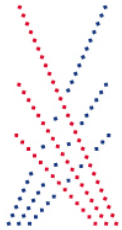

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Gamified Money - Exploring the Adoption and Use of Mobile Payment Among the Silver Generation in China

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Abstract
Mobile payment applications have become the main cashless payment methods for daily small transactions in China. However, the digital exclusion of the silver generation (aged 50 and above) has been observed in this revolution of payment method. To accelerate the penetration of mobile payment technology in China, leading service providers, like WeChat Pay and Alipay, developed a gaming programme embedded in their mobile payment applications known as Red Packet (*hongbao*) game. *Hongbao* is a traditional Chinese gift (containing cash inside a red packet) delivering good wishes and greetings sent by Chinese during the traditional Chinese New Year. Such cross-over between digital technology and cultural tradition brings gaming elements in the technology experience. With increasing attention given to gamification in technology adoption, this study extends technology acceptance model (TAM) with specific emphasis on the effects of gamification and perceived risks to demonstrate the game-elicited adoption of mobile payment technology among Chinese elderly consumers. A total number of 419 surveys was collected and the data was analysed using Structural Equation Modelling. Our findings confirm the effects of TAM in this specific context and reveal perceived benefits of gamification is determined by perceived enjoyment in the game. Perceived benefits of gamification have also been found to contribute to the users' attitude development, directly and through the perceived usefulness. Meanwhile, perceived risks were identified as a barrier in converting attitude into adoption intention. Our findings contribute to the conceptualisation and understanding of gamification, specifically among the silver generation and bring important practical and social implications.

Key Words: Gamification, Mobile Payment, Silver Generation, Technology Acceptance Model

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Word count: 5,786

1. Introduction

The speed at which smartphones has been adopted by the wider society is arguably one of the most important technological developments in recent decades (Masamila et al., 2010; Liébana-Cabanillas et al., 2018). The ubiquity of the use of smartphones has also led to the development of their associated functions augmenting personal and professional activities. Mobile payment is one such applications. According to specialists in the field of Finacial Technology (FinTech), mobile payment systems is on its way to become the major 'killer application' and feature in the mobile phone sector (Liébana-Cabanillas et al., 2015; 2018). Consumers are benefiting from the ease and convenience of paying for goods and services using this new payment mode with the proliferation of smartphones (Luna et al, 2018). However, not all members of society are accepting and adopting such mode of mobile payment although these means of payment has become a commonplace and simpler to use in recent years. As with the use of most electronic gadgets and technology, adoption rate for mobile payment among the silver generation, i.e. older adults aged 50 and above, remains low compared to the younger generation. Yet there is limited knowledge behind the reasons for older adults accepting and adopting mobile payment. At the same time, advanced technology has been shown to play an important role in assisting older adults with their daily livelihoods and quality of life (see for instance Choudrie et al., 2014; Lien and Cao, 2014; Pan and Jordan-Marsh, 2010). This study thus aims to investigate the adoption and usage behaviours of the silver generation.

China arguably has one of the world's largest aging population (World Bank, 2017), which sets the context for our study. Pertinently, commercial research suggests about half the world's digital payments in 2017 were made in China, predominantly through mobile payment apps Alipay (owned by Ant Financial, an affiliate of e-commerce Alibaba) and WeChat Pay (owned by Tencent) (PwC, 2017). To encourage the acceptance and adoption rate of mobile payment in China, WeChat Pay have developed add-on products (e.g., games) which have brought vital complimentary benefits in strengthening the core provisions of a platform, as well as enrich the broader functioning of WeChat ecosystem. One of such popular apps embedded in their mobile payment platforms is the Red Packet (*hongbao*) game. Red packet is a traditional Chinese gift (containing cash inside a red packet) delivering good wishes and greetings sent by Chinese during the traditional Chinese New Year. The digital red packet game was first launched by Tencent's WeChat in 2014 and subsequently joined by Alibaba's Alipay. Digital red packet has since become a part of daily life among Chinese. With the interactive nature of the digital red packet game, its introduction has resulted in a significant increase in user adoption rate of mobile payment (Sferrazza, 2017; Wu et al., 2017).

The objective of this study is twofold, first to assess the effects of the determinants related to the acceptance and adoption of mobile payment among older adults through the analysis of variables examined in the Technology Acceptance Model (TAM). In addition, this study also incorporates a set of technology resistant variables widely examined in extant technology adoption study such as perceived risks in financial transactions and operations (e.g., Liebana-Cabanillas et al., 2018; Wu et al., 2017). Second, to examine the use of 'gamified money', underpinned by the concept of gamification, in the augmentation of the adoption and usage of mobile payment. This study seeks to contribute to the understanding of the functionality of gamification in moderating the adoption of technology. This enables and furthers development of studies on the conceptualisation of gamification. In addition, the new knowledge also enhances the effectiveness of the services that the new technology provides. The proposed structure of the study is as follows, we first provide definitions to key terms used and set the

context for the study. We then examine existing studies in the field of mobile payments and gamification and introduce the theoretical framework of the proposed hypotheses. Following which we explain the chosen methodology, data collection process and analysis. We then discuss the findings, theoretical and practical implications and conclude with the limitations and suggestions for future research opportunities.

1.1 Mobile Payments and WeChat Red Packet

Mobile payment is defined by Dewan and Chen (2005) as the act of making "payments using mobile devices including wireless handsets, personal digital assistants (PDA), radio frequency (RF) devices, and NFC based devices". Liebana-Cabanillas (2012) updated the definition as follows, "business activity involving an electronic device connected to a mobile network enabling the successful completion of an economic transaction". For the purpose of this study, we have adopted the latest definition by Luna et al. (2018: 2) as "a type of financial process of a private or business nature, in which an electronic mobile communication device is used to initiate, authorize and carry out a financial transaction". Mobile payment can generally be categorised into three main types: in-person mobile payments, such as proximity (contactless) payments; remote mobile payments (made via an app or mobile website where the buyer is not physically present at point of sale); and peer-to-peer mobile payments (Liébana-Cabanillas et al., 2018).

Before the arrival of WeChat Pay, Alipay is China's largest mobile payment tool (Wu et al., 2017). To compete with Alipay, Tencent needed to grow its user base by developing a 'killer app' to cultivate user habits and stickiness of its WeChat Pay. It found an answer in the introduction of digital red packet. The gifting of red packet is a traditional Chinese custom of sending monetary gift in a red envelope, usually from elders to younger ones among family and friends, particularly during Chinese New Year and celebratory occasions (e.g., birthdays and wedding). Red packet symbolises prosperity and good luck where Chinese enjoy receiving and sending out to family and friends.

With the vast geographical spread of China, it may not always be practical to send and receive cash among family and friends, without having to visit the bank for transfer. WeChat identified this opportunity, developed and embedded the digital red packet which enabled the delivery of virtual money through WeChat Pay. The digital red packet was introduced in a soft launch aptly during the Spring Festival in China in 2014 (Che and Ip, 2017). To gain a bigger market share, Tencent partnered with the CCTV Spring Festival Gala[1] in 2015 where it promoted the WeChat digital red packet through the game of grabbing red packets – *WeChat Red Packet Shake*. Users interact by simply shaking their smartphones for a chance to grab red packets. WeChat Statistics revealed that 3.27 billion red envelopes were sent and received by WeChat users between 18 and 23 February 2015 (during the 15 days of Chinese New Year celebration) with 1.01 billion of them being exchanged online within 24 hours on 18 February (Wu et al., 2017).

Since WeChat users are only able to send or receive red packets by linking a bank account to their WeChat red packet accounts, the use of WeChat Payment is essential to support peer-to-peer money transfer between the user's bank account and WeChat account. The introduction of the WeChat digital red packet has resulted in the signing up of hundreds of millions of new users to the WeChat Pay, of which included the silver generation where the rate of adoption of new technology is often low (Choudrie et al., 2014). A recent consult report (Yuan, 2018) also revealed that the silver generation in China is now the most frequent users of

WeChat. With its ease of use and minimalistic interface, the digital red packet is currently the most widely used function in WeChat Pay, even amongst older users aged over 55 who send out digital red packets an average of 25 times per month (Che and Ip, 2017).

1.2 Gamified Money

WeChat's digital red packet not only embraces customary tradition but also embodies an important element of Chinese relationships within a social network environment. However, the most noteworthy innovation here is the use of game to encourage the take up of mobile payment among the silver generation, which we are looking at in this study. Beyond the simple gifting function, WeChat Red Packet has also been transformed into a solitaire style game known as *Red Packet Solitaire*. There are two ways of playing this game in a group. The first is to define an identical amount of money for each recipient (for instance, $10 RMB for each of the first 10 persons to open the packet), and the other is the random assignment of an amount for each recipient. The number of red packets to be given out will always be smaller than the number of participating players. Users will thus compete to open the red packet; the sooner they open it, the higher the chance of getting a red packet. Such game has not only encouraged the take up of WeChat pay among older people, it has further fuelled the growth in group-chats (Chen and Ip, 2017). Although games are mostly and mainly targeted at younger audiences, the concept of gamified money has seemingly transcended the conventional barriers of the use of modern technology to older adults. This study thus aims to understand how new technology is adopted among the silver generation, and through exploring the use of gamified money, contribute to the conceptualisation of gamification.

2. Theories, Hypotheses and Research Model

2.1 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) is one of the conventional approaches validated empirically in numerous studies for the analysis of behavioural pattern of users' acceptance and adoption of technology. Developed by Davies (1989), TAM suggests that the perceived usefulness and ease of use by an individual are the factors that determine the attitude towards the adoption of a specific technology, and consequently determine intention to use resulting in the adoption of the technology. TAM has been applied in studies examining user acceptance of mobile services (Chen, 2008), mobile wireless (Kim and Garrison, 2009), mobile ticketing (Suki and Suki, 2017), mobile banking (Mehrad and Mohammadi, 2017), e-government (Lin et al., 2011) and mobile payments (Liebana-Cabanillas et al., 2017; Ramos Luna et al., 2016), among others. Although TAM has undergone several revisions (Liebana-Cabanillas et al., 2017), it is still considered the most rigorous and influential model for the examination of technology acceptance behaviour (Davis, 1989; Davis et al., 1989; Wu et al., 2017). TAM is applied as a theoretical foundation of this study to understand the acceptance of the use of mobile payment among the silver generation, with considering gamification and perceived risks as an extension of the model.

2.2 Gamification

Gamification, first coined in 2008, refers to the use of game design elements in non-game contexts (Deterding et al., 2011). Since then it has been applied in a business context, where

gamification is used to describe a set of design principles, processes, and systems, which are used to influence, engage, and motivate individuals, groups and communities (Rodriques et al., 2016). It refers to software design aimed to provide a game-like experience to users, commonly with the end-goal of affecting user behaviour (Huotari & Hamari, 2012). Gamification is used and harnessed for business purposes and to influence customers' behaviour (Deterding et al., 2011; Hamari & Lehdonvirta, 2010). The development of digital gaming feature, when applied to businesses and commerce, has created a new trend, one that appeals to user experience and creates active participation through gamification. A wide variety of software applications across various sectors such as production, finance, education now offers gaming elements to its applications to increase customer engagement and loyalty (Rodrigues et al., 2016). Key features that engage users of games are social influences and 'game flow experience' (Hsu & Lu, 2004), as we have seen in WeChat Digital Red Packet.

Studies (Hsu and Chen, 2018; Jang et al., 2018; Rodrigues et al., 2016) suggest that gaming elements, when applied to e-business software, are likely to provide several advantages. Firstly, because games have reward mechanisms, such rewards may motivate customers to use the application more frequently and possibly increase their activities (i.e. to perform more transactions). Secondly, games may improve the user experience, learning process and enjoyment, thus facilitating the adoption of digital technology (Rodrigues et al., 2016). Yet until now, there is no indication that the acceptance of mobile payment can be directly influenced by software with game mechanics, but we can see a correlation between these factors. Understanding the mechanism of gamification-elicited adoption is vital in further conceptualising gamification in digital inclusion and assisting older adults ease into the use of modern technology.

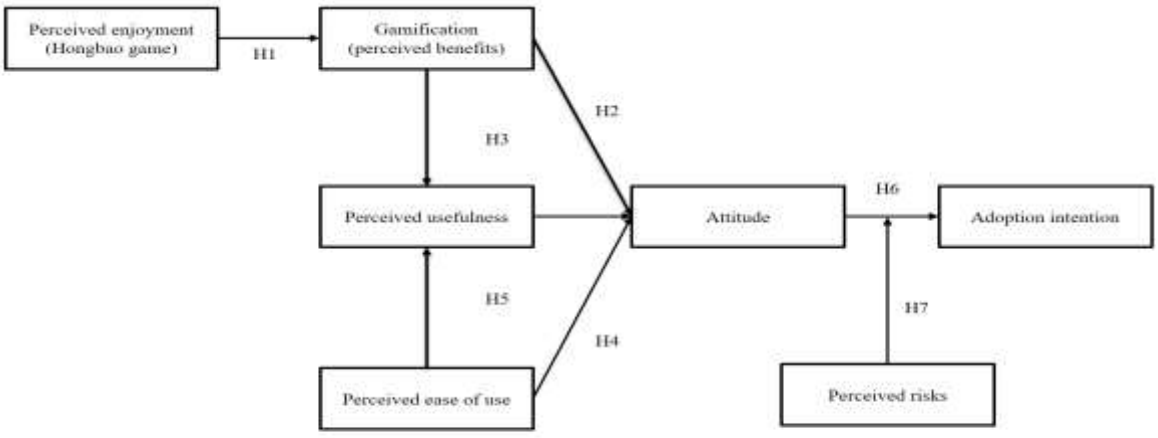
Most of the previous research on gamification focuses the gaming experience and its impact on the adoption behaviour (Eppmann, Bekk and Klein, 2018; Hofacker et al., 2016; Robson et al., 2015). However, from a user's perceptive, whether gamification is perceived to accelerate the technology adoption remains as an unanswered question. Therefore, drawing upon the previous development of gamification in technology adoption research, our conceptualisation of gamification in this study emphasises on the functionality of gamification in the technology adoption process – perceived benefits of gamification. In other words, gamification refers to the extent in which users perceive the gaming elements facilitate their knowledge and involvement in the target function/technology (Hamari and Koivisto 2012, 2015). This angle is important. Because it reflects the users' direct perception through the participation of the game. In TAM, attitude captures the overall evaluative beliefs regarding the end behaviour based on the individuals' perception (Ajzen and Fishbein, 1977; Davis, Bagozzi and Warshaw, 1989). Therefore, the perceived benefits of gamification are expected to influence the individuals' adoption intention through attitude. More importantly, similar to the functioning mechanism of perceived ease of use, although perceived benefits of gamification are expected to be an important component of the attitude formation, they could be more efficiently transmitted to the development of evaluative beliefs about the adoption through enhancing the perceived usefulness of the adoption (Sheng and Zolfagharian, 2014). After all, perceived usefulness is the determining factor of an individual's attitude towards the technology adoption. Perceived benefits of gamification are less beneficial for the adoption if they do not reflect how useful the technology is. Therefore. We postulate the perceived usefulness mediates the relationship between gamification and attitude towards adoption of Wechat payment. Building upon the previous literature of gamification, we also recognise perceived enjoyment as the source of gamification and postulate its positive association with perceived benefits of gamification (Koivisto and Hamari, 2014).

2.3 Perceived Risks

Although mobile payment presents several advantages (e.g., convenience, time-saving) for users compared to traditional (cash) payment, it is not always readily accepted and used by users, particularly among older adults. Extant studies on user acceptance (or resistance) of mobile payment have suggested positive influences (for instance, perceived ease of use, perceived usefulness, satisfaction, compatibility, relative advantage and favourable attitude) as well as negative (for instance, need for interaction, perceived risk and self-efficacy) factors on user intention to adopt mobile payment (Hanafizadeh et al., 2014; Liébana-Cabanillas et al., 2014; Qasim and Abu-Shanab, 2016; Schierz et al., 2010). Among these studies, perceived risk appears to be the recurrent negative factor examined in most mobile payment acceptance literature (Dahlberg et al., 2015; Wu et al., 2016). Given that studies (Kim et al., 2016; Liébana-Cabanillas et al., 2014) also suggest older adults are more susceptible to perceived risk with regard to the use of mobile payment, there is a need to understand the role of perceived risk in moderating the acceptance and adoption of mobile payment. We seek to examine how a consumer's perception of risks about mobile payment affects his/her intention to accept mobile payment. Previous behavioural studies reveal the gap between attitude and behavioural intention. In other words, a favourable attitude does not always lead to a stronger adoption intention and there are factors that create barriers that stop the individuals from adopting (Shin, 2013; Shin and Kim, 2015). Scholars suggest, to fill in the attitude-intention gap, situational factors need to be taken into consideration, together with the sociodemographic differences (Ajzen, 2005; Graafland, 2017). Extant literature shows elderly population, by nature, is less risk-taking than the youth, and likes to have more control over their financial resources (Caffaro et al., 2018; Nilsson, 2007). Mobile payment shares human control in the digitised payment and transactions and is perceived to be associated with risks, which enhances the significance of perceived risks in silver generation's adoption. Therefore, folliwng the gap between attitude and intention and the importance of perceived risks in the context, we postulate perceived risks play a negative moderating role between attitude and adoption intention.

Based on the conceptualisation and theorisation above, we extended TAM by taking gamification as an accelerator and perceived risks as decelerator in the elderly users' adoption process of mobile payment. Figure 1 generalises the postulated relationships in the extended TAM followed the hypotheses.

Figure 1: Proposed conceptual model



H1. Perceived enjoyment has a positive effect on perceived benefits of gamification.

H2. Perceived benefits of gamification have a positive effect on attitudes.

H3: Perceived usefulness mediates the relationship between perceived benefits of gamification and attitudes.

H4. Perceived ease of use has a positive effect on attitudes.

H5: Perceived usefulness mediates the relationship between perceived ease of use and attitudes.

H6. Attitudes has a positive effect on adoption intention.

H7: Perceived risk moderates (weakens) the positive relationship between attitudes and adoption intention.

3. Method

3.1 Data collection

"Team translation" was employed to establish equivalence of measures (Douglas and Craig, 2007). All questions were translated independently by two researchers, and the draft was then reviewed by two Chinese participants to ensure the questions were comprehensive and context-appropriate. Data was collected using interviewer-administered questionnaire survey. Trained research assistants distributed the questionnaires in various residential areas in Suzhou, one of the major cities in China, during May and July 2018. These trained research assistants conducted face-to-face survey with elderly consumers who are aged over 50 in the local communities and elderly colleges. In this study, the current users of WeChat but had not yet used mobile payment functions were eligible to answer the survey. 633 elderly individuals agreed to take part in this study and represented a 67.5% response rate. 582 of invited participants are currently using Wechat and only 163 of them have already adopted mobile technology. The penetration rates of Wechat and Wechat Payment are 92% and 28%, respectively.

Our final sample consists of 419 valid responses. The age range of the sample was between 50 – 80 years old with an average age of 56. 59.2% were female, and majority (54.5%) were not working. 69.5% of the respondents had monthly income between 2,000 – 8,000 yuan (equivalent to around £230 - £920). 77.4% have used WeChat for 2-4 years.

INSERT TABLE 1 HERE

4. Analysis and Results

4.1 Construct measurement

Measurement scales were first subject to Exploratory Factor Analysis with SPSS 25.0. Maximum likelihood factor analysis with oblique rotation (direct oblimin) was used since the

factors were expected to be correlated. The EFA results confirmed the factor structure in the proposed model. At this stage, poorly performing items with low item-total correlations were eliminated. 18 of the 23 items were retained, comprising 6 factors, which is consistent with the proposed measurement structure.

The psychometric properties of the constructs were examined by Confirmatory Factor Analysis with AMOS 25.0. The CFA results for the 18-item model demonstrate good model fit (χ^2/d.f. = 2.86, IFI = .96, TLI = .95, CFI = .95, RMSEA = .07).

The mean value for perceived enjoyment was very positive (mean = 6.16; sd= 1.11). Respondents also reported a high level of perceived benefits of gamification (mean = 5.61; sd= .78), high levels of perceived ease of use (mean = 5.26; sd= .78), and perceived usefulness (mean = 5.52; sd= .86). They also held positive attitudes (mean = 5.78; sd= .89), and showed a high level of adoption intention (mean = 5.80; sd= .93). The respondents meanwhile, perceived a lower level of risks (mean = 3.99; sd= .67).

The validated measures showed good internal consistency and reliability via Cronbach Alphas. All the constructs had composite reliability values greater than the recommended level of .75 (See Table 2). Convergent and discriminant validity was also evident by AVE values above 0.5, an the square root of AVEs greater than correlations of the constructs (Fornell and Larcker, 1981).

INSERT TABLE 2 HERE

4.2 Testing direct paths and mediation effects

The model was tested using structural equation modelling (SEM) to examine the hypothesised relationships. The fit indices of the structural model were adequate. (χ^2/d.f. = 2.86, IFI = .96, TLI = .95, CFI = .99, RMSEA = .07). To test the mediating effect of Perceived Usefulness (PU) in the relationships between Perceived Benefits of Gamification (PBG) and Attitudes and Perceived Ease of Use (PEU) and Attitudes, we used the bootstrapping bias-corrected confidence interval procedure in AMOS (Preacher and Hayes, 2008, Zhao, Lynch Jr and Chen, 2010) rather than the widely used causal steps approach for testing mediation (Baron and Kenny, 1986), which has a number of limitations (Hayes, 2009). Bootstrapping, a "nonparametric" way of computing a sampling distribution, has been recommended as a more powerful method of testing mediation effects (Preacher and Hayes, 2008). In this study, 2,000 bootstrap samples were used and the bias-corrected percentile approach generated 95% confidence intervals. Overall, the proposed direct effects H1 (β= .44, p<.001), H2 (β= .19, p<.001), H4 (β= .32, p<.001), and H6 (β= .81, p<.001) were all accepted. Both proposed mediating effects, PBG and PE on Attitudes via PU, were positive and significant at the p< .01 level, therefore H3 and H5 were accepted.

INSERT TABLE 3 HERE

4.3 Testing the moderating effect of perceived risk

The hypotheses suggest that the relationship between Attitudes and Adoption Intention (AI) may be weakened on the Perceived Risk (PR). The moderation relationships were tested in structural equation modelling using AMOS. A new variable which is the cross-product between the predictor (attitudes) and the moderator (PR) was created and included into the path model.

The fit indices of the structural model were excellent (χ^2/d.f. = 2.03, IFI = .99, TLI = .97, CFI = .99, RMSEA = .05). The results show a significant direct positive effect attitudes on adoption

intention (β= .81, p<.001), and a negative moderating effect of perceived risk. The path coefficient of the interaction was -.09 (p < .01). H7 was therefore supported.

To understand the form of the interaction, we plotted the independent value of attitudes for the outcome variable of adoption intention based on the level of perceived risk (Figures 2).

INSERT FIGURE 2 HERE

Figures 2 illustrated the changes of the relationship between attitudes and adoption intention at different levels of perceived risk. With the increase of the perceived risk, the slope of regression lines becomes flatter. In other words, intention to use appears to be moderated as a person's perceived risk increases.

5. Discussion

This study sheds light on the question of how gamification facilitates the senior consumers' adoption of mobile payment technology as an extended function of a parent technology. Drawing upon the literature of technology acceptance and gamification, we conceptualised gamification from a perspective of its functionality and demonstrated the mechanism of how enjoyment-initiated gamified experience helps the senior consumers to accept and adopt the extended mobile payment technology. Meanwhile, perceived risks have identified as a significant barrier in senior consumers' adoption of mobile payment technology. The following discussion details the rationales and expanded understating of our findings.

First, our findings initially suggest perceived enjoyment positively influences the gamification. Aforementioned, most research on gamification emphasises on the playfulness-oriented experience and asserts individuals obtain a sense of enjoyment through the participation of the game and are more likely to adopt the technology that has employed such gamified elements (Eppmann, Bekk and Klein, 2018; Hofacker et al., 2016; Robson et al., 2015) . Unlike previous studies that gamification is oriented by the gamified experience, our conceptualisation of gamification is exploratory and concentrates on the perceived benefits of the game. In other words, if gamification is believed to enhance the consumers' technology adoption, to what extent individuals feel the gamified elements actually motivate their involvement and engagement with the technology. In this case, gamification functions as an accelerator that facilitates the consumers' game-triggered technology involvement, perception and ultimate adoption behaviour. Even with functionality-centred conceptualisation, perceived enjoyment is still positively associated with gamification. This means that the enjoyable experience with fun and playful elements essentially important to the design of the gamified elements (Koivisto and Hamari, 2014). Additionally, this finding is also important from a social perspective since previous studies on gamification either focus on the effects of gamification on millennials or general public without drawing any particular sociodemographic boundaries (Brigham 2015; Buckley and Doyle, 2017). In the modern world where the aging issue is raging in the most of societies, technology research should also take this into consideration (Pan and Jordan-Marsh, 2010; Wang and Sun, 2016). The positive association that we discovered between enjoyment and gamification therefore also suggests that gamification is not a patent for the youth only. Gamified elements in the technology are also appreciated by the silver group. Therefore, having enjoyable games that are compatible with the target technology could effectively enhance the digital inclusion and technology engagement among the aging population.

Second, our findings reveal that gamification, perceived usefulness of the technology and perceived ease of use make a positive contribution to developing a positive attitude towards mobile payment technology. Following the literature of technology acceptance, perceived usefulness and perceived ease of use are the determinable elements in the attitude formation of different technologies. More precisely, in our study, perceived usefulness of reflects to what extent a senior consumer believes Wechat mobile payment enhances his/her paying experience (Davis, Bagozzi and Warshaw, 1989; de Luna et al., 2018). From an individual perspective, in order to make payment, more benefits one perceives from the mobile payment technology, a more favourable attitude towards the technology is developed. Perceived ease of use simply represents a senior consumer's beliefs on the extent of using mobile payment would be effort-free (Davis, Bagozzi and Warshaw, 1989; Liébana-Cabanillas, Molinillo and Ruiz-Montañez, 2019). Such beliefs also contribute to forming the attitude towards the technology. In addition to perceived usefulness and ease of use, gamification has been identified as a new dimension that contributes to the consumers' attitude towards the technology. Based on the previous studies, we argue gamification facilitates the individuals' familiarity and involvement with the extended functions of a parent technology (Hamari and Koivisto 2012, 2015). In our case, Wechat was initially developed as a messaging and social networking app. With the mobile payment function added to the app, the implementation of hongbao game assists the senior users' understanding of the mobile payment technology, thereby shaping their attitudes towards the Wechat's mobile payment. More importantly, in addition to the direct effects discussed above, our results also suggest the perceived usefulness mediates the effects that perceived ease of use and gamification have on the users' attitude formation. Such findings are important. Because, for one, regardless of how easy the technology can be operated, without being perceived to be useful, perceived ease of use cannot be efficiently translated into a favourable attitude towards the technology (Chang et al. 2015; Rahman et al. 2017). For another, in a similar case, if one discovers the multiple functions of a parent technology through the game participation without recognising the usefulness of the new function/technology, the attitude towards the technology that he/she has might not fully reflect his/her perception and understanding about such technology (Sheng and Zolfagharian, 2014).

Third, our findings suggest the positive association between the attitude towards the extended function and users' adoption intention and reveal the moderating role of perceived risks in such relationship. Social cognitive theorists suggest the positive relationship between attitude and behavioural intention in investigating individual behaviours, which has been adopted in technology acceptance studies (e.g. TAM) (Ajzen and Fishbein, 1977; Bandura, 1986; Davis, Bagozzi and Warshaw, 1989). Our finding is, therefore, in line with the fundamental theoretical proposition. However, previous studies also emphasise the significance of further exploring the gap between attitude and behavioural intention, particularly identifying the barriers in the behavioural mechanism of technology adoption (Shin, 2013; Shin and Kim, 2015). Scholars also suggest such gap filling research needs to consider the situational and individual characteristics (Ajzen, 2005; Graafland, 2017). Our study focuses on the senior users' adoption of mobile payment technology as an extended function that Wechat has. In the technology has particular relevance to money, the perceived risk is always one of the most influential barriers in the adoption process. Meanwhile, our particular focus on senior users amplifies such effects as previous literature suggests senior users are more sensitive with the risks involved in the technologies due to the unfamiliarity and distrust with the ever-developing technologies in general (Caffaro et al., 2018; Nilsson, 2007). Therefore, senior users who are more discreet and conserved with financial security and more conserved with technology perceive more risks involved in using the mobile payment system. While perceived risks led by such discretion and

conservation decelerate the conversion from the attitude to the adoption intention of the mobile payment technology.

6. Implications

Our study makes a number of important contributions. From a theoretical perspective, we extended the technology acceptance model in the context of adopting the extended function of an adopted parent technology. This is particularly important in the present market where all technology firms are looking to extend. Meanwhile, unlike previous gamification studies that concentrate on the gamified experience, we conceptualised and validated the measure of the perceived benefits of gamification in the process of adopting the new function/technology – to what extent game elements accelerate the users' exploration and involvement of a technology's extended functions. Furthermore, our particular emphasis on the impact of senior technology users provided empirical that the significance of gamification is not subject to technology users' age groups. Moreover, perceived risks filled the gap between attitude and behavioural intention and demonstrated the barrier in senior technology users' adoption behaviours.

In addition to the theoretical implications, our study also brings fresh managerial and social insights. First, the importance of gamification in senior people's technology adoption suggests that the silver group also has a playful heart. In the era where aging population and digitalisation are happening at the same time, improving the digital literacy among senior people and accelerating the senior users' technology adoption are particularly essential in order to develop a more equal and sustainable social environment. Implementing interesting, simple and enjoyable gaming elements into the technology address the psychological resistance that senior people have when facing technology. While game engagement encourages senior technology users to further explore and adopt the extended features and functions that the technology has. Therefore, technology developers should recognise the "playful heart" that the silver group has and employ the gaming elements to help the senior users' technology adoption, thereby contributing to the digital inclusion of the society.

Second, our contextualisation is unique as the digitalised hongbao not only represents a gamified experience that boosts the technology adoption but also reflects the practice of culture and traditions in China. This suggests the cultural tradition is not a barrier to technology penetration. In contrast, when technology firms discover and optimise the cross point of traditions and technologies, traditions could act as facilitators in assisting the penetration of the technology. However, the technology developers are suggested to carefully select and implement the intersection between cultural traditions and technology. The cultural and/or traditional elements implemented need to have relevance to the target technology. For example, in our case, hongbao traditionally indicates money-gifting behaviour particularly during the festive time in Chinese culture to represent the good wishes, such as New Year, wedding and birthday, which has a close link with the mobile payment technology. Such cultural practice in the digital context could be generalised in different cultures. For example, in western cultures, the similar idea could be borrowed to digitalise the individuals gifting behaviours for special occasions, like Christmas and wedding. This might not be only related to the penetration of mobile payment technology but also the digitalisation of the modern gift card culture.

Third, in senior people's gamification-elicited technology adoption, two key factors that need particular attention. For one thing, the gamification not only needs to assist the senior users'

discovery and exploration of the new functions but also reflect the usefulness of the target function/technology. Having the senior users to be "edutained" in the games could enable them to, on the one hand, enjoy the gamified experiences but also get familiar with the technology and the benefits of it. Therefore, the gamification will be more effectively motivate the senior users to develop a positive attitude and preferable adoption intention towards the technology. For another, aforementioned, perceived risks are the crucial barrier that stops senior individuals to actualise the adoption behaviour. Therefore, the penetrating strategy needs to be tailored when targeting the silver group. Here, the primary principle is to reduce users' concerns about privacy and security. Technology firms could utilise different strategies to address the concerns, such as guarantee, testimonies and enforcement. Meanwhile, with the gamification implemented in the technology, the technology developers could consider adopting some quizzes or activities in the game and awarding and/or achievements and badges to clear the risk-related doubts that the senior users have, thereby facilitating their adoption (Hamari, 2017).

7. Limitations and future research directions

Although this study takes a unique sociocultural angle to expand our understanding of the impact of gamification on technology adoption based on an extended technology acceptance model, specifically from a silver group's perspective and, it has some limitations. First, we examined the single-technology in an eastern cultural context. Individuals' technology adoption behaviours have been discovered to be culture-specific. Future research could examine the cultural differences in gamification and its impact on senior users' technology adoption (Straub, Keil and Brenner, 1997). Second, our conceptualisation of gamification focuses on its functionalities in helping the users' exploration and involvement of multiple functions. Future research could examine the antecedents of senior users' game engagement level and the mechanism of influencing the adoption behaviours. Third, researchers are also suggested to conduct comparison studies between the youth and senior to identify the distinctiveness in perceiving the gaming elements installed in the technology, thereby providing more insights for the gamification development that suits users at different ages (Comunello et al., 2017). Fourth, our research identified the perceived risks as the barriers that stop the senior consumers from adopting the mobile payment technology. Future studies could also employ the exploratory approach to investigate the senior technology users' risk-related psychological mechanism and develop corresponding risk-reducing strategies for the technology firms to implement in their product design and promotion.

References

Ajzen, I. (2005) *Attitudes, personality, and behavior*. McGraw-Hill International.

Ajzen, I. and Fishbein, M. (1977) Attitude-behavior relations: A theoretical analysis and review of empirical research. *Psychological bulletin*, *84*(5), p.888.

Arli, D., Tan, L.P., Tjiptono, F. and Yang, L. (2018) Exploring consumers' purchase intention towards green products in an emerging market: The role of consumers' perceived readiness. *International Journal of Consumer Studies*, *42*(4), pp.389-401.

Bandura, A. (1986) Social foundations of thought and action. *Englewood Cliffs, NJ, 1986*.

Baron, R.M., and Kenny, D.A. (1986). "The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations". *Journal of Personality and Social Psychology*, 51, 1173-1182.

Brigham, T.J. (2015) An introduction to gamification: adding game elements for engagement. *Medical reference services quarterly*, *34*(4), pp.471-480.

Buckley, P. and Doyle, E. (2017) Individualising gamification: An investigation of the impact of learning styles and personality traits on the efficacy of gamification using a prediction market. *Computers & Education*, *106*, pp.43-55.

Caffaro, F., Lundqvist, P., Micheletti Cremasco, M., Nilsson, K., Pinzke, S. and Cavallo, E. (2018) Machinery-related perceived risks and safety attitudes in senior Swedish farmers. *Journal of agromedicine*, *23*(1), pp.78-91.

Chang, C.C., Hung, S.W., Cheng, M.J. and Wu, C.Y. (2015) Exploring the intention to continue using social networking sites: The case of Facebook. *Technological Forecasting and Social Change*, *95*, pp.48-56.

Che, X. and Yip, B. (2017). *Social Networks in China.* Sawston, Cambridge: Chandos Publishing.

Chen, L. D. (2008). A model of consumer acceptance of mobile payment. *International Journal of Mobile Communications*, *6*(1), 32-52.

Choudrie, J., Pheeraphuttharangkoon , S., Zamani ,E. & Giaglis, G. (2014). *Investigating the adoption and use of smartphones in the UK: A silver-surfers perspective.* UH Business School Working Paper, University of Hertfordshire.

Comunello, F., Fernández Ardèvol, M., Mulargia, S. and Belotti, F. (2017) Women, youth and everything else: age-based and gendered stereotypes in relation to digital technology among elderly Italian mobile phone users. *Media, Culture & Society*, *39*(6), pp.798-815.

Dahlberg, T., Guo, J., & Ondrus, J. (2015). A critical review of mobile payment research. *Electronic Commerce Research and Applications*, *14*(5), 265-284.

Davis, F.D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, *13*(3), 319-339.

Davis, F.D., Bagozzi, R.P. and Warshaw, P.R. (1989) User acceptance of computer technology: a comparison of two theoretical models. *Management science*, *35*(8), pp.982-1003.

Davis, F.D., Bagozzi, R.P., Warshaw, P.R., 1989. User acceptance of computer technology: a comparison of two theoretical models. Manag. Sci. 35, 982–1003.

de Luna, I.R., Liébana-Cabanillas, F., Sánchez-Fernández, J. and Muñoz-Leiva, F. (2018) Mobile payment is not all the same: The adoption of mobile payment systems depending on the technology applied. *Technological Forecasting and Social Change*.

Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). *From game design elements to gamefulness: defining gamification.* In Proceedings of the 15th international academic MindTrek Conference: Envisioning future media environments (pp. 9-15). ACM.

Dewan, S.G., Chen, L.D. (2005). Mobile payment adoption in the USA: A crossindustry, cross-platform solution. *Journal of Information Privacy and Security, 1* (2), 4–28.

Douglas, S.P. and Craig, C.S. (2007), "Collaborative and Iterative Translation: An Alternative Approach to Back Translation," *Journal of International Marketing*, 15, 30-43.

Eppmann, R., Bekk, M. and Klein, K. (2018) Gameful Experience in Gamification: Construction and Validation of a Gameful Experience Scale [GAMEX]. *Journal of Interactive Marketing*, *43*, pp.98-115.

Fornell, C. and Larcker, D.F. (1981), "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error," *Journal of Marketing Research*, 18, 39-50.

Graafland, J. (2017) Religiosity, attitude, and the demand for socially responsible products. *Journal of Business Ethics*, *144*(1), pp.121-138.

Hamari, J. (2017) Do badges increase user activity? A field experiment on the effects of gamification. *Computers in human behavior*, *71*, pp.469-478.

Hamari, J. and Koivisto, J. (2015) Why do people use gamification services?. *International Journal of Information Management*, *35*(4), pp.419-431.

Hamari, J., & Lehdonvirta, V. (2010). Game design as marketing: how game mechanics create demand for virtual goods. *International Journal of Business Science & Applied Management*, *5*(1), 14e29.

Hanafizadeh, P., Behboudi, M., Koshksaray, A.A. and Tabar, M.J.S. (2014). Mobile-banking adoption by Iranian bank clients. *Telematics and Informatics*, *31*(1), 62-78.

Hayes, A.F. (2009). "Beyond Baron and Kenny: statistical mediation analysis in the new millennium". *Communication Monographs*, 76(4), 408-420.

Hofacker, C.F., De Ruyter, K., Lurie, N.H., Manchanda, P. and Donaldson, J. (2016) Gamification and mobile marketing effectiveness. *Journal of Interactive Marketing*, *34*, pp.25-36.

Hsu, C. L., & Chen, M. C. (2018). How gamification marketing activities motivate desirable consumer behaviors: Focusing on the role of brand love. *Computers in Human Behavior*, *88*, 121-133.

Hsu, C. L., & Lu, H. P. (2004). Why do people play on-line games? an extended TAM with social influences and flow experience. *Information & Management*, *41*(7), 853-868.

Huotari, K. and Hamari, J. (2012) October. Defining gamification: a service marketing perspective. In *Proceeding of the 16th international academic MindTrek conference* (pp. 17-22). ACM.

Huotari, K., & Hamari, J. (2012). *Defining gamification: a service marketing perspective.* In Proceeding of the 16th International Academic MindTrek Conference (pp. 17-22). ACM.

Jang, S., Kitchen, P. J., & Kim, J. (2018). The effects of gamified customer benefits and characteristics on behavioral engagement and purchase: Evidence from mobile exercise application uses. *Journal of Business Research*, *92*, 250-259.

Kim, S., & Garrison, G. (2009). Investigating mobile wireless technology adoption: An extension of the technology acceptance model. *Information Systems Frontiers*, *11*(3), 323-333.

Kim, S., Gajos, K. Z., Muller, M., & Grosz, B. J. (2016). Acceptance of mobile technology by older adults: a preliminary study. In *Proceedings of the 18th International Conference on Human-Computer Interaction with Mobile Devices and Services* (pp. 147-157). ACM.

Koetse, M. (2018, February, 15). CCTV Spring Festival Gala 2018. *What's On Weibo* [Online]. Available at: < https://www.whatsonweibo.com/cctv-spring-festival-gala-2018-live-blog/> (Accessed on 15 March 2018).

Koivisto, J. and Hamari, J. (2014) Demographic differences in perceived benefits from gamification. *Computers in Human Behavior*, *35*, pp.179-188.

Kollmuss, A. and Agyeman, J. (2002) Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behavior?. *Environmental education research*, *8*(3), pp.239-260.

Liebana-Cabanillas, F. (2012). El papel de los sistemas de pago en los nuevos entornos

Liébana-Cabanillas, F., & Lara-Rubio, J. (2017). Predictive and explanatory modeling regarding adoption of mobile payment systems. *Technological Forecasting and Social Change*, *120*, 32-40.

Liébana-Cabanillas, F., Marinkovic, V., de Luna, I. R., & Kalinic, Z. (2018). Predicting the determinants of mobile payment acceptance: A hybrid SEM-neural network approach. *Technological Forecasting and Social Change*, *129*, 117-130.

Liébana-Cabanillas, F., Molinillo, S. and Ruiz-Montañez, M. (2019) To use or not to use, that is the question: Analysis of the determining factors for using NFC mobile payment systems in public transportation. *Technological Forecasting and Social Change*, *139*, pp.266-276.

Liébana-Cabanillas, F., Ramos de Luna, I., & Montoro-Ríos, F. J. (2015). User behaviour in QR mobile payment system: the QR Payment Acceptance Model. *Technology Analysis & Strategic Management*, *27*(9), 1031-1049.

Liébana-Cabanillas, F., Sánchez-Fernández, J. and Muñoz-Leiva, F. (2014). The moderating effect of experience in the adoption of mobile payment tools in virtual social networks: the m-payment acceptance model in virtual social networks (MPAM-VSN). *International Journal of Information Management*, *34*(2), 151-166.

Lien, C.H. & Cao, Y. (2014). Examining WeChat users' motivations, trust, attitudes, and positive word-of-mouth: Evidence from China. *Computers in Human Behavior*, *41*, 104-111.

Lin, F., Fofanah, S. S., & Liang, D. (2011). Assessing citizen adoption of e-Government initiatives in Gambia: A validation of the technology acceptance model in information systems success. *Government Information Quarterly*, *28*(2), 271-279.

Luna, I. R., Liébana-Cabanillas, F., Sánchez-Fernández, J., & Muñoz-Leiva, F. (2018). Mobile payment is not all the same: The adoption of mobile payment systems depending on the technology applied. *Technological Forecasting and Social Change*.

Mehrad, D., & Mohammadi, S. (2017). Word of Mouth impact on the adoption of mobile banking in Iran. *Telematics and Informatics*, *34*(7), 1351-1363.

Nilsson, D. (2007) A cross-cultural comparison of self-service technology use. *European journal of marketing*, *41*(3/4), pp.367-381.

Pan, S. & Jordan-Marsh, M. (2010). Internet use intention and adoption among Chinese older adults: From the expanded technology acceptance model perspective. *Computers in Human Behavior, 26,* 1111–1119.

Pan, S. and Jordan-Marsh, M. (2010) Internet use intention and adoption among Chinese older adults: From the expanded technology acceptance model perspective. *Computers in human behavior*, *26*(5), pp.1111-1119.

Preacher, K. J., and Hayes, A. F. (2008). "Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models". *Behavior Research Methods*, 40(3), 879-891.

PwC (2017). E-Commerce in China - The Future is Already Here. Hong Kong: PriceWaterhouseCoopers Limited.

Qasim, H. and Abu-Shanab, E. (2016). Drivers of mobile payment acceptance: the impact of network externalities. *Information Systems Frontiers*, *18*(5), 1021-1034.

Rahman, S.A., Taghizadeh, S.K., Ramayah, T. and Alam, M.M.D. (2017) Technology acceptance among micro-entrepreneurs in marginalized social strata: The case of social innovation in Bangladesh. *Technological Forecasting and Social Change*, *118*, pp.236-245.

Ramos-de-Luna, I., Montoro-Ríos, F., & Liébana-Cabanillas, F. (2016). Determinants of the intention to use NFC technology as a payment system: an acceptance model approach. *Information Systems and e-Business Management*, *14*(2), 293-314.

Robson, K., Plangger, K., Kietzmann, J.H., McCarthy, I. and Pitt, L. (2015) Is it all a game? Understanding the principles of gamification. *Business Horizons*, *58*(4), pp.411-420.

Rodrigues, L. F., Oliveira, A., & Costa, C. J. (2016). Playing seriously–How gamification and social cues influence bank customers to use gamified e-business applications. *Computers in Human Behavior*, *63*, 392-407.

Schierz, P. G., Schilke, O., & Wirtz, B. W. (2010). Understanding consumer acceptance of mobile payment services: An empirical analysis. *Electronic Commerce Research and Applications*, *9*(3), 209-216.

Sferrazza, F. (2017). *China's great hongbao war: Why Alipay has always been the real innovator. Technode* [Online]. Available at: <https://technode.com/2017/03/11/china-hongbao-alipay-real-innovator/> (Accessed 1 December 2017).

Sheng, X. and Zolfagharian, M. (2014) Consumer participation in online product recommendation services: augmenting the technology acceptance model. *Journal of Services Marketing*, *28*(6), pp.460-470.

Shin, D.H. (2013) Defining sociability and social presence in Social TV. *Computers in human behavior*, *29*(3), pp.939-947.

Shin, D.H. and Kim, J. (2015) Social viewing behavior in social TV: Proposing a new concept of socio-usability. *Online Information Review*, *39*(3), pp.416-434.

Straub, D., Keil, M. and Brenner, W. (1997) Testing the technology acceptance model across cultures: A three country study. *Information & management*, *33*(1), pp.1-11.

Suki, N. M., & Suki, N. M. (2017). Flight ticket booking app on mobile devices: Examining the determinants of individual intention to use. *Journal of Air Transport Management*, *62*, 146-154.

Wang, Q. and Sun, X. (2016) Investigating gameplay intention of the elderly using an Extended Technology Acceptance Model (ETAM). *Technological Forecasting and Social Change*, *107*, pp.59-68.

World Bank (2017). Population ages 65 and above (% of total). Available at: < https://data.worldbank.org/indicator/SP.POP.65UP.TO.ZS> (Accessed 25 August 2018).

Wu, J., Liu, L. & Huang, L. (2017). Consumer acceptance of mobile payment across time: Antecedents and moderating role of diffusion stages. *Industrial Management & Data Systems, 117*(8), 1761-1776.

Yuan, M. (2018, October 15). China's Silver Generation Has Money and Time to Spend, East West Bank. East West Bank [Online]. Available at: < https://www.eastwestbank.com/ReachFurther/en/News/Article/Chinas-Silver-Generation-Has-Money-and-Time-to-Spend> (Accessed 12 December 2018).

Zhao, X., Lynch, J. G., and Chen, Q. (2010). "Reconsidering Baron and Kenny: Myths and truths about mediation analysis". *Journal of Consumer Research*, 37, 197-206.

Tables and Figures

Table 1: Descriptive statistics (n=419)

Variables	Categories	Frequency	Percent
Gender	Female	248	59.2%
	Male	171	40.8%
Employment	Retired	148	35.4%
	Housewife/husband	80	19.1%
	Full-time employee	94	22.5%
	Part-time employee	19	4.5%
	Self-employed	50	12%
	Free lancer	26	6.2%
	Other	1	.2%
Monthly income	< 2,000 yuan	14	3.3%
	2,001 – 5,000 yuan	160	38.2%
	5,001 – 8,000 yuan	131	31.3%
	8,001 – 11,000 yuan	58	13.8%
	11,001 – 14,000 yuan	35	8.4%
	>14,000 yuan	21	5%
Length of use	Less than a year	10	2.4%
	1-2 years	42	10%
	2-3 years	245	58.5%
	3-4 years	79	18.9%
	More than 4 years	43	10.3%
Total		419	100%

Table 2: Results of Measurement Model

Constructs	α	CR[a]	AVE	Mean	SD	N[b]	AI	PE	PEU	PBG	ATT	PU
AI	.85	0.87	0.69	5.80	.93	3	**0.83**					
PE	.94	0.94	0.84	6.16	1.11	3	0.18***	**0.92**				
PEU	.81	0.81	0.59	5.26	.78	3	0.43***	0.08	**0.77**			
PBG	.83	0.83	0.63	5.61	.78	3	0.17**	0.59***	0.07	**0.79**		
ATT	.86	0.86	0.67	5.78	.89	3	0.51***	0.32***	0.56***	0.22***	**0.82**	
PU	.85	0.86	0.66	5.52	.86	3	0.76***	0.18***	0.67***	0.11*	0.57***	**0.82**

Note: $N = 419$;
a Composite Reliability;
b Number of items in each validated measure;
Significance of Correlations: ** $p < 0.01$; *** $p < 0.001$

Table 3: Results of Direct Effect Hypotheses and Mediation Tests

		Bootstrap bias-corrected method 95% CI				
		Unstandardized Estimates	**SE**	**Lower**	**Upper**	***p*-value**
Direct effects						
H_1	Enjoyment → Gamification	.44	.03	.36	.50	.00
H_2	Gamification → Attitudes	.19	.05	.08	.29	.00
H_4	PEU → Attitudes	.32	.05	.23	.42	.00
H_6	Attitudes → Intention	.81	.09	.65	.96	.00
Indirect effects						
H_3	Gamification on Attitudes via Perceived Usefulness	.05	.02	.02	.10	.00
H_5	PEU on Attitudes via Perceived Usefulness	.28	.04	.19	.38	.00
Interaction						
H_7	Risk x Attitudes on Intention	-.09	.03	-.18	.00	.00

Figure 2: Moderating effect of perceived risk on attitudes and intention to use