

Which consumers are more likely to adopt a retirement app and how does it explain mobile technology-enabled retirement engagement?

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Abstract

Although planning for retirement is fundamental for consumers' future well-being, individuals often fail to engage with it. Retirement engagement refers to one's initial interest in and active planning for one's retirement. In this study, we focus on mobile technology-enabled retirement engagement, operationalized as consumers' perception of how a retirement app can help them plan for retirement. While rapid advances in digital platforms and mobile technology show promising use to the financial services sector, little is known about the adoption drivers of mobile technology in stimulating retirement engagement as a unique low-involvement, yet high-importance context. We address this gap in the existing literature by analyzing survey data from a representative sample of 440 Australian pension fund members. We find that consumers' financial self-efficacy, perceived financial security, consideration of future consequences, retirement planning involvement, and perceived usefulness have direct effects on their anticipated engagement with a mobile retirement app as well as indirect effects through their intention to adopt the app (financial self-efficacy and consideration of future consequences only have direct effects). We also find that mobile computing self-efficacy, prior finance app use, and perceived ease of use only have indirect effects through consumers' intention to adopt the app. Notably, the association between adoption intentions and anticipated engagement is stronger for those closer to retirement.

KEYWORDS

adoption intentions, consumer financial decision making, mobile apps, retirement engagement, retirement planning

1 | INTRODUCTION

"Retirement planning is undergoing a revolution as advances in financial technology proceed." (Agnew & Mitchell, 2019, p. 8).

Around the world, societal and economic factors, such as increased life expectancies and decreased employer contributions

and governmental financial support, place increasing pressure on pension systems and highlight individuals' need to pro-actively plan for retirement (Aegon, 2019; Anderson et al., 2016; Mercer, 2018). However, making informed decisions about retirement goals and future needs are some of the most complex decisions that individuals make in their life. Planning for retirement involves overcoming several challenges, including low retirement knowledge, temporal separation (i.e., saving now, receiving benefits later), and product and investment

performance uncertainty and risk (Lusardi & Mitchell, 2011). Moreover, individuals need the ability to identify future needs and preferences related to their desired lifestyle, family and housing situation, and expected health (Dellaert, 2010).

Aforementioned challenges create a barrier to effective retirement planning and are typically seen as underlying reasons for individuals' generally low retirement engagement and insufficient retirement saving, which can have detrimental effects on their future well-being (Deetlefs et al., 2018; Eberhardt et al., 2019). We posit that retirement engagement describes an individual's interest in and active planning for one's retirement, including behaviors such as choosing suitable pension fund provider(s), investment portfolios and insurance plans, monitoring employer contributions and making additional voluntary contributions, and assessing portfolio performance and management or account fees (Bateman et al., 2014; Deetlefs et al., 2018). Academics, governments, and business practitioners are giving growing attention to initiatives aimed at encouraging individuals to increase their retirement engagement and make timely and informed decisions about (managing and accumulating) their retirement savings (Aegon, 2019; Atkinson et al., 2012). For example, Loibl et al., (2018) investigated consumer responses to regulatory changes implemented by the U.K. government, which seeks to encourage individuals to take greater responsibility in making pension-related financial decisions. The authors find positive overall consumer sentiment, stating that little regulation around access to pension savings—and the increased freedom in decision making—motivated them to take out larger pension lump sums, highlighting that the larger the lump sum, the more likely the individual is to continue saving or investing the money. In addition, other recent literature suggests that developments in digital financial technology could help to overcome the generally low engagement with retirement (Brüggen et al., 2019; Dellaert, 2010).

In particular, pension fund members progressively seek just-in-time information and access to retirement products and services at their convenience. Accordingly, pension funds start to invest substantial resources in the creation and implementation of online communication tools and platforms (IQ Group, 2019; OECD, 2017) to improve consumers' retirement awareness and engagement (Brüggen et al., 2019) and attract new members (PwC & ASFA, 2014). Pension funds can leverage online technology to communicate with members in a more personalized manner, provide faster access to and a more convenient location for up-to-date financial information, encourage more account management and fee transparency, and support a more efficient management of members' personal retirement savings (Dellaert, 2010; OECD, 2017).

However, research on how digital technology can impact and shape consumers' retirement engagement and the retirement planning process is lacking to date. Prior research is limited to an investigation of personal finance blogs (Hoffmann & Otteby, 2018), online pension planners (Brüggen et al., 2019), and interactive online decision aids (Dellaert, 2010; see overview in Table 1) but has not addressed mobile technology-enabled retirement engagement. We address this gap in the existing literature through an investigation

of key adoption and engagement drivers of a mobile retirement app using data from a representative sample of 440 Australian pension fund members. Having one of the most developed pension systems globally (Mercer, 2018), and given the country's high mobile app usage (Statista, 2018), the Australian retirement income system ("Superannuation" or "Super") provides an ideal context for our research. Moreover, despite retirement saving being compulsory for all working Australians, there still is a need to increase their retirement engagement to improve their future well-being by ensuring these individuals meet savings goals, do not pay excess fees, have appropriate insurance cover, and avoid underperforming funds (e.g., Anderson et al., 2016; Bateman et al., 2014; Deetlefs et al., 2018). Prior studies have established the link between propensity to plan and subjective financial well-being, highlighting the need for further research (Xiao & O'Neill, 2017).

Against this backdrop, the aim of our paper is to identify the drivers of mobile retirement app adoption and how it explains pension fund members' technology-enabled retirement engagement, in particular their anticipated engagement with a mobile retirement app to plan for one's retirement. We build on and extend the Technology Acceptance Model (TAM; Davis, 1989) by integrating theoretical concepts from the retirement planning involvement (Donaldson et al., 2010; Hershey et al., 2007), digital customer engagement (Brodie et al., 2011; Eigenraam et al., 2018; ; van Doorn et al., 2010), and mobile financial service technology adoption literature (Hershey et al., 2010; Schierz et al., 2010; Teo et al., 2015; Topa et al., 2009). Specifically, we investigate whether factors related to consumers' perceived skills (i.e., financial self-efficacy; mobile computing self-efficacy; prior finance app use), perceived relevance (i.e., consideration of future consequences; retirement planning involvement; perceived usefulness of the retirement app), and information avoidance (i.e., perceived financial security; perceived ease of use of the retirement app) affect their anticipated retirement app engagement directly as well as indirectly through the intention to adopt a retirement app. We also examine whether the relationship between adoption intentions and anticipated engagement is moderated by consumers' retirement proximity.

Our paper makes both theoretical and practical contributions to the extant literature. Theoretically, we contribute to multiple literature streams, as summarized in Table 1. Indeed, our paper is positioned at the intersection of three main research areas, as illustrated in Figure 1. In particular, we contribute to the specific topic of mobile technology-enabled retirement planning by drawing on literature from three-related domains, namely (a) retirement planning involvement, (b) mobile financial service technology adoption, and (c) digital customer engagement. First, we contribute to the retirement planning involvement literature by answering the call for further research on how technology shapes the retirement process (Henkens et al., 2018). Following the rapid development of smartphones and apps, managing one's personal finances has become increasingly convenient, yet how these developments can support individuals with retirement planning as well as how technology can enhance the individual–business nexus has not yet been investigated in detail (Henkens et al., 2018).

TABLE 1 Our study relative to related literature

General topic	Research focus	Authors	Included variables				Estimated models			
			Time perspective	Self-efficacy	Financial security	Retirement planning involvement	Adoption intention	(Anticipated) engagement	Moderators	Mediators
Technology-enabled retirement planning	Role of technology on the retirement planning process	Current study	Yes	Yes	Yes	Yes	Yes	Yes	Retirement proximity	Intention to adopt
		• Dellaert (2010)	No	No	No	Partial ^a	No	No	N/A	N/A
		• Breit and Salomon (2015)	No	No	No	Yes	No	No	N/A	N/A
		• Hoffmann and Otteby (2018)	No	No	Partial ^b	No	Yes	No	N/A	Perceived helpfulness
		• Brügger et al., (2019)	No	No	No	Moderator ^c	Yes	Yes	N/A	Involvement
Retirement planning involvement	Antecedents and consequences of retirement planning involvement	• Donaldson et al., (2010)	No	No	No	Yes	No	No	N/A	Mastery (personal control)
		• Deetlefs et al., (2018)	No	No	No	No	No	Partial ^d	N/A	N/A
		• Hoffmann and Plotkina (2020)	No	Utilized as moderator	Utilized as moderator	No	Partial ^e	No	Perceived financial security, age, goal construal & self-control	Willingness to learn & retirement self-efficacy
		• Schierz et al., (2010)	No	No	No	No	Yes	No	N/A	N/A
		• Yang et al., (2012)	No	No	No	No	Yes	No	N/A	Relative advantage & perceived risk
Mobile financial service technology adoption	Antecedents of mobile financial service adoption	• Teo et al., (2015)	No	No	No	No	Yes	No	Experience	N/A
		• Shiau et al., (2020)	No	Yes ^f	No	No	Yes	No	N/A	Expectation confirmation
		• Chan et al., (2014)	No	No	No	No	Yes	Antecedent of intentions	N/A	N/A
		• Hollebeek et al., (2017)	No	No	No	No	No	Partial ^{g,h}	N/A	N/A
		• Eigenraam et al., (2018)	No	No	No	No	No	Partial ^{g,h}	N/A	N/A
Digital customer engagement	Characteristics of online or digital customer engagement	• Dellaert (2010)	No	No	No	No	Yes	Antecedent of intentions	N/A	N/A
		• Hoffmann and Otteby (2018)	No	No	No	No	No	Partial ^{g,h}	N/A	N/A
		• Brügger et al., (2019)	No	No	No	No	No	Partial ^{g,h}	N/A	N/A
		• Deetlefs et al., (2018)	No	No	No	No	No	Partial ^{g,h}	N/A	N/A
		• Hoffmann and Plotkina (2020)	No	No	No	No	No	Partial ^{g,h}	N/A	N/A

^aDellaert (2010) considered involvement levels with pension products.^bHoffmann and Otteby (2018) examine perceived financial uncertainty, of which perceived financial security can be used as a proxy.^cBrügger et al., (2019) utilizes the concept of involvement in relation to time-bound interaction with the online service.^dDeetlefs et al., (2018) investigated engagement with retirement savings through non-default behavior.^eHoffmann and Plotkina (2020) measured intentions in relation to retirement planning and not technology adoption.^fShiau et al., (2020) examine two types of self-efficacy, namely financial self-efficacy, and technological self-efficacy.^{g,h}The authors adopted the concept of digital customer engagement.

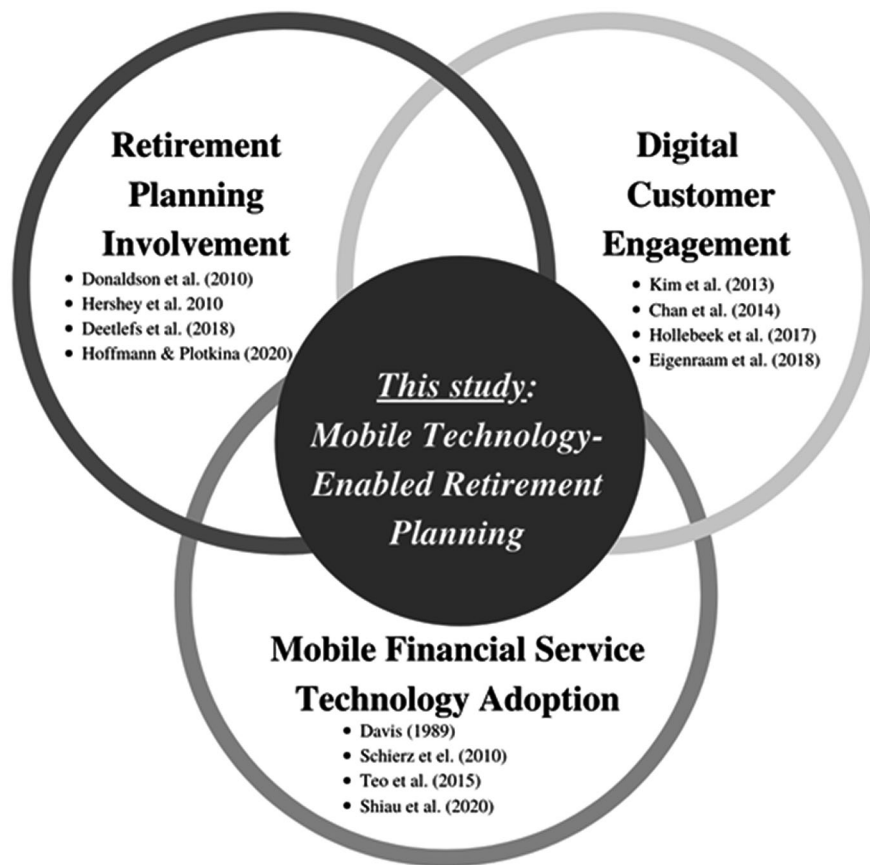


FIGURE 1 Overlap of our study with related research areas

As adequate retirement planning is becoming increasingly important and a personal responsibility of individuals, pension funds look for potential solutions to motivate individuals to increase their engagement with and efforts to plan for retirement. We address this question by providing empirical evidence on the factors driving adoption of and engagement with mobile retirement apps.

Second, we contribute to the mobile financial service technology adoption literature by demonstrating the relevance of technology in facilitating customer engagement in a low-involvement, but high-importance context. Although prior studies have investigated the antecedents of mobile financial service adoption in general (Hsu et al., 2011; Lee et al., 2012), none have accounted for mobile app adoption drivers in the retirement planning context. This is an important omission, given that individuals are requesting mobile apps from their pension providers, yet the industry has been slow to act on this request, citing a lack of evidence in the usefulness of such apps in assisting individuals with retirement planning (IQ Group, 2019). This study addresses this gap in the literature and is the first to investigate the drivers of mobile retirement app engagement, which provides useful insights for other low-involvement, but high-importance industries seeking to increase customer engagement with digital tools, such as health funds.

Third, we contribute to the digital customer engagement literature by generating insights into how mobile technology can help to improve individual's interest in and engagement with retirement planning. Prior literature has focused on investigating individuals'

online brand engagement (Chan et al., 2014), value co-creation (Luo et al., 2015), and social media engagement (Dolan et al., 2016). However, these types of engagement are not representative of the consequential and complex decision-making context of retirement planning. For example, providing feedback to a company via an online review is a less cognitively taxing task and emotionally taxing task compared with deciding on how much to save for possible future health issues in retirement. Although technology-enabled retirement planning engagement is still in its conceptual infancy, we follow the common direction of studying customer engagement with mobile apps (Kim et al., 2013).

Practically, our results provide valuable insights for policy makers and pension funds interested in the contingencies of mobile apps in facilitating retirement planning engagement. In particular, we contribute to a better understanding of the factors driving individuals' adoption of and engagement with mobile retirement apps. While existing industry and policy initiatives have focused on educational and financial literacy programs (Financial Health Network, 2020), several studies suggest that education alone may not be sufficient to change individuals' financial behavior (Lusardi & Mitchell, 2007). Additionally, literacy programs have often relied on a "one-size-fits-all" strategy, which disregards individuals' diverse saving patterns and varying degrees of financial literacy. Alsemgeest (2015) suggests that financial education can aide individuals with managing day-to-day finances, however, investment and retirement decisions require more expert knowledge. Against this backdrop, although retirement

education remains a necessary tool for ensuring that individuals acquire the relevant skills needed to plan for their future financial well-being, our results suggest that individuals' perceived skills, perceived relevance, and information avoidance tendencies are key to understand the drivers of consumers' retirement engagement.

The remainder of this paper is structured as follows. First, we discuss the theoretical background. Second, we present our conceptual framework and hypotheses. Third, we report on the data and method. Fourth, we present results of our PLS-SEM analysis. Fifth, we discuss the results and their theoretical and practical implications, as well as future research opportunities.

2 | THEORETICAL BACKGROUND

In this study, we focus on individuals' anticipated engagement with a mobile retirement app to plan for their retirement. The topic of retirement engagement has received scant attention in previous literature, resulting in a lack of a consistent definition and conceptualization. Initial attempts to conceptualize retirement engagement commenced only recently. For example, argue that retirement engagement comprises "engagement with retirement savings through nondefault behavior: if members make additional voluntary contributions," while Brügger et al., (2019, p. 491) define retirement engagement as "behavior and behavioral intentions [...] [that] extend beyond transaction and examine several aspects of acquiring more information about retirement planning in general or a specific personal situation." Most recently, Eberhardt et al., 2020, p. 3) note that "beyond the purchase of a pension product, behavioral engagement implies ongoing choices about the contribution rate, risk profile, or investment portfolio." We develop our understanding of technology-enabled retirement engagement by building on prior literature from three research areas, which provide the theoretical underpinning of this study and are discussed below: (a) retirement planning involvement, (b) mobile financial service technology adoption, and (c) digital customer engagement (Figure 1).

2.1 | Retirement planning involvement

The literature stream on retirement planning involvement draws on conceptualizations of consumer involvement (Laurent & Kapferer, 1985) and retirement planning (Hershey et al., 2007; Hershey & Mowen, 2000). Although the concept of consumer involvement has been extensively investigated in prior consumer behavior and marketing literature, with seminal contributions by Zaichkowsky (1985) and Laurent and Kapferer (1985), definitions of the concept vary. However, most research agrees that the focus is on personal relevance (Bienstock & Stafford, 2014). Although not a theory in itself, the involvement construct has been applied to a number of research domains, including retirement planning (Hershey & Mowen, 2000). In this study, we propose that delayed involvement with the topic of retirement can result in psychological distress, including increased

anxiety and worry, which negatively affects the quality of retirement preparedness (planning). Specifically, involvement is considered an antecedent of customer engagement, where both are based on the needs and values of the individual, which in turn motivates them toward a specified object or behavior (Hollebeek, 2011).

Regarding retirement planning, numerous studies have investigated post-retirement decision making, but limited studies have examined *pre-retirement* financial planning (Hershey & Mowen, 2000). While the factors influencing individual's preparedness are numerous, for the purpose of deciding on the key factors examined in this study we draw on two models: (a) the retirement planning model by Hershey et al., (2007) and (b) the retirement belief model by Eberhardt et al., (2019). As retirement planning is shaped by various psychological, social, and demographic factors, mobile technology-enabled retirement planning is assumed to be influenced accordingly. The retirement planning model introduced by Hershey et al., (2007) seeks to explain individuals' actions regarding retirement planning and saving as a result of three underlying motivations, which include personality, cognitive, and motivational factors. Among other things, these authors suggest that future time perspective, personal self-beliefs, and knowledge affect individuals' financial planning activity levels and savings contributions. The retirement belief model (Eberhardt et al., 2019) identified several other antecedents to pension information search and retirement planning, including individuals' assessment of their current savings levels, the perceived seriousness of their financial position in relation to retirement, and their perceived capability to perform the tasks required for retirement planning.

2.2 | Mobile financial service technology adoption

One of the most well-known theories stemming from the technology adoption literature is the TAM (Davis, 1989). Conceptually, the TAM proposes that the perceived usefulness and ease of use of a particular technology determine an individual's intention to use, which again influences the actual use of a given technology. While the TAM has proven useful in explaining behavioral intentions, recent studies have suggested that the TAM should be extended to make it more domain-specific and thus increase its explanatory power (Kim et al., 2014; Legris et al., 2003). Accordingly, various extensions of the model have been developed to make it more relevant to specific technology domains, including mobile (financial) services (Akturan & Tezcan, 2012; Baptista & Oliveira, 2015; Schierz et al., 2010). By integrating variables from related theoretical perspectives, researchers can gain a better understanding of consumer adoption and use of technology (Nysveen, 2005).

2.3 | Digital customer engagement

To establish our definition of "mobile app engagement," we consider the extensive research in marketing on customer engagement (CE), including its conceptualization and operationalization. CE is defined as "a psychological state that occurs by virtue of interactive,

co-creative customer experiences with a brand” (Brodie et al., 2011, p. 260). Van Doorn et al., (2010) argue that CE is an iterative process that extends beyond product or service consumption. Due to rapid developments in technology and digital landscapes, some authors further conceptualize CE with digital platforms and in the virtual sphere, defining digital engagement as “manifestations of consumers’ motivational states of [...] engagement [...], namely cognitive [...], emotional [...], and behavioral [...] engagement” (Eigenraam et al., 2018, p. 104). For the purpose of this study, we focus on mobile app engagement, a sub-category of digital CE, defined as “user interaction with their devices to deliver experiences that give them value and satisfaction [...] which influences their cognitive and affective user experience behaviors in real time” (Kim et al., 2013, p. 364).

While studies on CE are well-documented (Barari et al., 2020), the literature on mobile app engagement is still limited (Kim et al., 2013). In this study, we operationalize individuals’ anticipated engagement with a mobile retirement app to plan for their retirement as consisting of their cognitive, emotional, and behavioral engagement with the app. That is, we explore how using a mobile retirement app could help individuals think more about, feel better about, and actively manage or plan for their retirement. We posit that mobile engagement includes initial adoption and continued/habitual usage of a mobile app (Kim et al., 2013; Wang, 2020).

3 | CONCEPTUAL FRAMEWORK AND HYPOTHESES DEVELOPMENT

Based on the preceding theoretical background, we utilize TAM as a starting point for the development of our conceptual framework and extend it with additional constructs relevant for retirement planning involvement and (mobile) CE. In doing so, we follow Bagozzi’s (2007) call for additional domain-relevant research that broadens and deepens the understanding of technology adoption. In this study, we focus on individuals’ anticipated engagement with a mobile retirement app to plan for their retirement, which will be operationalized through the measurement of individual’s anticipated cognitive, emotional, and behavioral engagement with the app (see Table 4). We propose a conceptual framework that theorizes mobile retirement app adoption and engagement antecedents and contingencies (Figure 2). In particular, we examine the effect of a set of five psychological constructs and three technology-related constructs on consumers’ adoption intentions regarding—and anticipated engagement with—a mobile retirement app. In the context of retirement planning, we extend the TAM with constructs related to an individual’s perceived skills (i.e., financial self-efficacy; mobile computing self-efficacy; prior finance app use), information/usage avoidance tendencies (i.e., perceived financial security; information/usage avoidance tendencies (i.e., perceived financial security;), and perceived relevance (i.e., consideration of future

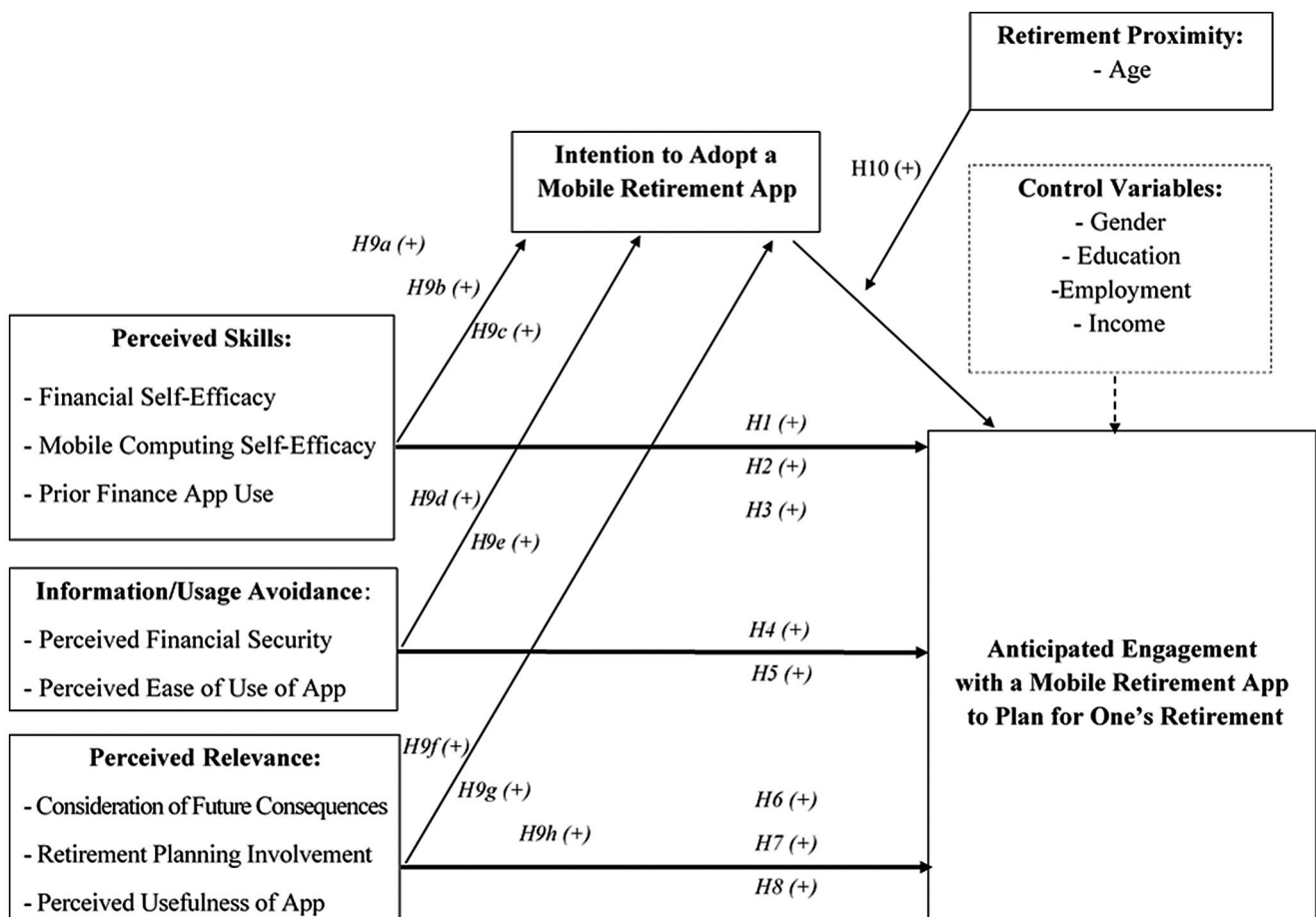


FIGURE 2 Conceptual framework and hypotheses

consequences; retirement planning involvement). While some of these constructs have been examined within the retirement planning context, most were studied either in isolation or in a non-technology-related context. The proposed conceptual framework thus seeks to combine technology adoption with financial decision-making behaviors, thereby highlighting their relational influence on one another within an integrated, overarching framework.

Additionally, our framework proposes individuals' intention to adopt the mobile app as a mediator of the relationship between aforementioned psychological and technological constructs and anticipated retirement engagement. Lastly, individuals' retirement proximity (i.e., their age) is proposed as a moderator of the relationship between their adoption intentions and anticipated retirement engagement.

3.1 | Perceived skills

Regarding the influence of perceived skills, previous studies emphasize the importance of self-efficacy in explaining human behavior and motivation (Asebedo & Payne, 2019; Hoffmann & Plotkina, 2020). Recent literature suggests that different behavioral domains require different types of self-efficacy (Cassar & Friedman, 2009; Shiau et al., 2020). In the context of this study, individuals are expected to evaluate their ability to manage, control, and influence retirement planning capabilities (financial self-efficacy), as well as their mobile app usage (mobile computing self-efficacy). Moreover, we examine the role of individuals' prior experience with using a finance app. Each of these factors will be discussed in detail below.

3.1.1 | Financial self-efficacy

One of the main barriers to retirement engagement is the perceived complexity of retirement-related information and decision making (Hoffmann & Plotkina, 2020). While some individuals may have recognized the need to plan for retirement, they often fall short of executing the required behavior. This may be due to a perceived lack of ability (both subjective and objective) and financial management skills or increased financial stress, which negatively impact long-term decision making (Asebedo & Payne, 2019). Financial self-efficacy (FSE), defined as an individual's subjective belief in their ability to successfully perform financial management behaviors is a strong indicator of their intentions and motivation to execute a financial behavior (Netemeyer et al., 2018). A such, individuals with higher FSE have more confidence in their ability to look for and apply financial information, set higher goals, and persevere through adverse economic events (Asebedo & Payne, 2019; Eberhardt et al., 2019). Similarly, we expect that the more favorable individuals perceive their financial management capabilities, the more likely they are to actively engage with retirement planning. The higher an individual's FSE, the more capable they will feel in acquiring and applying retirement-related information and actively engage with planning for retirement. We hypothesize:

Hypothesis 1 *FSE positively affects individuals' anticipated engagement with a mobile retirement app.*

3.1.2 | Mobile computing self-efficacy

Mobile retirement planning app engagement requires an individual to not only feel comfortable and capable about managing their finances, but also hold favorable views regarding their ability to use a mobile device. Mobile computing self-efficacy (MCSE) is defined as individuals' perceived personal ability to use mobile technology to perform a desired task and overcome technological barriers (Hong et al., 2014; Keith et al., 2015). Higher MCSE reduces technology anxiety (Fagan et al., 2004) and increases individuals' beliefs that they can effectively use wealth management apps (Hong et al., 2014; Shiau et al., 2020). Therefore, we expect individuals who hold favorable beliefs toward their ability to use mobile technology to be more likely to engage with mobile retirement apps. We thus hypothesize:

Hypothesis 2 *MCSE positively affects individuals' anticipated engagement with a mobile retirement app.*

3.1.3 | Prior finance app use

Whereas FSE and MCSE refer to an individual's subjective knowledge or skills, we also assess individuals' objective knowledge or skills through their prior finance app use (PFAU). That is, while self-efficacy captures individuals' perceived ability, PFAU gauges individuals' demonstrated ability to use a financial app. As such, individuals who have used mobile finance apps are presumed to be more likely to employ their knowledge gained from previous experience to form their intentions and behavior (Taylor & Todd, 1995). Individuals' experience can be shaped in two ways: it can either stem from direct experience with a focal technology or service, or it can be formed through prior experience with several similar technologies or services (Wang et al., 2012). Hence, we hypothesize:

Hypothesis 3 *PFAU positively affects individuals' anticipated engagement with a mobile retirement app.*

3.2 | Information/usage avoidance

According to information avoidance theory, individuals high in avoidance behavior typically exhibit "behavior intended to prevent or delay the acquisition of available but potentially unwanted information" (Sweeney et al., 2010, p. 341). While avoidance can be temporary, some individuals end up avoiding the information altogether, which is not without consequence. Individuals will avoid information acquisition if the information is inconsistent with their prior knowledge or beliefs and if it is likely to increase anxiety (Golman

et al., 2017). While information avoidance may be a necessary part of human behavior, it does have a negative effect on various areas, such as preventative health and financial planning (Narayan et al., 2011). For the purpose of this study, we utilize perceived financial security (PFS) as well as perceived ease of use (PEOU) as proxies for individuals' information and usage avoidance tendencies.

3.2.1 | Perceived financial security

PFS refers to an individual's evaluation of their present and desired future financial well-being (Netemeyer et al., 2018; Strömbäck et al., 2017) and has been identified as a key determinant of retirement satisfaction (Petkoska & Earl, 2009). The extent to which an individual seeks to acquire retirement-related information likely depends on their PFS at present and in the future. That is, we expect individuals with lower PFS to be less likely to engage with a mobile retirement app, as this behavior would present them with potentially anxiety-inducing information (e.g., the realization that they need to save much more than they initially anticipated). In contrast, we hypothesize individuals with higher PFS to be more likely to engage with a mobile retirement app, as they will be less inclined to avoid the retirement-related information which they could access through the app:

Hypothesis 4 *PFS positively affects individuals' anticipated engagement with a mobile retirement app.*

3.2.2 | Perceived ease of use

Perceived ease of use (PEOU) refers to "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989, p. 320). In the context of this study, PEOU refers to individuals' assessment of using a mobile retirement app as not requiring a lot of time and effort. Prior studies have established PEOU's effect on behavioral intentions, but few investigate its effect on actual use (Susanto et al., 2016; Venkatesh et al., 2003; Zhang et al., 2012). In line with prior studies, we anticipate individuals who perceive a mobile retirement app to be easy to use to exhibit less usage avoidance behavior and thus be more likely to engage with the app (McLean, 2018). As such, we hypothesize:

Hypothesis 5 *PEOU positively affects individuals' anticipated engagement with a mobile retirement app.*

3.3 | Perceived relevance

Regarding the perceived relevance of a mobile retirement app for consumers, it is important to account for how much individuals consider the future consequences of their behavior, how involved they are with the topic of retirement planning, and their judgment of the

perceived usefulness of the mobile retirement app. We discuss each of these factors in detail below.

3.3.1 | Consideration of future consequences

One of the most noteworthy aspects of retirement engagement is the temporal separation between the present and retirement as an occurrence in the (distant) future (Dellaert, 2010). Individuals face economic (i.e., recessions), physical (i.e., unexpected health issues), and social (i.e., technological advances) uncertainty regarding retirement. Additionally, a main challenge of planning for retirement is the requirement of individuals to consciously identify their future needs and preferences (e.g., what will my future family/housing situation be, will I encounter any health concerns?; Dellaert, 2010). Complex decision making, such as financial and retirement planning, is influenced by individuals' subjective evaluation of and trade-off between short-term sacrifices and long-term benefits (Howlett et al., 2008), which depends on their consideration of future consequences (CFC).

CFC is conceptualized as a personality trait that captures "the extent to which people consider the potential distant outcomes of their current behaviors and the extent to which they are influenced by these potential outcomes" (Strathman et al., 1994, p. 743). Prior studies find that individuals with high CFC are more prone to engage in personally beneficial behaviors (e.g., regular exercise, less impulse buying) and exhibit more self-control, as they assign more importance to future behavioral consequences (Joireman et al., 2008). Additionally, individuals with high CFC are more likely to plan for their (financial) future, including retirement (Howlett et al., 2008). Hence, we hypothesize individuals with higher levels of CFC (who are thus more future-oriented) to be more likely to exhibit stronger anticipated engagement with mobile retirement apps as these apps could help them prepare for their financial future:

Hypothesis 6 *CFC positively affects individuals' anticipated engagement with a mobile retirement app.*

3.3.2 | Retirement planning involvement

The consumer behavior literature has widely explored the concept of involvement (Jiang et al., 2010; Wills & Ross, 2007). Zaichkowsky (1985, p. 342) defines involvement as "a person's perceived relevance of the object based on inherent needs, values, and interest." Recent empirical research supports a positive relationship between retirement planning involvement (RPI) and individuals' retirement preparedness (Topa & Valero, 2017). Wills and Ross (2007) suggest that to increase an individual's retirement planning engagement, attention should be given to increasing retirement savings involvement. While related, involvement is viewed as an antecedent to engagement (Hollebeek, 2011). High involvement is assumed to result in more complex cognitive activity (Bennett et al., 2005), which is important as retirement planning requires individuals to consider

various issues, including investment choices, management fees, and life insurance (Deetlefs et al., 2018). We hypothesize:

Hypothesis 7 *RPI positively affects individuals' anticipated engagement with a mobile retirement app.*

3.3.3 | Perceived usefulness

According to Davis (1989, p. 320), perceived usefulness (PU) can be described as "the degree to which a person believes that using a particular system would enhance his or her job [i.e., task] performance." Performance refers to whether mobile retirement apps can make retirement planning less boring and less daunting. Due to increasing customer expectations and technological developments, usefulness of a technology is continuously cited as one of the most important determinants of technology adoption (King & He, 2006). In terms of mobile app adoption, the sheer number of apps available competing for individuals' time and attention further warrants the need for a mobile app to be useful. While PU has extensively been shown to significantly affect the adoption intentions (Yang, 2015), limited research has studied the effect of PU on engagement (McLean, 2018). Thus, we hypothesize:

Hypothesis 8 *PU positively affects individuals' anticipated engagement with a mobile retirement app.*

3.4 | Mediating role of adoption intentions

Behavioral intentions capture individuals' motivation and conscious effort that they are willing to exert to perform a given behavior (Ajzen, 1991). The harder individuals are willing to try (i.e., the stronger their intention), the more likely they are to execute the desired behavior. Contemporary theories of human behavior and motivation (i.e., TPB, TAM, and UTAUT), as well as ample empirical studies, propose that one's behavioral intention is a proximal cause of behavior (Cao et al., 2021; Stocchi et al., 2019). In the context of mobile app engagement, most studies have employed adoption intentions as a proxy for actual behavior such as engagement intentions (Kim et al., 2013) or behavioral intentions to use the mobile app (Hew et al., 2015).

The current study examines adoption intentions as mediator of the relationship between financial and MCSE, PFS and PEOU, CFC, RPI, PU, and anticipated engagement. Early conceptualizations of behavioral intention recognized the construct's mediating role between behavior and its determinants (Ajzen et al., 1980; Bagozzi & Youjae, 1989). Mediation occurs when a third variable (partially) accounts for the relation between the independent and dependent variables. Traditionally, for mediation to be present, the independent variable is required to have both a direct effect on the dependent and mediating variables, while the mediating variable must have a direct effect on the dependent variable (Baron & Kenny, 1986). More

recent approaches claim that an independent variable can also exert an indirect effect on a dependent variable through a mediator in the absence of a direct association between independent and dependent variables (Hayes, 2009). We hypothesize:

Hypothesis 9a-h *Individuals' adoption intentions positively mediate the effect of FSE, MCSE, PFAU, PFS, PEOU, CFC, RPI, and PU on their anticipated engagement with a mobile retirement app.*

3.5 | Moderating role of retirement proximity

The degree to which intentions explain actual behavior can vary considerably (Ajzen & Sheikh, 2013). The degree to which adoption intentions of a mobile retirement app explain anticipated engagement behavior with the app to plan for retirement likely depends on how aware individuals are of their future retirement. Although older individuals are less inclined to adopt digital technology in general (Venkatesh et al., 2012), once they have done so we hypothesize that they are more likely to engage with this technology as the topic of retirement planning will be more on their mind due to their retirement proximity (see e.g., Hoffmann & Plotkina, 2020):

Hypothesis 10 *Age positively moderates the effect of adoption intentions on anticipated engagement.*

4 | DATA AND METHOD

4.1 | Data collection

We administered an online questionnaire using the commercial panel provider *Qualtrics*. While online data collection requires participants to possess a minimum level of digital literacy, we consider this an acceptable pre-requisite for our study, as individuals with no digital literacy and smartphone use would not be interested in or benefit from a mobile retirement app. To be eligible for our survey, participants were required to live in Australia and be between 18 and 65 years old. This study uses a broad sample in terms of age distribution, due to the nature of retirement planning. In particular, to effectively harness the benefits of compound interest and long-term capital growth, individuals are advised to start planning for retirement early on. We excluded participants aged 65 + as they were assumed to be already retired, and therefore do not need to engage with apps to plan for their future retirement. We obtained a nationally representative sample to ensure generalizability of the findings to the Australian population. We selected Australia as the target research population because of the country's high mobile app usage (Statista, 2018) and its compulsory retirement system (Deetlefs et al., 2018), which ensures a minimum degree of retirement knowledge among participants, as most working Australians aged 18 and older are subject to participation in the so-called Superannuation

scheme. We obtained a total of $N = 440$ complete questionnaires for further statistical analysis.

4.2 | Sample description

In line with overall Australian demographics (Australian Bureau of Statistics, 2016), the sample consists of 49.3% (50.7%) males (females), aged between 18 and 65 years ($M_{age} = 39.34$; $SD = 13.36$). Ninety-seven percent of the sample has a high school degree or higher, 80.5% is Caucasian, and 47% is married. The modal income category is between \$37,001 and \$90,000 (Table 2). In line with previous industry reports (Deloitte, 2019), 32.5% of participants indicated that they spend more than 3 hr per day using mobile apps. When asked whether they use any type of financial app, most respondents answered that they did (75.7%); with 32.3% claiming they use financial apps at least once a day (Table 3). We also asked participants to share more information about their current Superannuation provider and interest in using a mobile retirement app, assuming their pension fund provider was to offer such an app. A large majority of respondents indicated their willingness to use the app (76.4%), stating that they are currently using their Superfund provider's Super app (26.6%) or that they would use such an app if available (49.8%). For those participants who stated that they would not use a Super app, the most common reason was that they did not need an app to manage their Super (13.2%).

4.3 | Measurement scales

All constructs use previously validated multi-item scales, which are only adapted to fit the study context (see Table 4). We used 7-point Likert scales, anchored at 1 = “strongly disagree” and 7 = “strongly agree,” as well as bipolar and slider scales. To measure FSE, we used five items from Netemeyer et al., (2018). Mobile computing self-efficacy was measured using four items from Wang and Wang (2008). Prior finance app use was measured using our own 5-item Likert scale. Consideration of future consequences was measured with six items adapted from Strathman et al., (1994), while PFS was measured using three items from Strömbäck et al., (2017). Perceived ease of use and PU were measured using three items each adapted from Lai and Li (2005). Retirement planning involvement was measured using five items adapted from Zaichkowsky (1985). Adoption intention was measured using three items adapted from Venkatesh et al., (2012). Anticipated engagement (cognitive, emotional, and behavioral) was measured with 10 items from Hollebeek et al., (2014). Participants were also asked to answer a series of standard socio-demographic questions, including age, gender, employment, income, and education. Before answering the survey questions, we presented participants with an infographic detailing the functions and benefits of a mobile retirement app to ensure a common knowledge base among participants and correct interpretation of our questions (Appendix A). The measurement items as well as their corresponding factor loadings (if applicable) are all displayed in Table 4.

TABLE 2 Descriptive statistics: socio-demographics ($n = 440$)

Variables	Indicator	Frequency	Percentage
Gender	Male	217	49.3
	Female	223	50.7
Age	18–22 years (Gen Z)	58	13.2
	23–39 years (Millennial)	158	35.9
	40–53 years (Gen X)	140	31.8
	54–65 years (Baby Boomers)	84	19.1
Employment	Unemployed--Looking for work	54	12.3
	Unemployed--Not looking for work	66	15.0
	Student	27	6.1
	Casual employment	24	5.5
	Part-time employment	64	14.5
	Full-time employment	175	39.8
	Self-employed/Freelance	30	6.8
Education	No formal education	2	0.5
	Primary school	11	2.5
	High school diploma	131	29.8
	College degree	31	7.0
	Vocational training	63	14.3
	Bachelor's degree	101	23.0
	Master's degree	70	15.9
	Professional degree	2	0.5
	Doctorate degree	15	3.4
Relationship Status	Other	14	3.2
	Single	117	26.6
	In a relationship/partnered/de-facto relationship	79	18.0
	Married/civil union	207	47.0
	Separated/divorced	30	6.8
	Widowed	6	1.4
	Other, specify	1	0.2
Ethnicity	White or Caucasian	354	80.5
	Black or African	5	1.1
	Middle Eastern	6	1.4
	Asian	53	12.0
	Indigenous and Torres Strait Islanders	8	1.8
	Other, specify	14	3.2
Gross Income (Annual)	Under \$18,200	105	23.9
	\$18,201–\$37,000	94	21.4
	\$37,001–\$90,000	131	29.8
	\$90,001–\$180,000	69	15.7
	\$180,001 and over	41	9.3

TABLE 3 Descriptive statistics: app usage (n = 440)

Item	Characteristic	Frequency
Time spent using Apps per day	Less than 30 min	60
	From 30 min to 1 hr	54
	From 1 to 2 hr	78
	From 2 to 3 hr	96
	More than 3 hr	143
	Other	9
Number of Apps on phone currently installed	0–5	36
	6–10	83
	11–20	119
	21–30	98
	31–50	73
	51+	31
Apps used per week	Less than 5	107
	6–10	181
	11–20	109
	21–30	29
	31–50	7
	More than 51	5
Use of any type of Finance App	Yes	333
	No	107
How often use Finance Apps	At least once a day	142
	Every couple of days	117
	Once a week	57
	Once a month	14
	Never	2
	Missing/Do not Use Finance Apps	107
	Other	1
	No	104
If answer: YES	I am currently using my Super provider's app	117
	I would use it if they had one	219
If answer: NO	I do not think a Super/retirement app could benefit me	25
	I do not know how a Super/retirement app could help me manage my Super	11
	I do not need an app to manage my Super	58

4.4 | Common method variance

As our data were collected using a survey methodology, we assessed the potential for common method bias (CMB) and applied a combination of procedural and post hoc remedies to overcome CMB as

recommended by Podsakoff et al., (2003). Due to the nature of the data collection, procedural remedies included variation in response format (e.g., Likert scales as well as bipolar scales and slider format) and the removal of ambiguously worded items, followed by post hoc remedies including Harman's single factor test. In particular, we loaded all study constructs into an exploratory factor analysis and analyzed unrotated factor loadings to identify the factors needed to account for the variance in constructs. The reported single factor value was 35.5% and items did not load on a single factor, alleviating CMB concerns.

5 | RESULTS

To test the hypotheses of the conceptual framework, we conducted a PLS-SEM analysis using SmartPLS 3.0. PLS-SEM is increasingly used as it is argued to provide a more robust estimation of the structural model compared with covariance-based techniques (Hair et al., 2014). The use of PLS-SEM is particularly appropriate to our study as it is suited for situations in which the analysis aims to: (i) test a structural model that is relatively complex and includes many constructs and relationships and (ii) improve the understanding of theoretical extensions and complex theory development (Hair et al., 2019). A PLS path model consists of a measurement or outer model and a structural or inner model, where the measurement model focuses on the relationships between a construct and its manifest variables, and the structural model specifies the relationships between the different latent constructs (Henseler et al., 2017).

5.1 | Measurement model

We establish convergent validity based on three criteria: (i) all factor loadings for the latent constructs exceed the cut-off value of 0.70 (Hair et al., 2014), (ii) the composite reliability (CR) values for all constructs exceed the cut-off value of 0.80 (Bagozzi & Youjae, 1988), and (iii) the average variance extracted (AVE) values all exceed 0.50 (Chin, 1998). Next, we investigate discriminant validity. Hair et al., (2014) suggest two measures in this regard: the Fornell and Larcker (1981) criterion and the individual cross-loadings of the constructs. As reported in Table 5, the AVE of each construct is higher than the construct's highest squared correlation with any other latent construct. Additionally, the factor loadings and cross-loadings assessment show that each item loads highly only on its corresponding latent construct. Internal consistency reliability is confirmed with all Cronbach's alpha values above 0.7 (Table 4). To test for multicollinearity, we assess the variance inflation factor (VIF) and tolerance values. Tolerance values for all items are well above 0.1 and VIF are all below 10 (Chin, 2010). Multicollinearity is thus not an issue. Finally, to reduce the potential for our conclusions to be affected by other individual-level variables or alternative theoretical explanations, we control for gender (Faqih, 2016), education and employment (Zheng, 2019), and annual income (Yang, 2015). We found no

TABLE 4 Measurement items and factor loadings

Construct and source	Measurement item	Factor loadings	Cronbach's Alpha	Composite reliability	Average VARIANCE EXTRA ^{cted}
Financial Self-Efficacy--adapted from Netemeyer et al., (2018)	FSE1--I know how to make complex financial decisions.	0.792	0.894	0.922	0.703
	FSE2--When it comes to money, I know how to be disciplined.	0.842			
	FSE3--I am able to make good financial decisions that are new to me.	0.903			
	FSE4--I know how to make myself save.	0.823			
	FSE5--I am able to recognize a good financial investment.	0.832			
Mobile Computing Self-Efficacy--adapted from Wang and Wang (2008)	MCSE1--I would be confident in using a Super app even if I had only the online instructions for reference.	0.808	0.898	0.929	0.767
	MCSE2--I would be confident in using a Super app if I had seen someone else using it before trying it myself.	0.896			
	MCSE3--I would be confident in using a Super app if I had sufficient time to complete transactions.	0.913			
	MCSE4--I would be confident in using a Super app if someone showed me how to use it first.	0.881			
Perceived Financial Security--adapted from Strömbäck et al., (2017)	FS1--I feel secure in my current financial situation.	0.920	0.940	0.962	0.894
	FS2--I feel confident about my financial future.	0.963			
	FS3--I feel confident about having enough money to support myself in retirement, no matter how long I live.	0.953			
Perceived Ease of Use--adapted from Lai and Li (2005)	PEOU1--I expect that learning to use a Super app would be easy for me.	0.877	0.878	0.924	0.803
	PEOU2--I expect it would be easy to use a Super app to accomplish my retirement planning.	0.898			
	PEOU3--Overall, I believe a Super App would be easy to use.	0.915			
Consideration of Future Consequences--adapted from Strathman et al., (1994)	CFC1--I act only to satisfy immediate concerns, figuring the future will take care of itself	0.814	0.890	0.915	0.643
	CFC2--My behavior is only influenced by the immediate (i.e., a matter of days or weeks) outcomes of my actions	0.785			
	CFC3--I generally ignore warnings about possible future outcomes because I think the problems will be resolved before they reach crisis levels	0.785			
	CFC4--I think that sacrificing now is usually unnecessary since future outcomes can be dealt with at a later time	0.775			
	CFC5--I only act to satisfy immediate concerns, figuring that I will take care of future problems that may occur at a later date	0.873			
	CFC6--Since my day-to-day work has specific outcomes, it is more important to me than behavior that has distant outcomes	0.785			
Retirement Planning Involvement--adapted from Zaichowsky (1985)	Retirement Planning is ...	0.909	0.932	0.734	
	Unimportant--Important	0.888			
	Of no concern--Of concern to me	0.878			

(Continues)

TABLE 4 (Continued)

Construct and source	Measurement item	Factor loadings	Cronbach's Alpha	Composite reliability	Average VARIANCE EXTRACTed
	Irrelevant--Relevant	0.883			
	Boring--Interesting	0.762			
	Useless--Useful	0.867			
Perceived Usefulness-- -adapted from Lai and Li (2005)	PU1--I think I could accomplish my retirement planning tasks more quickly using a Super app.	0.943	0.922	0.951	0.865
	PU2--I think I could accomplish my retirement planning tasks more easily using a Super app.	0.948			
	PU3--Overall, I think I would find a Super app useful.	0.899			
Adoption Intention-- adapted from Lai and Li (2005); Venkatesh et al., (2012)	I1--I intend to use a Super app in the future once available to me.	0.929	0.941	0.962	0.895
	I2--I would try to use a Super app in my daily life once available to me.	0.953			
	I3--I plan to use a Super app frequently once available to me.	0.956			
Engagement (Cognitive Processing)--adapted from Hollebeek et al., (2014)	CE1--Using a Super app would get me to think about retirement.	0.939	0.921	0.950	0.863
	CE2--I would think about retirement a lot if I would be using a Super app.	0.937			
	CE3--Using a Super app would stimulate my interest to learn more about retirement.	0.910			
Engagement (Emotional/Affective)--adapted from Hollebeek et al., (2014)	AE1--I expect to feel very positive when I would use a Super app.	0.949	0.954	0.966	0.878
	AE2--Using a Super app would make me happy.	0.945			
	AE3--I expect to feel good when I would use a Super app.	0.930			
	AE4--I would be proud to use a Super app.	0.923			
Engagement (Behavioral/Active)--adapted from Hollebeek et al., (2014)	AEC1--I expect to spend a lot of time using a Super app, compared with other retirement planning tools.	0.945	0.912	0.945	0.850
	AEC2--Whenever I would use a tool to manage my Super, I expect to use a Super app.	0.921			
	AEC3--A Super app is one of the tools I would expect to usually use when managing my Super.	0.900			
Prior Finance App Use	How often do you use financial apps on your mobile phone?	N/A as prior finance app use is a formative construct			
		N/A			
		N/A			
		N/A			
	At least once a day				
	Every couple of days				
	Once a week				
	Once a month				
	Never				

TABLE 5 Latent variable correlations (Fornell–Larcker)

	FSE	MCSE	PFAU	PFS	PEOU	CFC	RPI	PU	INT	ENG
FSE	<i>0.838</i>									
MCSE	0.247	<i>0.876</i>								
PFAU	0.238	0.290	<i>1.000</i>							
PFS	0.643	0.225	0.227	<i>0.945</i>						
PEOU	0.266	0.627	0.346	0.263	<i>0.896</i>					
CFC	0.053	0.090	0.0045	0.180	0.086	<i>0.769</i>				
RPI	0.240	0.268	0.175	0.229	0.335	−0.027	<i>0.857</i>			
PU	0.237	0.626	0.387	0.304	0.738	0.149	0.375	<i>0.930</i>		
INT	0.230	0.680	0.415	0.298	0.672	0.138	0.420	0.803	<i>0.946</i>	
ENG	0.331	0.610	0.405	0.396	0.678	0.184	0.439	0.871	0.819	<i>0.871</i>

Note: The square root of the average variance extract (AVE) is displayed in italics. The non-italic values are the correlation of the latent constructs, of which all must be smaller than the corresponding squared root of AVE.

Abbreviations: CFC, consideration of future consequences; ENG, anticipated engagement; FSE, financial self-efficacy; INT, adoption intention; MCSE, mobile computing self-efficacy; PEOU, perceived ease of use; PFAU, prior finance app use; PFS, perceived financial security; PU, perceived usefulness; RPI, retirement planning involvement.

TABLE 6 Results of bootstrapping tests (H1-H8)

Hypothesis	Path coefficient	t-value	p-value	Hypothesis supported?
Direct effects				
Hypothesis 1: Financial Self-Efficacy → Anticipated Engagement	0.065	1.765	0.078	Yes
Hypothesis 2: Mobile Computing Self-Efficacy → Anticipated Engagement	0.005	0.124	0.901	No
Hypothesis 3: Prior Finance App Use → Anticipated Engagement	0.027	1.034	0.301	No
Hypothesis 4: Perceived Financial Security → Anticipated Engagement	0.082	2.565	0.010	Yes
Hypothesis 5: Perceived Ease of Use → Anticipated Engagement	−0.0003	0.008	0.994	No
Hypothesis 6: Consideration Future Consequences → Anticipated Engagement	0.046	1.835	0.066	Yes
Hypothesis 7: Retirement Planning Involvement → Anticipated Engagement	0.079	2.871	0.004	Yes
Hypothesis 8: Perceived Usefulness → Anticipated Engagement	0.560	12.703	0.000	Yes

significant effects for any of the control variables on the anticipated engagement with the retirement app.

5.2 | Structural model

To test the structural model, we examine the model fit and structural relationships using the PLS algorithm and bootstrapping tests based on 5,000 sub-samples. We used the SRMR (standardized root mean square residual) as a criterion to assess model fit. Based on Henseler et al., (2017), the SRMR value of 0.05 indicates an acceptable model fit. Additionally, the model explains 82% of variance in anticipated engagement (R^2). This suggests that mobile retirement app engagement is well-explained by the hypothesized drivers and mediator and moderating variables.

Table 6 summarizes the results regarding the proposed direct effects. We find that FSE ($\beta = 0.065$, $p < .1$) is positively and significantly related to anticipated engagement, supporting Hypothesis 1. However, neither MCSE ($\beta = 0.005$, $p > .1$) nor PFAU ($\beta = 0.027$, $p > .1$) have a significant direct effect, thus not supporting Hypothesis 2 and

3. In terms of information/usage avoidance, we find that PFS is positively and significantly related to anticipated engagement ($\beta = 0.082$, $p < .01$), while PEOU ($\beta = -0.000$, $p > .1$) is not. Hence, we find support for Hypothesis 4, but not Hypothesis 5. This result demonstrates that the more financially secure an individual feels, the less likely they are to avoid retirement information and the more likely they will thus be to engage with a mobile app to plan for retirement. Concerning perceived relevance, the CFC has a positive and significant effect on anticipated engagement ($\beta = 0.046$, $p < .1$), supporting Hypothesis 6. This result highlights that the more an individual thinks about their desired future lifestyle or family situation (i.e., higher levels of CFC), the more likely they are to engage with a mobile retirement app to plan for their retirement. Finally, both RPI ($\beta = 0.079$, $p < .05$) and PU ($\beta = 0.560$, $p < .001$) have positive and significant effects on anticipated engagement, therefore, supporting Hypothesis 7 and 8. These results indicate that those individuals who recognize the relevance of retirement planning and are personally interested in this particular activity, as well as those individuals who perceive the mobile retirement app to be more useful, are more open to use and engage with mobile technology (i.e., the retirement app) to plan for their retirement.

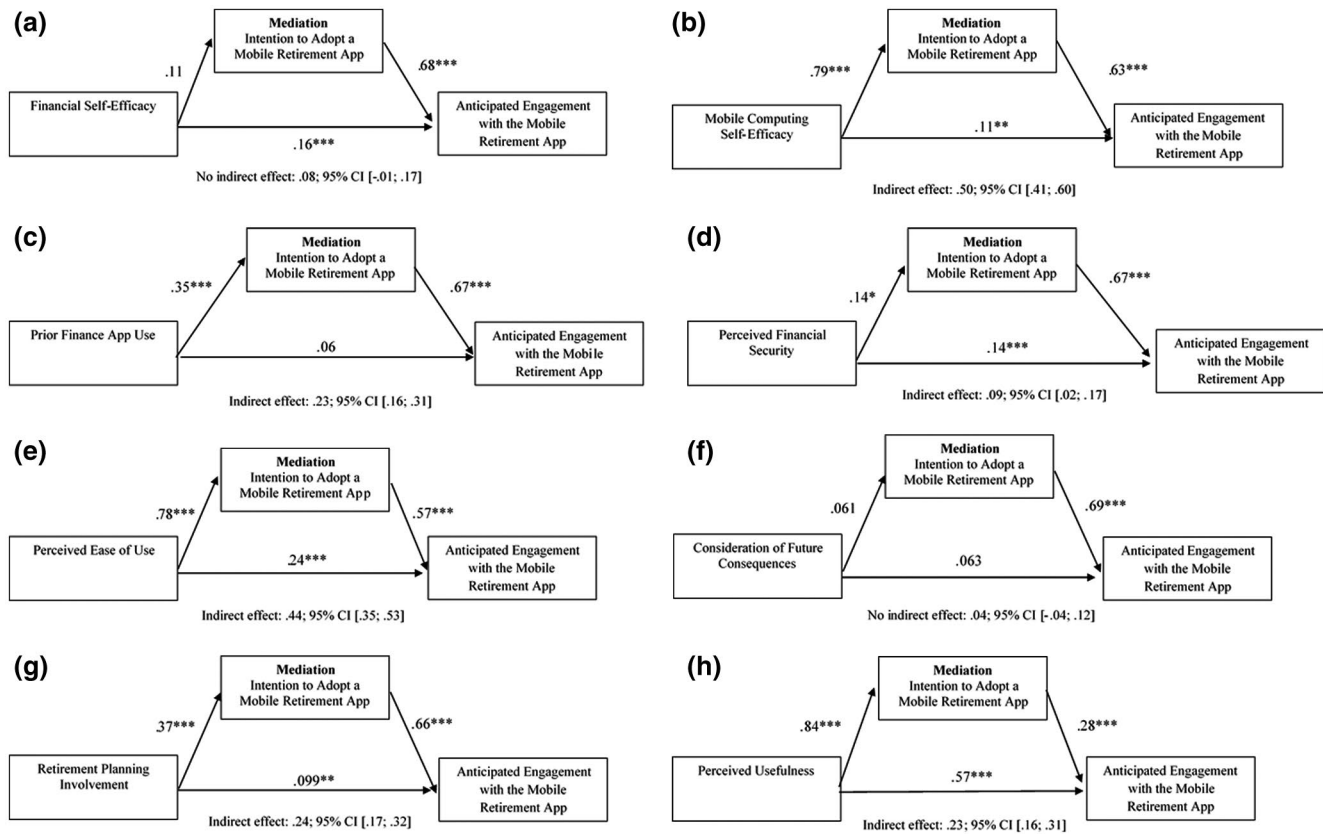


FIGURE 3 Mediation analysis results (H9). (a) Financial Self-Efficacy → Intention to Adopt → Anticipated Engagement. (b) Mobile Computing Self-Efficacy → Intention to Adopt → Anticipated Engagement. (c) Prior Finance App Use → Intention to Adopt → Anticipated Engagement. (d) Perceived Financial Security → Intention to Adopt → Anticipated Engagement. (e) Perceived Ease of Use → Intention to Adopt → Anticipated Engagement. (f) Consideration of Future Consequences → Intention to Adopt → Anticipated Engagement. (g) Retirement Planning Involvement → Intention to Adopt → Anticipated Engagement. (h) Perceived Usefulness → Intention to Adopt → Anticipated Engagement. * $p < .10$; ** $p < .05$; *** $p < .001$

5.3 | Mediation and moderation results

Next, we test Hypothesis 9a–h, which propose that the effect of aforementioned factors on anticipated engagement is mediated by individuals' intentions to adopt the retirement app. In order to perform a formal mediation analysis, we used Model 4 of the SPSS Process macro procedure (Hayes, 2013; Hayes & Preacher, 2014), based on 5,000 bootstrapped samples. Based on Figure 3a–h we conclude that the mediating effect of intention to adopt was positive and significant for MCSE (0.50; 95% CI [.41; 0.60]),¹ PFS (0.09; 95% CI [.02; 0.17]), PEOU (0.44; 95% CI [.35; 0.53]), RPI (0.24; 95% CI [.17; 0.32]), and PU (0.23; 95% CI [.16; 0.31]), supporting Hypothesis 9b–e and Hypothesis 9g–h. Intention to adopt does not mediate the

relationship between the CFC (0.04; 95% CI [-0.04; 0.12]) and perceived FSE (0.08; 95% CI [-0.01; 0.17]) and anticipated engagement, not supporting Hypothesis 9a and Hypothesis 9f.

Finally, we test the moderating effect of retirement proximity (Hypothesis 10), which further clarifies the underlying process through which intention to adopt affects anticipated engagement. We performed a formal moderation analysis using Model 1 of the SPSS Process Macro (Hayes, 2013), using 5,000 bootstrapped samples. We find that retirement proximity, as proxied by individuals' age, positively moderates the impact of intention to adopt (moderation impact = 0.0059; 95% CI [.0024; 0.0094] on individuals' anticipated engagement. Hence, for those closer to retirement (i.e., older individuals), the intention to adopt has a stronger effect on anticipated engagement with a mobile retirement app, supporting Hypothesis 10 (Figure 4).

¹Please note that the PLS-SEM results indicate a nonsignificant direct effect of mobile computing self-efficacy and perceived ease of use on anticipated engagement (thus indicating a full mediation effect by intention to adopt), whereas the regression analysis approach in the Process macro (Hayes 2013) suggests a significant direct effect (thus indicating partial complementary mediation by intention to adopt on anticipated engagement). These differences may be attributed to the fact that, in contrast to the PLS-SEM approach, the regression analysis approach treats the elements of the effect chains as separate processes and ignores measurement error effects (Sarstedt et al., 2020).

6 | DISCUSSION AND CONCLUSION

Retirement engagement is a crucial first step in ensuring financial capability and well-being during retirement (Bateman et al., 2014;

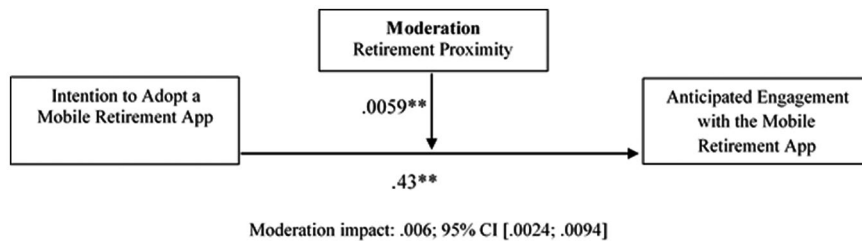


FIGURE 4 Moderation analysis results (H10). Intention to Adopt → Retirement Proximity → Anticipated Engagement. ** $p < .05$; *** $p < .001$

Brüggen et al., 2019; Deetlefs et al., 2018). Due to advances in digital technology tools, such as mobile apps, managing one's personal finances, including retirement savings, has become increasingly convenient (Dellaert, 2010; Henkens et al., 2018). However, to date retirement awareness and engagement remains generally low (Brüggen et al., 2019), and how aforementioned technological developments can support individuals with their retirement planning has not been investigated in detail. While a few studies have started to examine the impact of digital technology on individuals' retirement planning behavior (Brüggen et al., 2019; Hoffmann & Otteby, 2018), many questions remain unanswered.

In this paper, we integrate literature on RPI, mobile financial service technology adoption, and digital CE and propose a conceptual framework that theorizes mobile retirement app adoption and engagement antecedents and contingencies. Specifically, we examine the effect of a set of psychological and technological constructs on adoption intentions and anticipated engagement with a mobile retirement app. Our study shows the importance of (a) perceived skills (i.e., financial and MCSE and PFAU), (b) information/usage avoidance tendencies (i.e., PFS and PEOU), and (c) perceived relevance (i.e., CFC, RPI, and PU) in directly or indirectly determining individuals' anticipated engagement with a mobile retirement app. We also highlight the mediating effect of individuals' intention to adopt a retirement app in the first place. Furthermore, we show that individuals' intention to adopt an app partially explains the relationship between aforementioned psychological and technological constructs and one's anticipated engagement with a mobile retirement app (except for CFC and FSE which only have direct effects). Finally, we demonstrate the moderating effect of retirement proximity in that individuals closer to retirement are more likely to transform adoption intentions into anticipated engagement with a retirement app. Our findings have theoretical and managerial implications, which we discuss next.

6.1 | Implications for theory

Our study extends the TAM with constructs relating to technology adoption and financial decision making/retirement planning. That is, we combine constructs that have previously been studied either in different contexts or in combination with other factors. Specifically, in the context of mobile retirement planning, our study's findings add to the extant literature in several ways. First, we contribute to the emerging but still limited literature on technology-enabled retirement planning by answering the call for further investigations on

how technology impacts the retirement planning process (Henkens et al., 2018). In particular, we extend recent work by Brüggen et al., (2019), who demonstrated a positive effect of interactivity on individuals' behavioral intentions and behavior (i.e., clicked options) with an online pension planner. Our research builds on this through investigating several key psychological drivers relevant to complex future decision making (i.e., retirement planning). That is, we broaden the scope of prior research by providing insight into how (new) technology, such as mobile apps, can impact the retirement engagement.

Second, our findings offer an enhanced understanding of mobile app engagement in the low-involvement, but high-importance context of retirement planning. Prior mobile financial service adoption research has primarily focused on high-involvement contexts such as mobile payments (Alalwan et al., 2017; Lee et al., 2012; Teo et al., 2015). However, these findings are not readily applicable to the low-involvement context of retirement planning, where rewards are not immediately apparent, and consequences of low engagement are more substantial (e.g., the possibility of reduced retirement income and resulting negative effects on overall well-being). Indeed, our findings may also be applicable to other low-involvement, but high-importance industries such as the health sector. Both health and pension communication face similar challenges as both require an individual to think in the long-term, accrue immediate costs but provide only delayed rewards, and positive outcomes are not guaranteed (i.e., one might still get cancer even if one lived a healthy life, or one might die before one gets to access retirement savings; Eberhardt et al., 2019; Gubler & Lamar, 2014; Hoffmann & Risse, 2020).

Research on health technology adoption, including mobile apps, has increased rapidly in the past decade, highlighting the potential of this technology in fostering positive behavior. However, most of these studies have relied heavily on general technology acceptance theories or health behavior (Zhao et al., 2018). Our contribution to the health and pension literature lies in the integration of the mobile app engagement literature with psychological drivers linked to complex decision making. That is, individuals may initially adopt a health or pension app because it is easy or because they enjoy using it, but continuous engagement will depend on an individual's ability to persevere in making important decisions. The drivers identified in the present study (e.g., perceived relevance and information/usage avoidance tendencies) provide potential indicators for which individuals are likely to engage with the app in the longer term.

Finally, our research contributes to the digital CE literature by highlighting the important distinction between adoption intentions

and engagement. That is, we go beyond initial mobile app adoption and instead conceptualize key drivers of continuous engagement with the app regarding a complex decision-making domain (i.e., retirement planning). Most prior mobile engagement literature has applied technology-focused drivers stemming from various theories (i.e., TAM, TPB, and UTAUT), leading to an abundance of evidence in the applicability of these drivers on mobile adoption intention (Alalwan et al., 2017; Faqih & Jaradat, 2015). Additionally, many of these studies utilized adoption intentions as a proxy for engagement, however, several studies have shown that an individual's adoption intentions might be a poor predictor of adoption behavior (Arts et al., 2011). By including in our study anticipated engagement as a dependent variable and demonstrating the direct impact of various psychological drivers on engagement as well as the mediating role of adoption intentions, we contribute to overcoming this limitation of prior literature. Moreover, other psychological factors not included in the standard technology adoption models (i.e., TAM, TPB, and UTAUT) which are important to technology-enabled financial decision making were glanced over by prior literature. We address this knowledge gap by combining literature on complex financial decision making with the technology adoption and engagement literatures.

6.2 | Implications for practice

Our findings offer guidelines for pension fund managers considering how to stimulate retirement engagement through mobile apps. Practitioners should highlight mobile apps' potential to provide pension fund members with real-time insights, a condensed source of reliable information, and access to and the ability to monitor their retirement savings account (Brüggen et al., 2019; Henkens et al., 2018). In particular, we find retirement proximity to play an important role in terms of adoption intentions to convert into engagement with the app. Specifically, the closer an individual is to retirement, the more likely it is that their positive adoption intentions also translate into them engaging with the mobile retirement app. Prior pension communication strategies have sought to engage younger individuals with their retirement planning through technology because of these individuals' greater likelihood to adopt new technology and the fact that starting to prepare early is essential for achieving a financially secure retirement (Atkinson et al., 2012; BNY Mellon, 2016; OECD, 2017). While our findings are promising in their support for pension funds' decision to invest in mobile apps, they also highlight that these apps might fall short in stimulating the desired retirement engagement behavior in younger individuals, as their retirement proximity is often still low.

According to Ali et al., (2014), to ensure adequate savings for retirement, one has to start planning and saving for it while still young. Therefore, pension funds could consider ways to induce retirement proximity, or the feeling of being closer to retirement, in younger individuals. One potential strategy would be to focus on including gamified elements in the mobile app (Bayuk & Altobello, 2019). Through

the inclusion of digital avatars or visualized planning journeys (journey mapping), individuals might be able to envision themselves being closer to retirement. In this regard, Hershfield et al., (2011) propose digital visualization techniques to reduce the distance between individuals' current and future self, which could be very helpful.

Furthermore, our findings highlight the challenge identified by earlier studies (e.g., Hoffmann & Otteby, 2018) that individuals who seem least in need of a mobile retirement app, are actually most likely to use it to engage in retirement planning. That is, we find that individuals scoring high on perceived relevance (i.e., high CFC, high RPI, and high PU) and low on information avoidance tendencies (i.e., high PFS) to be more likely to engage with a mobile retirement app. However, individuals scoring low on PFS, and who thus fear the uncertainty of their financial well-being during retirement, may avoid using the app, although they would actually need it the most. To counter the hindering effect of fear on mobile app engagement, pension funds could clearly communicate what individuals need to do and how (i.e., outline the steps involved in retirement planning and which tasks are more complex, and indicate what support is available to help individuals with these tasks). Indeed, to minimize the perceived complexity of the task, such a message could be framed around an intuitively appealing storyline that using a mobile app to plan for retirement is "as simple as online banking." By referring to individuals' prior successes in managing their personal finances and using mobile technology (i.e., employing enactive mastery techniques as per Gist and Mitchell (1992)), and highlighting the benefits of using such an app, individuals' FSE will hopefully be stimulated, which we identify as an important psychological driver of individuals' mobile retirement app adoption and anticipated engagement in our current study.

Lastly, the effect of all psychological drivers, except for FSE and CFC, are partially explained by their effect on individuals' intention to adopt the app. This highlights the obvious reality that individuals first need to adopt the app before they will engage with it. Nevertheless, this finding also has some implications for practice. In particular, to initiate the desired adoption behavior, we suggest making it as easy as possible to adopt the app. That is, ensure the app is (freely) available in all app stores, is free of bugs and other technical issues, and pension fund members can easily find it (i.e., the name of the app should be the same as the name of the associated pension fund). Although these recommendations might seem obvious, to date, only half of the top 50 pension funds in Australia offer mobile retirement apps, while members of those that do, often abandon the app because of technical issues such as pages not loading fully or being shut out due to the session being timed out (IQ Group, 2019). We also recommend communicating to members how useful the app can be in managing the retirement planning tasks. For example, this can be done by suggesting that the app is as easy to use and useful as members' banking app, which also draws on members' prior finance app experience. Pension funds will need to address these issues if they seek to increase the adoption intentions, which ultimately affects the engagement with their app.

6.3 | Limitations and future research

Despite our contributions, we acknowledge some limitations which can guide future research. First, although this study conceptualized anticipated engagement as consisting of three engagement dimensions (i.e., cognitive, emotional, and behavioral engagement), we did not investigate the effects of aforementioned psychological drivers on each dimension separately. Cognitive engagement refers to an individual's thought processing and elaboration of interaction with the focal actor/object, whereas emotional engagement is concerned with the degree to which an individual forms positively valenced or negatively valenced emotions toward that focal actor/object. Finally, behavioral engagement includes the individual's effort, time spent, and energy devoted to the interaction with the focal actor/object (see Hollebeek et al., 2014).

Although a detailed analysis is beyond the scope of the present study, we did conduct an exploratory analysis of potentially differential effects on these three engagement dimensions. Interestingly, we found that each psychological driver only significantly affected two out of the three engagement dimensions. For example, FSE and PFS had significant positive effects on both emotional and behavioral engagement, but not on cognitive engagement. Meanwhile, the CFC and MCSE had no significant effect on emotional engagement, but only on cognitive and behavioral engagement. Future research could explore these findings to identify the intricacies among the three engagement dimensions and ensure that retirement engagement initiatives match the engagement dimension they are hoping to stimulate (e.g., cognitive, affective, or behavioral). For example, our exploratory analysis suggested that focusing on PFS to stimulate individuals' cognitive engagement is likely to be ineffective. Areas for further study could include focusing on social media's role in increasing retirement engagement. While, traditionally, engagement research focuses primarily on the dyadic relationship between customer and organization, digital technology forces researchers to adopt a new perspective to capture the emergence of complex, interconnected actor networks (Barari et al., 2020).

Second, future research could investigate how COVID-19 has affected individual's uptake of digital technology to engage in retirement planning. As our survey data were collected pre-COVID-19, our findings may not represent the increased perceived relevance of retirement planning induced by the pandemic. Customer expectations have changed during the pandemic, driving unprecedented change and causing fundamental shifts throughout the financial services industry. According to a report by Deloitte (2020), 35% of customers increased their use of online banking during the pandemic, in part due to limited mobility related to COVID-19 lockdowns. The same report emphasizes experts' predictions that as the financial services industry is becoming more digital, industry collaboration, partnerships, and business models will change, leading to the formation of new (service) ecosystems. In addition, a recent report by KPMG (2020) found that half of all Australian pension fund members surveyed claimed to have become more aware of their retirement

savings balance as a result of the pandemic, also stating that their savings and retirement planning has been interrupted as a result of COVID-19. The same report also found that 80% of consumers are willing to be serviced through digital means, however, current satisfaction with value delivery from Superfunds is low. These findings provide numerous directions for future research. For example, the question as to how digital technology can assist individuals in their retirement planning post-COVID-19 remains unanswered but is increasingly important. Future research could also focus on identifying value (co)creation behavior, taking a customer-centric view on the delivery of financial services.

Third, our study uses an Australian sample because of the relevance of this country's institutional setting (e.g., high mobile app usage, compulsory retirement saving). Hence, the findings might only generalize to countries with a comparable retirement scheme such as the Netherlands or Denmark (Mercer, 2018). Given that Australia has one of the highest financial literacy rates globally (Klapper & Lusardi, 2020), the applicability of our findings to a country with lower literacy rates and no compulsory retirement saving scheme could be investigated. As an alternative to our relatively broad sample, which included individuals aged between 18 and 64 years, future research could potentially focus on a specific age group (i.e., either older or younger individuals) when examining their intentions to adopt a mobile retirement app.

Fourth, a lack of available digital tools to support consumers in their retirement planning efforts (i.e., mobile apps, chatbots, online calculators, and electronic membership cards) may be partially attributed to a paucity of research on the factors influencing individuals' adoption of said tools and their effectiveness. Future research may wish to explore the introduction and adoption of different digital tools and their impact on retirement planning engagement.

Finally, we used online data collection. As such, respondents can be assumed to possess a certain degree of familiarity with mobile technology, potentially excluding individuals who are not familiar with said technology. However, as smartphone penetration in Australia is around 90% (Deloitte, 2019), identifying individuals who do not own a smartphone would have been near impossible. In addition, the researchers assume that a mobile retirement app would not be of great use to an individual not in possession of a smartphone compatible with such an app.

Despite these limitations, we contribute to the emerging, but still limited, research on technology-enabled retirement planning (Brüggen et al., 2019; Dellaert, 2010; Hoffmann & Otteby, 2018) by demonstrating the importance of various psychological and technological drivers for individuals' adoption intentions and anticipated engagement with a mobile retirement planning app.

CONFLICT OF INTEREST

The authors have declared no conflict of interest.

DATA AVAILABILITY STATEMENT

The research data will not be shared.

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APPENDIX A

FIGURE A1 Infographic displayed at start of survey

