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Having belief(s) in social virtual worlds: A decomposed approach

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Abstract

The interest in social virtual worlds with multiple functions has mushroomed during the past few years. The key challenge social virtual worlds face while attempting to anchor and serve the masses is to reflect the core beliefs of their users. As existing research lacks insight into these core beliefs, this study aims to contribute to the existing knowledge base by proposing and testing a model grounded on the decomposed theory of planned behavior. Predicated on the multipurpose nature of social virtual worlds, the model proposes medium-specific attitudinal, normative and control beliefs as determinants of continual use intention. The model is tested with a sample of 2175 users who inhabit Habbo Hotel – one of the largest social virtual worlds in the industry. The results indicate significant though different influences of attitudinal and control beliefs. The most fundamental finding is the irrelevance of normative beliefs, which puts the social character of social virtual worlds into perspective.

Keywords

Attitudinal beliefs, continual use, control beliefs, decomposed theory of planned behavior, normative beliefs, social virtual world

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Introduction

Social virtual worlds (SVWs) refer to three-dimensional, Internet based, immersive massive multi-user environments, wherein participants interact through avatars and perform activities ranging from social interaction to action-oriented gaming under minimum constraints (Jung and Kang, 2010). SVWs such as Habbo Hotel, Poptropica, Club Penguin, Stardolls and Second Life have grown rapidly in popularity. Worldwide, the total number of registered SVW accounts surpassed the 1.7 billion (kZero, 2012). The impressive uplift in SVW usage has received a great deal of attention from the public at large and contributed to the emergence of tens of new SVWs (kZero, 2012). Due to the rise of these new entrants, SVW operators and designers face the challenge of keeping their users' interests alive and facilitate them in such a way that they continue using their SVW after initial adoption (Platoni, 2008).

Remarkably, while numerous SVW studies have been conducted (for literature reviews, see Schwarz et al., 2012; Verhagen et al., 2012), relatively few of them address which medium-specific user beliefs drive SVW continual use intentions. To fill this gap and expand our knowledge on SVW continual use, which refers to post-adoption medium use (as opposed to initial acceptance) (e.g. Karahanna et al., 1999), this paper proposes and tests an integrative model grounded on the decomposed theory of planned behavior (DTPB) (Taylor and Todd, 1995a, 1995b). The DTPB is selected over other theories as it enables us to decompose rather generic beliefs into three belief types that directly tap into the nature of SVWs: beliefs about a person's behavioral feelings towards using a medium (attitudinal beliefs), beliefs about a person's perceptions about using a medium in relation to the opinion and impact of others (normative beliefs), and beliefs about a person's perceptions about the control she has in using a medium (control beliefs) (cf. Fishbein and Ajzen, 2010). Attitudinal beliefs are assumed to influence medium usage in situations where users can voluntarily use a medium for multiple purposes, which directly applies to SVW settings (Verhagen et al., 2012). The relevance of a study into normative beliefs is highlighted by the fact that SVWs are typical social online environments, in which users are literally surrounded by other users. This social nature makes it plausible to assume that normative beliefs may play a role in SVW user behavior (Merikivi, 2009). Also, developing insight into the influence of control beliefs is of interest, as using SVWs demands new navigational skills to use an avatar and navigate through these 3D environments (Verhagen et al., 2011).

The overarching goal of this paper is to apply the DTPB and develop a framework to examine the effects of key attitudinal, normative and control beliefs on SVW continual use. This goal translates into the following key research question: How and to what extent do attitudinal, normative and control beliefs influence SVW continual use? By answering this question, our paper intends to make four contributions. First, we generate new insights into the specific beliefs underlying SVW continual use. Knowledge on this issue is scarce and openly demanded for (Jung and Kang, 2010). Second, drawing upon the nomological structure of DTPB, we propose and test the influence of attitudinal, normative and control beliefs on continual use intentions. This testing counts as a contextual extension (see Berthon et al., 2002) as the DTPB has, to the best of our knowledge, not been applied in SVW settings. Third, we make use of real user data to

estimate and validate our model. As most prior research on SVWs has made use of student sampling (for a review, see Sivunen and Hakonen, 2011), using real users adds to the external validity of our knowledge of the beliefs underlying SVW continual use. Fourth, the gained insights on the relative influence of the examined beliefs aim to assist operators and designers of SVWs to further align the functionality of SVWs to better accommodate the expectations of their users. It also adds to the knowledge of society about why people keep on using SVWs.

Theoretical background

The decomposed theory of planned behavior

To focus explicitly on the role of beliefs behind SVW continual use, this study expands upon the DTPB (Taylor and Todd, 1995a, 1995b). Basically, the DTPB is a modification of the theory of planned behavior (TPB) (Ajzen, 1991). The TPB posits that an individual's behavior is directly driven by behavioral intentions where behavioral intentions are a function of behavioral attitudes, subjective norms, and perceived behavioral control. Behavioral attitudes stand for a person's general feelings of favorableness or unfavorableness toward a behavior (Fishbein and Ajzen, 1975), whereas subjective norms address a "person's perception of the social pressures put on him to perform or not perform the behavior in question" (Ajzen and Fishbein, 1980: 6). Perceived behavioral control concerns "people's perception of the ease or difficulty of performing the behavior of interest" (Ajzen, 1991: 183).

The TPB has been successfully applied to various behavioral settings, including new media technology usage, and the overall results support its predictive and nomological value (De Canniere et al., 2009). Still, the appropriateness of the three behavioral intention determinants has given rise to much debate for the past two decades. In particular Taylor and Todd (1995a, 1995b) highlighted the need for disaggregation of the attitudes, subjective norms, and perceived behavioral control to arrive at a fuller understanding of the beliefs underlying specific media technology usage. This indicates that finding the appropriate set of belief constructs does not necessarily require the adoption of these three generic constructs in a parsimonious structure; rather, it recommends decomposing them into more comprehensive sets of beliefs that directly apply to the specific context of the research setting. From this perspective the terms attitudinal beliefs, normative beliefs and control beliefs are used, each of them referring to the particular concept they are decomposed from. The advantage of the decomposed approach is that it is expected to generate a fuller understanding of the appropriate set of beliefs underlying the usage of a particular media technology (Taylor and Todd, 1995a, 1995b).

Previous research on SVW continual use

To qualify the decomposed approach founded on theoretical rationale and to identify the attitudinal, normative, and control beliefs driving continual SVW use, we conducted a context-centric review of the existing literature relevant to our topic. Using four scientific databases (ABI/INFORM, PsycINFO, ScienceDirect and Wiley) covering disciplines

such as information systems, computer science, marketing, and social psychology, a total of around 700 studies were found for the search terms "virtual world", "online game" and "online world" (abstract, title key words). Sixty-three studies concerned empirical examinations of a multitude of user behaviors and were therefore selected as relevant to preliminary assessment. Since 50 of these studies examined behavior other than continual use we decided to exclude them from further analysis. This resulted in a pool of 13 studies, which is summarized in Table 1.

As reflected in the number of studies listed, relatively little research exists on continual SVW use (see also Jung, 2011). Much of the research that does fall within this

Table 1. Empirical studies on continual virtual world use.

Author(s)	Focus	Theoretical framework	Beliefs studied	Sample	Key findings
Lu and Wang (2008)	Exploring the extent to which addiction and satisfaction influence loyalty towards online games	Exploratory approach	Control beliefs, normative beliefs, perceived playfulness	1186 players using various online games	Satisfaction contributes to loyalty more than addiction
Yang et al. (2009)	Assessing the factors anteceding satisfaction and loyalty towards online games	Technology acceptance model	Experiential value, transaction cost, service quality	877 players using various online games	Service quality and transaction cost support loyalty indirectly
Teng (2010)	Investigating how customization, immersion satisfaction, and gamer loyalty are related within online games	Reinforcement theory	Customization and immersion satisfaction	865 players using various online games	Customization and immersion satisfaction promote loyalty
Barnes (2011)	Examining the reasons why people continue using SVWs	Instant activation perspective; habit/ automaticity perspective	Perceived usefulness, enjoyment, habit	339 users of Second Life	Continual use is driven by perceived usefulness, enjoyment, habit, and instant activation
Goel et al. (2011)	Investigating factors that predict continual SVW use	Interactionist theory of place attachment	Cognitive absorption	199 students using Second Life	Continual use is determined by a state of deep involvement
Huang and Hsieh (2011)	Exploring the factors affecting consumer loyalty towards online games	Uses and gratifications theory; theory of flow	Entertainment, sociality, challenge, control, interactivity	126 interviews and 126 questionnaires of players using various online games	Players' sense of control, perceived entertainment, and challenge affect loyalty

(Continued)

Table 1. (Continued)

Author(s)	Focus	Theoretical framework	Beliefs studied	Sample	Key findings
Jung (2011)	Identifying the factors that influence continual SVW use	Expectation-disconfirmation theory	Telepresence, social presence, and perceived autonomy	194 users of Second Life	Continual use is determined by the sense of presence and perceived autonomy
Mäntymäki and Salo (2011)	Examining the drivers that influence continual SVW use	Technology acceptance model	Enjoyment, perceived aggregate network exposure, perceived usefulness, perceived ease of use	2481 users of Habbo Hotel	Perceived enjoyment and usefulness affects continual use
Nevo et al. (2012)	Exploring the cross-contextual use of VWs	Exploratory approach	Recreational, work usage, cognitive absorption	203 professionals involved in VWs	Through cognitive absorption, recreational usage promotes work usage intentions
Schwarz et al. (2012)	Explaining SVW assimilation	Theory of reasoned action	Ease of use, playfulness, social presence, self-distraction	223 users of Second Life	Technology and community class of factors influence intention via attitude towards VWs
Teng et al. (2012)	Investigating relationships among gaming challenge, interdependence and gamer loyalty within online games	Interdependence theory; bilateral deterrence theory	Challenge, interdependence, loyalty	994 players using various online games	Gaming challenge influences gamer loyalty directly and via interdependence
Lee and Tsai (2010)	Examining why people continue to play online games	Technology acceptance model; theory of planned behavior	Flow, perceived ease of use, perceived enjoyment	415 online game players	Attitudes, subjective norms, behavioral control flow and enjoyment influence continual use intention
Hsiao and Chiou (2012)	Exploring how network centrality influences continuance intention	Social capital theory	Perceived network centrality, non-guild interaction, perceived enjoyment, access to resources	347 players of World of Warcraft	Access to resources lead to game continuance

SVW: Social Virtual World; VW: Virtual World.

domain centers on concepts such as satisfaction (Teng, 2010), gaming addiction (Lu and Wang, 2008) or purchasing behavior (Mäntymäki and Salo, 2011), with only a few studies focusing on continual use intentions (Barnes, 2011; Goel et al., 2011). Furthermore, while numerous beliefs were studied, only a limited number of studies focused on beliefs that fall within the attitudinal normative of control domain. Those that do (e.g. Goel et al., 2011; Schwarz et al., 2012) only seem to focus on one of these belief types, which leaves their relative importance unaddressed. Moreover, while the available studies have adopted a multitude of diverging theoretical perspectives, the DTPB has not yet been included in the empirical discourse. We decided to adopt the DTPB as a theoretical anchor, as its nomological structure includes three types of beliefs (attitudinal, normative, control) deemed important in continual new media use (Huang and Hsieh, 2011; Mäntymäki and Salo, 2011).

Research model and hypotheses

Figure 1 shows the research model proposed. Drawing upon DTPB, the key dependent construct is continual use intention; whereas attitudinal, normative and control beliefs complete the model as intention determinants.

Perceived enjoyment and perceived usefulness were included as attitudinal beliefs. Both are rooted into the well-known distinction between intrinsic (perceived enjoyment) and extrinsic (perceived usefulness) beliefs behind new media usage (e.g. Barnes, 2011;

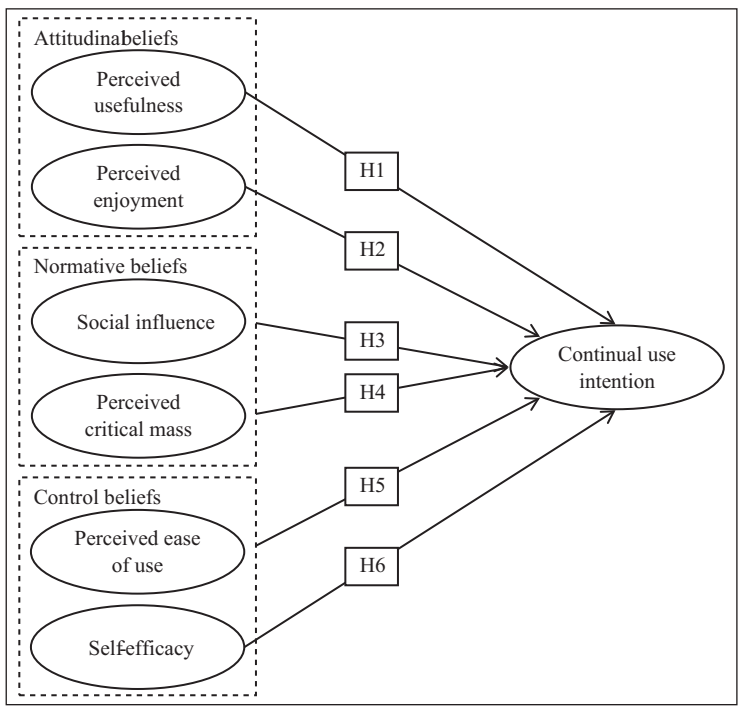

Figure 1. Research model.

Mäntymäki and Salo, 2011). Given the multi-purpose nature of SVWs, this makes it very interesting to cross-validate their (relative) influence on behavior. Social influence and perceived critical mass were proposed as normative beliefs. SVWs are social online environments, in which users are literally surrounded by other users. Both proposed beliefs address prominent social pressures associated with using SVWs (Mäntymäki and Salo, 2011), but have not previously been investigated in such combination. Finally, perceived ease of use and self-efficacy were included as typical control beliefs. These particular beliefs seem closely associated with the new navigational skills required to make use of avatars to move inside SVWs (Verhagen et al., 2012). This makes it highly likely that both influence behavior in SVW settings.

Following Premkumar et al. (2008), we directly relate the different beliefs to the continual use intention. Such an approach differs slightly from more traditional DTPB modeling as it removes the attitude, subjective norms and perceived behavioral control as mediators between the decomposed beliefs and the continual use intention. This more direct approach is advocated by Stutzman and Green (1982), who noted that the traditional relationship beliefs → attitude/subjective norms → intention → behavior is appropriate for simple behaviors, analogous to a single act criterion. For multiple act criteria and more complex behaviors, however, one needs to take a more complex view of the model by linking variables more directly to behavior. Support for this view is provided by literature that found rather direct effects of beliefs on various forms of behavior (Bagozzi, 1981; Fisher, 1984).

Attitudinal beliefs

Drawing upon motivation theory (e.g. Ryan and Deci, 2000a, 2000b), attitudinal beliefs in media technology research have predominantly been regulated by two types of beliefs, namely extrinsic and intrinsic (Venkatesh and Brown, 2001). Extrinsic beliefs propel individuals to achieve a specific outcome (e.g. reward, recognition), whereas intrinsic beliefs drive them to engage in activities for their own sake (e.g. pleasure, joy, or satisfaction) (Ryan and Deci, 2000a). Following prior literature (e.g. Davis et al., 1992; Hsieh et al., 2008), attitudinal beliefs are decomposed into the intrinsic belief perceived enjoyment and the extrinsic belief perceived usefulness. Although perceived usefulness is a less frequently reported belief in the SVW literature, both elements directly apply to SVWs given the combination of instantaneous pleasure and the more instrumental values these online environments provide (Barnes, 2011; Mäntymäki and Salo, 2011).

Perceived usefulness refers the degree to which a medium is perceived to provide certain benefits when performing certain tasks (Davis, 1989; Hong et al., 2006). Performing tasks such as virtual learning and training underlines the instrumental value of SVWs. Another element of the usefulness of SVWs is that SVWs offer their users a new medium to express their identity, status, and uniqueness. Individuals explore their identities with and within SVWs (Gunkel, 2010) and differentiate themselves from others through consumption and sale of virtual items (Lehdonvirta, 2009). They may also use avatars to communicate in an appearance different from their offline appearance, expressing themselves in a way others may find provoking, and transcending perceived offline social norms (Vasalou et al., 2008).

Given the above, and the results of Barnes's (2011) study, it is safe to assume that the overall instrumental value of an SVW contributes to a user's willingness to use SVWs. As a result, we hypothesize that:

H1: Perceived usefulness positively influences the SVW continual use intention.

The importance of perceived enjoyment has widely been addressed in online game research (e.g. Hsiao and Chiou, 2012), where it has been defined as the extent to which using the medium is "perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated" (Davis et al., 1992: 1113). Echoing Holbrook et al. (1984), perceived enjoyment is regarded as the chief constituent of play. The accumulated literature suggests that perceived enjoyment may apply directly to SVWs since motivation to use these online environments arises from play and enjoyment – especially when the users have nothing else to do (Ryan et al., 2006). As a result, we follow Van der Heijden (2003) and propose that perceived enjoyment directly influences the continual use of SVWs.

H2: Perceived enjoyment positively influences the SVW continual use intention.

Normative beliefs

To decompose normative beliefs we follow Taylor and Todd (1995a, 1995b), and draw upon innovation diffusion theory (IDT) (Rogers, 2003). According to IDT, initial users of a new form of technology gather information about the advantages and disadvantages of this technology through the opinions of individuals, informal groups, organizations and other social subsystems. By making use of such social networks, which results in information perceived relevant to the user both in terms of quality and quantity, users' behavioral intentions to use the technology are shaped (Rogers, 2003). To deal with the qualitative and quantitative aspects of SVW use we decompose normative beliefs into social influence (Venkatesh, 2003) and perceived critical mass (Lou et al., 2000; Valente, 1995; Van Slyke et al., 2007) respectively. These two elements are of particular interest from a normative social media technology perspective since they reflect social pressure exerted by peers to use a medium to strengthen existing social relationships or to add to and benefit from the network externalities of a medium (Matei and Ball-Rokeach, 2001).

The decision of an individual whether (or not) to use a new media technology is influenced by the opinions of important others such as family, friends and relatives (Ajzen, 2005). This so-called social influence refers to the degree to which an individual perceives that important others believe he or she should use the new media technology (Venkatesh, 2003). Social influence is assumed to play a role in the formation of behavioral intentions in SVW settings for several reasons. First, in game-like environments it is well-conceivable that close peers are enthusiastic about using the medium as it provides entertainment value (Verhagen et al., 2011). In such situations, peers most likely will encourage and persuade others to join them (Hau and Kim, 2011). Second, the behavior underlying SVW usage is to a large extent social and networked in nature. In such a setting social interactions are a major activity, which makes it plausible to assume

that the willingness of an individual to use the SVW is at least to some extent driven by social influences (Dholakia et al., 2004). Given the above, this leads us to propose that:

H3: Social influence positively influences the SVW continual use intention.

While the concept of social influence captures the qualitative aspect of social influence, it ignores the quantitative side highlighted by perceived network exposure, meaning that the amount of influence tends to gain strength as the number of the sources increases (Latané, 1981). In the media technology literature, this phenomenon is known as critical mass, which is defined as the point at which a further rate of adoption of an innovation becomes self-sustaining (Markus, 1990). This is due to the collective force of the increasing number of users who legitimate the use of SVWs by making it more and more attractive and valuable to everyone (Li et al., 2005; Lou et al., 2000). For instance, the experience in SVWs depends much on user-created content (Kohler et al., 2011), and without critical mass there would not be enough content for users to experience and consume.

Given that it would be difficult to accurately determine the level of the actual critical mass we follow Lou et al. (2000) and Sledgianowksi and Kulviwat (2009), who address the importance of subjective perceptions of critical mass (see also Van Slyke et al., 2007). Perceived critical mass relates to the extent to which an individual perceives a significant number of members in his/her network are using a certain innovation (Lou et al., 2000; Sledgianowski and Kulviwat, 2009). In line with research on perceived network exposure (Hsieh et al., 2008; Mäntymäki and Salo, 2011), it is plausible to assume that a higher perceived critical mass contributes to an individual's intention to continue using the technology. Such a direct relationship is most likely to occur when considering media technologies, the use of which is subject to social pressure (Strader et al., 2007), a situation that clearly applies to SVWs. As a result, we expect that:

H4: Perceived critical mass positively influences the continual use intention.

Control beliefs

In line with the original DTPB we draw upon social cognitive theory (SCT) (Bandura, 2001) to embed and decompose perceived behavioral control into its underlying control beliefs. Basically, SCT posits a triadic reciprocal relationship between behavior, personal factors, and the environment. In other words, an individual's behavior both influences and is influenced by personal factors and the environment. Such presumption of an individual having the ability to influence his/her behavior, while at the same time recognizing that his/her behavior is influenced by personal factors and the environment, is consistent with that of perceived behavioral control, which concerns personal perceptions of an individual's ability to perform a given behavior (Ajzen, 2002). From this perspective, and drawing upon previous empirical evidence (Hsieh et al., 2008), we decompose perceived behavioral control into perceived ease of use and self-efficacy.

Perceived ease of use is defined here as the degree to which a person believes he/she can use media technology free of effort (Davis, 1989). Perceived ease of use deals with

one of the most fundamental constructs determining new media usage in various settings (Hong et al., 2006), and has been acknowledged to directly influence behavioral intentions (Davis, 1989). In SVW settings the concept demands renewed attention, as the usage of an avatar is a relatively new way of computer-mediated navigation, which demands new skills to control the medium. Supported by an earlier study (Ajzen, 2005), we position the concept as a control belief as it mirrors an individual's capability to handle the complexity of the control of a medium. In line with the above, and recent empirical evidence in online gaming and SVW contexts (Huang and Hsieh, 2011), it is conceivable to assume that the ease with which an individual is able to use an avatar and interact with and within an SVW is essential in developing a positive intention to continue using an SVW. Therefore, we postulate:

H5: Perceived ease of use positively influences the SVW continual use intention.

Self-efficacy equals the degree of self-confidence an individual has about his/her capability to execute a behavior (Bandura, 2001). While the construct may be seen from a rather general trait-oriented perspective, we adopt a more medium-specific perspective (cf. Agarwal et al., 2000). As such, it accounts for the varying effects of other users on the individual's ability to perform a particular behavior.

The fact that users of SVWs are constantly observed by and confronted with others when performing a target behavior puts the concept of self-efficacy in a renewed perspective. Not only may the confrontation with other users' observations exert social pressure on their self-confidence to perform the behavior in question, but the users may even feel that it may be hampered by the actions of other users (e.g. losing a game because of other users' actions; being unable to purchase digital furniture as others already have them). These social characteristics make it plausible to believe that self-efficacy influences behavioral intentions in SVW settings. Moreover, in prior research there is a relative consensus that the higher the level of self-efficacy an individual has towards performing a certain behavior, the more likely it is that he/she intends to engage in it (Graham and Beverley, 2002). The above justifications and empirical support lead us to propose that:

H6: Self-efficacy positively influences the SVW continual use intention.

Method and results

Data collection

A survey design was adopted to collect empirical data and test the hypotheses. The sample consisted of users of the Finnish portal of the teenager-oriented SVW Habbo Hotel, which provides free access to over 30 country-specific portals with a number of public facilities such as virtual parks and cafés, and millions of user-generated private virtual rooms. Users communicate with one another and play various in-world games through an avatar. The users may control the way their avatars look, walk, talk, and dance, and purchase credits in order to create and furnish their very own personal virtual rooms.

Research design and measures

The survey was published on the home page of the portal; participation involved clicking on a hyperlink leading to an online survey. As no incentive of any kind was offered, the probability of conditioning due to a participation bias was considered low. All measures were derived from established and validated measurement scales (see Appendix 1).

Before publishing the survey, a pilot test was conducted using over 2000 Canadian Habbo users who were asked to evaluate the linguistic intelligibility of the survey and to propose improvements. Some minor modifications were made. Then, the survey was translated into the language in which it was to be administered (i.e. Finnish) by two new media researchers, whose native language is Finnish. The survey was then double-checked by a professional translator. Bearing in mind that the respondents were teenagers, no identifiable personal information such as user names was collected.

Results

A total of 2175 respondents filled out the survey completely. The majority of the respondents was female (n=1289; 59.3%), and between 10 and 15 years old (n=1836; 84.4%); 833 (38.3%) respondents reported using Habbo Hotel for between one and three years, while 933 (42.9%) respondents indicated using Habbo Hotel for three years or more. This implies that our sample was biased towards young, mostly female, rather experienced Habbo Hotel users. To investigate whether non-response bias posed a threat to the internal validity of the study, we compared the sample demographics with those of the population of Finnish Habbo users. A comparison with the available user survey (Habbo Hotel, 2008) indicated no large demographical discrepancies.

PLS was used to assess the validity and reliability of the measures. We utilized the software package Smart PLS (Ringle et al., 2005) to compute factor loadings, Cronbach's alpha, composite reliability and Average Variance Extracted (AVE). The results (Table 2) indicated convergent validity of all measures as the factor loadings exceeded the 0.70 criterion, the alphas surpassed the 0.80 level, the composite reliability scores exceeded the recommended level of 0.70, and the AVE-scores surpassed the recommended level of 0.50 (Ping, 2004).

Next, we assessed the discriminant validity of the measures by studying the within-construct item loadings and comparing these to across-construct item loadings. Since all within-construct item loadings were high, and substantially lower than their cross-loadings, discriminant validity could be assumed. Supplementary support for discriminant validity was provided by a study of the squared correlations between the constructs and a comparison of these scores with the individual AVEs (Table 3). For each pair, both individual AVEs exceeded the value of the squared correlations, confirming discriminant validity.

Finally, we assessed the reliability of the scales. The results strongly confirmed the reliability of the measures. All Cronbach's alphas and composite reliability scores exceeded the advocated values of 0.80. Moreover, all AVEs surpassed the 0.50 guideline for reliability (Ping, 2004).

Table 2. Validity and reliability statistics.

Construct (no. of items)	Factor loadings	Cronbach's alpha	Composite reliability	AVE
Perceived usefulness (3)	0.887; 0.884;0.894	0.867	0.918	0.789
Perceived enjoyment (3)	0.924; 0.950;0.950	0.936	0.959	0.886
Social influence (3)	0.919; 0.930;0.881	0.898	0.936	0.829
Perceived critical mass (3)	0.886; 0.906;0.867	0.865	0.917	0.786
Perceived ease of use (4)	0.924; 0.939;0.907; 0.889	0.935	0.954	0.837
Self-efficacy (3)	0.939; 0.948;0.944	0.938	0.961	0.890
Continual intention (3)	0.927; 0.951; 0.939	0.933	0.957	0.882

AVE: Average Variance Extracted.

Table 3. Squared pairwise correlation.

Construct	Perceived usefulness	Perceived enjoyment	Social influence	Perceived critical mass	Perceived ease of use	Self-efficacy	Continual use intention
Perceived usefulness	**0.789**						
Perceived enjoyment	0.790	**0.886**					
Social Influence	0.510	0.469	**0.829**				
Perceived critical mass	0.506	0.448	0.673	**0.786**			
Perceived ease of use	0.483	0.543	0.252	0.306	**0.837**		
Self-efficacy	0.315	0.375	0.141	0.199	0.723	**0.890**	
Continual use intention	0.597	0.669	0.361	0.398	0.583	0.494	**0.882**

Note: The bold scores (diagonal) are the AVEs of the individual constructs. Off-diagonal scores are the squared correlations between the constructs.
AVE: Average Variance Extracted.

PLS modeling was applied to validate the structural model and test the hypotheses (Gefen et al., 2000). Given our focus on predicting and attributing variances to the continual use without having too much knowledge on the possible outcome structures derived from previous publications, PLS was deemed a feasible method (Fornell and Bookstein, 1982). We applied the bootstrapping technique (500 re-samples) to estimate the standardized path coefficients and explained variances. Two-tailed *t*-tests were conducted to assess the significance of the path effects. Overall, the results strongly confirm the predictive power of the model. The amount of variance explained was rather high, implying a good fit to the data. Except for hypothesis 3, all hypotheses were supported.

Table 4. Summary of the hypotheses testing results.

Hypothesis	Path	ß	*T*-Statistics	Sign.	Result
1	Perceived usefulness → continual use intention	0.12	3.745	< .001	Supported
2	Perceived enjoyment → continual use intention	0.38	11.534	< .001	Supported
3	Social Influence → continual use intention	0.00	0.019	N.S.	Rejected
4	Perceived critical mass → continual use intention	0.08	3.500	< .001	Supported
5	Perceived ease of use → continual use intention	0.16	5.415	< .001	Supported
6	Self-efficacy → continual use intention	0.18	6.521	< .001	Supported

Note: All expected relationships are positive in nature.
N.S.: non-significant.

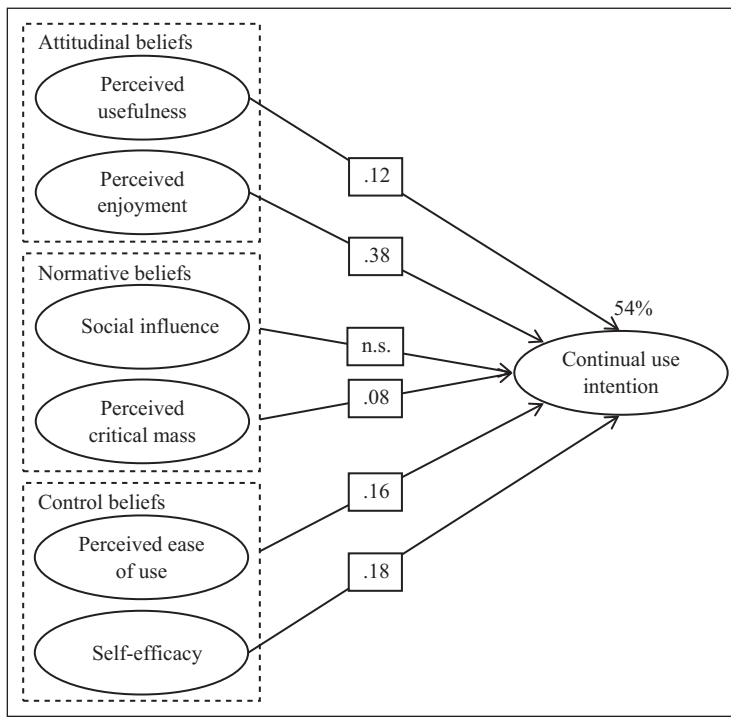

Figure 2. Structural model of the study.
Note: "54%" corresponds to the percentage of the variance in the continual use intention the proposed beliefs in our model explain.

Discussion

Key findings

Together, the beliefs in our model explained 54% of the variance in the continual use intention. The intention was determined strongly by enjoyment (ß = 0.38), rather moderately by self-efficacy (ß = 0.18), ease of use and usefulness (both: ß = 0.12). Remarkably, the influence of perceived critical mass on the continual use intention was trivial (ß = 0.08), while social influence had no significant effect at all. In sum, our findings indicate that SVWs are likely to anchor users who personally perceive the medium to deliver enjoyment and usefulness while reinforcing the feeling of being in control.

Implications for theory and practice

The findings of this study have several theoretical implications. First, an approach to how attitudinal, normative, and control beliefs jointly influence behavior in SVWs has remained an open question. We examined this issue empirically and demonstrated that attitudinal and control beliefs are the pivotal structures underlying the formation of SVW continual use intentions. Second, by identifying the individual key beliefs behind continual use intentions our study has enhanced theoretical knowledge of developing behavioral frameworks built upon DTPB. Not only do the proposed decomposed beliefs demonstrate the value of the theory when delineating the key beliefs underlying specific behavior, but they also embody a test of a DTPB structure in SVW settings. Such contextual extension should be seen as test of theoretical effectiveness as it adds to the generalizability of the DTPB (Berthon et al., 2002). Third, the fact that our findings confirmed direct influences of the different beliefs on continual use intentions puts the original structure of the DTPB into perspective. In the original DTPB the attitude, subjective norms and perceived behavioral control are included as mediators between the decomposed beliefs and the continual use intention. If these mediators do not fully mediate the relationships, their inclusion seems to hold less value (Chin, 1998). Our findings advocate more direct approaches in SVW settings (cf. Merikivi, 2009), as behavior in the SVW as a multipurpose medium is more diversified and complex in nature. In such situations, context-specific constructs rather than more global constructs have been demonstrated to explain behavioral intentions in a rather direct way (Hong and Tam, 2006).

From a practical point of view the findings yield interesting implications for improving the long-term user experience. First, the relatively high impact of enjoyment adds to the notion that the SVWs' young users continually advocate the game-like, rather pleasure-oriented nature over utility (cf. Barnes, 2011; Mäntymäki and Salo, 2011). This is not to advocate neglecting instrumental features completely (e.g. communicating with peers or expressing oneself) (Shin, 2009), however, as previous research has demonstrated that instrumental value may influence the use of SVWs through enjoyment (Verhagen et al., 2012). Still, when prioritizing user-centered developments, generating enjoyable experiences should be the first point of attention. Second, our counterintuitive findings on the influence of normative beliefs point out that while in their pre-teens and teens, the

respondents aim for individual freedom. Instead of adjusting their behavior to their referents' views, the users wish to make decisions on their own (Palan et al., 2010). Hence, anyone willing to influence behavior of SVW users, such as operators of SVWs and parents of SVW users, must be aware of the fact that friends and relatives only seem to play a minor role in this context. Third, while surrounded by countless avatars, SVW users hardly seem to perceive the benefits of critical mass. Operators and designers of SVWs may take this finding into account, for example, by communicating more clearly the growth of the user community and the increase in digital content, and by providing their users with more social tools to search for and expand the number of in-world friends (Mäntymäki and Salo, 2011). Fourth, our findings underline the value of paying attention to characteristics that determine the control and representation of avatars. This is because SVW users navigate, communicate and express themselves in the SVW environment through avatars. In line with previous SVW research (Huang and Hsieh, 2011), we therefore encourage the further development of avatar features that increase the usability of SVWs, as well as those that elevate the level of self-efficacy of their users.

Limitations and future research

This study has been subject to a number of limitations. First, our sample consisted of young respondents living in Western culture. The bias towards young people implies that one should be cautious when extrapolating our findings to other age groups. In addition, as previous research has shown that culture is likely to affect the extent to which media technology perceptions influence user behavior (e.g. Al-Gahtani et al., 2007), cross-cultural validation seems needed. Second, the data collection was restricted to one SVW. While Habbo Hotel is one of the most popular SVWs worldwide, our research findings may not be fully generalizable. We encourage researchers to cross-validate our findings with other SVWs. Third, the gender bias towards young women in our sample may have influenced our findings. For example, the influence of skills on exploratory behavior is assumed to be stronger for women than for men, and women also tend to rely more on enjoyment and less on usefulness when performing particular tasks (Richard et al., 2010). A line of future inquiry could address these issues. Fourth, the model has been validated by making use of scales initially designed for use with adults. Some caution may be required when extrapolating our findings. Fifth, while the predictive validity of our model was more than acceptable, the decomposed beliefs in the model were by no means meant to be complete. This offers opportunities for future extensions and refinements.

Conclusion

By applying the DTPB, this study has examined why young people continue using SVWs. Specifically, we investigated SVW-sensitive attitudinal, normative and control beliefs influencing users' continual use intention. While SVWs are multi-purpose and crowded by other users, our findings indicate that young people may keep using them mostly for their own personal enjoyment and are relatively insensitive to the presence and opinions of others. Due to the newness of SVWs in terms of navigability, importance is also attached to the ease of controlling the SVW system. Overall, we demonstrated that

making SVWs more enjoyable without jeopardizing the feeling of being in control is key in enhancing their long-time value among their users.

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Appendix 1

Appendix scales and measure items

Constructs	Items (1=Strongly disagree; 7=Strongly agree)	Source
Perceived usefulness	Allows me to express myself Comes in handy for my communication Is a good way to spend free time	Davis (1989); Davis et al. (1989)
Enjoyment	It is enjoyable to use Habbo It is fun to use Habbo It is entertaining to use Habbo	Hsieh et al. (2008); Venkatesh and Brown (2001)
Social influence	My family thinks I should use Habbo My relatives think I should use Habbo My friends think I should use Habbo	Ajzen (2005); Karahanna et al. (1999)
Perceived critical mass	How many people about your age use Habbo? How many of your friends use Habbo? How many of the people most meaningful to you use Habbo?	Lou et al. (2000); Sledgianowski and Kulviwat (2009); Valente (1995); Van Slyke et al. (2007)
Perceived ease of use	I find Habbo easy to use I find it easy to do what I intend to do in Habbo Using Habbo does not require a lot of my mental effort Using Habbo to communicate with others is clear and understandable	Davis (1989); Davis et al. (1989); Hsieh et al. (2008)

Appendix 1 (Continued)

Constructs	Items (1=Strongly disagree; 7=Strongly agree)	Source
Self-efficacy	I feel comfortable using Habbo on my own I can easily operate in Habbo on my own I feel comfortable using Habbo even if there is no one around me to tell how to use it	Agarwal et al. (2000); Compeau and Higgins (1995)
Continual intention	I intend to continue using Habbo during the next three months I intend to revisit Habbo shortly I predict I will revisit Habbo in the short term	Ajzen (1991); Ajzen and Madden (1986)