

Psychological needs and virtual worlds: Case Second Life

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Abstract

The most advanced contemporary virtual worlds provide their users with a possibility for living versatile virtual lives together with other users. A growing number of users worldwide are utilizing this possibility. The aim of this research was to study active virtual world users' satisfaction of psychological needs both inworld and outworld. A global online survey for the users of Second Life was constructed based on a model of ten psychological needs. The results based on 258 responses indicated that self-esteem, autonomy and physical thriving were the most highly satisfied needs inworld. Furthermore, the results indicated that autonomy, physical thriving, and money-luxury were needs, which were satisfied to a significantly larger extent in the virtual world than in the users' real lives (when not using a computer). On the other hand, the needs for competence, relatedness, security, and popularity-influence were more extensively satisfied in the users' daily lives than when in Second Life. The qualitative findings highlighted relatedness needs as motivations for Second Life usage and revealed five central themes in the motivations for Second Life usage: Second Life as self-therapy, as a source of instant pleasures, as liberation from social norms, as a tool for self-expression, and as exploration and novelty. In all, the findings suggest that the use of advanced virtual worlds is driven by a variety of different psychological needs. Virtual world usage is also related to need satisfaction in the users' lives outside the virtual world.

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1. Introduction

The current virtual worlds have their roots in different text-based environments, for example, discussion forums and multi-user dungeons (MUDs), which emerged as early as in the late 1970s and gained wide success in the 1990s when Internet became commonplace. One of the main advantages of virtual worlds is overcoming the limitations related to geographical distances (the need to commute). During the last few years, three-dimensional (3D) virtual worlds have finally gained global popularity. The most advanced environments provide their users with detailed 3D graphics, animation, different communication methods including voice communication, features for personalization and building new objects, and a massive number of places and objects created by others already available. These options are available in Second Life, which is widely

considered as the most advanced virtual world currently available. It also includes a virtual economy and its own currency. However, many virtual worlds offer only little external rewards and their use is consequently largely motivated by the psychological needs of the users. The role of different psychological needs in the use of virtual worlds is not entirely clear based on previous research, which has largely focused on activities and usage patterns instead of the needs and motivations behind the usage.

The aim of the current study was to study Second Life users' psychological needs in an explorative manner in order to create a more advanced understanding of the users' psychological needs and motivations underlying their use of the virtual world. Such an understanding would be an important basis for designers and researchers working on 3D virtual worlds. The framework of ten candidate psychological needs by Sheldon et al. (2001) was adopted as the main viewpoint on psychological needs and the related questionnaire method was applied to the study of virtual worlds and extended with qualitative research

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methods. Second Life was chosen as the virtual environment under study, because most other alternatives were constrained by a limited set of functionality, which guides user activity in the direction planned by the designers. In Second Life, a great number of different activities are available, and the users have tools for continuously developing new activities and personalizing the experience according to their own tastes. In addition, there are no general rules or objectives as in games, and consequently the inworld activity is largely based on the users' real psychological needs and motivations.

2. Related work

Different theories of human psychological needs have been suggested in the literature, the most famous probably being the hierarchy of needs by Maslow (1943), which classifies needs to five levels: physiological, safety, love/belonging, esteem, and self-actualization needs. As it is now, one of the most widely appreciated need theories is the self-determination theory (Deci and Ryan, 2000). It addresses both intrinsic and extrinsic factors, which either facilitate or undermine motivation. Psychological needs derived from the self-determination theory include autonomy (to actively participate in determining own behavior without external influence), competence (to experience oneself as capable and competent in controlling the environment and being able to reliably predict outcomes), and relatedness (to care for and be related to others). These three needs are now seen as critical in the light of the well-being of an individual (e.g. Deci and Ryan, 2000; Reis et al., 2000).

By building on the three needs suggested in self-determination theory (Ryan and Deci, 2000) and the hierarchy of needs by Maslow (1943), Sheldon et al. (2001) presented a model of ten candidate psychological needs. By also including psychological needs suggested by other researchers (e.g. Epstein, 1990), they formed a group of ten needs: autonomy, competence, relatedness, self-actualization-meaning, physical thriving, pleasure-stimulation, money-luxury, security, self-esteem, and popularity-influence. They also presented a questionnaire method for studying the degrees of satisfaction for the ten needs using 30 statements (three statements for each need) and applied the method in two studies on the most and least satisfying experiences of college students in two different cultural settings. Their results supported the self-determination theory, as they found that autonomy, competence, and relatedness were consistently among the top four needs, when their participants reported the degrees of need-satisfaction in the context of satisfying events. Self-esteem and security were also rated highly salient in satisfying events, whereas self-actualization-meaning, physical thriving, popularity-influence, and money-luxury were found to be of moderate salience.

Motivations for participation in virtual communities have been studied to some extent. Kollock (1999)

suggested three non-altruistic motivations for using online communities: anticipated reciprocity, increased recognition, and sense of efficacy. Existing research has shown that motivations for participation vary by type of online community. For example, in using Facebook, different kinds of social motives such as needs for maintaining relationships and social browsing emerged as the strongest motivators for the use of the service (Joinson, 2008). On the other hand, when the motives of contributors to collaborative encyclopedia Wikipedia were studied, social motivations were not found to be especially strong, but motivations related to fun, ideology and personal values were rated as significantly more important (Nov, 2007). In online communities developing open-source software Lakhani and Wolf (2005) found that feelings of creativity, intellectual stimulation, and improving professional skills were more important drivers for participation than social motives. Based on an interview study, Leitner et al. (2008) suggested that motivations for using online communities include friendship, and people's ambition of being an open-minded person that is up to date, well informed, and able to make self-reflected decisions.

The users' motivations for participation in virtual communities have not been very extensively studied in the context of three-dimensional virtual worlds. Ryan et al. (2006) found that for online video games the basic needs of autonomy, competence, and relatedness were associated with game enjoyment, preferences, and changes in well-being pre- to post-play. Competence and autonomy perceptions were also related to the intuitive nature of game controls and the sense of presence or immersion in participants' game play experiences.

Yee (2007) analyzed online 3D computer game players' motivations. The analysis revealed 10 motivation subcomponents, which were grouped into 3 overarching components: achievement, social, and immersion. The achievement component included advancement (e.g. gaining status and power), mechanics (understanding the system and underlying rules), and competition (desire to challenge and compete with others). The social component included socializing (helping and chatting with others), relationship (forming long-term meaningful relationships with others), and teamwork (being part of a group effort). The immersion component consisted of the following subcomponents: discovery (finding and knowing new things), role-playing (creating personas and stories), customization (personalization of characters), and escapism (avoiding thinking about real life problems).

Besides motivations for the usage of virtual worlds, behavioral, affective, and cognitive aspects of virtual world usage have been examined in previous research. Whang and Chang (2004) showed that on-line players of 3D game Lineage developed their own distinctive lifestyles in the virtual world. Baños et al. (2008) showed that positive emotions such as joy and relaxation could be manipulated in users of virtual environments by exposing the user to different in-world events. Riva et al. (2007) found that

interacting with virtual environments designed as anxious and relaxing really produced anxiety and relaxation as reported by the users. Holsapple and Wu (2007) suggested that different imaginal (fantasy, role projection, and escapism) and emotional responses play a central role in the user acceptance of virtual worlds.

Lately, psychological needs have been studied on a more general level in the research area of user experience. Marc Hassenzahl has suggested that psychological needs serve as ‘be-goals’, which express the hedonistic needs of the user, striving for the fulfillment of underlying psychological needs, for example, being related to other people by making a phone call (see e.g. Hassenzahl, 2010). The salience of different psychological needs in positive and negative user experiences has also been studied empirically using questionnaire methods. According to the results by Hassenzahl (2008), competence was the most salient psychological need in positive user experiences, followed by autonomy and relatedness. Hassenzahl et al. (2010) found that relatedness, stimulation, and competence were the most salient needs in positive user experiences, when autonomy and self-esteem were not included in the analysis. Based on their results, a model was presented, in which need fulfillment is seen as an important determinant of the perceived hedonic quality of products and positive emotions during the user experiences. Partala and Kallinen (in press) found that the fulfillment of autonomy and competence needs was rated as especially salient in most satisfying user experiences and absent in least satisfying user experiences. The fulfillment of self-esteem needs was also rated as important in most satisfying user experiences.

A challenge in building generalized knowledge based on existing studies on motivation and virtual worlds is the great number of different systems studied and research methods used. Second Life has great potential for becoming an important research platform for studies in this field. As it is now, a large number of Second Life studies are emerging, focusing, for example, on the educational applications. Research on psychological needs and motivations of using Second Life is, however, still sparse. Second Life has been studied from the viewpoint of user acceptance by Fetscherin and Lattemann (2008). As part of their study on user acceptance of Second Life, they found that “people are using Second Life not to change their identity, but rather to explore and visit new places and meet people”. The aim of the current research is to contribute to this research direction, and study the factors underlying Second Life usage in more detail especially from the viewpoint of psychological needs and their fulfillment in both Second Life and Second Life users’ real lives.

3. Questionnaire

In order to study the satisfaction of psychological needs in Second Life, a global online questionnaire was conducted. The questionnaire was constructed using a professional web research system and it was available on the web for 55 days in December 2008–January 2009. The language of the

questionnaire was English. It was especially targeted for experienced Second Life users. In order to obtain a holistic understanding of factors affecting need satisfaction in virtual worlds, the satisfaction of the users’ psychological needs were rated for both the periods of Second Life usage and the users’ daily lives (when not using a computer).

3.1. Respondents

A total of 301 participants started filling in the questionnaire and 269 responses were submitted. 11 responses – which did not follow some of the instructions or were based on a very monotonous answering style and missed qualitative answers – were discarded. Thus, the results are based on 258 responses (retention rate 85.7%). Respondents were recruited using two methods: by sending an e-mail advertisement to five different global Second Life related mailing lists aimed at different Second Life user groups and by posting advertisements to the walls of five Facebook groups also dedicated to Second Life users. It was assumed that recruiting respondents from forums, in which people are represented by their real names, would contribute positively to the reliability of the results. The questionnaire itself was anonymous, however, 255 participants reported the name of their Second Life avatar and received a reward of 300 Linden dollars (currency used in Second Life) for completing the survey. The respondents who entered the name of their avatars were paid their rewards within a week from completing the survey. Multiple responses from the same IP address were not allowed.

3.2. Materials and methods

The questionnaire consisted of a total of 93 questions or statements and it was divided into three parts. First, the respondents saw an introduction screen, which briefly outlined the purpose of the research. Eligible respondents were defined as anybody globally who has visited Second Life for at least four hours on four different occasions. The procedures for the protection of privacy and for delivering the survey incentive (300LS) were also presented. After the introduction page, the first survey page appeared. On the first page, demographic information about the users and information about their Second Life usage was gathered. The respondents were prompted to report the names of their avatars (or to report a nickname if they wanted to be anonymous), sex, age, country of residence, time since first login to Second Life, and time of active usage (defined as using the system at least once a week on average). They were also asked to indicate the type of account (a free basic account or a premium account with a monthly fee), if they owned land, a house or an apartment in Second Life, and the number of friends or avatars they know well in Second Life. Finally, in a mandatory question they were asked to freely recall and write a description of their most common activities and places that they visit most often in Second Life and give three examples of both activities and places, if possible.

The second and the main part of the survey consisted of ten pages, with each page consisting of seven quantitative scales and an optional possibility for reporting experiences qualitatively. Each page studied one of the ten candidate psychological needs suggested by Sheldon et al. (2001) based on previous research: autonomy, competence, relatedness, self-actualization-meaning, physical thriving, pleasure-stimulation, money-luxury, security, self-esteem, and popularity-influence. The needs were not formally defined for the participants. Instead, the statements from Sheldon et al. (2001) were applied two times: first the respondents rated the satisfaction of psychological needs when using Second Life (three statements) and after that they rated the satisfaction of needs in their real lives (three statements, defined as the respondents' daily lives when not using a computer). The statements used in this phase are presented in the Appendix.

Next, the respondents evaluated the personal importance of the psychological need under investigation. For example, the statement for the evaluation of autonomy was "The above mentioned feelings related to autonomy are important to me". For these seven statements, the respondents gave their ratings using nine point scales (as opposed to the five point scales used by Sheldon et al. in order to achieve a more fine grained conception of the respondents' feelings towards the needs under investigation). The scales ranged from 1 (not at all) to 9 (very much). Finally, the respondents were provided with a possibility to enter any free-form qualitative comments about the satisfaction of the psychological need studied in the current page.

When all the ten psychological needs had been evaluated separately, a final page was shown to the respondents. First, the respondents had a possibility to enter any qualitative comments about feelings related to any of the ten needs. They were especially prompted to report, which kinds of feelings related to psychological needs are the biggest motivators for their Second Life use. Second, the respondents were prompted to enter any comments about the survey itself. They were also asked, whether they found it easy or difficult to evaluate their feeling related to psychological needs.

3.3. Data analysis

For the quantitative data, Friedman's rank tests were used to compare the ratings of all ten psychological needs for significant differences and Wilcoxon's matched pairs signed ranks tests were used in pairwise comparisons. These tests were selected due to the nonparametric (distribution-free) nature of the gathered data. Normality of the data was tested using the Lilliefors and Shapiro-Wilk tests, which suggested that the data were not normally distributed for any of the 1–9 scales ($p < .001$). Bonferroni corrected significance levels are reported where multiple pairwise comparisons were carried out. Cronbach's α was used in calculating the internal consistencies

for each need category and Spearman's ρ was used in calculating interscale correlations.

The qualitative data were analyzed by grouping them inductively into themes using the procedure described in Braun and Clarke (2006). First, the researcher familiarized himself with the qualitative data and created an initial framework for coding the data. Second, the initial coding of the data was performed across the whole data. Next, the individual codes were combined into candidate themes, after which the candidate themes were reviewed and the final themes were defined and named. This procedure was used for analyzing the participants' activities in Second Life and the qualitative comments for each of the ten psychological needs. In addition, an overarching qualitative analysis was performed using this procedure for all the qualitative data on psychological needs (the qualitative data for each of the ten needs and the overall comments on motivations for using Second Life). In contrast, a theoretical thematic analysis (Braun and Clarke, 2006) was performed to analyze the participants' descriptions of their main motivations for Second Life usage. In this analysis, the ten psychological needs suggested by Sheldon et al. (2001) were used as the categories the participants' descriptions were categorized into.

4. Results

4.1. Demographic information and Second Life usage

The 258 respondents consisted of 152 females and 106 males and the mean age was 40.9 years. The respondents had used Second Life on average for 17 months (range 1 week–5 years), of which actively (defined as at least once a week on average) for 14 months (range 1 week–4 years and five months). 175 respondents (68.6% of those who answered to this question) reported that they use Second Life with a free basic account, while 80 respondents (31.4%) reported the use of a premium account with a monthly fee. 80 participants (31.4%) reported that they own land in Second Life and 105 participants (41.7%) reported owning a house or an apartment. The respondents reported on average 34 friends or persons they know well in Second Life (range 0–700).

Geographically, the respondents divided into the different continents as follows: North America 143 respondents (55.4%), Europe 80 (31.0%), South America 15 (5.8%), Oceania 13 (5.0%), Asia 6 (2.3%), and Africa 1 (.4%). The most active individual countries were: United States 127 respondents (49.2%), United Kingdom 23 (8.9%), Finland 16 (6.2%), Canada 15 (5.8%), Brazil 12 (4.7%), and Australia 11 (4.3%).

The most commonly reported activities in Second Life are illustrated in Fig. 1. They were (in order of frequency, times mentioned):

- Socializing (also: chatting/friends/dating/meeting new people): 89;



Fig. 1. Most commonly reported activities in Second Life (upper left: socializing; upper right: building; lower left: shopping; and lower right: exploring).

Table 1
Internal consistencies and interscale correlations (Second Life/real life).

	Auton.	Comp.	Relat.	Self-act.	Physical	Pleasure	Money	Security	Self-est.	Popul.
Autonomy	.79/.88									
Competence	.35/.47	.85/.88								
Relatedness	.46/.47	.30/.50	.93/.86							
Self-actualization-meaning	.36/.50	.44/.64	.54/.47	.91/.90						
Physical thriving	.21/.31	.22/.24	.37/.27	.37/.34	.94/.94					
Pleasure-stimulation	.28/.44	.37/.40	.51/.50	.56/.48	.39/.36	.81/.92				
Money-luxury	.39/.29	.44/.30	.42/.24	.43/.35	.28/.31	.38/.23	.85/.83			
Security	.13/.25	.17/.30	.17/.30	.34/.33	.13/.20	.16/.15	.20/.37	.73/.73		
Self-esteem	.48/.46	.41/.57	.47/.50	.49/.57	.27/.46	.43/.44	.42/.33	.22/.30	.90/.89	
Popularity-influence	.33/.31	.59/.54	.40/.28	.44/.46	.21/.18	.35/.32	.43/.31	.20/.25	.42/.40	.94/.94

- Building (creating/scripting/modeling): 88;
- Shopping (freebies): 77;
- Exploring (visiting new places): 69;
- Dancing (clubbing/partying/other non-live music): 59;
- Studying/teaching: 51;
- Playing (role playing): 37;
- Live events (music, concert, meetings, conferences): 34;
- Organizational activity (management/administration/running a company): 28;
- Physical activities (sports, e.g. sailing, downhill skiing): 19;
- Galleries (visual arts, consumption): 15.

4.2. Psychological needs

4.2.1. Internal consistencies and interscale correlations

To study the internal consistency of the statements for each psychological need, Cronbach's α scores were calculated for each group of three statements. Interscale correlations (Spearman's ρ) were also calculated to study the relationships between the need categories. The internal consistencies and interscale correlations are presented in Table 1 for both the Second Life ratings (on the left, before "/" in each cell) and real life ratings (on the right). Internal

consistencies (α) are shown in bold along the diagonal, and interscale correlations (ρ) are presented in the body of the table (unbolded numbers). The internal consistencies were on an acceptable level ($\alpha = .73-.94$) and they were also higher than the interscale correlations ($\rho = .13-.64$), which suggests that the categorization of the psychometric instrument worked well when applied in the current research.

4.2.2. Need satisfaction ratings

The average need satisfaction ratings for the ten psychological needs are presented in Fig. 2. The ratings are presented for each psychological need both for Second Life and the users' real lives.

The results suggested that self-esteem, autonomy, and physical thriving were the needs, which were the most highly satisfied when in Second Life. In their daily lives, the respondents rated self-esteem, relatedness, and competence as the most highly satisfied psychological needs. Statistical testing indicated significant variation in the respondents' need satisfaction ratings for the ten psychological needs in Second Life $\chi^2_F = 587.6$, $N = 258$, $p < .001$. Likewise, the respondents' need satisfaction ratings for the ten psychological needs in their real daily lives varied

significantly $\chi^2_F=521.4$, $N=258$, $p < .001$. Most of the pairwise differences in the need satisfaction ratings between needs were also significant after post-hoc correction (33 out of 45 pairs for the Second Life ratings and 35 out of the total 45 pairs for the real life ratings, Table 2).

There were eight significant pairwise differences between the Second Life ratings and the corresponding real life ratings of the ten psychological needs. The need satisfaction ratings for Second Life were significantly higher than their real life equivalents for three psychological needs: autonomy $Z=7.3$, $p < .001$, physical thriving $Z=5.9$, $p < .001$, and money-luxury $Z=3.6$, $p < .001$. For five psychological needs, the ratings for real life need satisfaction were significantly higher than the corresponding Second Life ratings: competence $Z=6.3$, $p < .001$, relatedness $Z=6.0$, $p < .001$, self-actualization-meaning $Z=8.5$, $p < .001$, security $Z=7.4$; $p < .001$, and popularity-influence $Z=4.8$, $p < .001$. The need satisfaction ratings of pleasure-stimulation and self-esteem did not differ significantly between Second Life and the users' real lives.

4.2.3. Personal importance ratings

The personal importance ratings for the ten psychological needs are presented in Fig. 3.

The importance ratings of the different psychological needs suggested that the respondents considered

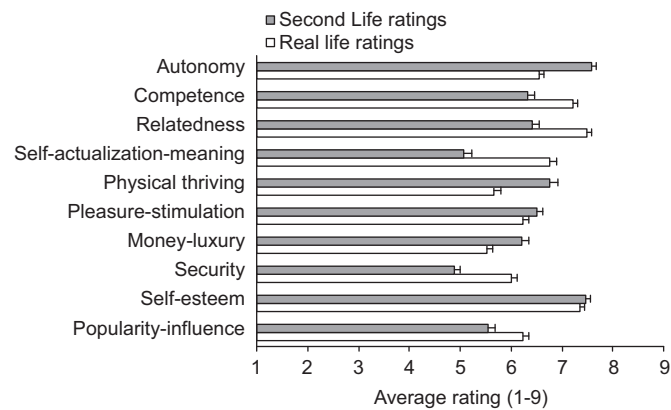


Fig. 2. Satisfaction of the users' psychological needs in Second Life and in their real lives (mean and SEM).

self-esteem and the needs related to self-determination theory (autonomy, competence, and relatedness) as the personally most important needs. In contrast, money-luxury and popularity-influence were rated as less important than most of the other needs. The importance ratings varied significantly $\chi^2_F=445.7$, $N=258$, $p < .001$. 31 out of 45 possible pairwise differences became statistically significant after post-hoc testing (Table 2).

4.3. Qualitative findings

4.3.1. Psychological needs

The number of qualitative comments given for the individual psychological needs ranged from 67 valid comments for self-esteem to 141 comments for autonomy. The overall question about the satisfaction of psychological needs and motivations provoked 210 qualitative comments and 212 participants gave feedback about the survey. The results are presented below with quotes from the users' comments so that the results for the ten individual needs are presented first, and the general themes and survey feedback are presented after that. The quotes selected for each need approximately represent the range of all qualitative comments received and consequently there are quotes, which more or less contradict one or more other quotes for the same need. In the users' qualitative descriptions, Second Life is often abbreviated as SL and correspondingly RL refers to the real lives of the users.

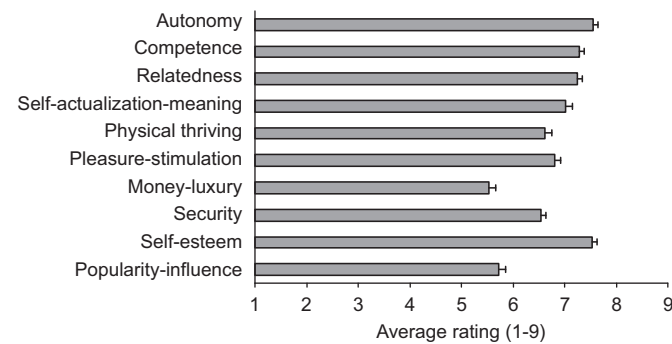


Fig. 3. Importance ratings of the different psychological needs (mean and SEM).

Table 2 Significant pairwise differences between need categories.

Autonomy	Auton.	Comp.	Relat.	Self-act.	Physical	Pleasure	Money	Security	Self-est.
Competence	SL RL								
Relatedness	SL RL	RL							
Self-actualization-meaning	SL I	SL RL	SL RL						
Physical thriving	SL RL I	RL I	RL I	SL RL					
Pleasure-stimulation	SL I	RL I	RL I	SL RL	RL				
Money-luxury	SL RL I	RL I	RL I	SL RL I	SL I	RL I			
Security	SL RL I	SL RL I	SL RL I	RL I	SL	SL	SL RL I		
Self-esteem	RL	SL	SL	SL RL I	SL RL I	SL RL I	SL RL I	SL RL I	
Popularity-influence	SL I	SL RL I	SL RL I	RL I	SL RL I	SL I	SL RL	SL I	SL RL I

SL=significant difference in Second Life ratings, RL=in real life ratings, and I=in importance ratings (bolded: $p < .01$; not bolded: $p < .05$).

4.3.1.1. Autonomy. The qualitative findings for autonomy indicated that most of the respondents experienced more autonomy in Second Life. Many respondents expressed this explicitly in their comments. According to the responses, the greater feeling of autonomy is due to the absence of physical or geographical limitations (e.g. no need for traffic), resource limitations (e.g. the necessity of getting an income or nutrition), or social prejudice (e.g. based on gender, race, or social status). In Second Life it is also more acceptable to personalize and experiment with different activities, looks, or behavior, because the possible negative consequences are more limited in scope. Some answers emphasized the great creative possibilities in Second Life and their impact on feelings of autonomy. On the other hand, many respondents also highlighted the similarities between the feelings of autonomy in both worlds.

Quote 1: “Everything can be engineered in SL, which is not the case in RL. The level of autonomy in SL is phenomenal.”

Q2: “In RL, I frequently do things because they are expected or required based on a given situation. In SL, there does not seem to be the same required expectations. In SL I feel free to be the person I want to be.”

Q3: “Second Life in particular and Virtual Worlds as a whole, provide a unique socio-professional tool box, with which an individual can create whatever they want, both in the form of identity as well as created objects. For many SL inhabitants, this level of creative freedom and self-expression has been suppressed or unavailable in their “1st lives,” do to social repression or financial limitations they have been unable to overcome.”

Q4: “I can’t say that my choices in SL are entirely autonomous, because they are constrained by time, the feelings or requirements of others, and real life obligations and needs.”

(141 comments received in total).

4.3.1.2. Competence. The qualitative responses highlighted that the participants experience more competence in the real world, which can be explained by the respondents’ superior experience in real life. Some of the respondents were still learning Second Life, or their Second Life usage was motivated by a small number of activities and they did not feel the need for gaining large-scale competences in Second Life. Again, many respondents highlighted the similarities of both worlds in this sense and also the possibilities for gaining different kinds of competencies in Second Life.

Q5: “The rewards for doing something well in second life are much more immediate than those provided in real life—where often we are not recognized for the things we do, even if they are quite extraordinary.”

Q6: “In Second Life, I do not feel completing different projects. Because there is freedom, the activities do not feel like projects, but I still feel very capable.”

Q7: “Challenges and projects I take in SL are for my pleasure, and I enjoy them very much, but they are not as important, to me, than my tasks in RL.”

Q8: “I have found creative skills I never knew I had because of second life, in real life my job is dull and requires no skill yet that is how I earn a living” (117 comments received in total).

4.3.1.3. Relatedness. The qualitative responses regarding feelings of relatedness suggested that in Second Life it is easier and faster to build deep and meaningful relationships with other people, but the life span of the relationships may also be shorter than typically in the real life. It is easier to find people with similar interests, life situations, or personality traits, and people can form relationships independent of real life barriers of race, gender, income, age, social status, or looks. However, in real life there are still typically larger levels of experienced closeness and intimacy involved in the relationships. Nevertheless, the qualitative comments indicated that relatedness is an important motivation for Second Life usage. Some respondents reported that their relationships span both worlds (e.g. meeting distant relatives in Second Life or extending meaningful online relationships to the real life).

Q9: “I believe that SL offers communication channels and anonymity that actually fosters intimacy among people who would not usually get close. The absence of tags that lead to prejudice has enabled me to get to know who I would never know in RL.”

Q10: “I have been extremely surprised at the strength of my relationships with people through SL. I have discovered things about myself in relating to others which I had only vaguely suspected in RL. (...) I feel I can be myself far more easily in relationships in SL.”

Q11: “We meet each other in SL ‘inside-out’. Even with the limited mode of text (I don’t do voice), we get to know each other in a more fundamental way. Without the trapping of status, material possessions or proximity.”

Q12: “Relationships in SL are very artificial to me since most don’t know me in RL. However, those who do know me in both environments are able to really get to know me better since they know my whole self.”

(106 comments received in total).

4.3.1.4. Self-actualization-meaning. The qualitative responses for self-actualization-meaning indicated that the respondents feel more self-actualization in their real lives than in Second Life. Many respondents stated that they have already found themselves and their own places in the world before even starting to use Second Life. However, some users emphasized that Second Life can have positive effects on the users’ real lives: through Second Life actions, experimentation, and communication people may find a deeper understanding of themselves and their relations to other people.

Q13: “I’ve discovered a few things in second life about myself that has affected my real life and am now happier in my real life”

Q14: “It is more important to be who you really are in real life than in second life as this has a direct effect on the people around you.”

Q15: “In Second Life you can personalize more without getting mocked by other people.”

Q16: “In SL many meaningless mundane concerns and maintenance are gone, not an issue, I am free to pay more attention to more important things.”

(101 comments received in total).

4.3.1.5. Physical thriving. Most of the respondents indicated that they feel more physical thriving when in Second Life. The biggest differences were among the respondents, who have some kind of health issue, disability or an issue about their looks in the real life. In Second Life, avatars’ looks may be designed. Many respondents stated that they have either made themselves look like idealized versions of themselves (how they would like to look like when given all the freedom, typically young and totally fit) or look like slightly enhanced versions of their real life selves. Some respondents expressed that this was pleasurable and made them feel better about themselves than in real life. However, some respondents indicated a willingness to look exactly like their real world selves in Second Life, even with all the flaws in their real life appearance.

Q17: “Everyone in SL is a hardbody. Without handicap or flaws in our appearance. This makes it easy to adopt a persona that represents our *inner* self-image. It is this self-image that we use to explore with. SL would be much less appealing if we were forced to be more physically genuine in-world.”

Q18: “I have multiple health problems & I’m dealing with constant physical pain. SL is a great escape into a healthy body for a while.”

Q19: “Always been a bit larger than most... Am totally tone (and short) in Second Life... What I wish for in the Physical World...”

Q20: “Because my SL avatar looks in very good physical condition I feel motivated to be in similar condition in RL, I think this is one driving factor in my recent improvement in physical fitness and interest in keeping my physique in excellent condition.”

(106 comments received in total).

4.3.1.6. Pleasure-stimulation. The responses for pleasure and stimulation indicated that, like in the physical world, there are many different activities, which can induce pleasure and stimulation to different persons. The responses mostly indicated that it is easier for the participants to feel genuine physical pleasure in real life, but Second Life pleasures can be accessed more easily and may offer mental or intellectual pleasure that may be more difficult to obtain in the real life.

Q21: “I much prefer real pleasure. It is not a driving factor for me. However intellectual pleasure and stimulation is. SL provides some of that.”

Q22: “Mostly I find visual/mental stimulation and pleasure. There are some exquisitely beautiful things that people have built in-world and I love finding them. Especially when they include innovative functionality/design. I love finding objects that creatively solve problems or have design features that are surprising.”

Q23: “The immersive aspect of SL gives a heightened sense of pleasure because you become so focused. In RL you can become distracted or self-conscious by strong reactions or feelings and may try to mask or diminish them. In this sense SL frees the person to truly experience pleasure on a higher level.”

Q24: “I understand that some people feel a sensation by ‘proxy’ through their avatar, but I do not. I am not physically in a virtual world, nor do I find it ‘physically pleasurable’ to engage in virtual activities. It can be interesting and exciting to explore and face challenges in the virtual world though, and it can engage the mind as any intellectual pursuit would.”

(85 comments received in total).

4.3.1.7. Money-luxury. The respondents indicated that they have relatively more money and possessions as well as feelings of luxury in Second Life, as compared to their real lives. It is easier to build objects, find free objects and earn money in Second Life. For many users it is possible to have virtual possessions, which would not be possible or feasible in real life. However, there are less compulsory material needs in a virtual world (e.g. no need for a home). Some respondents were concerned about the easiness of transactions and the dangers of overspending in Second Life.

Q25: “In SL I have all of the ”bling” that I want. I can’t afford that in real life.”

Q26: “SL is more like a 3rd world country... my money goes a long way compared to RL.”

Q27: “SL has become a great outlet for my need for a little luxury. Sometimes I just want to give myself a treat.”

Q28: “Money is not an issue with me at all in Second Life. I can find what I need for free, or I can have access to them. In real life, I also do not concentrate on luxury.”

(91 comments received in total).

4.3.1.8. Security. The comments about feelings of security were mixed. There were comments, which emphasized the similarity of feelings of security in both worlds, as well as comments expressing that either real life or Second Life feels safer. Based on the comments, in real life people have more routines and habits, which bring feelings of safety to their lives, whereas in Second Life people are more spontaneous in their behavior. Second Life is safer in the sense that there are no

physical threats and it is safe to experiment with activities, which would involve a danger component in real life. However, in Second Life people sometimes can feel being, for example, threatened, grieved or frauded by other people. Some users also commented that technical issues (with the software, the service providers' servers, their personal computers or Internet connections) reduced their feelings of security in Second Life.

Q29: "I actually let myself play more in Second Life than I do in real life, where I am most comfortable with routines. In Second Life I can occasionally be more spontaneous, which I think is probably a good thing. Safety is illusory."

Q30: "I think it's nice in SL to be able to experiment with the unpredictable. Even if something is dangerous, the avatar cannot get injured. RL has to be safer."

Q31: "Second life is safe. I can walk away or transport from anything that makes me uncomfortable. I am very much in control. Real life is uncertain. Others control my environment. I cannot transport out of a traffic jam or from a car that runs a red light."

Q32: There is no (or very little) direct danger as a result of the virtual world, although there can be difficult situations which make one feel threatened or intimidated at times.

(70 comments received in total).

4.3.1.9. Self-esteem. The responses about feelings of self-esteem were quite unambiguous. A clear majority of those who submitted comments did not find a difference between their self-esteem in Second Life and their real lives. However, some participants reported experiencing higher self-esteem in Second Life than in the real life, found SL useful in further developing their self-esteem, and also found that self-esteem established in Second Life carries out to their real life behavior.

Q33: "It has taken years to get comfortable in my own skin (physical world) and only a short time to do the same in Second Life..."

Q34: "I'm constantly working on "me." This is true both in real life and in Second Life."

Q35: "I like my avatar more than I like my real self. That's because I didn't create my avatar to be me, but to be the me I want to be. After all, she is the "personification" of my goals, isn't she?"

Q36: "You just can't escape from who you are..."

(67 comments received in total).

4.3.1.10. Popularity-influence. Many respondents expressed that their ratings for feelings of popularity and influence were largely affected by their greater history and experience in the real life and that they consider those feelings more important in the real life, while their Second Life visits are motivated by different reasons. However, many people also stated that they did not find major

differences in feelings of popularity and influence between the two worlds.

Q37: "I have a position of leadership in RL. I don't mind taking a back seat in SL."

Q38: "I have enough of this in my first life; I don't look for positions of influence in general in my second life. That's not a goal area for me, so I didn't work on it with my avatar."

Q39: "I like being somewhat influential and try to be as consistent and reliable as I can in both worlds"

Q40: "I am a knower-of-things. In RL or SL, people seek me out for advice or just general information. It's nice to feel influential, but I've never felt particularly popular (which is one way I suppose SL and I clash; in SL, popularity can be everything)."

(71 comments received in total).

4.3.2. General themes

The respondents' general comments about their needs and motivations for using Second Life were categorized to the ten needs suggested by Sheldon et al. (2001) according to the main motivations in the comments. Motivations linked to relatedness (e.g. friendship, meeting new people) were mentioned 65 times, motivations related to autonomy (e.g. freedom, removing boundaries) were mentioned 45 times, motivations related to self-actualization (or self-improvement) were mentioned 30 times and motivations related to pleasure-stimulation (e.g. new kind of experiences) were mentioned 26 times. The other six of the ten psychological needs were mentioned as the main motivations less than ten times.

Based on the overarching thematic analysis for the all the qualitative data on psychological needs and motivations, five central themes were identified in how the users described their motivations for using Second Life. They are described below with an example quote for each theme.

4.3.2.1. Second Life as self-therapy. Based on the qualitative descriptions, it is quite typical for Second Life users to use the system in order to gain positive psychological effects. The therapeutic usage may be motivated, for example, by real-life depression, stress, a handicap, an issue related to physical appearance, or a given personality trait. In many cases the participants expressed that this kind of self-therapy can be very successful and may also lead to positive long-term personal development.

Q41: "I find that I spend more time in game when I am depressed. It's the ultimate retail therapy."

4.3.2.2. Second Life as a source of instant pleasures. Another central motivation for Second Life usage was easy access to a large variety of different pleasures, for example, aesthetic pleasures (art, music) or social pleasures. This motivation category was especially prominent for participants, who had a limited access to real-life activities for some reason, for example, a distant location, financial

reasons, or life situation (e.g. children to raise). The participants often expressed that they have similar pleasures available in real life, but in Second Life they can be more easily and rapidly accessed, and that is why virtual pleasures are often used as a substitute for the real-world ones.

Q42: “Pleasures are, I suppose, a lot easier to come by in SL too. They’re: 1. Free. 2. No hassle. There’s no long drive, just a short teleport. 3. Not crowded. For those of us who dislike the crowd mentality, taking in an experience at our own time and pace is refreshing. 4. Interactive. In RL, western society likes to pretend that only children play. In SL, it’s expected.”

4.3.2.3. Second Life as liberation from social norms. A noticeable tendency in the participants’ responses was highlighting the different in social norms as a motivation for Second Life usage. They described that in Second Life, communication is less affected by different kinds of norms and prejudices existing in the real world, which has a positive impact on their social relationships and makes the formation of friendships easier.

Q43: “A big part of SL is social networking and personal connections which can quickly escalate into deep friendships. I think this contrasts to RL where people tend to be more guarded and don’t form friendships as quickly.”

4.3.2.4. Second Life as a tool for self-expression. Another frequently described motivation for using Second Life was related to self-expression and personalization. Second Life offers flexible tools for customizing one’s avatar and building different objects including, for example, clothing, furniture, and buildings. There is also a very large variety of objects available made by others. Many participants expressed that the possibilities for creative self-expression are better than in their real lives and this forms a central motivation for Second Life usage.

Q44: “It’s a very flexible tool through which I can be creative and express myself. There are many many things that I can do and make in Second Life that I can’t do in the real world because I lack the skills or resources to do so. (Or physics doesn’t allow it.)”

4.3.2.5. Second Life as exploration and novelty. The motivations in this category are based on the need for exploring new places and finding novel types of stimulation. Second Life has a very large number of different locations and activities available, which can be easily browsed and explored. The users also have a possibility to first try simulations of real-world activities virtually and to try simulations of daring real-world activities safely.

Q45: “SL allows me to explore worlds and fantasies I would never be able to explore in RL... at least not without real consequences.”

4.3.3. Survey feedback

The qualitative comments about the survey itself were mainly positive; however, some of the participants commented that the survey was quite long. Most of the participants also reported that rating the satisfaction of psychological needs based on the method developed by Sheldon et al. (2001) was easy, however, again a minority of respondents thought that giving the ratings was difficult, mainly because they had not thought about the issues under study before taking the survey.

5. Discussion

The current results suggest that there is considerable variation in the activities and motivations among users of the Second Life virtual world. However, the results showed relatively clear patterns in how psychological needs of the respondents are typically satisfied in the real world and the virtual world. The quantitative results suggested that feelings of autonomy, self-esteem, physical thriving, pleasure and stimulation, and relatedness were among the needs, which are most strongly satisfied when in Second Life. The satisfaction ratings of autonomy and physical thriving needs were also significantly higher for the virtual world as compared to the respondents’ real lives, and the participants also reported more satisfaction related to the need for money and luxury in Second Life than in their real lives. On the other hand, the satisfaction of needs related to competence, relatedness, self-actualization-meaning, security, and popularity-influence were quantitatively evaluated as lower than in the users’ real lives. The quantitative ratings for the importance of different needs confirmed that the needs under study were regarded as highly important by the current user sample with the exception of money-luxury and popularity-influence, which were only evaluated as moderately important.

By applying the model of ten psychological needs suggested by Sheldon et al. (2001) to the research of virtual worlds, significant variations in the levels of satisfaction for the different needs were observed. The model of ten psychological needs and the questionnaire method developed based on it has not been previously applied to the study of virtual worlds. However, the role of psychological needs is already seen as crucial as in the research area of user experience. An important part of good user experience is determined by the fulfillment of the user’s psychological needs (Hassenzahl et al., 2010). The current study showed that using the framework and methodology by Sheldon et al. (2001), satisfaction of different fundamental psychological needs can be effectively studied in practice in the context of 3D virtual worlds.

However, when making inferences based on the current quantitative results, it should be noted that the psychometric instrument suggested by Sheldon et al. (2001) was used in a slightly different way than in their original paper, or the studies by Hassenzahl (2008), Hassenzahl et al. (2010), and Partala and Kallinen (in press). While those studies asked their participants to rate the satisfaction of different needs in the context of the single most satisfying or unsatisfying life events or user experiences, in the current study the participants were asked to give average ratings for the satisfaction of different needs across their experiences from a longer period of time. Because of this methodological difference, the current results cannot be compared in detail with the results of those studies. Overall, however, the psychological needs rated as the most salient and important in the current study (autonomy, competence, relatedness, and self-esteem) were also among the most salient and important in the above mentioned studies.

An interesting difference between the results of Sheldon et al. (2001) and the current results emerged in the ratings of physical thriving and pleasure-stimulation. Sheldon et al. found that the ratings for physical thriving and pleasure-stimulation had high intercorrelations and emerged as a single factor in a factor analysis. In contrast, in the current study there were significant differences between the ratings of the two needs and also higher levels of physical thriving were reported in Second Life than in the respondents' real lives, whereas there was no corresponding difference for pleasure-stimulation. These results suggest that differentiating between these two needs is useful at least in the context of studying virtual worlds, in which the users are virtually represented by avatars.

The qualitative findings of the current study were generally in line with the quantitative results and provided important insight into the nature of the users' experiences related to psychological needs and virtual worlds. Based on the qualitative comments, it became evident that there is a two-way interaction between the users' behavior and experiences in the virtual world and in their real lives. Relatedness needs were mentioned more frequently than the other needs in the qualitative comments. Aspects related to autonomy and pleasure-stimulation was also regarded as important motivations for using Second Life. Self-improvement also became an important issue based on the qualitative analysis. An overarching analysis of the qualitative data revealed five different typical ways of thinking about one's own motivation for Second Life usage: Second Life as self-therapy, Second Life as a source of instant pleasures, Second Life as liberation from social norms, Second Life as a tool for self-expression, and Second Life as exploration and novelty.

An especially prominent aspect in the current findings was that Second Life is used as a form of self-therapy. While it is known that virtual environments can be effectively used for professional therapy (e.g. Hoffman, 2004), self-therapy has received less attention. The current

findings suggested that by targeting in certain emotions and experiences, people use Second Life successfully as different kinds of self-therapy. Yee (2007) found that escapism from real world is one of the motivations for playing 3D online games. In line with his results, the current findings suggest that escapism from real world is also an important motivation for using Second Life and the users can guide their Second Life usage so that it often has positive therapeutic effects for their real lives.

Another motivation for using Second Life was related to social norms. It has been found that social norms also exist to some extent in virtual environments. For example, Yee et al. (2006) found that social norms related to interpersonal distance and gender can also be present in virtual worlds. In the current study, the findings suggested that social norms in Second Life were perceived as liberal, underdeveloped, or even nonexistent, however, for many users the resulting 'barrier-free' communication with other users was found to be an important motivation for using Second Life.

Oulasvirta and Blom (2008) have suggested that possibilities for personalization support the needs related to the self-determination theory: autonomy, competence, and relatedness. Second Life experience can be highly personalized by the users, and these features are strong candidates for explaining the high satisfaction ratings of the self-determination theory related needs in Second Life. In the qualitative analysis of the current study, "Second Life as a tool for self-expression" emerged as a central theme, suggesting that these aspects may indeed have a connection.

In the current study, aspects related to exploration and novelty emerged as one of the five central themes based on the qualitative findings. Fetscherin and Lattemann (2008) found that exploring new places was an important motivation for Second Life users. Their finding was confirmed in the current study and the current results also showed that many users are motivated to actively look for new kind of activities and experiences.

When the current findings were compared to those of Yee (2007), many similarities were discovered. Yee grouped online 3D game players' motivations to three major categories: achievement, social, and immersion. These were divided into subcategories as follows: advancement, mechanics, competition (achievement), socializing, relationships, and teamwork (social), and discovery, role-playing, customization, and escapism (immersion). All these categories of motivations were also identified in the current research, however, the needs related to Yee's achievement category were not especially prominent in the current research, because Second Life is in general not oriented towards achievement.

Vasalou et al. (2008) studied virtual avatars and found that avatars were used to accurately reflect their owners' offline self; participants chose to display stable self-attributes or idealized their avatar by concealing or emphasizing attributes aligned to imagined social roles. They also

found that the diversity of customization options was exploited by some participants who broke free from the social rules governing self-presentation offline; others used the avatar's appearance to emotionally provoke and engage the avatar viewer. Whang and Chang (2004) found two different behavior styles in the context of an online computer game: norm-oriented players, behaving mostly as in real world and 'off real world' or 'outlaw' players, who behaved significantly differently in the virtual world, ignoring the norms of the real life. The current results are in line with these results. The majority of the respondents reported behaving as in the real world, and they also made their avatars look much like their real world appearances. However, they typically reported idealizing their avatars to a small extent and behaving a bit more daringly in trying new activities. Another, smaller group of users used the virtual world for breaking free from real life norms and their avatars were typically very different from their real appearances. Typically, these users were engaged in role playing activities of different kinds and possibly also used non-human avatars.

In the current research, we used a dichotomy between Second Life, the popular virtual world, and the real life to study the respondents' feelings of various aspects in both worlds. The objective was to study the respondents' feelings at the level of their naive conceptions, and the Second Life/real life dichotomy was based on prior observations on the language used by Second Life users (they typically refer to RL, the real life, meaning their lives in the physical world when not using a computer). Consequently, it is not suggested that such a dichotomy exists in the philosophical sense. The question whether virtual worlds are real is addressed in a number of other publications, including Bray and Konsynski (2007). However, it is suggested that this kind of dichotomy can be useful in empirical research on understanding the needs and motivations of the users of virtual worlds.

In the case of the current research, web-based survey as a research method had some benefits. By means of a web survey, the target population of this research, active and experienced Second Life users, could be reached in an efficient way. Furthermore, the information gathered in this study was very personal and confidential, and people usually feel more comfortable disclosing personal information in a web questionnaire than in a less anonymous setting (see e.g. Locke and Gilbert, 1995). A major concern in any web-based survey lies in the reliability of the results. In their large-scale analysis, Gosling et al. (2004) found that many preconceptions about the reliability of web-based studies can be regarded as myths, but special care must be paid to eliminating repeat responders and to obtaining a sample that is diverse enough related to the goals of the study. Based on the demographic results, the procedure of the current research was indeed able to provide a sample, which was relatively well distributed in terms of location, age, and sex of the respondents. Reliability was increased by targeting survey promotion

to forums, in which users were represented by their real names, as well as blocking multiple responses from the same IP address. In addition, "hasty" answers with very little or no qualitative comments were dropped from the analysis. The remaining respondents' qualitative comments seemed thoughtful and unique for each respondent. Finally, the respondents' public avatar profiles were briefly examined before the survey rewards were paid. This procedure gave further indication that the respondents were different persons and in most cases experienced Second Life users.

The current study produced systematic quantitative results on the fulfillment of psychological needs in the context of Second Life – a popular online 3D virtual world – and also produced diverse qualitative findings, which could have practical design implications for advanced 3D virtual worlds. Designers of virtual worlds could include supporting autonomy, self-esteem, relatedness, and pleasure-stimulation in their design goals and experiment with different methods for supporting those aspects of user experience. Another important viewpoint emerging from the current research is that the use of Second Life is often motivated by the users' real world limitations. For example, there was a group of users, who indicated that they looked for experiences of money and luxury in Second Life to compensate their lack of real-life resources. The aspect of designing virtual worlds based on different kinds of real-world limitations could also be a useful view when taken systematically into account in the design process. In addition to design implications, the current results shed light on the concepts of "real" and "virtual" in a new way also on a more general level: if people can perform similar activities in the real world and an advanced virtual world, which activities do they want to perform virtually and which psychological needs do those activities fulfill? Second Life is among the first platforms, which enable the holistic study of these aspects, and the current results could be important in guiding future research on advanced virtual worlds.

In all, the current study indicated differences in the levels for satisfaction for different psychological needs both between the different needs and for the same needs between Second Life and in the users' real lives. The results indicated that satisfaction of psychological needs such as autonomy, competence, relatedness, self-esteem, physical thriving, pleasure-stimulation, and money-luxury are important motivations for the usage of Second Life. For many users, the results pointed out a two-way interaction between the virtual and the real lives of the users, also indicating impacts of virtual world usage on their real lives. In some cases, these personal real life impacts acted as important motivations for the usage of virtual world. In the future, it seems worthwhile to study the interactions between different psychological aspects of the usage of virtual worlds and the users' real lives more closely. Such research could contribute towards an even more detailed understanding of the motivations for using virtual worlds than obtained in the current research.

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Appendix. The statements for studying the satisfaction of psychological needs

The statements for studying the satisfaction of psychological needs are presented in the table below. Each statement began with either of the wordings presented in the first row of the table. The endings of the statements are originally from Sheldon et al. (2001). They were changed from the past to the present tense for the current research.

“In Second Life I feel...”/“In the real life I feel...”

1. Autonomy

“... that my choices are based on my true interests and values.”

“... free to do things my own way.”

“... that my choices express my ”true self.””

2. Competence

“... that I am successfully completing difficult tasks and projects.”

“... that I am taking on and mastering hard challenges.”

“... very capable in what I do.”

3. Relatedness

“... a sense of contact with people who care for me, and whom I care for.”

“... close and connected with other people who are important to me.”

“... a strong sense of intimacy with the people I spend time with.”

4. Self-actualization-meaning

“... that I am ”becoming who I really am.””

“... a sense of deeper purpose in life.”

“... a deeper understanding of myself and my place in the universe.”

5. Physical thriving

“... that I get enough exercise and am in excellent physical condition.”

“... that my body is getting just what it needed.”

“... a strong sense of physical well-being.”

6. Pleasure-stimulation

“...that I am experiencing new sensations and activities.”

“...intense physical pleasure and enjoyment.”

“...that I have found new sources and types of stimulation for myself.”

7. Money-luxury

“... able to buy most of the things I want.”

“... that I have nice things and possessions.”

“... that I have plenty of money.”

8. Security

“...that my life is structured and predictable.”

“...glad that I have a comfortable set of routines and habits.”

“...safe from threats and uncertainties.”

9. Self-esteem

“...that I have many positive qualities.”

“...quite satisfied with who I am.”

“...a strong sense of self-respect.”

10. Popularity-influence

“...that I am a person whose advice others seek out and follow.”

“...that I strongly influence others’ beliefs and behavior.”

“...that I have strong impact on what other people do.”

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