmon 2007). Hence, marketers and consumers alike may see value in and benefit from mobile LBA.

Given these benefits, it is not surprising that mobile LBA spending is growing rapidly. According to a recent report by BIA/Kelsey (2014), the share of the total U.S. mobile ad expenditure attributed to location-based campaigns will increase from 40% in 2013 to 52% in 2018. Furthermore, it is estimated that mobile LBA revenues will triple in the United States, reaching \$15.7 billion by 2018. The forecast comprises a range of mobile ad formats, including search (i.e., advertising based on search queries), display (i.e., display advertising on mobile apps or mobile Web platforms), video (i.e., video ads distributed on mobile apps or mobile Web platforms), native social advertising (i.e., advertising displayed on mobile social apps such as Facebook), and commercial short message service (SMS). Search currently holds the largest share of mobile LBA spending, followed by display and native social advertising (BIA/Kelsey 2014).

### Types of Mobile LBA

Despite the benefits associated with mobile LBA and its rapid growth, some issues of concern should be taken into account when discussing mobile LBA. Relevant in this regard is the distinction between push and pull LBA, which highlights the fact that mobile LBA can be delivered to consumers who do, and who do not, explicitly request to receive such advertising. In pull LBA, the consumer initiates the advertising process by explicitly requesting advertisements or promotions from relevant retailers close to his or her geographic location. In other words, advertising is delivered to the consumer's mobile device based on geographic location and his or her explicit request (Barnes 2002; Okazaki, Molina, and Hirose 2012; Unni and Harmon 2007; Xu et al. 2009).

To illustrate, British mobile phone company ZagMe introduced one of the first pull LBA services in the United Kingdom in 2000. Registered consumers would receive advertising or promotional messages via SMS when they entered certain designated areas (i.e., Lakeside and Bluewater shopping malls in Essex and Kent, respectively). As location-tracking technology was not in place at the time, consumers had to activate the

service by sending a text message or through a voice call. Upon activation, consumers received advertising messages from retailers (e.g., Pizza Hut, Top Shop) based in the mall. The service was in place for one year, during which approximately 85,000 consumers signed up (Buckley 2004; Unni and Harmon 2007).

In contrast to pull advertising, push LBA does not involve the explicit request from the consumer. That is, while consumers may have opted in previously, they do not actively seek promotional messages in the case of push LBA. Instead, the marketer initiates the advertising process by sending unsolicited marketing messages to consumers' mobile devices based on their real-time geographic location (Barnes 2002; Okazaki, Molina, and Hirose 2012; Unni and Harmon 2007; Xu et al. 2009). With push LBA, marketers may trigger impulse buying and can avoid the risk of consumers not activating or requesting mobile LBA (Unni and Harmon 2007). However, consumers may perceive push LBA as intrusive because they have less control over the advertising process (Xu et al. 2009). Consequently, consumers may not see the potential benefits of mobile LBA and could develop a negative attitude and low acceptance intentions toward push LBA in particular.

A recent example for using push LBA is the mobile campaign run by Best Western in 2013. To encourage consumers to book a stay at one of the Best Western locations, the hotel chain set up geofences around airports, train stations, and rival hotels in Washington state. Travelers with the Best Western app installed on their mobile device would receive push notifications once they entered the predefined area. The location-specific ads included information regarding the distance to the nearest Best Western hotel as well as a "Book Now" button. The campaign received a 0.95% click-through rate, which is considered high in comparison to the industry average of 0.2% to 0.8% (eMarketer 2014b).

**Attitude as a Determinant of Acceptance Intention**

Given that the success of mobile advertising largely depends on user acceptance (Merisavo et al. 2007; Vatanparast and Asil 2007; Wu and Wang 2005), negative consumer responses to mobile LBA, due to, for example, perceptions of intrusiveness, may hinder its growth and effectiveness. The theory of reasoned action (TRA; Ajzen and Fishbein 1980; Fishbein and Ajzen 1975) and the technology acceptance model (TAM; Davis 1989) can be used to examine intentions to accept or adopt new information and communication technologies (e.g., Legris, Ingham, and Colletette 2003; Lu et al. 2003; Soroa-Koury and Yang 2010; Wu and Wang 2005).

The TRA posits that the most direct antecedent of behavioral performance is a person's behavioral intention, which, in turn, is determined by attitude toward the behavior. With regard to mobile LBA, this would suggest that people who hold a positive attitude toward mobile LBA should have greater acceptance intentions than those who hold a negative

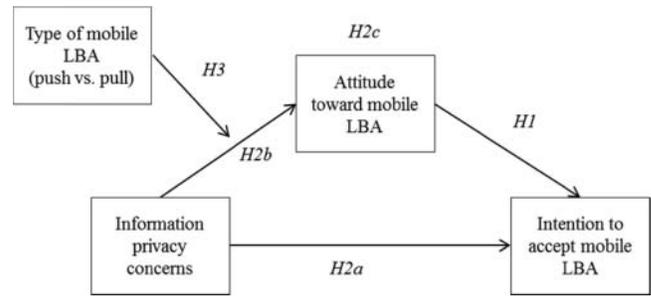


FIG. 1. Summary of hypotheses.

attitude toward mobile LBA (Ajzen and Fishbein 1980; Davis, Bagozzi, and Warshaw 1989). Similarly, the TAM posits that usage of information and communication technologies is determined by people's behavioral intention, which, in turn, is determined by their attitude toward the technology. When applying the TAM to the context of mobile LBA, it can be assumed that people will develop the intention to accept LBA if they have a favorable attitude toward it. Given that attitude is a key determinant of behavioral intention in both TRA and TAM, the following hypothesis is posed (see Figure 1):

**H1:** Consumers' attitude toward mobile LBA will be directly and positively related to their intention to accept mobile LBA.

**Privacy Concerns as Determinant of Attitude and Intention**

Mobile devices are generally considered highly personal devices (Okazaki, Li, and Hirose 2009; Park, Shenoy, and Salvendy 2008), and mobile LBA involves the tracking and utilization of consumers' real-time geographic location (Chen, Ross, and Huang 2008). Consequently, mobile LBA may be perceived as intrusive and as invading personal privacy (Cleff 2007; Unni and Harmon, 2007; Xu et al. 2009), which, in turn, may hamper the development of favorable attitudes toward and acceptance of mobile LBA.

From a legal standpoint, privacy is generally defined as "the right to be let alone" (Warren and Brandeis 1890, p. 193). As a multidimensional concept and a communication construct, this right to privacy encompasses physical privacy, psychological privacy, social privacy or autonomy rights, and information privacy (Burgoon et al. 1989; Chen, Ross, and Huang 2008). Defined as "the claim of individuals, groups, or institutions to determine for themselves when, how, and to what extent information about them is communicated to others" (Westin 1967, p. 7), information privacy is of particular importance in the context of mobile LBA, given that mobile LBA involves the collection of location information, which is considered to be highly personal information by many individuals (Junglas, Johnson, and Spitzmüller 2008).

To illustrate, Unni and Harmon (2007) found privacy concerns regarding location information to be high in the context

of mobile LBA. Similarly, a recent report by eMarketer (2012) indicates that 22% of people who had used location-based services felt that privacy risks outweigh the benefits offered by these services. Among respondents' top information privacy concerns were their location information being used for marketing purposes and strangers knowing too much about their personal data (eMarketer 2012). Evidently, information privacy concerns are an issue of concern in the context of mobile LBA and may thus hinder favorable attitudes toward and consumer acceptance of mobile LBA.

To be more specific, information privacy concerns encompass several types of privacy threats (Smith, Milberg, and Burke 1996; Malhotra, Kim, and Agarwal 2004), which may impede acceptance of mobile LBA. For instance, according to Smith, Milberg, and Burke (1996), there are four main types of privacy threats that shape information privacy concerns, namely (1) collection; (2) unauthorized secondary use; (3) improper access; and (4) errors. In the context of online marketing, these dimensions of information privacy concerns have been redefined to encompass collection, control, and awareness of privacy practices (Malhotra, Kim, and Agarwal 2004). Similar to Smith, Milberg, and Burke (1996), Malhotra, Kim, and Agarwal (2004) define collection as the extent to which an individual is concerned about the accumulation of personal data by others. Control refers to the degree to which a person has control over his or her personal information through, for example, opt-in or opt-out options. Finally, awareness represents an individual's understanding of privacy conditions and practices (Malhotra, Kim, and Agarwal 2004).

Regarding mobile LBA, Smith, Milberg, and Burke's (1996) and Malhotra, Kim, and Agarwal's (2004) notions of information privacy concerns combined suggest that individuals with high information privacy concerns perceive that (1) too many personal data, especially location information, are collected; (2) their personal data are used for undisclosed purposes; (3) their personal data are not properly protected by corporations; and (4) their personal data may be stored inaccurately (Smith, Milberg, and Burke 1996; Stewart and Segars 2002); and they would like to (5) be given control over their personal information and (6) be aware of and informed about data collection and other practices concerning their personal data (Malhotra, Kim, and Agarwal 2004).

In line with the theory of psychological reactance, it can be expected that people scoring high on information privacy concerns will respond negatively to mobile LBA. Psychological reactance theory posits that, when an individual perceives his or her freedom to be threatened, the individual will experience the need to restore the freedom and thus react defensively (Brehm 1966; Burgoon et al. 2002). Hence, central to psychological reactance theory is the notion of freedom and control. Given that mobile LBA involves tracking of and storing geographic information (Chen, Ross, and Huang 2008), individuals with high information privacy concerns in particular may perceive their ability or freedom to control

their privacy as threatened and, consequently, respond negatively to mobile LBA.

Indeed, a significant body of research has demonstrated the negative effects of privacy concerns on consumer responses, although these studies did not focus on LBA (e.g., Baek and Morimoto 2012; Dinev and Hart 2005; Milne and Boza 1999; Zhou 2011). In accordance with these previous research findings in the field of consumer behavior and in line with psychological reactance theory, the following hypotheses are posed (see Figure 1):

**H2a:** Information privacy concerns will be directly and negatively related to consumers' intention to accept mobile LBA, such that the more consumers are concerned about their privacy, the less will they intend to accept mobile LBA.

**H2b:** Information privacy concerns will be directly and negatively related to consumers' attitude toward mobile LBA, such that the more consumers are concerned about their privacy, the more negative will be their attitude toward mobile LBA.

**H2c:** Information privacy concerns will have an indirect effect on consumers' intention to accept mobile LBA through attitude toward mobile LBA.

### Effects of Push Versus Pull LBA

As suggested, the distinction between pull versus push LBA is central to the discussion of consumer responses to mobile LBA. As defined earlier, pull LBA refers to advertising that is delivered to the consumer's mobile device upon his or her explicit request. In contrast, push LBA is initiated by the marketer without the consumer actively seeking or requesting promotional messages (Barnes 2002; Okazaki, Molina, and Hirose 2012; Unni and Harmon 2007; Xu et al. 2009). In terms of psychological reactance theory (Brehm 1966; Burgoon et al. 2002) this means that, in pull LBA, the consumer has the freedom to choose between receiving and not receiving mobile LBA. That is, the consumer has a certain level of control over the advertising process. However, in push LBA, this freedom or control is restricted as the marketer initiates the advertising process. In other words, the consumer's freedom to choose between receiving and not receiving mobile LBA is removed. Consequently, in line with the principles of psychological reactance theory (Brehm 1966; Burgoon et al. 2002), privacy concerns may be more salient and consumers may perceive their freedom to control their privacy as particularly threatened in the case of push LBA.

Embedded in this argument is the notion of control, which is a central theme put forward not only in the theory of psychological reactance but also in most conceptualizations of information privacy concerns (Malhotra, Kim, and Agarwal 2004; Smith, Milberg, and Burke 1996; Stewart and Segars, 2002). As Malhotra, Kim, and Agarwal (2004) put it: "An individual's concerns for information privacy center on

whether the individual has control over personal information” (p. 339). In other words, information privacy concerns can be expected to be more severe in cases when individuals cannot exercise process control (Malhotra, Kim, and Agarwal 2004), as is the case in push LBA (Barnes 2002; Okazaki, Molina, and Hirose 2012; Unni and Harmon 2007; Xu et al. 2009).

Several studies have demonstrated the importance of consumer control in advertising or marketing contexts (Bamba and Barnes 2007; Edwards, Li, and Lee 2002; Tsang, Ho, and Liang 2004; Varnali, Yilmaz, and Toker 2012). For example, Edwards, Li, and Lee (2002) found that forced exposure to online pop-up ads triggers perceived ad intrusiveness and, consequently, leads to ad avoidance. Similarly, Tsang, Ho, and Liang (2004) revealed that consumers hold negative attitudes toward SMS-based mobile advertising unless they had previously given their consent or permission to it. Given these research findings and in line with psychological reactance theory and conceptualizations of information privacy concerns, the following hypothesis is posed (see Figure 1):

**H3:** The negative effect of information privacy concerns on consumers’ attitude toward mobile LBA will be moderated by the type of mobile LBA, with the negative effect being stronger for push LBA as compared to pull LBA.

## METHOD

### Research Design

To test the hypotheses, an online experiment was conducted, allowing for the manipulation of key variables. Respondents were randomly assigned to a questionnaire that represented one of two experimental conditions, namely pull mobile LBA and push mobile LBA. A total of 224 subjects participated in the research, with 112 respondents in each condition. The respective type of mobile LBA was manipulated using a scenario-based method, which seems particularly appropriate in the context of mobile advertising, given that “the use of scenarios makes it possible for researchers to study the emerging phenomenon without being constrained by timing of the study or the state-of-the art technology” (Sheng, Nah, and Siau 2008, p. 63). Thus, not surprisingly, scenario-based methods have frequently been used to study new technologies and phenomena, including mobile advertising and location-based services (e.g., Malhotra, Kim, and Agarwal 2004; Okazaki, Li, and Hirose 2009; Xu et al. 2009).

### Experimental Material

The scenarios were adopted from Xu and colleagues (2009) and slightly modified to fit the context of the present study. M-Coupon, a fictional service that delivers promotional offers and advertising messages to consumers’ mobile devices, served as the mobile LBA application. In the pull

scenario, participants were instructed to imagine that they could access the M-Coupon application on their mobile devices to find promotional offers from retailers in their surroundings. Their geographic location would be detected automatically upon access of the application, and a list of retailers in the vicinity would be provided. After selecting the merchant of interest, in this case their favorite coffeehouse, Brown’s Café, the requested coupon would be delivered to the consumer’s mobile phone in form of a barcoded receipt (Xu et al. 2009). In the push scenario, participants were instructed to imagine that they had signed up for the M-Coupon service by providing their mobile phone number and by indicating retailers of preference and interest, including Brown’s Café, their favorite coffeehouse. Profiling information would then be utilized to send unsolicited promotional offers to the consumers’ mobile device whenever they entered the vicinity of Brown’s Café (Xu et al. 2009).

### Procedure

This proposed research was submitted for ethical review prior to commencement to ensure ethical conduct. Data were collected in April 2014 using convenience sampling. Participants were recruited by promoting the survey online through e-mail, social media, and relevant forums. The online announcements included a link to the survey, explained the research purpose, and asked for subjects’ participation. Given that mobile LBA is a digital phenomenon characterized by the delivery of advertising messages to consumers’ mobile devices (Cleff 2007; Haghirian and Madlberger 2005; Petty 2003), online recruitment of participants appears particularly appropriate.

Upon accessing the link, respondents were first provided with a fact sheet, the purpose of which was to explain the nature of the research and to inform respondents that participation in the study was voluntary, that anonymity was guaranteed, and that participating did not entail any risk, stress, or discomfort. Subjects who wished to participate after having read the fact sheet gave their informed consent and subsequently commenced with the actual questionnaire.

At the onset of the questionnaire, respondents were provided with a brief definition of mobile LBA. Giving a definition of LBA was deemed necessary to overcome any lack of or differences in familiarity with mobile LBA and to ensure that all respondents had sufficient knowledge to form an opinion (Junglas, Johnson, and Spitzmüller 2008). Following the definition of mobile LBA, respondents were provided with either the push or the pull scenario. After having read the scenario, participants were instructed to answer a set of questions regarding their attitude toward and intention to accept mobile LBA, and the statements representing the manipulation checks were posed. Items were displayed in random order to avoid response bias.

Next, to measure subjects' information privacy concerns, respondents were asked to indicate the extent to which they agreed or disagreed with a set of statements about personal information. Here, too, items were displayed in random order to avoid response bias. Finally, participants answered questions regarding their mobile use behavior, prior experience with mobile LBA, previous privacy experience, and demographic information. Completing the self-report questionnaire took approximately ten minutes.

## Measures

The items to measure the previously mentioned constructs were developed by adapting existing scales that had been validated in previous studies to the context of mobile advertising.

**Manipulation check.** To verify that the scenarios were effective in manipulating the respective type of mobile LBA (i.e., push versus pull), manipulation checks were adopted from Xu and colleagues (2009) and included in the questionnaire. Specifically, on a seven-point Likert scale ranging from 1 (*Strongly disagree*) to 7 (*Strongly agree*), respondents were asked to indicate their level of agreement with the following statements: (1) With the M-Coupon service, I can search for up-to-date information about promotions and special offers from my favorite stores wherever I want to (pull scenario) ( $M = 4.82$ ,  $SD = 1.58$ ) and (2) With the M-coupon service, I automatically receive unsolicited information about promotions and special offers when I am near to my favorite stores (push scenario) ( $M = 4.94$ ,  $SD = 1.57$ ) (Xu et al. 2009, p. 169).

**Information privacy concerns.** Information privacy concerns were measured with Malhotra, Kim, and Agarwal's (2004) second-order scale consisting of collection (four items), control (three items), and awareness (three items). The 10 total items were rated on a 7-point Likert scale with response categories ranging from 1 (*Strongly disagree*) to 7 (*Strongly agree*). For example, respondents were asked to indicate their level of agreement with the following statements: (1) Consumer control of personal information lies at the heart of consumer privacy; and (2) Companies seeking information online should disclose the way the data are collected, processed, and used (Malhotra, Kim, and Agarwal 2004, p. 351). A reliability analysis yielded a Cronbach's alpha coefficient of .88 ( $M = 5.91$ ,  $SD = .76$ ), so the 10 items were averaged to create a single information privacy concerns measure.

**Attitude toward mobile LBA.** Attitude toward mobile LBA was measured using a four-item scale derived from Taylor and Todd (1995). Participants were asked to rate the following statements on a 7-point Likert scale anchored at 1 (*Strongly disagree*) and 7 (*Strongly agree*): (1) Using mobile LBA is a good idea; (2) Using mobile LBA is a wise move; (3) I like the idea of mobile LBA; and (4) Receiving mobile LBA is pleasant (Taylor and Todd 1995). A reliability analysis generated a Cronbach's alpha coefficient of .90 ( $M = 4.36$ ,  $SD = 1.45$ ). Hence, Taylor and Todd's (1995) attitude scale is reliable in

the context of the present study, and the four items were averaged to represent attitude toward mobile LBA.

**Intention to accept mobile LBA.** Intention to accept mobile LBA was measured with a two-item scale adopted from Merisavo and colleagues (2007); Standing, Benson, and Karjaluoto (2005); and Tsang, Ho, and Liang (2004). Using a 7-point Likert scale ranging from 1 (*Strongly disagree*) to 7 (*Strongly agree*), respondents were asked to indicate their level of agreement with the following statements: (1) I am willing to receive mobile LBA in the future; and (2) I intend to read all mobile LBA I receive in the future (Merisavo et al. 2007; Standing, Benson, and Karjaluoto 2005; Tsang, Ho, and Liang 2004). To determine scale reliability, Pearson product-moment correlation coefficient was used. The analysis revealed a strong, positive correlation between the two items ( $r = .57$ ,  $N = 224$ ,  $p < .001$ ). The two items were thus averaged to represent intention to accept mobile LBA ( $M = 3.32$ ,  $SD = 1.47$ ).

**Mobile use behavior.** To get a basic understanding of respondents' mobile use behavior, participants were asked (1) whether they own a mobile phone (yes or no), with all but one of the 224 respondents indicating that they owned one; (2) whether they regularly use their mobile phone to access the Internet (yes or no), with 88.39% of the participants indicating that they regularly access the Internet with their mobile phone; (3) how frequently they use their mobile phone ( $M = 1.53$ ,  $SD = 1.14$ ), with response options 1 (*More than ten times a day*), 2 (*Between five and ten times a day*), 3 (*Between three and four times a day*), 4 (*Between one and two times a day*), 5 (*Several times a week*), 6 (*Once a week*), 7 (*Several times a month*), 8 (*Once a month*), and 9 (*Less frequently*); and (4) how long they have been using a mobile phone ( $M = 5.48$ ,  $SD = 1.02$ ), with response options 1 (*Less than one year*), 2 (*Between one and two years*), 3 (*Between two and three years*), 4 (*Between three and five years*), 5 (*Between five and eight years*), and 6 (*More than eight years*) (Bigné, Ruiz, and Sanz 2007; Okazaki, Li, and Hirose 2009).

**Demographics.** The participants' gender, age, and level of education were measured. Age was measured by asking respondents to indicate their year of birth. Subjects' ages ranged from 18 to 63 years, with a mean age of 25.56 ( $SD = 7.23$ ). Participants' gender was identified using the question "What is your gender?" Within the total sample, 34.82% of the participants were male, and 65.18% were female. Level of education was measured with one question—"What is the highest level of education that you have completed?"—with the result that 11.2% of the respondents had graduated from high school, 3.1% had completed vocational or technical school, 57.1% had a bachelor's degree, 25% had a master's degree, and 0.9% had a doctoral degree; 2.7% described their education as "other." Age ( $t(222) = .68$ ,  $p = .495$ ), sex ( $\chi^2(df = 1) = .49$ ,  $p = .483$ ) and education ( $\chi^2(df = 5) = 6.58$ ,  $p = .254$ ) were equally distributed across conditions.

**Control variables.** Prior research on privacy concerns and technology acceptance indicates that additional factors may

have to be considered due to their potential influence on the key constructs in the present research model. To be more specific, it has been shown that prior experience with targeted or online advertising (Cho and Cheon 2004; Culnan 1995) and previous privacy experience (Malhotra, Kim, and Agarwal 2004; Okazaki, Li, and Hirose 2009; Smith, Milberg, and Burke 1996) may influence consumers' responses to advertising and their concerns about privacy violations. Prior experience with mobile advertising was measured with one item derived from Culnan (1995), asking respondents how frequently or infrequently they have used or received mobile LBA during the past year on a 7-point Likert scale ranging from 1 (*Never*) to 7 (*Very frequently*) ( $M = 2.58$ ,  $SD = 1.74$ ). Previous privacy experience was measured with one item adopted from Malhotra, Kim, and Agarwal (2004). Specifically, using a 7-point Likert scale with response options ranging from 1 (*Never*) to 7 (*Very frequently*), respondents were asked to indicate how frequently or infrequently they felt themselves to be victims of privacy invasion ( $M = 3.46$ ,  $SD = 1.59$ ).

## RESULTS

### Manipulation Check

To verify that the type of mobile LBA, namely push versus pull, was manipulated successfully, two independent-samples  $t$  tests were conducted. Respondents in the pull condition ( $M = 5.12$ ,  $SD = 1.43$ ) scored significantly higher on the statement "With the M-Coupon service, I can search for up-to-date information about promotions and special offers from my favorite stores wherever I want to" than participants in the push condition ( $M = 4.53$ ,  $SD = 1.67$ ;  $t(216.90) = 2.83$ ,  $p = .005$ ), while participants in the push condition ( $M = 5.16$ ,  $SD = 1.54$ ) scored significantly higher on the statement "With the M-Coupon service, I automatically receive unsolicited information about promotions and special offers when I am near my favorite stores" than participants in the pull condition ( $M = 4.71$ ,  $SD = 1.57$ ;  $t(222) = 2.15$ ,  $p = .033$ ). Hence, the manipulation was successful, that is, the scenarios were effective in manipulating the respective type of mobile LBA (i.e., push versus pull). In addition, there was no statistically significant correlation between information privacy concerns and the type of mobile LBA ( $r = -.03$ ,  $N = 224$ ,  $p = .673$ ), which suggests that the experimental condition did not influence participants' privacy concerns, so that privacy concerns can be used as a moderator in the analyses.

### Control Variables

To determine whether it was needed to control for prior experience with mobile LBA and previous privacy experience, correlation analyses using Pearson coefficients were performed prior to hypotheses testing. The analysis revealed a

weak, positive correlation between prior experience with mobile LBA and the mediator variable (i.e., attitude toward mobile LBA) ( $r = .15$ ,  $N = 224$ ,  $p = .027$ ) and the dependent variable (i.e., intention to accept mobile LBA) ( $r = .15$ ,  $N = 224$ ,  $p = .027$ ). Similarly, there was a weak, negative correlation between previous privacy experience and the mediator variable (i.e., attitude toward mobile LBA) ( $r = -.15$ ,  $N = 224$ ,  $p = .027$ ) and the dependent variable (i.e., intention to accept mobile LBA) ( $r = -.17$ ,  $N = 224$ ,  $p = .010$ ). Given these significant correlations, prior experience with mobile LBA and previous privacy experience were included as control variables in subsequent analyses.

### Hypotheses Testing

To test the direct effect of information privacy concerns on intention to accept mobile LBA, the indirect effect of information privacy concerns on acceptance intentions through attitude toward mobile LBA, and the potential moderating role of the type of mobile LBA (i.e., push versus pull), a conditional process analysis using Model 7 of Hayes's (2013) PROCESS macro was conducted. This approach is superior to Baron and Kenny's procedure according to recent literature (e.g., Zhao, Lynch, and Chen 2010; Hayes and Scharkow 2013; Hayes 2009). Information privacy concerns was entered as the independent variable, intention to accept mobile LBA was entered as the outcome variable, attitude toward mobile LBA and type of mobile LBA were entered as mediator and moderator, respectively, and prior experience with mobile LBA and previous privacy experience were entered as control variables to control for their potential effect on key variables in the model. Table 1 summarizes the means and standard deviations of all continuous variables.

In line with Hayes's (2009) recommendation, the analysis was conducted based on 5,000 bootstrapped samples. Statistical significance of the indirect effect was tested using a 95% bias-corrected confidence interval (CI) (Hayes 2009, 2013; Preacher and Hayes 2008). Overall, it was found that information privacy concerns and the type of mobile LBA accounted for a significant amount of the total variance in attitude toward mobile LBA ( $F(5, 218) = 7.44$ ,  $p < .001$ ;  $R^2 = .140$ ). Similarly, information privacy concerns and attitude toward mobile LBA explained a significant amount of the total variance in acceptance intentions ( $F(4, 219) = 98.10$ ,  $p < .001$ ;  $R^2 = .586$ ).

Specifically, the first hypothesis, which predicted that consumers' attitude toward mobile LBA would directly determine their intention to accept mobile LBA, was supported by the analysis. The more positive people's attitude toward mobile LBA, the greater their intention to accept it ( $b = .69$ ,  $SE = .05$ ,  $t = 14.88$ ,  $p < .001$ ). Similarly, hypothesis 2a, which predicted a direct and negative effect of information privacy concerns on people's intention to accept mobile LBA, was confirmed. Information privacy concerns did indeed influence

TABLE 1  
Means and Standard Deviations in Total Sample and Across Conditions

Variable	<i>M</i>	<i>SD</i>	<i>M</i> <sub>pull</sub>	<i>SD</i> <sub>pull</sub>	<i>M</i> <sub>push</sub>	<i>SD</i> <sub>push</sub>
Information privacy concerns	5.91	.76	5.93	.73	5.88	.79
Attitude toward mobile LBA	4.36	1.45	4.41	1.37	4.31	1.53
Intention to accept mobile LBA	3.32	1.47	3.37	1.43	3.27	1.51
Previous privacy experience	3.46	1.59	3.52	1.63	3.39	1.54
Prior experience with mobile LBA	2.58	1.74	2.76	1.73	2.39	1.74

Note. LBA = location-based advertising. Measured on a 7-point Likert scale ranging from 1 (*Strongly disagree*) to 7 (*Strongly agree*) for information privacy concerns, attitude toward mobile LBA, and intention to accept mobile LBA; and from 1 (*Never*) to 7 (*Very frequently*) for previous privacy experience and prior experience with mobile LBA;  $N = 224$ .

acceptance intentions independent of its effect on attitude. That is, the analysis revealed a significant direct effect of information privacy concerns on acceptance intentions, such that the greater people's concern for privacy, the less they intend to accept mobile LBA ( $b = -.32$ ,  $SE = .09$ ,  $t = -3.43$ ,  $p = .001$ ).

However, contradictory to prior expectations, there was no evidence of a significant main effect of information privacy concerns on attitude toward mobile LBA ( $b = .30$ ,  $SE = .38$ ,  $t = .79$ ,  $p = .430$ ). Hence, hypothesis 2b, which predicted a direct and negative effect of information privacy concerns on consumers' attitude toward mobile LBA, was not confirmed. Rather, the effect of information privacy concerns on attitude toward mobile LBA was contingent on the type of mobile LBA (i.e., push versus pull), as evidenced by the statistically significant interaction between information privacy concerns and type of mobile LBA ( $b = -.52$ ,  $SE = .24$ ,  $t = -2.20$ ,  $p = .029$ ).

To investigate the nature of this significant interaction and to test the third hypothesis, which predicted a stronger negative effect of information privacy concerns on consumers' attitude toward mobile LBA for push LBA than for pull LBA, Hayes and Matthes's (2009) ModProbe macro was used. The analysis revealed that information privacy concerns significantly determined attitude toward mobile LBA only in the case of push advertising ( $b = -.74$ ,  $SE = .17$ ,  $t = -4.46$ ,  $p < .001$ ), while there was no significant effect of information privacy concerns on attitude toward mobile LBA in the case of pull advertising ( $b = -.22$ ,  $SE = .19$ ,  $t = -1.18$ ,  $p = .241$ ; see Figure 2). Hence, the third hypothesis was partially supported: The negative effect of information privacy concerns on attitude toward mobile LBA was not only stronger for push than for pull LBA but also only significant in the former.

Hypothesis 2c predicted an indirect effect, with attitude mediating the relationship between information privacy concerns and acceptance intentions. This hypothesis was supported, albeit only partially. Specifically, given that the direct effect of information privacy concerns on attitude toward mobile LBA is moderated, the indirect effect will also be

conditional on the type of mobile LBA. In other words, while attitude emerged as a significant mediator between information privacy concerns and acceptance intentions with a 95% CI ( $-.69$ ,  $-.04$ ), this indirect effect was dependent on the type of mobile LBA, which is called moderated mediation or a conditional indirect effect (e.g., Hayes 2009). In the case of push advertising, information privacy concerns significantly predicted acceptance intentions through the effect on attitude, as revealed by the 95% bootstrapped CI, not including zero ( $-.77$ ,  $-.30$ ). The greater people's privacy concerns, the more negative their attitude toward mobile LBA and their subsequent intention to accept it ( $b = -.51$ ,  $SE = .12$ ). In the case of pull advertising, however, the indirect effect was not different from zero with a 95% CI ( $-.42$ ,  $.07$ ). Hence, attitude mediated the effect of information privacy concerns on acceptance intentions only in the case of push mobile LBA, but not in the case of pull mobile LBA, giving partial support for hypothesis 2c. Figure 3 summarizes the hypothesized results of the conditional process analysis.

Finally, it is worth noting an additional, although not hypothesized, finding. Specifically, the analysis revealed a significant main effect of the type of mobile LBA (i.e., push versus pull) on attitude toward mobile LBA ( $b = 3.01$ ,  $SE = 1.35$ ,  $t = 2.24$ ,  $p = .026$ ). Surprisingly, people in the push

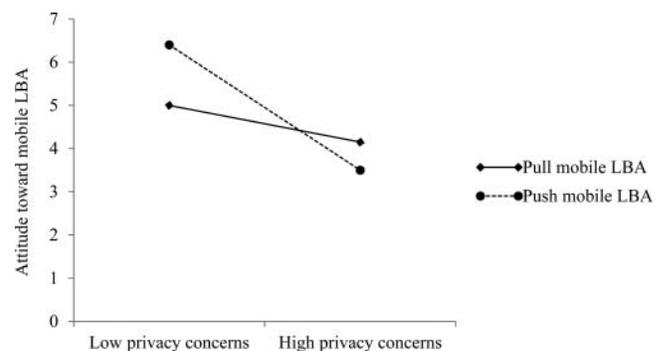


FIG. 2. ModProbe graph displaying interaction: Attitude toward mobile LBA as a function of privacy concerns and type of mobile LBA.

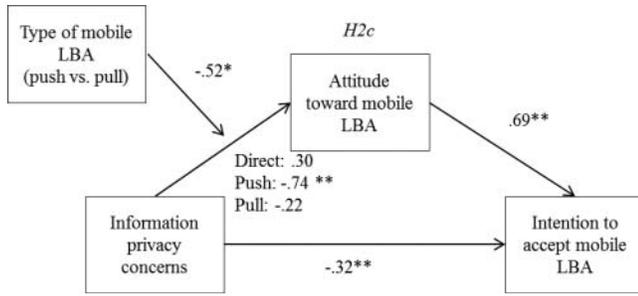


FIG. 3. Statistical diagram representing a moderated mediation effect. \* $p < .05$ ; \*\* $p < .01$ .

condition displayed significantly higher attitude scores than people in the pull condition. In other words, people in the push condition evaluated mobile LBA significantly more favorably than people in the pull condition.

**DISCUSSION AND CONCLUSION**

The aim of this study was to investigate the effect of information privacy concerns on consumers’ attitude toward and intention to accept mobile LBA, and the potential role of the type of mobile LBA (i.e., push versus pull) in moderating the relationship between information privacy concerns and attitude. Results showed that information privacy concerns have a direct negative effect on intention to accept mobile LBA, and attitude is a direct determinant of intention. However, the direct effect of information privacy concerns on attitude and the indirect effect of information privacy concerns on intention through attitude are contingent on the type of mobile LBA. That is, information privacy concern is a predictor of attitude, and attitude mediates the relationship between information privacy concerns and intention only in the case of push, but not pull, LBA. Hence, the type of mobile LBA plays an important role in determining the effect of information privacy concerns on attitude.

More specifically, the analysis revealed that consumers’ attitude toward mobile LBA is directly and positively related to their intention to accept mobile LBA. The more favorable an individual’s attitude toward mobile LBA, the greater his or her intention to accept it. This finding is in line with the theory of reasoned action and the technology acceptance model, which both posit that behavioral intention is determined by attitude toward the behavior (Ajzen and Fishbein 1980; Davis 1989; Davis, Bagozzi, and Warshaw 1989; Fishbein and Ajzen 1975). Moreover, the result is in accordance with previous research on mobile advertising indicating that attitude is a significant predictor of behavioral intention (e.g., Okazaki, Molina, and Hirose 2012; Soroa-Koury and Yang 2010).

The findings of the present study also confirmed the significant direct negative effect of information privacy concerns on consumers’ intention to accept mobile LBA. The more an individual is concerned about his or her information privacy,

the less he or she intends to accept mobile LBA. This finding can be explained by the nature of mobile LBA and psychological reactance theory. Given that mobile LBA involves the tracking and usage of location information (Chen, Ross, and Huang 2008), individuals scoring high on information privacy concerns in particular may perceive their freedom to control their privacy as threatened and, consequently, react defensively by exhibiting low acceptance intentions toward mobile LBA.

Somewhat contradictory to this line of reasoning, however, is the finding that information privacy concerns did not emerge as a direct predictor of attitude toward mobile LBA. While this may seem somewhat surprising at first, it can be explained by the significant interaction between information privacy concerns and the type of mobile LBA. In other words, the type of mobile LBA plays a crucial role in determining the effect of information privacy concerns on attitude. While information privacy concerns do not have an effect on attitude in the case of pull LBA, they do determine attitude in the context of push LBA, such that as an individual’s concern for information privacy increases, his or her attitude toward mobile LBA becomes less favorable.

Similarly, attitude mediates the relationship between information privacy concerns and intention to accept mobile LBA only in the case of push, but not pull, LBA. These findings—namely that (1) information privacy concerns determine attitude only in the case of push, but not pull, LBA; and (2) attitude mediates the effect of information privacy concerns on intention only in the case of push, but not pull, LBA—are in line with the theory of psychological reactance. As indicated previously, the notion of freedom or control is central to psychological reactance theory (Brehm 1966; Burgoon et al. 2002). In pull LBA, the consumer has control over the advertising process in that he or she can choose between receiving and not receiving mobile LBA. In other words, choice alternatives are not limited. In contrast, in push LBA, the consumer’s freedom to choose between receiving and not receiving mobile LBA is limited as it is the marketer who initiates the advertising process (Barnes 2002; Okazaki, Molina, and Hirose 2012; Unni and Harmon 2007; Xu et al. 2009). It is thus not surprising that information privacy concerns are salient and thus determine attitude only in the case of push LBA, and that attitude mediates the relationship between information privacy concerns and intention only in the context of push LBA.

Finally, somewhat unexpected is the finding that the type of mobile LBA is a direct determinant of attitude, with people having a more favorable attitude toward push than pull LBA. When taking into account the propositions of the theory of psychological reactance (Brehm 1966; Burgoon et al. 2002), consumers’ attitude toward pull LBA should be more positive than toward push LBA given that their freedom is not limited in the former but is in the latter. However, the present study demonstrated the opposite. A possible explanation for this contradictory finding may be the ease of use of push relative to

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pull LBA. According to TAM, attitude is, in part, determined by perceived ease of use of information and communication technologies (Davis 1989; Davis, Bagozzi, and Warshaw 1989). Perceived ease of use refers to the extent to which a user believes that using a particular information system does not require any effort (Davis 1989; Davis, Bagozzi, and Warshaw 1989). Several studies have provided evidence for the significant correlation between perceived ease of use and attitude (e.g., Moon and Kim 2001; Porter and Donthu 2006). Given that push LBA is initiated by the marketer, it does not require much effort on the part of the consumer. Pull LBA, on the other hand, requires the consumer to initiate the advertising process, meaning the degree of effort involved is greater than for push LBA, which may consequently translate into a less favorable attitude.

This may have especially been the case in the present study due to the scenarios used. Specifically, both the push and pull scenarios were relevant to the participants in that the ad was for their favorite coffeehouse. Previous research has shown that ad relevance influences consumers' attitude toward and acceptance of mobile marketing (Varnali and Toker 2010). Considering research findings with respect to ad relevance, the proposition of TAM related to ease of use and the nature of push versus pull LBA, participants received the relevant ad without any effort in the push scenario, while some degree of effort was required to receive the relevant ad in the case of the pull scenario. Therefore, participants in the push condition may have displayed a more favorable attitude toward mobile LBA than participants in the pull condition. Taking into account the importance of ad relevance (Varnali and Toker 2010), consumers' attitude toward push LBA may become unfavorable the moment they receive irrelevant promotional offers.

### Theoretical and Practical Implications

These findings have important implications for both theory and practice. From a theoretical standpoint, the results give further empirical support to the theory of reasoned action (Ajzen and Fishbein 1980; Fishbein and Ajzen 1975) and the technology acceptance model (Davis 1989) by showing the direct positive relationship between people's attitude toward mobile LBA and their intention to accept it. Moreover and most important, the findings advance knowledge and understanding of information privacy concerns in the context of mobile LBA. Information privacy concerns have widely been identified as an issue of concern in the context of mobile advertising (eMarketer 2012). However, the results of the present study highlight the importance of distinguishing between the different types of mobile LBA (i.e., push versus pull) when discussing information privacy concerns as a potential impediment to mobile LBA. Specifically, information privacy concerns may hinder the effectiveness of push LBA by negatively affecting attitude and acceptance intentions. In contrast, information privacy concerns do not influence attitude toward and

acceptance intentions of pull LBA. Hence, any theoretical discussion of information privacy concerns in the context of mobile LBA must include the consideration of the different types of mobile LBA.

From a practical standpoint, the present study's findings have two important managerial implications. First, using mobile LBA requires careful selection of the type of mobile LBA. Although it was found that consumers have a more favorable attitude toward push than pull LBA, using the former is not always advised, because the ultimate effectiveness of push LBA depends on the target group's level of privacy concerns. That is, if there is reason to believe that privacy concerns are high among members of the target audience, companies should refrain from using push LBA and instead make use of pull LBA. In other words, it is safer to use pull LBA in circumstances when consumers' privacy concerns are high, since privacy concerns determine attitude toward and acceptance intentions of mobile LBA only in the case of push, but not pull, LBA. The challenge in selecting the type of mobile LBA thus lies in determining the target audience's level of privacy concerns. Put differently, there are two crucial questions to answer when selecting the type of mobile LBA: (1) Who is the target audience? (2) What is the level of privacy concerns among members of the target audience?

Previous research gives some insight into determining factors of privacy concerns, and can thus provide some initial guidance in this regard. It has, for example, been found that highly educated people are more concerned about their privacy than less educated people (Sheehan 2002), that women have greater privacy concerns than men (Fogel and Nehmad 2009; Smit, van Noort, and Voorveld 2014), and that older individuals worry more about their privacy than younger individuals (Smit, van Noort, and Voorveld 2014).

Second, companies must understand the crucial role privacy concerns play in determining the outcome of their push LBA efforts. As people's concern for privacy increases, their attitude toward and acceptance intention of push mobile LBA decreases. Hence, the effectiveness of push LBA in promoting brands, products, and services will depend on how well marketers address and mitigate consumers' privacy concerns. Mitigating consumers' information privacy concerns could, for example, be achieved by respecting the individual's information rights through the establishment of fair social contracts which disclose a company's privacy policy and which enable consumers to exercise control over the collection and usage of their personal information (e.g., opt-in or opt-out options; a right to request deletion of data; access to personal data stored in databases) (European Commission 2014; Malhotra, Kim, and Agarwal 2004; Okazaki, Li, and Hirose 2009). With this in mind—that is, (1) by carefully selecting the type of mobile LBA and (2) by addressing privacy concerns when using push LBA—mobile LBA can be used as a tool to promote brands, products, and services.

## Limitations

Although the present study gave rise to important theoretical and managerial implications, a number of limitations that indicate opportunities for future research have to be noted. First, a scenario-based method was used to manipulate the respective type of mobile LBA (i.e., push versus pull). While this approach has frequently been used to study new information and communication technologies and is justified given the novelty of mobile LBA (e.g., Junglas, Johnson, and Spitzmüller 2008; Malhotra, Kim, and Agarwal 2004; Okazaki, Li, and Hirose 2009; Xu et al. 2009), it is hypothetical in nature and represents a simplification of the real mobile LBA context, which limits the external validity and generalizability of the present study's findings. Hence, to enable participants to gain realistic experiences of mobile LBA and to ultimately improve generalizability, researchers are encouraged to replicate this study with real mobile LBA as stimuli.

Somewhat related to the manipulation of the type of mobile LBA is the measurement of privacy concerns. Particularly, a study in which both the type of mobile LBA and the level of privacy concerns are manipulated simultaneously would be interesting. The challenge, however, is to design manipulations for privacy concerns and the type of LBA in a realistic manner. Specifically, as recognized by other researchers (e.g., Xu et al. 2009), triggering a consumer's volitional decision to initiate pull LBA in an experimental setting remains a challenge. Similarly, it will be challenging to manipulate participants' level of privacy concerns in an experimental setting, because concern for privacy does not exist in a vacuum but is strongly influenced by personal, contextual, and environmental forces (Junglas, Johnson, and Spitzmüller 2008).

Another venue for future research builds on the managerial implications drawn from this study. Specifically, researchers are advised to further examine antecedents of information privacy concerns. Understanding what influences people's concern for privacy will be important for marketers to determine the level of privacy concerns among members of their target audience. Similarly, for advertisers to be able to address privacy concerns successfully, future research should investigate means to mitigate consumers' privacy concerns.

Furthermore, future research could examine the rather surprising, although not hypothesized, finding of the present study that consumers' attitude is more favorable toward push than pull LBA. As suggested previously, a possible explanation may be the relative ease of use of push as opposed to pull LBA (Davis 1989; Davis, Bagozzi, and Warshaw 1989). Testing whether this is indeed the case and whether it also holds true in the case of irrelevant promotional offers will be important for marketers to determine which type of LBA to use to optimize consumer attitude.

Finally, recruitment of participants was based on online convenience sampling. Although this type of sampling is common in the domain of information and communication

technologies (e.g., Malhotra, Kim, and Agarwal 2004; Smith, Milberg, and Burke 1996; Stewart and Segars 2002) and can be justified given that mobile LBA is a digital phenomenon (Cleff 2007; Haghirian and Madlberger 2005; Petty 2003), care has to be taken when generalizing the results. Researchers are thus advised to replicate this study using probability sampling.

## Conclusion

Despite the aforementioned limitations, the present study provides important insight into the effect of information privacy concerns on consumer attitude toward and acceptance of mobile LBA. In conclusion, the type of mobile LBA (i.e., push versus pull) plays a crucial role in determining the effect of LBA. Specifically, information privacy concerns may hinder the effectiveness of push LBA by negatively affecting attitude and acceptance intentions. In contrast, information privacy concerns do not influence attitude toward and acceptance intentions of pull LBA. Practitioners should thus be aware that information privacy concerns hinder the effectiveness of their push LBA campaigns in particular.

Considering the transition toward the era of the Internet of Things, where all devices are connected and capable of receiving and transmitting information, this finding has important implications for how marketers can incorporate location-based advertising across multiple technologies. LBA is not restricted to mobile phones. As such, push versus pull LBA may have equally different effects on consumers' attitude and acceptance across technologies. Although whether this is indeed the case remains to be researched, marketers are nonetheless advised to consider the different effects of push versus pull when using LBA on, for example, other wearable computing devices (e.g., Apple Watch, Fitbit) and when targeting consumers using iBeacon or augmented reality systems (e.g., Google Glass). For researchers, these new technologies open a plethora of opportunities to measure, collect, and analyze consumers' responses to LBA, as these technologies offer possibilities to track consumers' behavioral reaction instead of measuring their attitudes and acceptance intentions.

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