

Associations between problematic mobile phone use and psychological parameters in young adults

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Abstract

Objectives This study aims to address possible associations between excessive or dysfunctional use of mobile phones and certain psychological variables.

Methods Our study focuses on *Problematic Mobile Phone Use* (PU) in 196 young adults. A survey was arranged to measure PU, daily mobile phone use in minutes, use of short message service (SMS) and also included psychological and health variables (e.g., chronic stress, depression).

Results Statistic analysis indicates that chronic stress, low emotional stability, female gender, young age, depression, and extraversion are associated with PU.

Conclusions Future research needs to clarify the causality of these findings and should also intend to develop concepts for a more meaningful use of mobile phone and related technologies.

Keywords Mobile phone · Behavior · Occupational health · Well-being

Introduction

Launching of handheld communication devices has been a unique success story and sometimes attributed as a revolution in communication. Alongside with mentioning all the multitude of positive effects of the new technology,

concerns have been raised that adverse effects on our quality of life and even on health might also exist.

Beside the discussion about possible risks of electromagnetic fields (EMF) emitted by mobile phones (Augner et al. 2009; Augner and Hacker 2009) recent research has focused on problematic behaviors in relation to mobile phones that may threaten health or well-being.

Addiction to technologies is not a new phenomenon: recently, a study about computer game playing addiction revealed that about 12% of the players displayed pathological behavior (Batthyany et al. 2009). Mobile phone use is even more widespread in modern societies than computer game playing, and this fact might be reflected in a possibly higher prevalence of addiction in mobile phone users. According to Van den Bulck (2003), use of short messaging during night can be an important factor in causing sleep disturbances amongst children and adolescents. In a study by Bianchi and Phillips (2005), extraversion, young age, and low self-esteem were found to be related to *Problematic Mobile Phone Use* (PU).

Koivusilta et al. (2007) documented a possible association between poor health and mobile phone use in adolescents. In families with lower socioeconomic status, adolescents seemed to use mobile phones more frequently than did those in families with higher socioeconomic status. A Spanish survey with 13–20-year-old adolescents identified a prevalence for mobile phone dependence of 20%. The authors reported that intensive mobile phone use was associated with female gender, rural school location, good family economy, smoking tobacco, excessive alcohol consumption, depression, cell phone dependence, and school failure (Sanchez-Martinez and Otero 2009).

A very recent pilot study conducted with adults revealed a significant connection between mobile phone dependence and physical symptoms such as headache (Augner, results

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not published). A US research team found some evidence for an association between trait anxiety and subscales mobile phone dependence and mobile phone abuse (Merlo and Stone 2009). The same researchers created a scale measuring a mobile phone social interaction index that was significantly positively associated with assertiveness, anxiety, vulnerability, and emotionality (Stone and Merlo 2009). Taken together, there is fragmentary evidence that extensive mobile phones use can have adverse effects on well-being and life quality.

The present study intended to explore possible associations between PU and certain indicators of self-rated psychological and physical health in young adults.

Method

Participants

The head authorities of nurses' training schools, Upper Austria, Austria, and of the technical college, Salzburg, Austria, had been asked for their permission to conduct this survey with students during their lectures. Agreement was obtained from three different nurses' training schools and one technical college. Trainees were requested to complete a survey about their mobile phone habits during a lecture session; 206 students completed the questionnaire; 10 participants were excluded from the analyses for failing to give their written informed consent or being aged over 35 years. Therefore, 196 participants between 17 and 35 years (mean 20.05, SD = 3.21) were included in the data analysis; 76.53% were female, and 23.47% were male.

All procedures were consistent with the ethical guidelines of the expanded Helsinki Declaration (World Medical Association Declaration of Helsinki 1997) and those suggested by the American Psychological Association (2002).

Problematic mobile phone use (PU)

Inspired by the survey of Merlo and Stone (2009), a questionnaire was designed, consisting of three subscales: (1) Dependence (9 items), i.e., non-use of mobile phone leads to negative feelings, (2) Social interaction (7 items), i.e., mobile phone used to avoid direct interactions or act as a kind of substitution for direct interactions with people, and (3) Consequences (10 items), i.e., mobile phone used in improper situations that lead to negative consequences, e.g., blame by teacher or sleeplessness during night. Response categories of *Dependence* and *Social interaction* items ranged from 0 (strongly disagree) to 4 (strongly agree). For *Consequences*, categories ranged from 0 (never) to 4 (very often).

Further, *Duration of calls* per day, *Number of short messages* per day, other functions of mobile phone used, and *Most frequent reasons to call* someone were assessed. The latter items were analyzed separately from the PU scale.

Psychological and physical health parameters

We assessed certain physical symptoms by a symptom list of 10 very common symptoms (e.g., headache, backache, nausea). Respondents had to rate frequency of each symptom from 0 (never) to 4 (very often).

The WHO-5 well-being questionnaire was used to screen depressive behaviors and daily hassles by three items (Lowe et al. 2004). Both scales referred to the past 2 weeks.

Three questions were administered to create a further scale, addressing quality of sleep during the past 2 weeks (e.g., How often did you get enough sleep during the past 2 weeks to feel well rested?). Response categories ranged from 0 (never) to 4 (very often).

To identify possible adverse eating behaviors we used the *SCOFF-questionnaire* consisting of five "yes"/"no"-questions. Hölling and Schlack (2007) reported that in this test, 2 yes-answers out of 5 would indicate probable pathological problems with eating.

Furthermore we worked out a coping style questionnaire in German language very close to the *Coping Strategies Inventory Short-Form* (CSI-SF) (Addison et al. 2007) and 10 items referring to personality according to the *Ten-Item Personality Inventory* (TIPI) (Gosling et al. 2003).

Furthermore we used two standardized questionnaires to measure trait anxiety (*State-Trait Anxiety Inventory*; STAI) (Laux et al. 1970) and the amount of chronic distress (*Trier Chronic Stress Inventory*; TICS) (Schulz et al. 2004).

All questionnaires were in German language.

Statistics

For statistical analyses, the software package PASW Statistics 17 was used. Descriptives were calculated for all variables. Reliability analysis was obtained for PU scale. Multivariate linear regression model was calculated (stepwise).

Results

Descriptives

In the specific age and social group tested here, mean duration of all mobile phone calls per day together was 35.38 min (SD = 30.21; maximum: 190). The mean number of short messages was 18.32 per day (SD = 22.36; maximum: 200), and the mean amounts for average and

Table 1 Mobile phone behavior study (Austria, 2009): descriptive data of important problematic mobile phone use (PU)-scale items

	Response (%)				
	Strongly disagree (0)	(1)	(2)	(3)	Strongly agree (4)
9. I am always bothered if I have no signal	2.6	7.7	15.8	22.5	51.5
13. I never switch off my mobile phone	23.2	12.2	11.9	15.5	37.1
15. Sometimes I deal with my mobile although I should do something else	28.2	21.5	16.9	12.8	20.5
17. If I cannot use my mobile phone for a longer time, I have bad mood	60.5	19.5	8.2	8.2	3.6
18. Instead of talking to someone, I like to use SMS	32.5	13.9	22.2	19.6	11.9
	Never (0)	(1)	(2)	(3)	Very often (4)
30. I have had (nearly) an accident, because I used my mobile during a dangerous situation	77.9	13.8	5.6	1.5	1.0
31. I have been admonished by teacher or boss because I used my mobile phone during work- or school time	54.4	23.1	16.4	5.6	0.5
32. I have been waking up during night because of calls or SMS	12.8	11.8	39.0	20.0	16.4

Response categories range from 0 = strongly disagree (or never) to 4 = strongly agree (or very often)

maximum costs for mobile phone use per month were 24.35 € (SD = 21.05; maximum: 250) and 95.95 € (SD = 107.38; maximum: 812.50), respectively.

It turned out that the most frequent reasons to call someone were to “make or reschedule appointments” (median = 2.00), or “to discuss private issues” (median = 2.00).

Table 1 shows some of the most important items of the PU scale.

Problematic mobile phone use (PU) and self-rated health

PU subscales Dependence (Cronbach’s $\alpha = .82$), Social Interaction ($\alpha = .74$) and Consequences ($\alpha = .78$) were reliable scales. PU sum scale ($M = 1.42$, $SD = 0.64$; min = 0.14, max = 3.05) showed high internal consistency ($\alpha = .90$) and was used for further analyses.

In a stepwise linear regression analyses with PU as the dependant variable and psychological parameters as independent variables, the best model’s R^2 was 0.40 (Table 2). Agreeableness, conscientiousness, openness, anxiety, symptoms, daily hassles, coping engagement, coping disengagement, quality of sleep, and pathological eating behavior were excluded from the model.

Table 2 shows that high chronic stress and low emotional stability were best predictors for high PU. Female sex was significantly associated with higher PU. Further, age was negatively associated with PU, whereas depression and extraversion were positively associated with PU.

Correlation analysis showed that PU score was significantly associated with calls (min/day) (Pearson’s $r = 0.40$,

Table 2 Mobile phone behavior study (Austria, 2009): Problematic Mobile Phone Use (PU) as dependent variable

	Problematic mobile phone use	<i>p</i>
Standardized beta		
Chronic stress	0.27	<.001
Gender	−0.20	.004
Emotional stability	−0.21	.002
Extraversion	0.13	.037
Depression	0.15	.033
Age	−0.17	.013

R^2 for the model = 0.40

Gender 0 indicates female, 1 indicates male

p Level of significance ($p < 0.05$ is defined as significant)

$p < .001$), use of short message service (number of messages/day) ($r = 0.33$, $p < .001$), and functions of mobile phone used ($r = 0.23$, $p = 0.001$).

Stepwise regression analysis was also calculated for calls as the outcome variable, and with psychological parameters as the independent variables. However, best model’s R^2 was low: 0.11. Only gender and conscientiousness remained as significant negatively associated with calls (minutes/day) in the model.

Discussion

Only relatively few studies have dealt with this topic so far. Carbonell et al. (2009) searched for published studies of addiction to internet, video games, and mobile phones. Only 2.1% of the studies dealt with mobile phones.

Nevertheless, the results of our current study are in line with findings of previous studies.

Some more serious concerns about the validity of self-reported data regarding mobile phone use were raised before. For instance, overestimation of use seems to be common (Tokola et al. 2008). However, Tokola et al. (2008) obtained a correlation coefficient of 0.71 between self-reported mobile phone use and network operators' data. This result seems to provide considerable validity for our study.

Positive association of calls (min/day), number of mobile phone functions and PU underlines the validity of the PU questionnaire used. It has to be mentioned that our PU questionnaire does not—in any item—directly refer to the frequency of mobile phone use.

Our results show that chronic stress, and depression scores are positively associated with PU score. This finding is supported by available evidence: a study with 12–18-year-old Finns found that depression score and daily health complaints were significantly higher for frequent mobile phone users while self-rated health was significantly lower (Koivusilta et al. 2007). Sanchez-Martinez and Otero (2009) report significant association between intensive cell phone use and depression in 13–20-year-old adolescents. Another study found higher risks in problematic mobile phone users for low self-esteem and suicidal tendencies (odds ratios between 3.93 and 4.97 for both, analyses were divided by gender) in adolescents (Yang et al. 2010).

Interestingly, female gender was significantly associated with PU. Bianchi and Phillips (2005) had reported that males more than females show problematic use with technology. Based on their own results, they concluded that regarding mobile phones, no gender difference would exist. However, results of the present study appear to show a relationship. One reason could be that the present student sample might not be as representative as Bianchi and Phillips' (2005) sample of adults. A second reason could be that young males nowadays are more engaged in other technical equipments such as computers. A third reason could be that males simply have another kind, maybe a more practical, relationship to their mobile phones than females. Further, we found a negative association between age and PU, as was also reported by Bianchi and Phillips (2005). They outline that young people's general risk for addiction is higher, as they are more engaged with new technology than are elder people. For our study, this explanation remains unsatisfactory, because "elder people" in our study were in their 20s only, and therefore are unlikely to already having lost interest in new technologies. Maybe, a consolidation of mobile phone behavior takes place at the beginning of the 20s and during the same age, the openness for new interventions might slightly decrease.

Personality traits were also associated with PU: extraversion is positively, emotional stability negatively related to PU score. In Bianchi and Phillips (2005) extraversion was correlated with problematic mobile phone use. Personality traits seem to play a role in addiction in general, but especially for problematic mobile phone use. Takao et al. (2009) found, that problematic mobile phone use was associated with self-monitoring and approval motivation.

Obvious signs for problematic mobile phone are exceptionally high bills, use in dangerous situations and those situations where mobile phone use is prohibited (Sanchez-Carbonell et al. 2008). Psychological and social problems appear to be less evident, but still seem to be associated with problematic mobile phone use. Although the present study has some limitations (e.g., the high proportion of female participation may have aggravated effects; sample focused a young student group), it underlines the presence of an important connection between chronic stress and problematic mobile phone use. Further research needs to address this issue in detail, in order to make sure that use of this technology does not lead to unwanted effects on behavior, health, and well-being. The enormous presence of mobile phones in our daily lives further underlines the importance of research in this area. Further, the results presented here should stimulate the development of new teaching concepts for schools and adults' education implementing the issue of a more meaningful use of mobile phone technologies.

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Conflict of interest The authors declare that they have no competing interests.

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