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The Integration of Video Games in Family-life dynamics: An Adapted Technology Acceptance Model of Family Intention to Consume Video Games

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The Integration of Video Games in Family-life dynamics: An Adapted Technology Acceptance Model of Family Intention to Consume Video Games

Abstract

Purpose: Empirical studies using the Technology Acceptance Model (TAM) have mainly focused on utilitarian technologies. The aim of this study is to extend the TAM in order to develop a more nuanced understanding of the family dynamic around video game acceptance within households.

Design/methodology/approach: This paper proposes a new and unique adaptation of the TAM to study the acceptance of hedonic technologies in the context of parents'/carers' acceptance and integration of video games within family-life dynamics. This adaptation of the TAM attempts to shed light on the social influences and intrinsic motivations behind parents' and carers' intentions to purchase video games for their children's consumption.

Findings: The usefulness of video games lies in how enjoyable and entertaining they are, and this seems to be influenced by the convenience and ease of use, that ultimately affects the behavioural intention towards video games. Convenience of use brings in social influences on perceived enjoyment and on parents' actual behaviour towards video games. Some social influences seem to play a direct role in affecting children's behaviour towards video games.

Research limitations: We acknowledge that using Facebook as a tool for data collection has limitations attributed to selection bias. Another limitation is not giving voice to the children to account for their own subjective experience of video games and relying on their parents' perceptions on the matter.

Theoretical implications: This study advocated extending TAM within a hedonic framework in the context of examining parents'/carers' acceptance of video games, while re-validating past theories of TAM and introducing new contextual variables adapted to address hedonic technologies.

Originality: Empirical studies using TAM have focused on the utilitarian nature of technologies and very few considered hedonic technologies. This study's key contribution to research lies in explaining the effects of parents' perceived enjoyment, ease of use and convenience on the intention to purchase and play video games. The findings feed into work on the ethics and developmental issues around the marketing of video games to and for children.

Keywords: Technology Acceptance Model (TAM); Video games; Family; hedonic technologies; social influences.

Introduction

Video games have become an intimate aspect of the lives of many children in developed and developing countries (Berk, 2009; Abram and Luther, 2004; Paramentier and Rolland, 2009; De Prato and Simon, 2015; Basole and Karla, 2011). This partly reflects the increased autonomy of children as consumers (Thomson et al., 2007; Götze et al., 2009) as they often search and choose games online, share information about games with friends and use their own resources to purchase games, in negotiation with their parents, carers and extended family (Bassiouni, 2013). Video games on all platforms, including on- and offline computer games, and games played on dedicated consoles, smartphones and tablets, have become part of the everyday leisure and social activity of many families (Bassiouni and Hackley, 2016). In spite of children's increased autonomy, parents and carers have retained a key influence in the acceptance of video games within households (Powell et al., 2016). Parents' and carers' attitudes to video games and the motivations behind their intentions to purchase are important elements of understanding the ways in which video games are accepted into families. Policy makers, regulators and video games marketers might all benefit from a deeper understanding of the influence of family dynamics in video game demand. Hence, the present study addresses a gap in the research around the acceptance of video games within families by adapting the well-established technology acceptance model (TAM) (Davis, 1989) to a new context: parents'/carers' acceptance of video games within families.

Examining the acceptance of video games within families presents a theoretical challenge because the technology in question is not merely utilitarian but is principally hedonic (Van der Heijden, 2004; Agarwal and Karahanna, 2000). People play video games primarily for fun, and consumer research has established the motivational force of hedonic consumption (Hirschman and Holbrook, 1982). In hedonic technologies, perceived enjoyment can be a stronger determinant of intention to use the technology than perceived usefulness (Rodrigues et al., 2016; Venkatesh et al., 2012; Davis et al., 1989). TAM studies focusing largely on hedonic technologies have been gaining some popularity in recent years (Wang and Goh, 2017; Hernández et al., 2017; Chang and Chen, 2018), however research has yet to further explore the various dimensions of the acceptance of primarily hedonic technologies. Accordingly, this study' s key contribution to research is in extending the TAM to explain the effects of parents' and carers' perceived enjoyment, ease of use and convenience on the intention to purchase and play video games. In addition, the study extends the scope of the

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TAM by including social influences such as subjective norms, image, social interaction and shared identity.

Literature Review

The Technology Acceptance Model (TAM) is based on the Theory of Reasoned Action (TRA) (Ajzen and Fishbein, 1975) and has been adopted in numerous studies to explore user acceptance of technology (Venkatesh, 1999; Venkatesh and Davis, 2000). Utility-based technologies studied by TAM have included computers (Davis, 1989) word processors (Davis et al., 1989), the internet (Johnson and Hignite, 2000; Atkinson and Kydd, 1997), e-learning (Rodrigues et al., 2016; Roca et al., 2006), retail technology (Ha and Stoel, 2009) and internet banking (Lee, 2009). In addition, some attention has been paid to activities that have elements of enjoyment in addition to utility, such as internet shopping (Aldhmour and Sarayrah, 2016; Childers et al., 2002, Mathwick et al., 2001), e-tourism (Oumlil and Ouhamane, 2016), social media (Rauniar et al., 2014) and educational games that have an entertainment element (Bourgonjon et al., 2009; Ketelhut and Schifter, 2011; Park et al., 2018; Martí-Parreño et al., 2018; Sánchez-Mena et al., 2017). In recent years some studies using TAM have focused on the hedonic aspects that might be a component of the intention to use gaming technology (Chang and Chen, 2018; Wang and Goh, 2017; Hernández et al., 2017; Yoon and Kim, 2007).

TAM originally determined user acceptance by two key behavioural beliefs, perceived usefulness and perceived ease of use (Davis, 1989: Davis et al, 1989; Venkatesh and Morris, 2000). Another key behavioural belief in extended TAM studies is perceived enjoyment, which defines the degree of pleasure and joy attained from the use of entertainment-oriented technologies such as video games (Teo et al., 1999; Venkatesh, 2000; Choi and Kim, 2005). As we note above, in several studies, ease of use and perceived enjoyment have been shown to be more important than perceived usefulness in understanding behavioural intention to use hedonic-oriented technologies (Rodrigues et al., 2016; Chen and Lu, 2016; Van der Heijden, 2004; Childers et al., 2002). In the present study, TAM is adapted on the basis that the intention to allow the playing of video games is a function of its perceived enjoyment and convenience from the parents'/carers' points of view, as well as ease of use. The study also explores social influences that might affect parents' and carers' decisions in allowing or forbidding children to play video games, such as shared identity, social interaction, subjective norm and image. In the coming section, the theoretical rationale for the model will be

explained and the constructs defined through two tracks; attitudinal influences and social influences.

Attitudinal Influences on Parent's behavioural intentions towards video games

This study postulates that parents' intention to get and play video games is the consequence of perceived enjoyment that parents/carers and their children experience with video games, while this intention is the antecedent of parents' actual behaviour towards video games. And so, the behavioural intention to get and play video games mediates the relationship between the attitudinal components (perceived enjoyment) and parents' actual behaviour. Consistent with the theory, this relationship between behavioural intention and actual behaviour is considered one of the basic TAM relationships and is well supported by several empirical studies (Davis, 1989, Venkatesh and Davis, 2000). Hence, the following hypothesis is suggested:

H1: The Behavioural Intention to get and play video games has a positive influence on parents'/carers' actual behaviour towards video games.

Perceived ease of use

Perceived ease of use is a key behavioural belief in TAM studies (Davis, 1989) and studies have suggested that ease of use plays an important role in the usage of entertainment-oriented technologies (Atkinson and Kydd, 1997; Davis et al., 1992; Igbaria et al., 1997; Teo et al., 1999; Van der Heijden, 2004; Okazaki et al. 2008; Rodrigues et al., 2016; Van Rooij et al., 2017; Wang and Goh, 2017). Given the hedonic nature of video games, the ease of use is posited to be more influential in predicting the intention to get and play than perceived usefulness, as suggested by Venkatesh and Morris (2000), in spite of some studies suggesting a reverse relationship (Agarwal and Karahanna, 2000; Huang et al., 2007). Hence, we posit that:

H2: Perceived Ease of Use has a positive influence on Perceived Enjoyment.

Perceived Enjoyment

Previous studies have deemed ease of use an antecedent to perceived enjoyment of hedonic technologies (Igbaria et al., 1997; Van der Heijden, 2004; Okazaki et al. 2008; Rodrigues et al., 2016). Enjoyment (Davis et al., 1992) on the other hand, is recognised as an important antecedent to behavioural intention that overrules perceived usefulness (Davis et al., 1992; Van der Heijden, 2004; Van Rooij et al., 2017) as well as being an intrinsic motivator

(Jarvenpaa and Todd, 1996; Okazaki et al., 2008; Li et al. 2005; Koufaris 2002; Venkatesh, 2000; Teo et al., 1999; Venkatesh et al., 2012). In fact, enjoyment has been suggested to have a large impact on users' intention and behaviour (Davis et al., 1992; Venkatesh and Davis, 2000; Koufaris, 2002; Lee and Tsai, 2010; Wang and Goh, 2017). Hence, it is postulated that the greater the enjoyment attained from playing video games, the stronger the intention to get and play more games.

H3:   *Perceived Enjoyment has a positive influence on intention to get and play video games.*

In previous TAM studies, it was found that perceived convenience mediates the relationship between perceived ease of use and perceived usefulness (Yoon and Kim, 2007). Empirical studies that have investigated hedonic technologies have mostly adapted perceived usefulness of work technologies to perceived enjoyment or perceived fun (Rodrigues et al., 2016; Van der Heijden, 2004). In the present study, it is suggested that perceived convenience would mediate the relationship between perceived ease of use and perceived enjoyment, and hence perceived convenience is postulated to have a direct influence on perceived enjoyment, which in turn is expected to affect behavioural intention.

H4: *Perceived Convenience has a positive influence on the perceived enjoyment of video games*.

Perceived Convenience

Video games are highly convenient, given their portability (depending on the console) and ease of access. Convenience denotes availability, accessibility and agility of a product taking into consideration the time and effort exerted to attain it (Brown, 1990; Okazaki et al., 2008). When Brown (1990) introduced the convenience concept, he noted that it is multidimensional and he put forward five dimensions to it – time, place, acquisition, use and execution. In this study, the five dimensions of convenience are at play when investigating video games. The 'use' dimension of convenience is frequently regarded as an 'ease of use' construct (Brown, 1989; Yoon and Kim, 2007). Since ease of use is a convenience dimension as proposed by Brown (1989), accordingly, it is posited that 'perceived ease of use' will be an influential determinant of 'perceived convenience'. In this sense, it is noted that the easier it is to use video games, the more convenient it will be.

H5: Perceived Ease of use positively influences Perceived Convenience of video games.

Okazaki and Mendez (2013) argued that when it comes to gaming, convenience is not only about ownership or reliability but also the ability of the user to be entertained without being restricted by time or place. This further connects with Brown's (1990) time and place dimensions of convenience. Hence, given the ubiquity of video game access, particularly on mobile platforms, video games seem to satisfy Brown's five dimensions of convenience (Brown, 1990). As videogaming technologies become a more convenient tool for entertainment, this will ultimately influence intention to use the technology (Yoon and Kim, 2007; Tang and Chiang, 2009; Collier and Sherrell, 2010). Accordingly, in this study it is postulated that since video games constitute a convenient technology allowing children to overcome time, location and societal constraints, parents will be more inclined towards accepting and integrating video games within family lifestyle.

H6: Perceived convenience has a positive influence on parents' actual behaviour towards video games.

Social Influence

Social influences, defined as the direct and indirect impact of others on user's thoughts, feelings and actions, ultimately affects their behavioural intention (Venkatesh et al., 2003: Hsu and Lu, 2004). Social influence can comprise elements of compliance, internalisation and identification (Kelman, 1958; Venkatesh et al., 2003; Warshaw, 1980). Venkatesh and Davis (2000) noted that internalisation and identification are at play in technologies that are not enforced on the user, and that social influence moderates the decision whether to use the technology. When it comes to video games, children associate social acceptance and identity validation with ownership and use of the right video games (Bassiouni, 2013) and their parents and carers will be aware of this social imperative, hence the gatekeeper's intention to purchase video games for their family will be influenced by this belief. Various research studies have considered subjective norm, descriptive norm, social pressure and image as important social determinants of behaviour (Baabdullah, 2018; Chang and Chen, 2017; Rivis and Sheeran, 2003; Venkatesh et al., 2003; Moore and Benbasat 1991). In this study, those constructs are slightly adapted and hence social influence is investigated through four contingent constructs; subjective norm, image, social interaction and shared identity and their relationships with parents' attitudinal forces that drives their behaviour and acceptance of video games.

Subjective norm originates from TRA, which is considered "TAM's referent theory" (Venkatesh and Morris, 2000) and has been adapted in TAM2 (Venkatesh et al., 2003). This social construct is defined as a "person's perception that most people who are important to him think he should or should not perform the behaviour in question" (Ajzen and Fishbein, 1975; Davis et al., 1989). In spite of conflicting research evidence around the importance of subjective norm in determining behavioural intention (Ajzen and Fishbein, 1975; Taylor and Todd 1995; Hsu and Lu, 2004; Szajna, 1996; Mathieson, 1991; Venkatesh and Morris, 2000; Brown and Venkatesh, 2005) in this study, it is postulated that subjective norm would have an indirect influence on parents'/ carers' actual behaviour towards video games acceptance that is mediated by perceived convenience.

H7: Subjective *norm has a positive influence on perceived convenience.*

Moreover, Kelman (1958) noted that individuals tend to respond to social normative pressures in order to attain a favourable image within a reference group and referred to this source of social influence as identification. Parents and carers might identify with their children's expressed need for social status through ownership of particular video games (Bassiouni and Hackley, 2015; Elliott and Leonard, 2004; Götze et al., 2009). Furthermore, the willingness to identify with the children's social need to be in the avant garde of games players might be seen to enhance the parent's/carer's image with peers and their children's social group (Moore and Benbasat, 1991). TAM2 postulated that subjective norm has a positive influence on image (Venkatesh et al., 2003). So if it is perceived that usage of a certain video game is highly valued by a child's reference group, then it is assumed that this behaviour will elevate the child's social status as well as that of their parents'/carers' within their group. Not only this, but it is postulated that image will actually mediate the relationship between subjective norm and perceived convenience, as image will have a positive influence on perceived convenience as well through acquisition. Hence this study considers this relationship as an important one to test and, therefore, formulates the following hypotheses:

H8: Subjective norm has a positive influence on image.

H9: Image has a positive influence on perceived convenience.

Social Interaction and shared identity

Prior research noted that one of the reasons people are initially motivated to play video games is due to perceived social interaction attained from technology usage ((Ekström, 2007; Yee, 2006; Cole and Griffiths, 2007; Hou, 2011; Van Rooij et al., 2017; Baabdullah, 2018).

Contrary to the view that playing video games is a solitary activity, doing so is seen by many children as a source of social interaction both on and offline (Jenkins, 1998; Buckingham and Green, 2003). Thus, it is postulated that perceived social interaction of children attained from video games will indirectly influence parents' behavioural intention towards video games usage through perceived convenience. In addition, the enhanced social cohesion resulting from this increased social interaction will also have a positive influence on shared identity (Haagsma et al., 2013; Buckingham and Green, 2003) causing video games to be viewed positively.

H10: Social interaction has a positive influence on Perceived convenience.
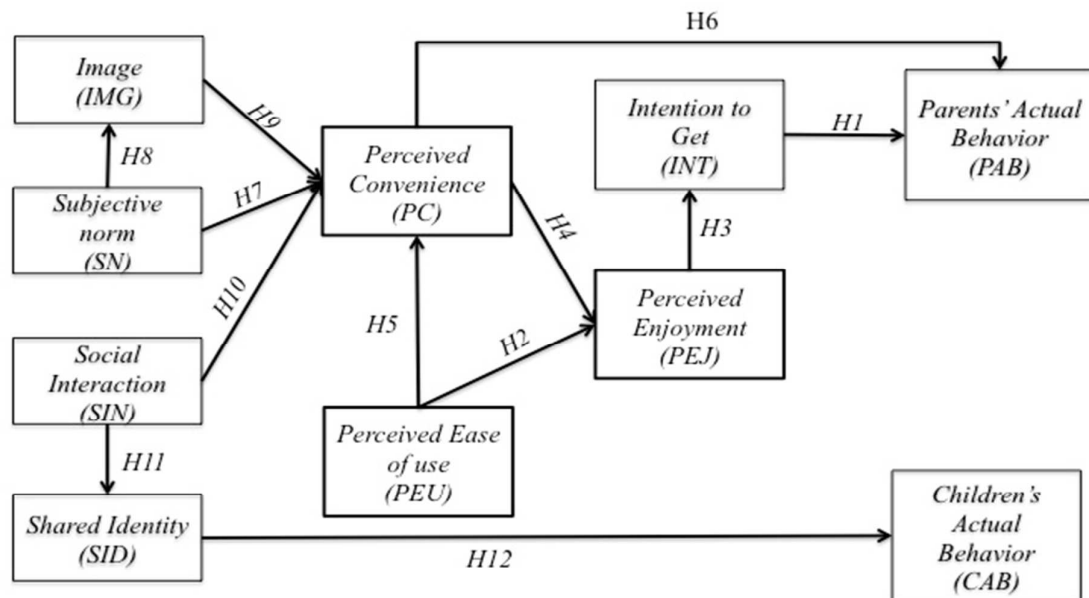
H11: Social interaction has a positive influence on shared identity.

H12: Shared identity has a positive influence on children's actual behaviour towards video games.

Adapted TAM model

The above reasoning gives us an adapted TAM model which is represented in figure 1. below:

Figure 1: Adapted TAM

Research design

Data Collection and Sample Characteristics

The data were collected using an anonymous and voluntary online survey that was posted and advertised on the Facebook social media platform. Facebook facilitates data collection by storing detailed records of its users' demographic profiles, social interactions, interests and behaviours (Kosinski et al., 2015). Previous research has indicated that, though statistically significant differences exist between Facebook and data collected through standalone websites, these differences are small or practically non-significant in magnitude, which presents Facebook as a viable research platform (Rife et al., 2016). The Facebook post used in this study was targeted to parents/carers between the ages of 27-50, who have children between 3-12 years of age and residing in the U.K. This target was further narrowed down psychographically by choosing some interests that might be common among parents, such as toys, games, family, cooking, shopping and travel. Hence, judgment sampling was utilised as Facebook ads pushed the post to the chosen target. The advert ran for three weeks and received 410 clicks on the survey, with only 331 actually taking the survey. The questionnaire used in the survey investigated parents'/carers' acceptance of video games and the perceived attitudinal and social influences that affect their behavioural intention. Although, the number of collected responses was 331 questionnaires, there were a large number of cases that had at least one independent variable item missing. Thus, utilising a list wise method of data analysis would have reduced sample size considerably. Moreover, there were 11 cases that had data missing from all study variables and accordingly they were removed from the study. The Little's MCAR test obtained for this study's remaining data resulted in a chi-square = 211.283 (df=191; p=0.15), which indicates that the data are completely missing at random. Thus multiple imputations was the approach best suited for our study which resulted in estimates with little bias (Sinharay et al. 2001; Enders and Bandalos, 2001). Missing data were imputed using EM through SPSS statistics resulting into 320 usable responses. Overall, 72.8 % of the sample were males while the rest were females. This can be attributed to the nature of the research on video games that seems to have been more appealing to males than females. *Table I* highlights the sample characteristics. Moreover, most of the parents/carers who have participated in this survey have indicated that they have played video games when they were children (92%) and 85% still played video games.

Table I: Sample Characteristics

Demographics	% (N=320)	
Gender		
Male	72.8%	
Female	27.2%	
Age		
From 20-29 year	13.16%	
From 30-39 years	52.19%	
From 40-49 years	32.89%	
50 years or more	1.75%	
Parent/Children Distribution	**Male**	**Female**
Parents with One Child (100% of the sample)	66.6 %	33.3%
Parents with 2 Children (84% of the sample)	54 %	46%
Parents with 3 Children (35 % of the sample)	48 %	52 %
Occupation		
Management Occupation	10.09%	
Sales and Related Occupations	10.09%	
Office and Administrative Support Occupations	9.65%	
Homemaker (stay at home mom/dad)	7.46%	
Education, Training, and Library Occupations	6.58%	
Installation, Maintenance, and Repair Occupations	5.70%	
Other	50.43%	

Operational Measures

All constructs in the proposed model are based on reflective multi-item scales. Exploratory factor analysis was used for measure purification followed by confirmatory factor analysis using SEM procedures for further measure purification. Problematic items involved in high-standardised residuals with other items were removed. The purified measures are shown in *table II*. Face validity of customisation was obtained through expert judgment. Other forms of validity (convergent, discriminant and nomological) are assessed in the results section. All indicators are measured with a seven-point scale, having 1 representing the lowest level and 7 the highest level.

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Table II: Constructs' purified measurement scales

Construct Name	Purified Measurement Items	Adapted From
Actual Behaviour	• How often do you play video games? • How often do your children play video games? • How long do you play video games a week? • How long do your children play video games a week?	Hou, 2011; Chen et al., 2016
Intention to get and play	• I think I will frequently get video games in the future. • I intend to play video games in the future. • I intend to play video games with my children in the future. • I think I will frequently play video games with my children in the future.	Davis, 1989; Brown and Venkatesh, 2005; Okazaki et al., 2008; Venkatesh et al., 2012
Perceived Enjoyment (intrinsic motivation)	• I find video games very entertaining. • I find the time I spend playing video games with my children truly enjoyable, compared with other media.	Davis et al. 1992; Van der Heidjen, 2004; Okazaki et al., 2008; Lee and Tsai, 2010; Venkatesh et al., 2012; Chen et al., 2016;
Perceived Convenience	• Playing video games is an efficient way to be entertained in any time, any place. • Playing video games with my children fits in with the pace of my life. • I find video games very practical.	Mathwick et al., 2001; Okazaki et al., 2008
Perceived Ease of Use	• I find video games to be easy to play/use. • I find it easy to understand video games.	Davis, 1989; Venkatesh and Davis, 2000; Venkatesh, 2000; Hsu and Lu, 2004; Brown and Venkatesh, 2005; Lee and Tsai, 2010
Subjective Norm	• Other parents (People who influence my behavior) suggest that I should get video games for my children. • Other parents suggest that I should play video games with my children.	Azjen and Fishbein, 1975; Davis et al. 1989; Mathieson 1991; Taylor and Todd 1995; Lee and Tsai, 2010; Venkatesh et al., 2012; Chen et al., 2016
Image	• Other parents I know who use video games with their children have more prestige than those who do not. • Other parents I know who get video games for their children have a high profile.	Moore and Benbasat 1991; Venkatesh and Davis, 2000; Brown and Venkatesh, 2005
Social Interaction	• Getting video games for my children helps them in making friends. • Getting video games for my children helps me in protecting them from stigmatisation and bullying.*	Lee and Tsai, 2010; Hou, 2011; Chen et al., 2016
Shared Identity	• Having and playing video games allows my children to belong to the group. • Having and playing video games will decrease the likelihood of my children being left out.	Hou, 2011; Chen et al., 2016
* Items added by the researcher.		

Estimation

The model was estimated using Maximum Likelihood (ML) since it is the most widely used technique that is the default method in most software packages, even though it is sensitive to violations of Multivariate Normality (Buamgartner and Homburg, 1996; Boomsma, 2000). However, ML is quite consistent at producing different estimations and is rather robust against moderate violations of the normality assumption (Diamantopoulos and Siguaw, 2000) provided that the sample comprises 100 or more observations (Anderson and Gerbing, 1988; Steenkamp and Van Trijp, 1991).

The data analysis followed Anderson and Gerbing's (1988) two-step approach. The first step is a confirmatory measurement or factor analysis specifying the relations of the observed measures to their posited underlying construct. The second step is a confirmatory structural model that specifies the causal relations of the constructs to one another as posited by theory. In this regard, LISREL 9.2 was selected as the software tool used in the analyses.

Results

Descriptive analysis

Means and standard deviations of original variables can be found in *Table III*. Analysis of the measurement model using confirmatory factor analysis (CFA) reveals satisfactory overall model fit statistics (χ^2 = 391.839, df = 164; χ^2/df = 2.389; RMSEA = 0.0659; NNFI = 0.926; CFI = 0.948; GFI = 0.901; AGFI = 0.847; SRMR = 0.0408).

Table III Means, standard deviations and standardised loadings for manifest variables

Construct	Item	Mean	Std Deviation	Loading
Actual behaviour parents	AB1_1	4.306	1.827	0.924*
	AB2_1	2.704	1.351	0.751*
Actual behaviour children	AB1_3	4.814	1.544	0.911*
	AB2_3	2.863	1.465	0.711*
Intention to get and play	IGP3	4.638	1.148	0.742*
	IGP4	5.078	1.144	0.910*
	IGP5	5.043	0.966	0.881*
	IGP7	4.768	1.004	0.840*
Perceived Enjoyment	PFU1	5.093	1.011	0.893*
	PFU3	4.535	0.893	0.734*

Perceived convenience	PC1	4.656	0.973	0.704*
	PC4	4.193	0.898	0.758*
Perceived ease of use	PEU4	4.785	0.867	0.821*
	PEU5	4.926	0.889	0.939*
Subjective norms	SN1	3.328	0.801	0.889*
	SN2	3.340	0.820	0.804*
Image	IMG1	3.496	0.799	0.811*
	IMG2	3.380	0.766	0.893*
Social interaction	SIN3	3.989	0.934	0.773*
	SIN4	3.536	0.836	0.703*
Shared identity	SID1	3.824	0.940	0.846*
	SID2	3.657	0.930	0.857*

Note: *****Significant at<0.001 level (two-tailed test)

Measurement reliability and validity

The reliability and validity measures for the model constructs of this study were examined as evident in *Table IV*. All Cronbach's Alphas exceed the 0.7 (Nunnally, 1978). Without exception, latent variable composite reliabilities (Fornell and Larcker, 1981) are higher than 0.60 (Bagozzi and Yi, 1988) showing a high internal consistency of indicators measuring each construct and thus confirming construct reliability. The average variance extracted (Fornell and Larcker, 1981) is also always higher than 0.50, indicating that the variance captured by each latent variable is significantly larger than the variance due to measurement error, and thus demonstrating uni-dimensionality and a high convergent validity of the constructs. Reliability and convergent validity of the measurement model were also confirmed by computing standardised loadings for indicators (*Table IV*) and Bootstrap t-statistics for their significance (Anderson and Gerbing, 1988). All standardised loadings exceed the 0.7 threshold and they were found, without exception, significant at 1 percent significance level, thus confirming a high convergent validity of the measurement model.

Discriminant validity is assessed determining whether each latent variable shares more variance with its own measurement variables or with other constructs. In this vein, all the squared roots of AVEs exceeded the multiple correlations (Ping, 2004) between the

respective construct with the exception of three correlations, which exceed the AVE of the involved constructs as shown in *table V*. However, correlations between constructs significantly differed from unity. This was achieved by using a single degree of freedom CHI-square difference test with the constructs that demonstrated correlations that are greater than the SQRT of the average variance extracted. This test compares two structural equation measurement models, the first one is the measurement model and the second one contains a pair of constructs with correlation fixed to unity. If the CHI-square is significant, as is the case with our results, this would suggest that correlation is not one and hence would imply that constructs are distinct (Anderson and Gerbing, 1988; Bagozzi and Phillips, 1982; Steenkamp and Van Trijp, 1991; Ping, 2004), which would present further evidence of discriminant validity. Accordingly, it is concluded that all the constructs in the proposed model show evidence for acceptable validity.

Table IV Reliability and Validity Measures

Construct	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
Actual behaviour parents	0.813	0.828	0.709
Actual behaviour child	0.786	0.798	0.668
Intention to get and play	0.904	0.909	0.715
Perceived Enjoyment	0.788	0.799	0.668
Perceived convenience	0.695	0.697	0.535
Perceived ease of use	0.870	0.874	0.778
Subjective norms	0.834	0.836	0.718
Image	0.839	0.842	0.728
Social interaction	0.701	0.706	0.546
Shared identity	0.841	0.841	0.725

Table V Correlations between latent variables and square roots of average variance extracted

	Actual Behaviour Parents	Actual Behaviour Child	Intention To Get And Play	Perceived Enjoyment	Perceived Convenience	Perceived Ease Of Use	Subjective Norms	Image	Social Interaction	Shared Identity
Actual Behaviour Parents	*0.842*	0.099	0.764	0.802	0.670	0.631	0.214	0.124	0.267	0.051
Actual Behaviour Child		*0.817*	0.063	0.024	0.158	0.129	0.117	0.031	0.222	0.192
Intention To Get And Play			*0.846*	0.983*	0.769	0.729	0.217	0.202	0.295	0.041
Perceived Enjoyment				*0.817*	0.860*	0.796	0.248	0.293	0.361	0.093
Perceived Convenience					*0.732*	0.704	0.428	0.427	0.522	0.275
Perceived Ease Of Use						*0.882*	0.209	0.238	0.274	0.013
Subjective Norms							*0.848*	0.475	0.349	0.312
Image								*0.853*	0.516	0.375
Social Interaction									*0.739*	0.849*
Shared Identity										*0.852*

Note: Numbers shown in italics denote the square root of the average variance extracted

(*) Correlations which exceed variance extracted

Model estimation results

Analysis of the structural model reveals satisfactory overall model fit statistics (χ2= 556.03, df = 206; χ2/df=2.699; RMSEA= 0.0729; NNFI= 0.910; CFI= 0.920; GFI= 0.862; AGFI= 0.830; SRMR = 0.0761). *Table VI* shows the explanatory power (through determination coefficient, R^2) of the equations explaining the endogenous constructs. It can be seen that the proposed model shows a high explanatory power for perceived enjoyment (R^2=0.721), shared identity (R^2=0.695), perceived convenience (R^2=0.613), intention to get and play (R^2=0.923) and actual behaviour of parents (R^2=0.630). The determination coefficients regarding the explanation of image and actual child behaviour are lower (between 0.0419 and 0.247), which was expected since the proposed model offers a less detailed explanation of these constructs. More specifically, actual child behaviour is reported from the parent's/carers' point of view, which could be inaccurate or biased. Particularly for the focal constructs of the model, the results of intention to get and play as well as actual parent's behaviour show a good explanatory power and therefore provide strong support for the nomological validity of the proposed model.

Furthermore, *Table VI/ Figure 2* presents the estimates of path coefficients of the proposed model and respective significances. The effect sizes for evaluating the predictive importance of each determinant may also be found in *table VI/figure 2*. With the exception of subjective norms on perceived convenience, all the hypothesised paths were statistically significant at 0.001 level with the exception of the impact of perceived convenience on actual parents' behaviour and the impact of shared identity on actual child behaviour which was significant at 0.01 level. Also the effect of image on perceived convenience was significant at 0.05 level.

Table VI Structural model results

Criterion	Predictors	Hypothesis	R^2	Path Coefficient
Perceived Enjoyment	Ease of Use	H2	0.721	0.438 ***
	Perceived Convenience	H4		0.482 ***
Image	Subjective Norms	H8	0.247	0.497***
Shared Identity	Social Interaction	H11	0.695	0.834***
Perceived Convenience	Subjective Norms	H7	0.613	**0.158 ***
	Social Interaction	H10		0.225 ***
	Ease of Use	H5		0.621 ***
	Image	H9		Not significant

Intention to get and Play	Perceived Enjoyment	H3	0.923	0.961***
Actual Behaviour (Parents)	Intention to get and Play	H1	0.630	0.607***
	Perceived Convenience	H6		0.228**
Actual Behaviour (Child)	Shared Identity	H12	0.0419	0.205**

Notes: *Significant at ,0.05 level (two-tailed test); **significant at ,0.01 level (two-tailed test); ***significant at ,0.001 level (two-tailed test

Figure 2: Structural model results
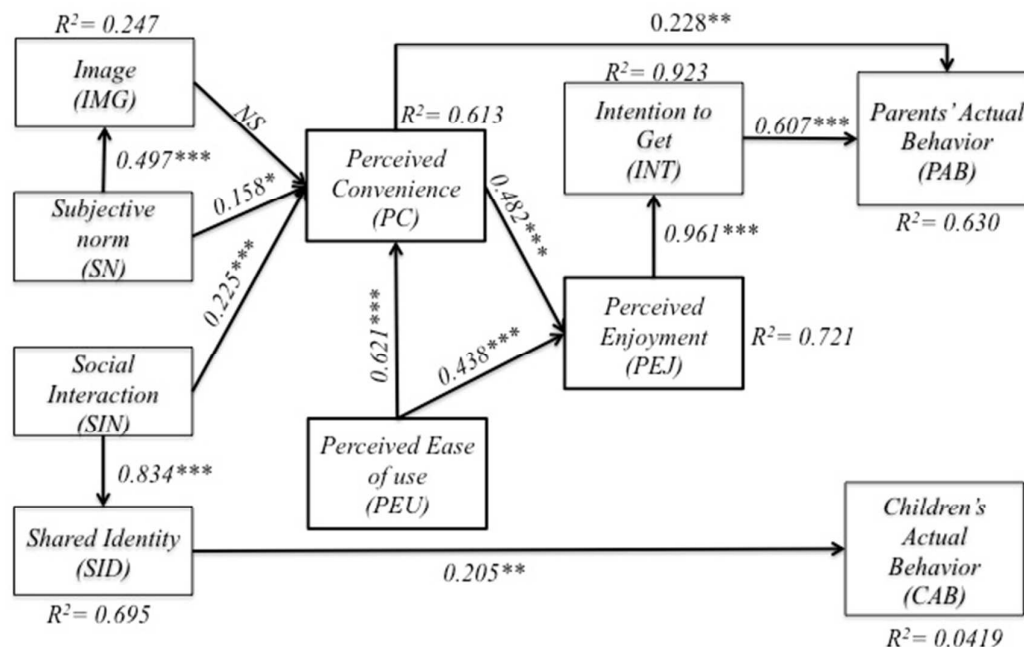
Notes: *Significant at ,0.05 level (two-tailed test); **significant at ,0.01 level (two-tailed test); ***significant at ,0.001 level (two-tailed test)

Moving to the model's hypotheses, social interaction was found to have a positive impact on perceived convenience (Υ=0.225), hence, confirming H10. Moreover, ease of use has a positive impact on perceived convenience (Υ=0.621) also confirming H5 and subjective

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norms was found to positively impact perceived convenience (Υ=0.158) giving a support to H7. Image's effect on perceived convenience was found to have an insignificant impact, which fails to confirm H9. Perceived convenience in turn, had a significant positive effect on perceived enjoyment (β=0.482), hence, supporting H4. Moreover, ease of use was also found to positively impact perceived enjoyment (Υ=0.438), which confirms H2. And perceived enjoyment was found to have a significant positive relationship with intention to get and play (β=0.961) and accordingly H3 was confirmed. Actual parents' behaviour was found to be mainly affected by intention to get and play (β=0.607) and to a lesser degree by perceived convenience (β=0.228), which confirms H1 and H6 respectively. As for actual children's behaviour, it was found to be positively affected by shared identity (Υ=0.205), and therefore gives credence for H12. Finally subjective norms positively impacted image, thus supporting H8 (Υ=0.497).

Globally, most of the model hypotheses were confirmed. Even though perceived usefulness was substituted by perceived enjoyment given the hedonic nature of video games studied, perceived ease of use remained a main determinant of this construct. Furthermore, this did not undermine the strong role played by perceived convenience, which was the gateway for social influence constructs to be integrated within TAM. In addition to that, actual parents' behaviour was highly congruent with their reporting on their intention to get and play. Nevertheless, perceived convenience was still an important factor determining their actual behaviour. And in turn, perceived convenience was mainly affected by ease of use as its main determinant. As for children's actual behaviour, shared identity had a significant effect but with a very low ability to explain this construct's variability. This highlights the need to give children a voice and investigate more determinants of their actual behaviour from their own subjective experience (Bassiouni and Hackley, 2013; 2016).

In this proposed model, the five main constructs were perceived convenience, perceived enjoyment, intention to get and play, actual parents' behaviour, and actual children's behaviour. *Table VII* shows the total impacts, direct and indirect, between constructs (origins of the effects in rows and destinations in columns), while Table VIII shows only the indirect effects thus portraying the proposed constructs' mediating roles. Looking at perceived convenience, the highest total effect is the one originating from perceived ease of use, while the second highest total effect is the one originating from social interaction. Thus, it seems as though parents regard video games that are easier to use as a convenient technology to accept. Not only this, but also video games that are perceived to be a social ticket for their children to group membership and social inclusion are also regarded as being more

convenient to use. Moving to perceived enjoyment, the highest effect is the one originating from perceived convenience, which reconfirms the important mediating role that perceived convenience plays in introducing social influence factors to TAM. The second highest effect on perceived enjoyment is the one originating from perceived ease of use, which is a viable relationship since video games may not be considered entertaining unless they are easy to use. Perceived enjoyment also seems to be the antecedent of intention to get and play, since it had the highest effect on this construct. Nonetheless, perceived enjoyment plays two mediating roles, one between perceived ease of use and intention to get and play, and the other between perceived convenience and intention to get and play.. The interesting factor to consider here is the fact that substituting the construct of perceived usefulness in the original TAM model for the construct of perceived enjoyment did not alter the direction and strength of the relationship with intention to get and play. Turning to the actual parent's/carers' behaviour, the highest effect was the one originating from intention to get and play and the second highest total effect is the one originating from perceived enjoyment. It is still noteworthy to highlight the strong total effect of perceived convenience that deems this construct as an important and focal construct in the model. Finally, shared identity had the highest total effect on actual children's behaviour; however, given the small variance as highlighted before, determinants of this construct need further investigation.

Table VII Total Effects

CRITERION

Predictor	Actual Behaviour Parents	Actual Behaviour Child	Intention To Get And Play	Perceived Enjoyment	Perceived Convenience	Image	Shared Identity
Intention To Get And Play	0.607	--	--	--	--	--	--
Perceived Enjoyment	0.583	--	0.961	--	--	--	--
Perceived Convenience	0.509	--	0.463	0.482	--	--	--
Perceived Ease Of Use	0.571	--	0.708	0.299	0.621	--	--
Subjective Norms	0.100	--	0.091	0.094	0.196	0.497	--
Image	0.038	--	0.035	0.036	0.075	--	--
Social Interaction	0.114	0.171	0.104	0.108	0.225	--	0.834
Shared Identity	--	0.205	--	--	--	--	--

Table VIII Indirect effects

CRITERION

Predictor	Actual Behaviour Parents	Actual Behaviour Child	Intention To Get And Play	Perceived Enjoyment	Perceived Convenience	Image	Shared Identity
Intention To Get And Play	--	--	--	--	--	--	--
Perceived Enjoyment	0.583	--	--	--	--	--	--
Perceived Convenience	0.281		0.463				--
Perceived Ease Of Use	0.571		0.708	0.299			
Subjective Norms	0.100		0.091	0.094	0.038		
Image	0.038		0.035	0.036			
Social Interaction	0.114	0.171	0.104	0.108			
Shared Identity							

Common Method Bias Assessment

Finally, a test of common method variance was performed. The reason for conducting such tests was to have an additional scrutiny of the validity of the results since common method variance was described as one of the main sources of systematic measurement error (Podsakoff et al., 2003). Initially, several ad-hoc design considerations were followed as recommended by Podsakoff and Organ (1986) as means of reducing common method bias. That is, they acted on the need to protect respondent anonymity and reduce evaluation apprehension, counterbalance question order, and improve scale items, as also suggested by Podsakoff et al. (2003). This effort was further complemented by a post-hoc statistical patching up. In this regard, Kock (2015) suggested that the occurrence of a VIF greater than 3.3 is proposed as an indication of pathological collinearity, and also as an indication that a model may be contaminated by common method bias. Therefore, if all VIFs resulting from a full collinearity test are equal to or lower than 3.3, the model can be considered free of common method bias. Accordingly SMART PLS was used to compute all variance inflation factors (VIFs) at the factor level (Latent variable level). Having done so, all the VIFs for all the factors indicated values between 1.0 and 2.272, lower than the 3.3 threshold and further evidence of the absence of common method bias.

Discussion

Parents and carers are important gatekeepers in the family use of video games. Their attitudes matter for the import and impact of managerial strategies and public policy initiatives. This study sought to elaborate on what is understood about the dynamics of family use of video games by adapting the well-established TAM model (Davis, 1989: Venkatesh et al., 2002; 2003: 2012). The results of the analysis provide overall empirical support for the proposed model. Within a context of wide acceptance of video games as legitimate and positive elements of family life, notwithstanding widely held reservations about their positive effects amongst some adults, results showed that parents'/carers' perceived ease of use is a major factor in intention to purchase and has a direct and indirect effect on their perceived enjoyment through perceived convenience. This finding supports and extends findings in previous studies (e.g. Igbaria et al., 1997; Van der Heijden, 2004; Okazaki et al. 2008; Rodrigues et al., 2016; Davis et al., 1992; Van der Heijden, 2004; Venkatesh et al., 2012; Van Rooij et al., 2017).

Perceived subjective norms and perceived access through games to social interaction played lesser roles, while perceived convenience played a crucial role in explaining parents'/carers' perception of enjoyment. Perceived enjoyment was the most influential determinant of parent's behavioural intention towards video games' acquisition and usage, which is consistent with the hedonic nature of video games (Teo et al., 1999; Venkatesh, 2000; Choi and Kim, 2005; Wang and Goh, 2017). Along with ease of use, perceived enjoyment is more important than perceived usefulness in parents'/carers' intention to acquire and use video games. Parents/carers find video games more convenient given that those games are easy to understand and play while at the same time helping their children to make friends through the peer group's shared interest in video games. Video games tend to be viewed as an entertaining activity which is more enjoyable than engaging in other media. Therefore, the role of social influence factors was mainly mediated by perceived convenience. In other words, perceived convenience from the parents'/carers' perspective can be considered the gateway that instigated the inclusion of social influence in the adapted TAM model in this study.

Moreover, the parents'/carers' behaviour was congruent with their intentions as demonstrated by the strong relationship between these two constructs. Usefulness was a less important element in the intention to purchase than enjoyment, as suggested by previous studies

focusing on hedonic technologies (Rodrigues et al., 2016: Chen and Lu, 2016; Van der Heijden, 2004; Childers et al., 2002). Of course, this could be perceived negatively- parents/carers could be criticised for being relatively indifferent to the usefulness of video games and more interested in the convenience, ease of use and entertainment value. However, moral judgements on child rearing are beyond the scope of this study. Whether or not video games are a positive influence on children's intellectual, moral, social and physical development, this study has shown that they are perceived to play a positive role within family dynamics from the perspective of parents and carers.

Our empirical results provide several theoretical contributions in the area of hedonic technology acceptance and usage. Firstly, recent research has advocated extending and re- validating past theories of TAM but within a hedonic framework (Chang and Chen, 2018; Wang and Goh, 2017; Hernández et al., 2017; Van Rooij, 2017) in the new context of video games. As such, the current study represents, to the researchers' best knowledge, the first attempt to examine parents'/carers' acceptance and integration of video games within family- life using scales derived from existing literature. What distinguishes our extension to TAM as a reliable instrument to be adopted in future studies examining hedonic technologies is the composite reliabilities of our constructs that were above the threshold all along with the high AVEs of each construct. Moreover, the results from the structural model re-constructed and validated new relationships that were suggested in more recent TAM studies, rather than just re-establishing relationships between original TAM constructs. In particular, perceived enjoyment substituted perceived usefulness as a dominant factor influencing intention to use, whereas perceived ease of use acted through perceived enjoyment as a secondary influence. Accordingly, this substitution is recommended as an adaptation to TAM whenever the context of hedonic technologies is investigated, especially from an entertainment perspective. In addition to that, social influences played an indispensible role. This role was mainly mediated by perceived convenience, which had a direct influence on the actual behaviour. Thus, it is suggested that in hedonic technologies, perceived convenience shall be the gateway that instigates the inclusion of social influence. A final relationship discovered would be that some social influences, such as shared identity in this study, might have a direct effect on the actual behaviour towards the technology. In this study, shared identity had a direct influence on children's behaviour towards video games from the perspective of their parents, as they were seen to seek potential social gains such as group membership and inclusion from its ownership and usage. Hence, it is argued that social influences can have

both a direct and indirect influence on user acceptance of hedonic technologies. Given these conclusions, the proposed extension and modification to TAM dimensions is a significant addition to the theory for studying the acceptance of hedonic technologies.

Limitations and further research

The study has limitations that might be addressed in future research. Firstly, the use of a cross-sectional design cannot fully capture the dynamic and interactive behaviour of many relationship variables. Secondly, the use of virtual social networks, namely *Facebook* for data collection, is prone to selection bias. This was evident as 72% of the sample was skewed towards male respondents. A third limitation is not giving children a voice and relying mainly on parents'/carers' perceptions of their children's behaviour, which might not be entirely consistent with children's actual intentions and behaviour. A fourth limitation is that this study did not account for the negative perceptions of the overuse of videogames such as the potential for addiction or social isolation.

Future research should investigate the present model under other contextual settings, for example other countries and other hedonic technologies, which might substantiate the external validity of our proposed model and highlight the different interrelationships between variables in the model. Another important avenue for research is to replicate the same model but from children's perspective or using a dyadic approach to get further in depth knowledge on children's true beliefs and intentions, while further investigating the interplay between parents' and children's intention and behaviour towards the acceptance and integration of video games within family-life dynamics. Finally, some additional control variables could also be incorporated to refine the model, such as gender and age.

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