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Excessive use of internet, mobile phones and computers: the role of technology-related changes in needs and psychological boundaries

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Abstract

In this paper, based on the psychological model of consequences of info-communicational technology use [1] we study the role of two factors – change in needs (the need for development of image making by technology, the need for convenience and functionality) and transformation of psychological boundaries (subjective extension and subjective violation) – in the excessive use of technologies in the normative population (N=254, 17-77 years old). Specifically, we focus on the use of two gadgets (mobile phones and computers) – and one technology (the Internet). Hierarchical regressions were used to predict the two aspects of the excessive use – subjective feeling of dependence and subjective readiness of refusing from technologies. There were different patterns of correlations between age, gender and excessive use for mobiles, the Internet and computer. Frequency of use was unrelated to the excessive use. Psychological factors significantly improved all the models explaining 10-22 percent of the variance in subjective dependence, and 6-25 percent of the variance in readiness of refusing. Both technology-related changes in needs (especially need for "cool", stylish or expensive gadgets) and psychological boundaries extension affect the excessive use of technologies although the contribution of each factor depends on technology in question. Data allows suggesting possible psychological mechanisms participating in the development of the excessive use of technologies.

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Keywords: Compliance, Self-determination theory, Causality orientations, Psychometric properties, Compliance-Related Causality Orientations Scale.

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1. Theoretical background

A rapid progress of info-communicational technologies in the temporary society raises a question of their impact on human beings that is widely discussed in sociology and philosophy [2],[3],[4], [5], [6]. The main focus for a psychologist shifts to the psychological consequences of the use of technologies [5]. The most prominent of them are an excessive or problem use (e.g., [7]) and technological addictions [8], [9]. Although there is a growth of the literature about criteria and components of the excessive use of technologies, little has been done to reveal possible psychological mechanisms and factors underlying its development. There are exceptions: the studies of personality traits [10], [11] and the beliefs about technologies [12] as predictors of technological addiction. But, typically they are cross-sectional, and they don't focus on how special traits could lead to the excessive use and dependence. In this paper, based on the psychological model of consequences of technology use [1] we study the role of two factors – change in needs and transformation of psychological boundaries – in the frequency of use and the excessive use of technologies in the normative population. Specifically, we focus on the use of two gadgets (mobile phones and computers) – and one technology (the Internet).

1.1. Excessive use of technologies and technological addiction: models and criteria

There is a number of terms describing different aspects of behavioral problems emerging because of technologies. First, the problem use [8] includes a wide range of symptoms starting from harming others using technologies (cyberstalking, cyberbullying) to a socially unaccepted or dangerous use (talking on a mobile phone while driving or in the cinema). However, in practice, most scales measuring the problem use are based on criteria of addiction (e.g., SMS Problem Use Questionnaire, [14], Mobile Phone Problem Use Scale, [8], The Internet Related Problem Scale, [15]). Secondly, "technological addiction" is a term suggested by M. Griffiths to define a non-chemical (behavioral) dependence which involves human–machine interaction [10]. Although neither DSM-IV, nor ICD-10 recognizes it as a mental disorder, most researchers use their criteria for substance use or gambling to measure the dependence upon technologies. M. Griffiths [16] developed a six-component model of addiction (salience, mood modification, tolerance, withdrawal symptoms, conflict, and relapse). However, there is no agreement about the definition and criteria of technological addiction yet. Therefore, the third term of "excessive use" is often applied. Usually, "excessive" includes subjective perception of dependence upon spending "too much time" and either may or may not include some other criteria of addiction.

In this study, we pay our attention on two aspects of addiction: subjective possibility of refusing from technologies and subjective perception of dependence and interference of technologies with other activities. Taking into account that frequency of behavior might be related but not equal to addiction [11], we also controlled frequency of technology use.

1.2. Psychological model of consequences of technology use: a framework for empirical studies

According to our model [1] there are technology-related psychological transformations typical of population, and they could mediate behavioral problems like the excessive use. One possible transformation is a perception of a gadget or technology as necessary or even "too necessary" for a person. As far as mentioned above, this component is traditionally described as a subjective aspect of addiction and criteria of the excessive use. Second technology-related change involves the sphere of needs (e.g., [17]). Both technologies and gadgets obtain some additional meanings for the person (e.g., "to have expensive mobile phone" means "to look decent") transforming existing or even creating new needs (e.g., need for a cool mobile phone). Third transformation was described by M. McLuhan [18] as a subjective extension of human boundaries. We distinguished two aspects of this component. Due to the technologies person may reach and control much more objects and people than earlier (boundaries extension) but potentially he or she is much more reachable by others (boundaries violation). The

model was empirically tested [19] in the normative sample for the use of one technology (the Internet) and two gadgets (mobile phones and computers).

In this study, we hypothesized that technology-related changes in needs and psychological boundaries would predict the excessive use of technologies after controlling effects of age, gender and frequency of use. As in the previous study we applied three different models: one example of technology (the Internet) and two examples of gadgets (mobile phones and computers).

2. Study

2.1. Participants

254 residents of Moscow and Moscow region (63 males and 189 females, age range between 17 and 77 years old) participated in the study. Participants were divided by the age in three groups: younger than 25 years old who are familiar with info-communicational technical gadgets from the childhood (N=159), 25 to 40 years old who faced rapid development of technologies as teenagers and young adults (N=33) and elder than 40 years old who were elder than 30 in the period when technologies were widely spreading in Russia.

2.2. Materials and Procedure

Frequency of each technology or gadget use was assessed by one statement with a 4-point Liker scale "Typically I use … (the Internet, mobile phone or computer) never or almost never / rarely / sometimes / often".

Excessive use and technology-related changes in needs and psychological boundaries were measured by Technology-Related Psychological Consequences Questionnaire [19]. This is a screening instrument that was developed and validated on the normative sample in the three forms: the Internet, mobile phones and computers. The questionnaire consists of seven scales. Each scale is tested by three items appraised on the 4-item Liker scale. Two of them assess the excessive use component: possibility of refusing ("I can't imagine my life without mobile phone") and subjective dependence ("I spend more time in the Internet that I would like to"). Two scales focus on the change of psychological boundaries: boundaries extension ("If the person whom I'm used to talking to in the Internet isn't online for a long period of time, I worry") and boundaries violation ("I'm anxious that my personal information may be available to anyone in the Internet"). Three more scales are about technology-related needs: functionality ("I like the Internet because I can send messages to any persons I need to contact wherever I am and they are at any time"), convenience ("All I need for a computer to be reliable and easy to use") and image making ("I prefer to buy expensive but stylish mobile phone"). Due to the specificity of gadgets, version for computers didn't include functionality and image making scales.

In the normative Russian sample [19] Cronbach's alpha for all the scales except convenience varied across scales and test versions from .61 to .80. Although the consistence was low (.46-.54) for the convenience scale, the scale was included in the questionnaire because it had clear content validity and was well-reproduced in the factor analysis. Factor analysis supported the structure of all the versions (62.2-66.5 percent of variance explained by factors). There were expected differences between age groups in technology-related psychological changes as well as in the pattern of correlation with frequency of technology use.

2.3. Results

A series of the hierarchical regression analysis was used to test the hypothesis. First, for each questionnaire version (the Internet, mobile phone, and computer) we have tested whether technology-related changes in needs and psychological boundaries predict subjective possibility of refusing from technology after controlling age, gender and frequency of technology use. Secondly, the same hypothesis was proved for a subjective dependence

upon technologies. Shown in Table 1, the inclusion in the model of the technology-related psychological consequences significantly improves it both for subjective dependence and possibility of refusing regardless of the version of the questionnaire.

Table 1. Technology-related psychological consequences as predictors of the excessive technology use: results of hierarchical regression analyses

Variables in the model	**Mobile phones**		**Internet**		**Computer**	
	β	**R^2**	**β**	**R^2**	**β**	**R^2**
***Dependent variable:* subjective dependence**						
Step 1						
Frequency of use	.11	.04*	-.03	.16**	-.04	.06**
Gender	.00		-.29**		-.16*	
Age group	-.17**		.21**		.14*	
Step 2						
Frequency of use	.09		-.04		-.07	
Gender	-.01		-.12*		-.15*	
Age group	-.12		.21**		.16**	
Boundaries extension	.15*	.14**	.30**	.38**	N/A	.22**
Convenience	-.05		-.10		-.12	
Image making	.25**		.23**		.11	
Boundaries violation	.12		.06		.37**	
Functionality	-.06		.11		N/A	
R^2 change		.10**		.22**		.15**
***Dependent variable:* possibility of refusing from technology**						
Step 1						
Frequency of use	-.33**	.16**	-.04	.14**	.01	.15**
Gender	-.17**		.16*		.12*	
Age group	-.05		-.27**		-.33**	
Step 2						
Frequency of use	-.20**		-.03		-.02	
Gender	-.09		.07		.09	
Age group	-.04		-.20**		-.30**	
Boundaries extension	-.33**	.41**	-.20**	.29**	N/A	.21**
Convenience	-.16**		-.12*		.02	
Image making	-.23**		-.21**		-.20**	
Boundaries violation	.10		.14*		.14*	
Functionality	-.16**		-.09		N/A	
R^2 change		.25**		.15**		.06**

** - p<.05, ** - p<.01*

Initially (step 1), the subjective dependence on the Internet and computer is predicted by elder age and masculine gender while the subjective dependence upon mobile phones is predicted by younger age. Interestingly, the frequency of use didn't predict the subjective dependence. Younger participants are much more involved in mobile activity than elder ones [19], so their subjective dependence may reflect their tendency to overestimate frequency of use. Elder people might be more concerned with the time spent in the Internet and for using a computer because of better reflection and more knowledge about addiction. Psychological factors improve the model by 10-22 percent of variance explained. The subjective dependence on the Internet and mobile phones increases with higher boundaries extension and needs to make self-image with the help of

technology/gadget. The subjective dependence on computers is positively predicted by the concern that psychological boundaries could be violated by them.

The possibility of refusing from technologies is dependent (negatively) upon the frequency of use of mobile phone version only. Less frequent use and masculine gender predict more readiness to live without mobile. This result is in line with findings that females spend more time speaking on mobile phones and have stronger need for it [17]. For the Internet and computers the subjective possibility of refusing is higher for females and younger people. This pattern is similar in that what we have discussed concerning the subjective dependence. The addition of psychological variables improves models by 6-25 percent of the variance explained. For mobile phones and the Internet a negative predictor is a boundaries extension as well as needs for convenience and image making. For computers the need for image making but not for convenience was related to lower possibility of refusing. The need for functionality of mobile phones reduces readiness to do without it. The feeling of boundaries violation was weak predictor of higher readiness to live without phones and computers.

3. General Discussion

In this study, we focused on two aspects of the excessive use: subjective feeling of dependence on technology and subjective readiness for refusing from technology. According to our data, it was unrelated to frequency of use (a higher frequency of use was related to a lower possibility of refusing from mobile phones only), that is, in the line with empirical data that addiction doesn't necessarily depend on the frequency [11]. Patterns of correlations between age, gender and excessive use are different for mobiles, the Internet and computer. The difference could be explained by a subjective meaning of technologies: mobiles are hypothesized to be more important for females and youth [17] while the Internet – for males. As far as we expected, changes in needs and psychological boundaries are important factors for the excessive use regardless of the technology measured. Psychological boundaries extension and meaning of technology as an important part of image contribute to subjective dependence and possibility of refusing from technologies. The role of the needs for convenient and functional technology/gadget was revealed only for the possibility of refusing from mobile phones and the Internet. Perception of boundaries violation had significant effect only for computers increasing both the subjective dependence and possibility of refusing. Please, note: our sample was normative while the role of psychological factors in addicts to technologies could be different and needs further research. Nevertheless, our data supports our hypothesis that both technology-related changes in needs (especially need in cool, stylish or expensive gadgets) and psychological boundaries extension affect the excessive use of technologies.

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