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The effects of retail apps on shopping well-being and loyalty intention: A matter of competence more than autonomy[☆]

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ABSTRACT

The literature on retail apps has overlooked i/their potential impact on shopping well-being, ii/the underlying mechanisms for this effect, and iii/how such shopping well-being can trigger loyalty in an omnichannel context. To fill this gap, we mobilize the self-determination theory and, in a first study, show that using a retail app does not increase consumers' sense of autonomy, but does increase that of competence, thereby enhancing their shopping well-being and loyalty intention. Using an experimental design, a second study replicates these findings and shows that the sense of competence triggered by app customization leads to greater shopping well-being among people with low technology expertise.

1. Introduction

Well-being – or the subjective assessment that individuals make of the quality of their lives (Keyes, 2002) – is essential to human functioning, happiness, and health (Ryan and Deci, 2001). Well-being has been a topic of interest for philosophers since antiquity (Waterman, 1990), emerging in the late 1950s as a scientific field in its own right to monitor social change and improve social policies (Land, 1975). Since well-being depends on resources that go beyond the purely economic and include capabilities in general (i.e., what a person is actually able to do or be; Sen and Nussbaum, 1993), the question arises as to whether the capabilities that consumers are provided with or develop during their shopping experience can affect their well-being – namely their shopping well-being – and, ultimately, their loyalty towards the retailer (El Hedhli et al., 2013).

In this regard, consumers increasingly use their mobile phones when shopping (Roggeveen and Sethuraman, 2020), leading retailers to develop their own apps. Such apps can be viewed as firm-controlled touchpoints (Becker and Jaakkola, 2020) that provide customers with new capabilities (Dacko, 2017), enabling them to enjoy an omnichannel experience and enhancing their in-store shopping experience (Molinillo et al., 2020). Given the growing use of smartphones and apps, increased

attention has been paid to the impact of mobile phones and apps on well-being (Linnhoff and Smith, 2017; Roberts and David, 2016). In spite of this growing interest, four gaps in the literature remain that are worth addressing. First, most research on apps focuses on their negative effects (Linnhoff and Smith, 2017; McLean et al., 2022), with only a few authors exploring positive effects such as well-being (Garrouch and Ghali, 2023; Roy et al., 2023). Second, when examining the effects of apps on positive states like well-being or psychological needs satisfaction, authors have primarily investigated the effects of health apps (Hu et al., 2022; Stancu et al., 2022; Villalobos-Zuniga and Cherubini, 2020) and have tended to neglect retail apps (for an overview of existing research on retail app use and well-being, see Appendix A). Third, previous research mainly focused on life satisfaction (Linnhoff and Smith, 2017), customer well-being (Garrouch and Ghali, 2023) or subjective well-being (Roy et al., 2023), but not on the specific form of shopping well-being. Such shopping well-being captures the emotional state of life satisfaction consumers may experience while shopping (El Hedhli et al., 2013) and can therefore be a valuable predictor of how their shopping experience contributes to loyalty towards the retailer (Troebbs et al., 2018). Fourth, most studies on retail apps consider the latter as a new sales channel (McLean et al., 2022; Wang et al., 2015) that can replace in-store shopping experiences, neglecting their use during in-store

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shopping (Flacandji and Vlad, 2022; Iyer et al., 2018). However, in an omnichannel context where such apps have become more prominent and are constantly changing the way consumers shop, it is essential to better understand their impact on the in-store shopping experience.

This lack of research is even more striking in the marketing field, especially if one considers the call from Kumar et al. (2020) for more work on the impact of new technologies on personal needs such as autonomy and well-being. As argued by self-determination theory, well-being is experienced when basic psychological needs – namely, autonomy, competence, and relatedness – are satisfied (Ryan and Deci, 2008). Using retail technologies while shopping can help to satisfy these psychological needs (Leung and Matanda, 2013), which in turn may increase both shopping well-being and loyalty intention. To date, mobile app studies have mainly focused on app adoption (Japutra et al., 2021; McLean et al., 2022), purchase behavior (Wang et al., 2015), app satisfaction (Iyer et al., 2018; Molinillo et al., 2020), loyalty to the app (Japutra et al., 2022; McLean et al., 2022), and retailer satisfaction (Sinemus et al., 2022). Since customers are generally looking to enhance their well-being, investigating the impact of app use on their well-being, especially their shopping well-being, appears of major interest.

To address this gap, we examine whether retail app use while shopping in a physical store makes consumers feel more competent and autonomous, and if such competence and autonomy in turn increases their shopping well-being and loyalty intention towards the retailer. A first study addresses these questions and bolsters our understanding of the role of retail app use by identifying the psychological mechanisms that enhance shopping well-being and loyalty intention towards the retailer. A second study – an experiment – replicates the first study, taking it further by questioning whether app customization plays a role in shopping well-being and for which type of customer.

2. Theoretical background

2.1. Self-determination theory and shopping well-being

Subjective well-being refers to a positive affect associated with greater life satisfaction (Purohit et al., 2022). Self-determination theory (SDT, hereafter; Deci and Ryan, 2000) states that such subjective well-being is experienced when the innate basic psychological needs for i/autonomy (i.e., the perception of having freedom and control over personal actions), ii/competence (i.e., feeling capable and competent), and iii/relatedness (i.e., the need to be affiliated with others¹) are fulfilled (Deci and Ryan, 1985; Ryan and Deci, 2008). These psychological needs act as factors to facilitate intrinsic motivation, engendered when people are in conditions that support these states (Ryan and Deci, 2000). SDT thus appears to be an interesting framework for subjective well-being identification since it offers better predictive power of human behavior than other established behavioral models (Gilal et al., 2019).

Extant literature on SDT suggests that subjective well-being can be profoundly shaped by consumption experiences (Ekici et al., 2018). This is particularly true when consumption drives positive emotions, thoughts, and behaviors, and/or when it satisfies the psychological needs for autonomy, competence, and relatedness (Guevarra and

¹ Turning to relatedness as the third psychological need that drives motivated behavior and enhances well-being (Ryan and Deci, 2000), mobile phone use while shopping may reduce interactions with other people, especially employees (Fuentes et al., 2017). Thus, app use may reduce relatedness. However, an alternative prediction is that app use could induce a sense of community, making people feel that they belong to a community of app users (Dickinson et al., 2018), thereby enhancing their relatedness. Given the potential bidirectional effects of app use on relatedness, we followed Kim and Lee (2019) who excluded relatedness from their study of consumer preferences in the context of online customization, and did not take relatedness into consideration in the present study.

Howell, 2015). Given that shopping can be perceived as a strongly positive experience (Pine and Gilmore, 1999), the concept of subjective well-being has been extended to include shopping well-being. This particular form of well-being refers to “a shopper’s perceived impact of a shopping mall in contributing to satisfaction in important life domains (such as consumer life, social life, leisure life, and community life) resulting in a global judgement that the mall contributes significantly to one’s overall quality of life” (El Hedhli et al., 2013, p. 857). As the authors explain, shopping well-being stems from subjective well-being and the idea that a wide array of shopping experiences – from the purchase of consumer goods and services to socialization with retail employees and other shoppers – can trigger affective responses, including some that play an important role in overall quality of life. Consequently, since shopping well-being represents a specific life domain and subjective well-being is a significant consequence of shopping well-being (Ekici et al., 2018), it may be useful to mobilize SDT to better understand how shopping well-being, as a specific form of well-being, develops.

2.2. Retail app use, psychological needs, and shopping well-being

SDT states that autonomy is one of the innate needs that individuals strive to satisfy through their experiences. Autonomy refers to the belief that we can freely choose how to behave in a specific situation (Deci and Ryan, 1985). In the shopping context, such autonomy refers to consumers’ conscious or unconscious impression of freedom and the perception of control over the shopping process (Shen et al., 2023). Thus, in the specific context of mobile app use, autonomy has been referred to as users’ perception of personal choice throughout their interaction with the app, which derives from their perceived feeling of control (Flaherty et al., 2019). This perception of control – or “the extent to which consumers can determine the timing, content, and sequence of a transaction” (Kleijnen et al., 2007, p. 36) – is one of the main features of mobile apps (Kim et al., 2015), explaining why their use may boost consumers’ impression of autonomy (Shen et al., 2023).

In the food retailing context, Flaherty et al. (2019) empirically demonstrated the importance of health app use in consumers’ feeling of autonomy, arguing that giving people the possibility to adapt apps to their needs contributes to perceived autonomy and engagement with the app. Features of health apps like reminders, goal-setting parameters, motivational messages, gamification elements, and pre-commitments (Stancu et al., 2022; Villalobos-Zuniga and Cherubini, 2020) help to satisfy the basic need for autonomy. In general, technological features like connectivity, personalization, controllability, and responsiveness can improve consumers’ independent choices and autonomy (Shen et al., 2023). Since retail apps are software applications specifically designed to offer a convenient shopping experience and to facilitate the buying and selling of products or services (McLean et al., 2018), we predict that this feature will foster consumer autonomy. Our prediction also finds support in the work of Zhang et al. (2022) who, in the context of mobile payment apps, observed that when users reach a high level of need satisfaction using an app, it boosts their confidence in their own autonomy. Hence, in view of what precedes, we propose the following hypothesis:

H1. Retail app use increases customer autonomy.

As the second most important need in SDT, competence refers to a person’s need for feelings of effectiveness, achievement, and challenge (Deci and Ryan, 2000). More specifically, competence refers to “feeling effective in one’s interactions with the social environment – that is, experiencing opportunities and support for the exercise, expansion, and expression of an individual’s capacities and talents” (Ryan and Deci, 2017, p. 86). The need for competence is thus clearly distinct from that of autonomy: the first refers to the desire to feel oneself effective in producing and preventing desired and undesired outcomes, while the second refers more to the innate desire to experience one’s true self as the origin of one’s actions (Deci and Ryan, 1985; Skinner, 1996).

Competence is determined by an individual's ability to use two types of resources, namely, environmental or individual resources (Mallalieu and Palan, 2006). In this regard, mobile apps represent an environmental resource that consumers can use to enhance their competence (Bitrián et al., 2021; Stancu et al., 2022; Villalobos-Zuniga and Cherubini, 2020). In the retail context, mobile apps offer access to anytime anywhere information (Fuentes et al., 2017), making customers more knowledgeable and informed about the retail organization in question and its products and services (Alnawas and Aburub, 2016), and thus improving the cognitive dimension of the experience (Molinillo et al., 2022). Interestingly, since competence reflects individuals' cognitive beliefs about their ability to perform a given task (McDonald and Siegall, 1992) and is therefore cognitive in nature, we could argue that if using a retail app enhances the cognitive dimension of the experience, it might also affect people's feelings of competence. This prediction finds theoretical support in prior research showing that using mobile apps enhances people's confidence and competence (Alnawas and Aburub, 2016; Japutra et al., 2022). Hence, we propose the following hypothesis:

H2. Retail app use increases customer competence.

Earlier research has identified several antecedents of shopping well-being, including primarily hedonic value (El Hedhli et al., 2016; Shafiee and Es-Haghi, 2017), utilitarian and hedonic dimensions of the shopping experience (Maggioni et al., 2019), mall image (Shafiee and Es-Haghi, 2017), functional, convenience, safety, leisure, atmospherics and self-related factors (El Hedhli et al., 2013), and self-congruity (El Hedhli et al., 2021). To date, no research focusing on the in-store shopping experience (with or without app use) has examined satisfaction of the psychological needs for autonomy and competence as specific antecedents of shopping well-being. However, the relationship between the human psychological needs satisfaction of autonomy and competence and subjective well-being has been supported in various contexts related to digitalized experience, such as online retail (Shen et al., 2023) or AI-enabled technologies (André et al., 2018). Considering these arguments and the fact that autonomy and competence are the psychological needs with the greatest influence on well-being (Deci and Ryan, 2000), we propose the following hypotheses:

H3. Autonomy following retail app use increases shopping well-being.

H4. Competence following retail app use increases shopping well-being.

2.3. Loyalty as an outcome of shopping well-being

Customer loyalty is a key issue for retailers (Rokonuzzaman et al., 2020). Loyalty refers to a certain "preference for, consistent repurchase from, and support for a specific retailer over time" (Liu-Thompkins et al., 2022, p. 93), and thus reflects customers' willingness to consider the retailer as their first choice, to give said retailer positive evaluations, and to recommend the retailer to others (Zeithaml et al., 1996). Acknowledged as driving engagement towards an app (Fang, 2019; Japutra et al., 2022; Kumar et al., 2018; Zhang et al., 2022), mobile use in in-store shopping – or, more specifically, retail app use (Flacandji and Vlad, 2022) – might also boost customer loyalty (Collin-Lachaud and Diallo, 2021). However, the positive link between app use and loyalty has received little attention in the physical retail context to date.

Previous research on mobile app use supports the positive impact of a wide range of app-related outcomes on loyalty to a retailer. These outcomes include value-in-use (Fang, 2019), utilitarian and hedonic gratification (McLean et al., 2022), app engagement (McLean, 2018), loyalty towards an app (Japutra et al., 2021), attitude towards an app (McLean et al., 2020), app usage intention (Baek and Yoo, 2018), customer satisfaction (Iyer et al., 2018; Japutra et al., 2021; Molinillo et al., 2020, 2022; Sinemus et al., 2022), experience with the app (Molinillo et al., 2022), and shopping value (Flacandji and Vlad, 2022). However, Troebs et al. (2018) suggest investigating other potential underlying mechanisms of the effects of app-related outcomes, specifically identifying

well-being as a valid predictor of loyalty. This suggestion is supported by prior research (Kim and Kim, 2022) showing that well-being can affect users' loyalty to apps, a type of loyalty that is theoretically close to – but still different from – loyalty to retailers. Thus, considering the positive impact of app use on autonomy and competence, together with prior research showing a positive relationship between shopping well-being and loyalty intention (El Hedhli et al., 2013; Troebs et al., 2018), we propose the following hypotheses:

H5a. Autonomy and shopping well-being (in that order) serially and positively mediate the effect of retail app use on loyalty intention.

H5b. Competence and shopping well-being (in that order) serially and positively mediate the effect of retail app use on loyalty intention.

3. Study 1

The first study tests our basic prediction that retail app use while shopping (*versus* no use) increases customer autonomy and competence, which in turn prompts shopping well-being and loyalty intention.

3.1. Procedure and measures

For data collection purposes, we adopted a survey approach. The selection criteria meant that only individuals aged 18 or over who had shopped at least once in the month prior to their participation in the study at one of the seven leading grocery retail chains in France were included. In utilizing these screening criteria, our sample accurately embodies the common user profile of mobile apps adopted by retailers to align with our target population.² Participants were asked to complete the survey via a URL link that was posted on social networks (e.g., Facebook, Instagram). The data were collected in November 2022 using a quota sampling approach based on sociodemographic criteria. Participation was voluntary and non-incentivized. In total, 494 individuals responded to our invitation and completed the questionnaire in full. Thirty-one observations were removed as, according to the respondents, they did not shop in the top 7 French retailers' stores. In addition, thirty-six were removed for failing the attention checks, leaving a total of 427 valid questionnaires (56.4% female; 45.9% over 35 years of age; 36.5% with an education level equal to or above Bachelor level; 31.1% from the 'lower occupations' social classification) (See Web Appendix A for an overview of the sample). Participants were classified into the categories of retail app users (29.3%) *versus* non-users (70.7%) from their answer to the following question: "Do you have the retailer app on your mobile?" (Yes, I use it systematically; Yes, I use it from time to time; Yes, but I don't use it; No, I uninstalled it; No, I never downloaded it). From this question, we considered respondents who declared that they use it systematically or from time to time as app users.

Turning to the measures, measurement scales were all adapted from previous studies (see Appendix B for details). Autonomy and competence were captured using respectively 4 and 5 items adapted from Thomson (2006). Shopping well-being was measured following El Hedhli et al. (2013). To measure loyalty intention toward the retailer, we adopted the scale developed by Zeithaml et al. (1996). Finally, since app use and loyalty intention have been shown to vary with deal proneness (Flacandji and Vlad, 2022), this variable was introduced as a covariate in the further analyses (4 items; Flacandji and Vlad, 2022). All 7-point Likert items were anchored with 1 = "Do not agree at all" and 7 = "Fully agree", and were found to be reliable, with Cronbach's alpha (CA) and composite reliability (CR) scores exceeding the threshold of 0.60 (Bagozzi and Yi, 1988). Convergent validity was assessed using the average variance extracted (AVE) score, where convergent validity is

² The French Loyalty Observatory reported that the percentage of retail app users grew from 17.6% in 2018 to 27.6% in 2020. Our sample data aligns with this pattern, with app users accounting for 29.3% of the sample.

supported if the AVE score is above the 0.50 threshold. Each construct's average variance extracted (AVE) was compared with its squared correlations with other constructs in the model to assess discriminant validity. Both convergent validity and discriminant validity were achieved (Fornell and Larcker, 1981). The Heterotrait-Monotrait (HTMT) ratio confirmed that discriminant validity was achieved as the HTMT ratio scores were below 0.90 (Henseler et al., 2015). Table 1 presents the measures' reliability and validity. Further, given the cross-sectional nature of the study, common method bias (CMB) was assessed (Podsakoff et al., 2003) using Harman's single factor test. The aggregate variance of a single factor accounted for 38.28%, which is below 50%, indicating that CMB was not an issue.

3.2. Hypotheses testing

T-tests for independent samples revealed significantly greater competence in the app use condition ($M_{App\ use} = 3.82, M_{No\ app\ use} = 3.17, t(425) = -4.48, p < 0.001$) as well as greater shopping well-being ($M_{App\ use} = 3.76, M_{No\ app\ use} = 3.36, t(425) = -2.61, p < 0.001$) and loyalty intention ($M_{App\ use} = 5.99, M_{No\ app\ use} = 5.41, t(425) = -4.45, p < 0.001$). However, no significant difference in terms of autonomy emerged ($M_{App\ use} = 4.43, M_{No\ app\ use} = 4.24, t(425) = -1.16, p = 0.25$).

Using Process Model 80 (Hayes, 2018) and in line with our prediction (H1-H5), we tested whether retail app use (versus no use) leads to autonomy and competence, which in turn predicts shopping well-being that then predicts loyalty intention. The results yielded no impact of app use on autonomy ($B = 0.19, p = 0.25$). Thus, H1 was not supported. However, with regard to competence, the results showed a strong effect of app use on competence ($B = 0.65, p < 0.001$), supporting H2. Regarding the effect of both autonomy and competence on shopping well-being, the results revealed a positive effect of autonomy ($B = 0.19, p < 0.001$) as well as competence ($B = 0.48, p < 0.001$), supporting H3 and H4.

Given the lack of effect of app use on autonomy, no serial indirect effect of app use on loyalty intention through autonomy and shopping well-being ($B = 0.00, 95\% CI = -0.01; 0.02$) was observed. H5a is therefore not supported. However, turning to competence, the results revealed a significant index of serial mediation ($B = 0.05, 95\% CI = 0.02; 0.09$), indicating that the increase in perceived competence derived from app use and the subsequent increase in shopping well-being explain the positive indirect effect of app use (versus no app use) on loyalty intention. H5b is thus supported.

Of note, deal proneness had a positive effect as a covariate on both autonomy ($B = 0.25, p < 0.001$) and competence ($B = 0.32, p < 0.001$), as well as on shopping well-being ($B = 0.25, p < 0.001$) and loyalty intention ($B = 0.26, p < 0.001$). Results supporting the effects of retail app use on competence and subsequent shopping well-being and loyalty intention were also observed without the inclusion of deal proneness as a covariate (all 95% CIs not crossing 0).

Table 1
Reliability, convergent and discriminant validity.

| | Mean | SD | α | Composite reliability | AVE | (1) | (2) | (3) | (4) | (5) | (6) |
|--------------------------|------|------|----------|-----------------------|------|------|------|------|------|------|-----|
| Study 1 | | | | | | | | | | | |
| Autonomy (1) | 4.29 | 1.57 | 0.88 | 0.89 | 0.68 | | | | | | |
| Competence (2) | 3.36 | 1.39 | 0.88 | 0.88 | 0.59 | 0.15 | | | | | |
| Shopping well-being (3) | 3.48 | 1.43 | 0.84 | 0.84 | 0.56 | 0.15 | 0.30 | | | | |
| Loyalty intention (4) | 5.57 | 1.25 | 0.83 | 0.83 | 0.62 | 0.11 | 0.14 | 0.15 | | | |
| Deal proneness (5) | 4.64 | 1.60 | 0.89 | 0.89 | 0.66 | 0.10 | 0.15 | 0.15 | 0.22 | | |
| Study 2 | | | | | | | | | | | |
| Autonomy (1) | 5.20 | 1.41 | 0.92 | 0.88 | 0.64 | | | | | | |
| Competence (2) | 4.78 | 1.36 | 0.90 | 0.84 | 0.51 | 0.36 | | | | | |
| Shopping well-being (3) | 4.46 | 1.47 | 0.91 | 0.82 | 0.54 | 0.34 | 0.49 | | | | |
| Loyalty intention (4) | 5.76 | 1.11 | 0.90 | 0.81 | 0.59 | 0.40 | 0.35 | 0.37 | | | |
| Deal proneness (5) | 4.72 | 1.55 | 0.95 | 0.86 | 0.60 | 0.24 | 0.25 | 0.30 | 0.32 | | |
| Technology expertise (6) | 5.25 | 1.23 | 0.88 | 0.96 | 0.81 | 0.05 | 0.02 | 0.06 | 0.06 | 0.10 | |

Notes: SD = standard deviation. A = Cronbach's Alpha. Squared correlations are below the diagonal.

4. Study 2

In Study 2, we first attempt to replicate the mediating effect of competence and shopping well-being observed in Study 1, together with the absence of the mediating effect of autonomy. We then examine how retail app customization affects relations between retail app use, competence, shopping well-being, and loyalty intention.

4.1. The role of retail app customization

Some retail apps, such as Carrefour, allow users to customize their app by selecting tailored promotions from a list provided by the retailer, giving customers a more personalized and convenient shopping experience. When using an app and customizing it to get promotions that best suit their individual needs, customers play an active role in co-creating their shopping experience outcomes. This process involves two or more parties collaboratively interacting to create value (Vargo and Lusch, 2016), which is ultimately created "in-use", being generated jointly between the customer and the producer (Lusch and Vargo, 2014). Importantly, co-creation implies that consumers play an active role in their own consumption experience, triggering stronger adoption intention (Nikhashemi et al., 2021) and taking them to a higher level of loyalty (Coelho and Henseler, 2012). To date, little attention has been paid to such app customization and how it can enhance shopping well-being or consumer loyalty.

In line with prior research supporting the interest of building on SDT as a theoretical lens to explore value co-creation (Hsieh and Chang, 2016) as well as considering well-being as an outcome of co-creation (Kim and Lee, 2019; Shen et al., 2023; Shulga and Busser, 2021), we suggest that when customers are able to customize retail app use, it can strengthen their feeling of autonomy and competence. This notion builds on the fact that customization represents a new form of customer empowerment by offering a personalized consumer experience (Torres et al., 2018). In the context of health app use, Stancu et al. (2022) mobilized the SDT to show consumers' preference for app features like making changes to the menu recommendations or self-selecting their rewards, which can in turn lead to autonomy and competence. Thus, we can argue that when customers use a retail app allowing the customization of certain features, they have more control over the app features and ultimately over their shopping experience. Since feeling in control generates a sense of competence (Mencarelli et al., 2022), a feeling of competence may arise from performing this design job effectively and feeling confident during the customization process (Schreier, 2006).

Here, we build on the notion that when using technology, the sense of competence is a critical driver of how people respond to it (Meuter et al., 2005). Specifically, we introduce the notion of technology expertise – or "the amount of knowledge about a particular (self-service) technology acquired through experience or training" (Reinders et al., 2015, p. 192) – to predict that a sense of competence following its

customization may prove particularly beneficial for consumers who are generally uncomfortable with using a particular technological device such as a retail app (and thus have low levels of technology expertise). This prediction is grounded in prior research demonstrating that expectations evolve with increased expertise (Boulding et al., 1993). It suggests that customers with low expertise may not have strong expectations of competence when faced with an app, which means that feeling competent will be even more satisfying. In addition, since customers without much experience of technology have negative perceptions of self-service in terms of its use (Frambach et al., 2007), the feeling of competence following retail app customization may again be unexpected and therefore more satisfying, prompting greater shopping well-being. In light of the above, we propose the following hypothesis:

H6. *When customers use a retail app with customization options, the feeling of competence increases shopping well-being even more strongly for customers who are low (versus high) in technology expertise.*

This last hypothesis leads to the following final theoretical model (Fig. 1).

4.2. Procedure, design and measures

A sample of 409 participants were recruited to participate in the online study through Panelabs, a renowned panelist website. A scenario-based between-subjects experiment with 3 conditions (No app use; App use without customization; App use with customization) was here used. For the sake of ecological validity (Van Heerde et al., 2021), the design of the scenarios was based on the description of the official Carrefour app, the only app in France that offers customers the possibility to customize their promotions by choosing the product categories for their discounts. We modified the original description of the Carrefour app in the no app customization condition. The scenario simply stated that the app allows customers to replace their loyalty card, consult their loyalty account and current benefits, and offers them personalized promotions based on their purchase history. In both conditions, screenshots were provided of the Carrefour app, without the retailer's name, to recap the app's main features (see Web Appendix B). Participants were then told to imagine that they were going to use the app. In the no app use condition, the respondents were invited to answer the questions based on their actual shopping experience without app use. Of note, 113 respondents failed the attention checks, leaving a total sample of 296 observations (54.4% female; 76.6% over 35 years of age – see Web Appendix A).

The measures were the same as in Study 1 (see Appendix B), except that they included one of technology expertise (5 items; Reinders et al., 2015). Again, deal proneness was measured and included as a covariate in the further analyses. In addition, since being a current user of the retail app may explain customer loyalty towards the retailer, we also assessed whether respondents were actual users of the retail app (0 = No, 1 = Yes). Finally, since variance in customer loyalty could be related to prior experience with the retailer, we ensured that the respondents did not differ in their initial satisfaction toward the retailer (3 items from Oliver, 1980; $\alpha = 0.92$). This measure was thus completed upfront in the questionnaire by the respondent. Interestingly, no differences were observed between the 3 groups ($F(2, 295) = 1.14, p > 0.10$), suggesting that the initial relationship with the retailer was not an issue in our study. This variable served as an additional covariate. Reliability for all the scales exceeded 0.60, indicating good reliability of the constructs. Both convergent validity and discriminant validity were also achieved, with AVE scores above the threshold of 0.50 (see Table 1).

4.3. Manipulation checks

Participants who were app users in the scenario assigned to them (app use condition) reported a significantly higher level of awareness regarding their portrayal as app users compared to participants in the no app use condition ($\chi^2 = 296.00, p < 0.001$). Further, those in the app customization condition ($M_{\text{App use with customization}} = 6.09$; $M_{\text{App use without customization}} = 4.88$) reported significantly more opportunity to customize the app promotions ($t(201) = -6.10, p < 0.001$). These results support the manipulation of both app use and app customization. Finally, with regard to the scenario used, 46.7% of respondents recognized the app described as belonging to Carrefour, but with no significance across the groups ($\chi^2 = 0.13, p = 0.72$).

4.4. Effects of app use and customization on autonomy and competence

The hypotheses were first tested using ANOVAs that considered app use as a factor on three levels (0 = no app use, 1 = app use without customization, 2 = app use with customization), with each dimension of the basic psychological needs serving as the dependent variables. Table 2 presents the descriptive statistics. As in Study 1, the results revealed no significant effect of app use on autonomy ($F(2, 293) = 2.26, p = 0.11$), thus not supporting H1, but – as expected – showing a significant and positive effect of app use on competence ($F(2, 293) = 10.76, p < 0.001$). Planned contrasts revealed a significant mean difference of

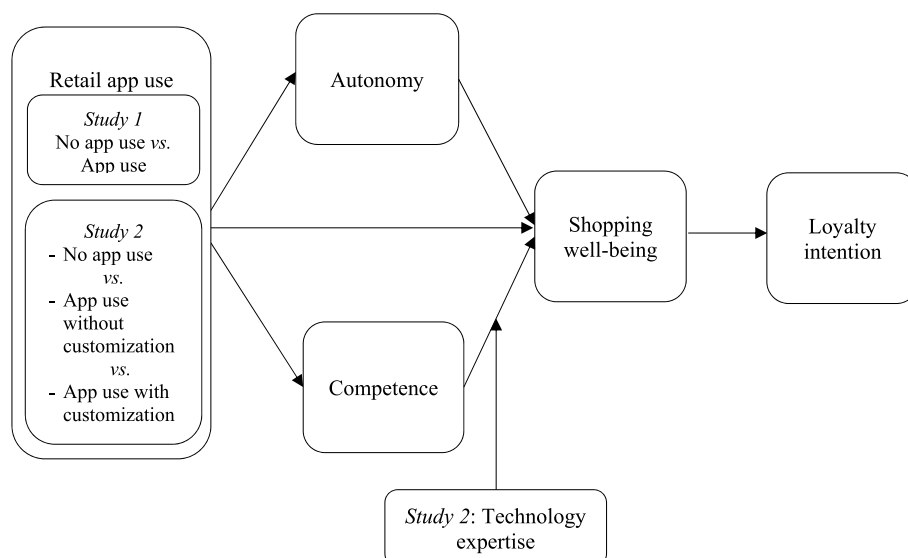


Fig. 1. Final theoretical model.

Table 2
Descriptive statistics and ANOVA results for Study 2.

| | No app use condition | App use conditions | | Test | |
|----------------------|----------------------|-------------------------|----------------------|-----------|--------|
| | (N = 93) | Without cust. (N = 102) | With cust. (N = 101) | F(2, 293) | p |
| Initial satisfaction | 5.56 (1.11) | 5.65 (1.08) | 5.78 (0.96) | 1.14 | 0.32 |
| Autonomy | 5.17 (1.35) | 5.00 (1.47) | 5.42 (1.37) | 2.26 | 0.11 |
| Competence | 4.31 (1.31) | 4.79 (1.43) | 5.19 (1.21) | 10.76 | <0.001 |
| Shopping well-being | 4.10 (1.51) | 4.42 (1.46) | 4.84 (1.34) | 6.53 | <0.01 |
| Loyalty intention | 5.69 (1.20) | 5.65 (1.13) | 5.94 (0.99) | 1.97 | 0.14 |
| Technology expertise | 4.51 (1.45) | 4.69 (1.47) | 4.95 (1.38) | 1.98 | 0.14 |
| Deal proneness | 5.10 (1.45) | 5.23 (1.02) | 5.42 (1.20) | 1.66 | 0.19 |

Note: Cust. = Customization. Standard deviations are presented in brackets.

competence across the no app use condition ($M = 4.31$) and both i/the app use without customization condition ($M = 4.79, t = 2.53, p = 0.012$) and ii/the app use with customization condition ($M = 5.19, t = 4.85, p < 0.001$), thereby supporting H2.

We then examined whether the mediating role of perceived autonomy and competence on shopping well-being observed in Study 1 was replicated in Study 2. As the app use variable had 3 conditions (i.e., no app use, app use without customization, and app use with customization), we followed Hayes and Preacher (2014)'s guidelines on mediation analyses using multicategorical independent variables, performing a general linear modelling approach to estimate the indirect effect when the independent variable is multicategorical (Process, Model 4, 5000 bootstraps). More specifically, the macro automatically recodes the three experimental conditions into two dummy coded variables – X_1 and X_2 –, such that the no app use condition becomes the baseline (X_1 no app use = 0, app use without customization = 1 and X_2 no app use = 0, app use with customization = 1).

Consistent with Study 1, and given the lack of mean differences in autonomy across app use conditions, the results revealed no significant effect of app use on autonomy ($X_1: B = 0.24; X_2: B = -0.17; p's > 0.05$). H1 is therefore not supported. Regarding the effect of autonomy on shopping well-being, the results revealed a positive effect ($B = 0.25, p < 0.001$), supporting H3. However, the indirect effect of retail app use on shopping well-being via autonomy was not significant ($X_1: B = -0.04, 95\% CI = -0.13; 0.05; X_2: B = 0.05, 95\% CI = -0.03; 0.15$). Turning to competence, a pattern of results similar to Study 1 was observed, with a significant positive effect of app use on competence ($X_1: B = 0.48; X_2: B = 0.88; p's < 0.001$). Consequently, H2 is supported. Regarding the effect of competence on shopping well-being, the results revealed a positive effect ($B = 0.59, p < 0.001$), supporting H4. Finally, we observed an indirect effect of retail app use on shopping well-being ($X_1: B = 0.20, 95\% CI = 0.02; 0.41; X_2: B = 0.37, 95\% CI = 0.19; 0.60$).

A similar analysis was performed with the covariates (i.e., deal proneness, current app user status, and initial satisfaction) included. Similar results were observed, with deal proneness having a positive effect on autonomy, competence, and loyalty intention (all $p's < 0.001$). Being a current user of the retail app also increased competence ($B = 0.29, p < 0.05$). Initial satisfaction was positively associated with autonomy ($B = 0.48, p < 0.001$) and competence ($B = 0.41, p < 0.001$), but not with shopping well-being ($B = 0.12, p > 0.05$). Further, and importantly, no significant effect of app use on shopping well-being through autonomy emerged here again ($X_1: B = -0.04, 95\% CI = -0.12; 0.04; X_2: B = 0.00, 95\% CI = -0.05; 0.05$), but a significant effect of app use on shopping well-being through competence was found ($X_1: B$

$= 0.18, 95\% CI = 0.02; 0.34; X_2: B = 0.31, 95\% CI = 0.13; 0.49$). Overall, the results replicate the mediating effect of competence in the relationship between retail app use and shopping well-being, giving further support to the robustness of our findings.

4.5. Effects of autonomy, competence, and shopping well-being on loyalty

The role of shopping well-being on loyalty intention set out in Hypothesis 5 was tested using Process Model 80 (Hayes, 2018). As previously mentioned, no significant effect of app use on autonomy emerged, which made the indirect effects of app use on loyalty intention through autonomy and shopping well-being ($X_1/X_2 \rightarrow$ autonomy \rightarrow shopping well-being \rightarrow loyalty intention) non-significant ($X_1: B = -0.01, 95\% CI = -0.03; 0.01; X_2: B = 0.01, 95\% CI = -0.01; 0.04$). Thus, as in Study 1, H5a is not supported. However, with regard to competence, the indirect effects of app use on loyalty intention ($X_1/X_2 \rightarrow$ competence \rightarrow shopping well-being \rightarrow loyalty intention) were – as in Study 1 – significant ($X_1: B = 0.06, 95\% CI = 0.01; 0.13; X_2: B = 0.10, 95\% CI = 0.05; 0.19$). Hence, H5b is supported. Of note, a similar pattern of results was observed when covariates were included. Covariates had an analogous effect as in the H1-H4 tests, but in this case, deal proneness ($B = 0.18, p < 0.001$) and initial satisfaction ($B = 0.39, p < 0.001$) also positively affected loyalty intention.

4.6. The roles of app customization and technology expertise

The last set of analyses examined the roles of app customization and technology expertise for customers using an app. A moderated-mediation analysis was performed that included the two app use conditions manipulating customization (i.e., with customization versus without customization) as the independent variable, competence and shopping well-being as the mediators, and loyalty intention as the dependent variable (Process, Model 91, 5000 bootstraps). The results revealed a marginally significant effect of app customization on competence ($B = 0.29, p = 0.07$) and a positive effect of such competence on shopping well-being ($B = 1.13, p < 0.001$). Importantly, they also yielded a significant interaction between competence and technology expertise on shopping well-being ($B = -0.11, p < 0.001$), indicating that such technology expertise moderates the effect of competence on shopping well-being. As illustrated by Fig. 2, and providing support for H6, the results show that the sense of competence triggered by app customization leads to enhanced shopping well-being, but this effect is stronger among people with low (versus high) technology expertise.

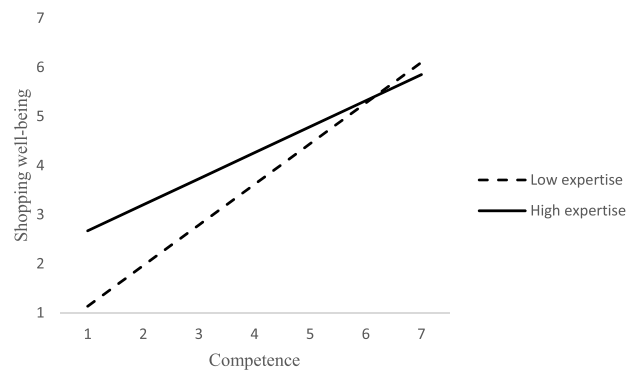


Fig. 2. The moderating role of technology expertise on the competence-shopping well-being relationship.

5. General discussion

Previous research on smartphone apps has mainly focused on their adoption and consumer responses to the app features. Building on both SDT and value co-creation theory, the present research examined the psychological benefits of retail app use, showing that its adoption during the shopping experience can meet the basic human need for competence more than autonomy, which then increases shopping well-being and loyalty intention. Further, the study supports the idea that customers can also be co-producers of the retail app use process, with customization leading to marginally greater perceived competence, which in turn results in greater shopping well-being, especially among customers who are not experts in such technology. Thus, this research offers insights into why encouraging consumers to use a retail app can be beneficial to both customers and retailers.

5.1. Theoretical contributions

Previous literature has been inconclusive as to whether app use has a positive or negative impact on well-being, and what spillover effect this may have on retail outcomes such as loyalty. We therefore examined the mechanisms by which retail app use can increase loyalty intention through the lens of SDT and a sub-domain of well-being, namely, shopping well-being.

The first and most important result pertains to the distinct roles of autonomy and competence in the effects of retail apps. Specifically, since retail apps offer access to additional information, enabling customers to make more informed and confident choices (Fuentes et al., 2017), our results support the view that consumer competence is enhanced by retail app use. However, surprisingly, they also show that retail app use has no impact on perceived autonomy. This lack of effect could be explained by certain retail app features, such as when the app restricts users' decision-making power by offering limited choices or pushing certain products too aggressively. A retail app thus appears to be more of an empowering tool than one that fosters autonomy and freedom.

Our second contribution relates to shopping well-being. Faber et al. (2022)'s interdependence/enslavement paradox in the mobile use context suggests that continual connection to smartphones can give consumers a sense of security, but can also monopolize their attention, potentially impacting their well-being. Hence, research suggests that diminished well-being is a frequent outcome of multichannel shopping (Harris, 2017). However, our results indicate that this negative effect is not always observed. In particular, increased competence from retail app use triggers a sense of shopping well-being, confirming the relevance of the "Positive Technology" research stream which argues that technology can be designed to improve well-being (Gaggioli et al., 2017). Our research suggests that shopping well-being will prompt loyalty intention, lending further support to the need to consider shopping well-being as an antecedent of loyalty (Troebbs et al., 2018). We also contribute to the literature on omnichannel retailing by showing how loyalty intention is strengthened through app use in a physical store setting (Becker and Jaakkola, 2020; Liu-Thompkins et al., 2022). Our conclusions are consistent with the literature, which views retail apps as useful tools for strengthening customer-retailer relations (Flacandji and Vlad, 2022; McLean et al., 2022).

Our third contribution concerns the role of customization and its implications for loyalty programs. Despite the growing number of such programs, some authors have suggested rethinking their design by proposing loyalty programs that can impact consumers' well-being and quality of life (Belli et al., 2022). In this regard, the literature highlights personalized coupons based on loyalty program data as a common and useful strategy (Bues et al., 2017). Our results add to this literature by showing that when users customize their app and thus participate in the co-creation of loyalty program rewards, the resulting sense of competence induces greater shopping well-being, especially among people

who are not particularly comfortable with such technology. Thus, we argue that there is a need to consider not only customization as an important feature of retail apps, but also individual differences – like technology expertise – when investigating customer responses to such devices.

5.2. Managerial implications for retailers

Our results have concrete implications for retailers. In particular, we show that retailers can help to contribute to the well-being of society and, more specifically, to that of their customers, by going beyond merely designing a product offer. Our findings also support the notion that shopping can be experienced as a powerful, positive experience (Pine and Gilmore, 1999) that can enhance customers' shopping well-being. Concerning the effects of retail app use and customization, our results suggest that retailers can cultivate customer competence and shopping well-being by incorporating features and functionalities into their retail app. Such features can enhance competence and shopping well-being during the in-store shopping experience, especially for customers who lack technology expertise. Retailers can empower such customers by designing a comprehensive and easy-to-use app that serves as a valuable tool for making informed choices. In addition, tailoring offers, rewards, and personalized experiences based on customers' preferences and choices can further enhance their shopping well-being and foster a stronger sense of loyalty. Customization can go beyond promotions. For example, perceived competence can be enhanced by providing more tailored options for the app, such as changing the interface. In line with customization, retailers can play on exclusivity, with app users receiving unique offers for which other customers are not eligible (Bues et al., 2017).

Retailers can also empower customers by organizing different types of challenges to reinforce consumer competence once the app has been downloaded. They could also create a user ranking system to recognize and reward the most active users, and organize events where users can share their experiences of the app use to enhance their sense of shopping well-being beyond the in-store shopping experience. Communication about the app should clearly highlight the features that enable customers to become smart shoppers and the positive impact of the app on their shopping well-being.

Furthermore, our results showed no effect of app use on perceived autonomy, but a positive effect of autonomy on shopping well-being. As a result, retailers could rethink their apps to help users feel more autonomous than non-users, providing them with useful information that allows them to optimize their decisions. In addition to functionality, it is crucial for retailers to design app interfaces that give customers a sense of control and autonomy over their shopping experience and mitigate potential negative effects. Monitoring customer feedback and continually improving app functionality can also help prevent potentially negative outcomes.

5.3. Limitations and future research avenues

The current research has some limitations that offer potentially useful opportunities in the future. First, the experimental protocol used in Study 2 led respondents to imagine using/not using a specific version of an app from the retailer of their choice. To increase ecological validity, it could be useful to run a field experiment with a given retailer. Second, our results showed no impact of app use on autonomy. This may be explained by the specific context of grocery shopping, which is already highly autonomous and relatively routine. In such a context autonomy may not play a significant role. Autonomy may be more affected in contexts where shopping is less routine, and further research would benefit from exploring this issue. In addition, and from an SDT perspective, individuals are likely to suffer from frustration due to the psychological need for autonomy (Van Assche et al., 2018). Further research could thus attempt to better understand the underlying

mechanisms and boundary conditions for the effects of retail app use on autonomy. Third, mobile phones may be used to avoid interactions with store staff (Fuentes et al., 2017). Our research did not take the relatedness dimension developed in SDT into consideration. Hence, future research could investigate the reduction in social interactions associated with app use. Finally, we considered deal proneness as the only control variable that might affect loyalty. Future research may benefit from considering other drivers of customer loyalty towards the retailer, which could be included in the model as control variables (for a review, see Liu-Thompkins et al., 2022).

CRedit authorship contribution statement

Michaël Flacandji: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources,

Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Mariana Vlad:** Writing – review & editing, Writing – original draft, Validation, Supervision, Project administration, Methodology, Conceptualization. **Renaud Lunardo:** Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

Authors have no conflict of interest to declare.

Data availability

Data will be made available on request.

Web appendix. Supplementary data

Supplementary data to this article (Web Appendix A and Web Appendix B) can be found online at <https://doi.org/10.1016/j.jretconser.2024.103762>.

Appendix A. Overview of existing research on app use and well-being

| Authors | Theory | Context | Sample | Main independent variables | Underlying mechanisms | Main dependent variables | Moderator | Key findings |
|---------------------------|------------------------|-------------------------------|--|--|---|---|---------------------------|--|
| David et al. (2018) | No specific theory | Mobile and app use | Study 1: 195 college students Study 2: 132 college students | Total time spent on apps, usage of apps, | | Well-being | | Smartphone use is generally negatively associated with well-being. The use of some apps is associated with more positive well-being, while the use of other apps is associated with lower well-being. Participants whose notifications were batched three-times-a-day reported improved well-being. They felt more attentive, productive, in a better mood, and in greater control of their phones. Participants who did not receive notifications at all experienced higher levels of anxiety and “fear of missing out” (FoMO). |
| Fitz et al. (2019) | Psychological theory | Custom-designed app | 237 respondents | Batching notifications 3x/day, every hour, never, and as usual | Inattention, fear of missing out (FoMO) | Different aspects of well-being (happiness, stress, anxiety, negative feelings ...) | | Perceived well-being is influenced by the dimensions of perceived value from MSApps use (utilitarian, hedonic, and social value) and influences customers’ citizenship behavior. |
| Garrouch and Ghali (2023) | Social exchange theory | Mobile shopping apps (MSApps) | 314 users of MSApps | MSApps value: utilitarian, hedonic and social | Customer well-being | Customer citizenship behavior | Customer intimacy | Perceived well-being is influenced by the dimensions of perceived value from MSApps use (utilitarian, hedonic, and social value) and influences customers’ citizenship behavior. |
| Hu et al. (2023) | | Fitness apps | 561 respondents in first wave survey; 177 in the second wave | Personal and social oriented features | Exercise adherence, social engagement | Well-being | Gender, app use frequency | Personal-oriented and social-oriented features of fitness apps improve exercise adherence and social engagement, both of which enhance users’ well-being. App use frequency moderates personal-oriented features and well-being. |

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| Authors | Theory | Context | Sample | Main independent variables | Underlying mechanisms | Main dependent variables | Moderator | Key findings |
|---------------------------|---|--|---|---|--|---|----------------------|--|
| Kim and Kim (2022) | Cognitive appraisal theory and social media influencer literature | Streaming app (Twitch) | 396 Twitch users | Streamer attributes, live-streaming mobile app attributes | Flow experience, well-being | Commitment, loyalty to the favorite Twitch streamer | – | Streamer attributes and live-streaming mobile app attributes influence well-being, which increases commitment and thus loyalty. |
| Linnhoff and Smith (2017) | Uses and gratification theory | Mobile and apps use | 107 college students | Types of app used, mobile use | Addiction | Life satisfaction | | High (low) levels of mobile app use are related to low (high) levels of life satisfaction. |
| Roy et al. (2023) | SDT, service-dominant logic | Digitalized interactive platform (with apps) | 355 respondents | Autonomy, relatedness, competence | Engagement (cognitive, affective and behavioral) | Subjective well-being | | Autonomy and competence are significantly, related to all dimensions of customer engagement (cognitive, affective and behavioral). Relatedness only has a significant impact on affective engagement. Subjective well-being is influenced by affective and behavioral engagement. |
| Our research | SDT, co-creation literature | Retail app | Study 1: 125 app users and 302 non-app users Study 2: 3 conditions (no app use, app use/ no customization; app use/ customization), with 296 respondents | App use, app customization | Autonomy, competence, shopping well-being | Loyalty intention | Technology expertise | Retail app use satisfies the need for competence, but not for autonomy. Competence and shopping well-being mediate the relationship between app use and loyalty intention. The feeling of competence offered by app customization increases shopping well-being more strongly for customers who are low in technology expertise. |

Appendix B. Measures used in the studies

| | Factor loadings | |
|--|-----------------|---------|
| | Study 1 | Study 2 |
| Autonomy (adapted from Thomson, 2006) | | |
| Shopping in the store of [Retailer name] makes me feel free to be who I am | 0.859 | 0.819 |
| While shopping in the store of [Retailer name], I feel that my choices are based on my true interests and values | 0.838 | 0.711 |
| When I am going to that store of [Retailer name], I feel free to do things my own way | 0.858 | 0.860 |
| While shopping in the store of [Retailer name], I feel that my choices express my 'true' self | 0.737 | 0.766 |
| Competence (adapted from Thomson, 2006) | | |
| Generally, shopping in the store of [Retailer name] makes me feel very capable and effective | 0.657 | 0.618 |
| Shopping in the store of [Retailer name] makes me feel inadequate or incompetent (reversed) | 0.793 | 0.693 |
| While shopping in the store of [Retailer name], I feel that I can successfully complete difficult tasks and projects | 0.815 | 0.764 |
| While shopping in the store of [Retailer name], I feel that I can take on and master hard challenges | 0.785 | 0.739 |
| While shopping in the store of [Retailer name], I feel very capable in what I do | 0.781 | 0.749 |
| Shopping well-being (El Hedhli et al., 2013) | | |
| This store satisfies my overall shopping needs | 0.617 | 0.564 |
| This store plays a very important role in my social well-being | 0.783 | 0.759 |
| This store plays a very important role in my leisure well-being | 0.809 | 0.832 |
| This store plays an important role in enhancing the quality of life in my community | 0.775 | 0.755 |
| Customer loyalty intention (Zeithaml et al., 1996) | | |
| I will come back to this store to buy a product identified today | 0.797 | 0.728 |
| I will recommend this store to my relatives | 0.790 | 0.687 |
| I will recommend products in this store to my relatives | 0.774 | 0.678 |
| Deal proneness (Flacandji and Vlad, 2022) | | |
| Beyond the money I save, buying brands on deal makes me happy | 0.781 | 0.737 |

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| | Factor loadings | |
|---|-----------------|-------|
| When I purchase a brand that is offering a special promotion, I feel that it is a good buy | 0.827 | 0.798 |
| I feel like a smart shopper when I purchase products that offer special promotions | 0.839 | 0.745 |
| I love special promotional offers for products | 0.800 | 0.806 |
| Technology expertise (Reinders et al., 2015) | | |
| I am very familiar with mobile apps | – | 0.909 |
| I have a clear idea about which characteristics of mobile apps are important in providing me maximum usage satisfaction | – | 0.878 |
| I know a lot about mobile apps | – | 0.894 |
| I consider myself an expert about mobile apps | – | 0.896 |
| I have a lot of experience with mobile apps | – | 0.933 |
| Satisfaction (Oliver, 1980) | | |
| I am satisfied with my visit to this store | – | 0.883 |
| I think that I had a good idea when I decided to come to this store | – | 0.834 |
| I am happy to have been in this store | – | 0.838 |

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