

Intensity of mobile phone use and health compromising behaviours—how is information and communication technology connected to health-related lifestyle in adolescence?

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Abstract

The association of mobile phone use with health compromising behaviours (smoking, snuffing, alcohol) was studied in a survey comprising a representative sample of 14–16-year-olds ($N = 3485$) in 2001. Mobile phone was used by 89% of respondents and by 13% for at least 1 h daily. The intensity of use was positively associated with health compromising behaviours. The associations remained, although somewhat reduced, after including weekly spending money in the models. This study concludes that, at least in the present developmental level of communication technologies, intensive mobile phone use seems to be part of the same health-related lifestyle as health compromising behaviours.

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Introduction

New information and communication technologies (ICT), such as computers, Internet, and mobile phones, have tremendously changed adolescents' everyday life. This is especially true in case of mobile phones, an important part of the new lifestyle of Western people. Being among countries with the highest mobile phone density, Finland is a model example of this development. Mobile phone ownership has grown rapidly from 258,000 in 1990 to 3,729,000 in 2000. The ownership rate per 100 inhabitants was 72 in 2000 ([Statistics Finland, 2002](#)). The majority of Finnish adolescents has a mobile phone today. Access to mobile phone is recognized as a vital necessity among young people, a portable gadget for survival in the modern society. In addition to

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calling friends, family members and other important people, much time is devoted to sending text messages (SMS) making it possible to reach each other whatever the time and place (Coogan and Kangas, 2001; Saarinen, 2001). Besides contact keeping mobile phones provide their holders with a large assortment of electronic games.

ICT has significance and influence on people's lives in a way that has resonance for health researchers. Mobile phones are related to factors influencing the distribution of health, such as health behaviour patterns of adolescents. There are so far only a few studies on adolescent mobile phone use, and even fewer investigating how mobile phone use is connected to health-related behaviours, of which health compromising behaviours are an example. Smoking and excessive mobile phone use have been found to coincide in the same individuals (Koivusilta, Lintonen, & Rimpelä, 2003). On the other hand, mobile phone can be argued to be an effective competitor to cigarettes, because the same kinds of functions may be associated with both products. As the use of various goods depends on the money disposable to buy them (McLellan, Rissel, Donnelly, & Bauman, 1999), prioritization must be done especially in adolescence when the amount of pocket money often is scarce. There has been a debate going on whether mobile phones and smoking are substitutable commodities (Charlton and Bates, 2000; Invernizzi, Boffi, Mazza, & Paredi, 2001; Lee, 2001), or whether they are complementary behaviours and should be considered as two characteristics of the same lifestyle (Peretti-Watel, & Legleye, 2002; Koivusilta et al., 2003). Here, other health compromising behaviours may be involved as well.

In post-modern societies, consumption styles signalize a belonging to reference groups and the significance of symbols is highlighted (Campbell, 1987; Helenius, 1996). Consumption is a way to express important things about oneself and one's way of life (Bauman, 1998; Miles, 1998) as well as to build up one's identity (Gabriel and Lang, 1996; du Gay, 1996; Giddens, 1991). Buying the "right" things gives safety for a young person, and possessing them helps to find and establish a place in the social networks (Helenius, 1996; Uusitalo, 1998; Coogan and Kangas, 2001). This is reflected in the fact that mobile phones, their covers and ringing tones are continuously replaced by newer models, and that there is a wide market for various peripheral equipment for phones. Likewise, smoking has been found to be a signal of style, individuality and peer group membership (Aloise-Young, Hennigan, & Graham, 1996). Smoking and alcohol use are closely related to each other (Aarø, Laberg, & Wold, 1995), but do not always coincide in the same adolescents. They may thus represent different dimensions of health compromising behaviours as well (Pohjanpää, Rimpelä, Rimpelä, & Karvonen, 1997). However, smoking, alcohol and other health compromising behaviours have all been found to be associated with similar attitudes, especially towards school (McLellan et al., 1999). Weak commitment to school life, poor school performance and modest educational aspirations are typical of adolescents with those behaviours (Koivusilta, Rimpelä, & Rimpelä, 1998; Miller and Plant, 1999). The same applies to some forms of ICT, among them video game playing which has been a focus of recent research (Gentile, Lynch, Ruh Linder, & Walsh, 2004).

This study aims at finding out how mobile phone use is connected to health-related lifestyle in adolescence. Health compromising behaviours constitute a continuum of health-related lifestyle (Aarø et al., 1995). We study how the intensity of mobile phone use is associated with smoking, using smokeless tobacco (snuff) and alcohol drinking style. As the opportunities for buying various commodities are restricted by the amount of disposable money, we also study how the

associations between health compromising behaviours and intensity of mobile phone use are modified by the amount of weekly spending money.

Material and methods

Participants

Data were collected in February–April 2001 from a nationally representative sample based on dates of birth of 14- and 16-year-old Finns, using a self-administered structured mailed questionnaire with two re-inquiries to non-respondents. The total sample size was 4766 and the number of respondents 3485. The response rates were 66% in 14- and 62% in 16-year-old boys, and 79% in 14- and 82% in 16-year-old girls. This study is a nation-wide monitoring system of adolescent health and health-related lifestyle (the Adolescent Health and Lifestyle Survey), where comparable surveys on 12-, 14-, 16- and 18-year-olds have been repeated every second year since 1977 (see e.g. Rimpelä and Rainio, 2004). Since 2001, research on new information and communication technologies has been one of the key topics. The ethical committee of the Department of Public Health at the University of Helsinki accepted the study protocol.

Variables

The dependent variable *intensity of mobile phone use* was measured by asking the respondent how many hours he/she used a mobile phone daily on phoning, text messages, playing games, etc. The alternatives were ‘not at all’, ‘occasionally’, ‘less than an hour’, ‘1–3 h’, ‘4–5 h’, ‘over 5 h’. In the statistical analyses the variable had five categories: not at all, occasionally, daily less than 1 h, daily 1–3 h, daily at least 4 h.

An identical repeat questionnaire was sent after 1 month to a systematic sample ($N = 254$) of the 14-year-olds who had responded to the first inquiry. Using that material weighted kappa-coefficients were calculated to assess the reliability of the measurement of mobile phone use. The reliabilities were ($\kappa = 0.55$) in girls and ($\kappa = 0.49$) in boys, thus indicating fair to good reliability (Fleiss, 1981).

Among the independent variables were *smoking status* (does not smoke or has tried once, has smoked or smokes but not daily, smokes daily < 10 cigarettes, smokes daily at least 10 cigarettes) and *use of smokeless tobacco* (never tried, tried once, used more than once). Alcohol drinking style was investigated with two questions: (1) ‘How often do you use alcohol? Try to include even those occasions when you only consumed small amounts of alcohol’, and giving nine alternatives; and (2) ‘How often do you use alcohol until you are really drunk’. *Alcohol drinking style* variable was construed by combining the two questions into a four-tiered scale: abstinence, occasional drinking, recurring drinking (drinks alcohol about once a month or more often) and recurring drunkenness (drinks alcohol until really drunk once a month or more often). The fourth independent variable *amount of weekly spending money* (excluding housing, eating and clothing expenses) was categorized according to the distribution quartiles in each age and sex group: lowest quartile, two middlemost quartiles, highest quartile. The amount of spending money was measured categorically using a question with nine categories.

Statistical analysis

Logistic regression analysis was used to study the associations between mobile phone use and the independent variables. Because of the ordinal nature of the polychotomous dependent variable, cumulative logistic models were calculated (Hosmer and Lemeshow, 2000). First, univariate associations between health compromising behaviours and mobile phone use were tested. Then, statistically significant associations were included in multivariate analyses in order to see which ones were independently associated with the intensity of mobile phone use. As the final phase of analysis, these variables, together with the amount of weekly spending money, were included in the model to find out how the magnitudes of the associations changed when money was taken into account. The cumulative odds ratios (COR) with 95% confidence intervals (CI) were calculated for variables showing a significant independent explanatory power in the multivariate model. Boys and girls were analysed separately. The analyses were performed using the ordinal logistic regression procedure in the Statistical Package for Social Sciences (SPSS 11.0 for Windows).

Results

Among 14–16-year-olds 20% of boys and 22% of girls smoked daily, 26% of boys and 10% of girls had tried smokeless tobacco, and 16% of both boys and girls experienced recurring drunkenness (Table 1). Mobile phones were used by 85% of boys and 93% of girls (Table 1). Girls spent more time using them than boys did. There was a sexual distinction in the frequency of smoking, smokeless tobacco use and alcohol use. Except for smokeless tobacco, girls had more often than boys at least some experience on every health compromising behaviour ($p < 0.001$). The amount of weekly spending money was somewhat higher in boys than in girls ($p < 0.01$).

The intensity of mobile phone use increased along with an increase in smoking, smokeless tobacco use and alcohol use (Fig. 1). Among boys, about one fifth of those not having smoked, not having tried smokeless tobacco or being abstinent neither used mobile phones, while among girls these proportions were smaller.

The univariate associations of smoking, smokeless tobacco use and alcohol use and the intensity of mobile phone use were statistically highly significant in boys (Table 2) and girls (Table 3). When the frequency of health compromising behaviours increased, the use of mobile phones increased accordingly. This phenomenon was also evident in the association between the amount of spending money and mobile phone use.

When smoking, smokeless tobacco use and alcohol drinking style were taken into a multivariate model together, all of them had independent associations with the intensity of mobile phone use. In boys, all smoking categories differed statistically significantly from the non-smokers' category ($p < 0.001$), and all categories indicating a recurring use of alcohol differed highly significantly from the category indicating no use ($p < 0.001$). Those drinking occasionally differed from the abstaining ones at the 5% significance level. Those who had used smokeless tobacco more than once differed at the 1% significance level from those who had never tried it. In girls, smoking and alcohol drinking style showed statistically highly significant independent associations with the intensity of mobile phone use. In both variables all categories differed statistically highly

Table 1
Percentage distributions of the study variables by sex

Study variable		Boys	Girls
Intensity of mobile phone use			
Not at all		15	7
Occasionally		43	34
Daily <1 h		33	43
Daily 1–3 h		7	12
Daily \geq 4 h		2	4
Total	%	100	100
<i>n</i>		2008	2479
Smoking status			
At most once		52	46
Not daily		28	32
Daily <10 times		9	12
Daily \geq 10 times		11	10
Total	%	100	100
<i>n</i>		2008	2498
Use of smokeless tobacco			
Never tried		73	90
Used once		11	7
Used more		16	3
Total	%	100	100
<i>n</i>		2079	2566
Alcohol drinking style			
Abstinence		32	24
Occasional drinking		29	31
Recurring drinking		23	29
Recurring drunkenness		16	16
Total	%	100	100
<i>n</i>		2045	2530
Weekly spending money			
Lowest quartile		33	38
Two middlemost quartiles		45	43
Highest quartile		22	19
Total	%	100	100
<i>n</i>		1990	2458

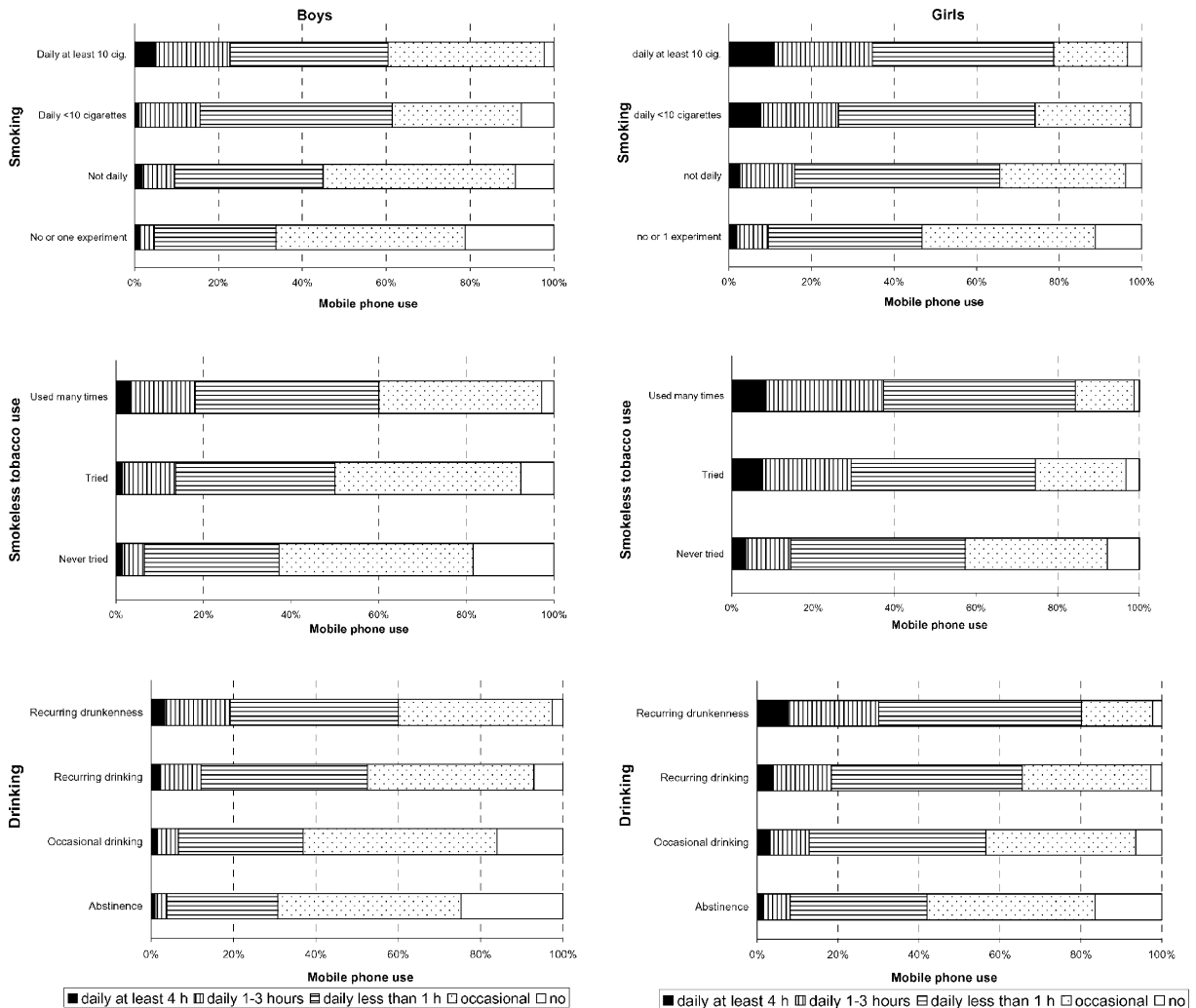


Fig. 1. Intensity of mobile phone use according to health compromising behaviours.

significantly from the reference category ($p < 0.001$). Those who had used smokeless tobacco more than once differed at the 5% significance level from those who had never tried it.

The amount of weekly spending money was statistically significantly associated ($p < 0.001$) both with the intensity of mobile phone use and with each form of health compromising behaviours ($p < 0.001$; Table 4). Boys and girls with least spending money used mobile phones less than adolescents with more money. Boys and girls belonging to the lowest spending money quartile most often had only smoked once or drunk alcohol seldom, while adolescents with more disposable money smoked and drank more. The association of the amount of spending money with boys' use of smokeless tobacco resembled that of smoking and alcohol use. In girls, use of smokeless tobacco increased in proportion with the amount of spending money.

Table 2

Univariate and multivariate associations of the intensity of mobile phone use with health compromising behaviours, 14- and 16-year-old boys. Cumulative logistic regression analysis

Univariate analysis				Multivariate analysis ^a			
Independent variables	COR	95% CI	P	Independent Variables	COR	95% CI	P
Smoking status				Smoking status			
At most once	1.0			At most once	1.0		
Not daily	1.9	1.5–2.3	<0.001	Not daily	1.4	1.1–1.8	0.004
Daily < 10 times	3.3	2.4–4.4	<0.001	Daily < 10 times	1.9	1.3–2.7	0.001
Daily ≥ 10 times	4.0	3.1–5.3	<0.001	Daily ≥ 10 times	1.9	1.3–2.7	0.001
Smokeless tobacco				Smokeless tobacco			
Never tried	1.0			Never tried	1.0		
Used once	1.9	1.5–2.5	<0.001	Used once	1.2	0.9–1.6	0.27
Used more	2.9	2.3–3.7	<0.001	Used more	1.4	1.0–1.9	0.032
Alcohol drinking style				Alcohol drinking style			
Abstinence	1.0			Abstinence	1.0		
Occasional drinking	1.5	1.2–1.9	<0.001	Occasional drinking	1.2	1.0–1.6	0.072
Recurring drinking	3.0	2.3–3.7	<0.001	Recurring drinking	1.9	1.5–2.5	<0.001
Recurring drunkenness	4.4	3.4–5.7	<0.001	Recurring drunkenness	2.1	1.5–3.0	<0.001
Weekly spending money				Weekly spending money			
Lowest quartile	1.0			Lowest quartile	1.0		
Middle quartiles	2.2	1.8–2.6	<0.001	Middle quartiles	1.8	1.5–2.3	<0.001
Highest quartile	2.8	2.2–3.5	<0.001	Highest quartile	2.2	1.8–2.9	<0.001

^a Multivariate model: Smoking + Smokeless tobacco use + Alcohol drinking style + Weekly spending money.

In the final models the amount of spending money was included in the logistic regression analyses together with the independent health compromising behaviours, smoking, smokeless tobacco use and alcohol drinking style. In both sexes smoking and alcohol drinking style retained their significant associations with mobile phone use although the CORs diminished (Tables 2 and 3). The significance of smokeless tobacco use was borderline for both boys and girls. Altogether, taking account of weekly spending money somewhat weakened but not annulled the associations.

Discussion

The associations between mobile phone use and the studied health compromising behaviours were strong in both sexes. The amount of mobile phone use increased when the frequencies and intensities of these behaviours increased. Thus, not only the access to a mobile phone but also the frequency and intensity of its use were linked with health compromising behaviours. In boys, all of the studied health compromising behaviours displayed independent associations with the intensity of mobile phone use. In girls, however, only smoking and alcohol drinking style had independent associations. Taking account of weekly spending money somewhat reduced the associations

Table 3

Univariate and multivariate associations of intensity of mobile phone use with health compromising behaviours, variables in 14- and 16-year-old girls. Cumulative logistic regression analysis

Univariate analysis				Multivariate analysis ^a			
Independent Variables	COR	95% CI	P	Independent Variables	COR	95% CI	P
Smoking status				Smoking status			
At most once	1.0			At most once	1.0		
Not daily	2.1	1.8–2.5	<0.001	Not daily	1.6	1.3–1.9	<0.001
Daily < 10 times	3.5	2.8–4.5	<0.001	Daily < 10 times	2.0	1.5–2.7	<0.001
Daily ≥ 10 times	5.0	3.8–6.5	<0.001	Daily ≥ 10 times	2.7	1.9–3.7	<0.001
Smokeless tobacco				Smokeless tobacco			
Never tried	1.0			Never tried	1.0		
Used once	2.3	1.7–3.1	<0.001	Used once	1.2	0.9–1.7	0.25
Used more	3.6	2.4–5.3	<0.001	Used more	1.6	1.0–2.4	0.050
Alcohol drinking style				Alcohol drinking style			
Abstinence	1.0			Abstinence	1.0		
Occasional drinking	2.0	1.6–2.4	<0.001	Occasional drinking	1.6	1.3–1.9	<0.001
Recurring drinking	3.0	2.4–3.6	<0.001	Recurring drinking	1.8	1.4–2.3	<0.001
Recurring drunkenness	5.8	4.5–7.4	<0.001	Recurring drunkenness	2.6	1.9–3.5	<0.001
Weekly spending money				Weekly spending money			
Lowest quartile	1.0			Lowest quartile	1.0		
Middle quartiles	1.6	1.4–1.9	<0.001	Middle quartiles	1.3	1.1–1.6	0.002
Highest quartile	1.9	1.6–2.4	<0.001	Highest quartile	1.5	1.2–1.8	0.001

^a Multivariate model: Smoking + Smokeless tobacco use + Alcohol drinking style + Weekly spending money.

suggesting that mobile phones and health compromising behaviours may at least to some extent be substitutable goods. There is evidence from earlier studies that having a small amount of weekly spending money is associated with lesser tobacco use and alcohol drinking, as well as lesser involvement in other health compromising behaviours (McLellan et al., 1999). This was confirmed in our study, with the addition that adolescents with least spending money display less intensity in mobile phone use. However, as smoking and alcohol drinking style were still strongly related to the intensity of mobile phone use irrespective of the money available, it seems to be reasonable to conclude that there, at least for now, exists a health-related lifestyle in which smoking, alcohol drinking and mobile phone use play central roles. It is possible that among these adolescents there are some with a part-time job during the school year providing them with money to spend both on mobile phone expenses and on tobacco and alcohol. Adolescents working during the school year have been found to possess an increased risk of heavy drinking (Kouvonen & Lintonen, 2002) and other risky behaviours (Kouvonen & Kivivuori, 2001).

Smoking has been considered the main indicator of a rebellious lifestyle where interest is directed towards leisure, peers and “street culture” (West and Sweeting, 1997). Keeping contact with friends also spending their leisure time on streets makes the mobile phone extremely important. The lack of it could mean isolation from peers (Kulutus ja arki, 1999) and missing

Table 4

The amount of weekly spending money in relation to mobile phone use and health compromising behaviours

Mobile phone use and health compromising behaviours	Weekly spending money					
	Boys			Girls		
	Lowest quartile	Two middlemost quartiles	Highest quartile	Lowest quartile	Two middlemost quartiles	Highest quartile
Intensity of mobile phone use						
Not at all	24	10	9	10	6	5
Occasionally	46	43	39	39	31	28
Daily < 1 h	25	38	37	39	46	45
Daily 1–3 h	4	8	11	10	13	17
Daily ≥ 4 h	1	1	4	3	4	5
Total	% 100	100	100	101	100	100
<i>n</i>	612	865	427	896	1035	453
Smoking status						
At most once	60	50	44	55	40	40
Not daily	28	26	31	29	34	32
Daily < 10 times	7	10	10	10	14	13
Daily ≥ 10 times	5	14	15	6	12	15
Total	% 100	100	100	100	100	100
<i>n</i>	621	865	430	492	1033	465
Use of smokeless tobacco						
Never tried	82	70	67	93	90	85
Used once	10	12	10	5	7	9
Used more	8	18	23	2	3	6
Total	% 100	100	100	100	100	100
<i>n</i>	639	881	433	913	1051	466
Alcohol drinking style						
Abstinence	40	29	24	32	19	19
Occasional drinking	32	28	25	34	29	30
Recurring drinking	19	25	27	22	34	28
Recurring drunkenness	9	18	24	12	18	23
Total	% 100	100	100	100	100	100
<i>n</i>	626	874	429	913	1040	463

some important happenings. In this kind of culture, not being continuously reachable or living “off-line” would indicate asociality and shutting oneself off from the social life (Coogan and Kangas, 2001). In Finland, especially among adolescents, drinking outdoors is more popular than in any other European country (Hibell et al., 2000). Since alcoholic beverages and tobacco

products are legally sold to those above 18 only, information about who has access to them must be exchanged. Mobile phones may be used to create special arrangements for the delivery of these products or to organize where to drink and with whom. Adolescents who use them most are also most dependent on this kind of communication, practised in private and concealed from parents. The field of ICT is undergoing a rapid and constant change, and it remains to be seen how the various forms of ICT create differences in adolescent lifestyles in a long run.

Finland's position as one of the pioneering countries of ICT use (Rogers, 1995) is reflected in the high mobile phone density (Statistics Finland, 2002). Mobile phones may have different connotations in different societies depending on the stage of the diffusion of this innovation, marketing strategies, geographical distances, etc. Smoking and drinking habits are culturally regulated phenomena as well, and their prevalence and changes in their prevalence vary between countries and population groups (Charlton, 2001; Ferrence, 1996; Karisto, Prättälä, & Berg, 1993; Rogers, 1995). Associations between mobile phone use and health compromising behaviours may vary between countries and population groups depending on country-specific cultural reasons. Mobile phone density among adolescents is connected with family culture and ways to keep contact between family members. Finland, for example, is a country where both parents', particularly mothers', labour market participation is very high and this may create special needs to reach children by mobile phone. Consequently it is likely that the money needed to use a mobile phone does not, at least fully, come from a young person's own purse. Parents equip their children with phones in order to keep contact with them and adolescents pay only the part of the bill that exceeds a set limit (Coogan and Kangas, 2001). In a recent Finnish study parents paid at least a half of the mobile phone expenses for 70% of the 16–20-year-olds. This proportion is probably higher concerning 14–16-year-olds. The same phenomenon has been noticed elsewhere, too (Nurmela, Heinonen, Ollila, & Virtanen, 2000). It is obvious that in societies and population groups where parents do not participate in mobile phone costs the association found in this study might be different.

The proportion of mobile phone users in the present study was similar to that in other Finnish studies (Wilska, 2001a; b). Mobile phones are now a fundamental part of young people's lifestyles in countries of high technology (Saarinen, 2001) as well as a way to form and express identity (Gabriel and Lang, 1996; Miles, 1998; Uusitalo, 1998; Wilska, 1999) and belonging to reference groups (Coogan and Kangas, 2001), or to make a distinction from others (Bourdieu, 1984). However, tobacco and alcohol use have not lost their roles in the lives of adolescents (Tyas and Pederson, 1998), and drunkenness-related style of alcohol use prevails among Finnish youth (Lintonen, Rimpelä, Ahlström, Rimpelä, & Vikat, 2000). It may be asked whether intensive users of all of these commodities form a distinctive subgroup of adolescents. The ways in which mobile phones are used have been found to differ among adolescents and to have clear connections with other consumer behaviours (Wilska, 2002a). A distinct group of "mobile phone addicts" emerged in a Finnish study on 16–19-year-olds (Wilska, 2002b), but in that study associations with traditional health compromising behaviours, such as smoking and drinking, were not examined. There is research evidence suggesting that adolescents who regard themselves as heavy spenders often use operator's account control to keep the balance between their mobile phone expenses and disposable money (Wilska, 2002b). Indeed, we may ask what will happen to adolescents who find all of these commodities necessary without being able to afford them. Is the money taken away

from other, possibly health-enhancing behaviours, e.g. those related to physical exercise or nutrition? Are these people at risk of running into debt?

Although our study shows that mobile phone use may be associated with several health compromising behaviours, the various ways to use mobile phones may also be health protecting in facilitating the maintenance of social relations and diminishing insecurity of the physical environment. The role of new information and communication technologies should not be underestimated in health research. Studies are needed on new perspectives opened for health promotion, for example how mobile phones could be used for health education, in prevention of tobacco use, etc. Dissemination of health messages through mobile phones among adolescents not reachable using traditional channels, e.g. school health lessons, offers one special challenge for the future. As this gadget, which especially symbolizes communication between people, is strongly linked with other features of adolescent health-related lifestyle as well, it should be studied what kind of a role socialization with friends acts as a motivator to engage adolescents in various behaviours. In general, more extensive studies on the rapidly developing area of ICT as part of adolescent health-related lifestyle are needed.

Acknowledgements

The Ministry of Social Affairs and Health in Finland (the Section 27 Appropriation of the Tobacco Act), Juho Vainio Foundation and the Health Promotion Research Programme of the Academy of Finland supported the study.

References

- Aarø, L., Laberg, J., & Wold, B. (1995). Health behaviors among adolescents: Towards a hypothesis of two dimensions. *Health Education Research*, 10, 83–93.
- Aloise-Young, P. A., Hennigan, K. M., & Graham, J. W. (1996). Role of the self-image and smoker stereotype in smoking onset during early adolescence: A longitudinal study. *Health Psychology*, 15, 494–497.
- Bauman, Z. (1998). *Work, consumerism and the new poor*. Cambridge: Open University Press.
- Bourdieu, P. (1984). *Distinction. A social critique of the judgement of taste*. London: Routledge & Kegan Paul.
- Campbell, C. (1987). *The romantic ethic and the spirit of modern consumerism*. Oxford: Blackwell.
- Charlton, A., & Bates, C. (2000). Decline in teenage smoking with rise in mobile phone ownership: Hypothesis. *British Medical Journal*, 321, 1155.
- Charlton, A. (2001). Changing patterns of cigarette smoking among teenagers and young adults. *Paediatric Respiratory Reviews*, 2, 214–221.
- Coogan, K., & Kangas, S. (2001). *Nuoret ja kommunikaatioakrobatia, 16-18-vuotiaiden nuorten kännykkä- ja internetkulttuurit*. Nuorisotutkimusverkosto ja Elisa Communications. Elisa tutkimuskeskus. Raportti 158. Retrieved 27.3.2003. <http://www.alli.fi/nuorisotutkimus/julkaisut/akrobatia.pdf>.
- Fleiss, J. L. (1981). *Statistical methods for rates and proportions*. New York: Wiley.
- Ferrence, R. (1996). Using diffusion theory in health promotion: The case of tobacco. *Canadian Journal of Public Health*, 87(Suppl 2), 24–27.
- Gabriel, Y., & Lang, T. (1996). *The unmanageable consumer. Contemporary consumption and its fragmentations*. London: Sage.
- du Gay, P. (1996). *Consumption and identity at work*. London: Sage.
- Giddens, A. (1991). *Modernity and self-identity*. Cambridge: Polity Press.

- Gentile, D. A., Lynch, P. J., Ruh Linder, J., & Walsh, D. A. (2004). The effects of violent video game habits on adolescent hostility, aggressive behaviors, and school performance. *Journal of Adolescence*, 27, 5–22.
- Helenius, P. (1996). *Nuorten kulutus ja identiteetti 1990-luvun Suomessa*. Keskustelualoitteita 22. Helsinki: Kuluttajatutkimuskeskus.
- Hibell, B., Andersson, B., Ahlström, S., Balakireva, O., Bjarnasson, T., Kokkevi, A., & Morgan, M. (2000). *The 1999 ESPAD report. Alcohol and other drug use among students in 30 European Countries*. Stockholm: CAN.
- Hosmer, D. W., & Lemeshow, S. (2000). *Applied logistic regression*. New York: Wiley.
- Invernizzi, G., Boffi, R., Mazza, R., & Paredi, P. (2001). Italian data don't show the same pattern. *British Medical Journal*, 322, 616–617.
- Karisto, A., Prättälä, R., & Berg, M. A. (1993). The good, the bad, and the ugly. Differences and changes in health related lifestyles. In U. Kjærnes, L. Holm, M. Ekström, E. L. Fürst, & R. Prättälä (Eds.), *Regulating markets, regulating people. On food and nutrition policy* (pp. 185–205). Oslo: Novus Forlag.
- Koivusilta, L., Lintonen, T., & Rimpelä, A. (2003). Mobile phone use has not replaced smoking in adolescence. *British Medical Journal*, 326, 161.
- Koivusilta, L., Rimpelä, A., & Rimpelä, M. (1998). Health-related lifestyle in adolescence predicts adult educational level—a longitudinal study from Finland. *Journal of Epidemiology and Community Health*, 52, 794–801.
- Kouvonen, A., & Kivivuori, J. (2001). Part-time jobs, delinquency and victimization among Finnish adolescents. *Journal of Scandinavian Studies in Criminology and Crime Prevention*, 2, 191–212.
- Kouvonen, A., & Lintonen, T. (2002). Adolescent part-time work and heavy drinking in Finland. *Addiction*, 97, 311–318.
- Kulutus ja arki 1999. Retrieved 27.5.2000. <http://www.info.uta.fi/winsoc/luento/arki.html>.
- Lee, C. Y. (2001). No correlation in Switzerland either. *British Medical Journal*, 322, 617–618.
- Lintonen, T. P., Rimpelä, M. K., Ahlström, S., Rimpelä, A. H., & Vikat, A. (2000). Trends in drinking habits among Finnish adolescents from 1977 to 1999. *Addiction*, 95, 1255–1263.
- McLellan, L., Rissel, C., Donnelly, N., & Bauman, A. (1999). Health behavior and the school environment in New South Wales, Australia. *Social Science & Medicine*, 49, 611–619.
- Miles, S. (1998). *Consumerism as a way of life*. London: Sage.
- Miller, P., & Plant, M. (1999). Truancy and perceived school performance: An alcohol and drug study of UK teenagers. *Alcohol and Alcoholism*, 34, 886–893.
- Nurmela, J., Heinonen, R., Ollila, P., & Virtanen, V. (2000). *Matkapuhelin ja tietokone suomalaisen arjessa*. Suomalaiset ja tuleva tietoyhteiskunta—tutkimushanke, vaihe II, raportti I. Statistics Finland. Katsauksia 2000/2. Helsinki.
- Peretti-Watel, P., Legleye, S., & Beck F, . (2002). Cigarettes and mobile phones: Are they complementary or substitutable products? *Drugs: Education, Prevention and Policy*, 9, 339–343.
- Pohjanpää, A. K. J., Rimpelä, A. H., Rimpelä, M., & Karvonen, J. S. (1997). Is the strong positive correlation between smoking and use of alcohol consistent over time?—A study of Finnish adolescents from 1977–1993. *Health Education Research*, 12, 25–36.
- Rimpelä, A. H., & Rainio, S. U. (2004). The effectiveness of tobacco sales ban to minors—the case of Finland. *Tobacco Control*, 13, 167–174.
- Rogers, E. M. (1995). *Communication of innovations*. New York: The Free Press.
- Saarienen, H. (2001). *Nuoruus ja hulluus, vanhuus ja viisaus? Tutkimus nuorten kulutuskäyttäytymisestä ja velkaantumuksesta. (English abstract: Youth and madness, old age and wisdom? A study of young people's consumer behavior and indebtedness)*. National Research and Development Centre for Welfare and Health (STAKES). Reports 261. Helsinki.
- Statistics Finland, Finland in figures. Retrieved 17.4.2002. <http://www.stat.fi/tk/tp/tasku/taskue.liikenne.html>.
- Tyas, S. L., & Pederson, L. L. (1998). Psychosocial factors related to adolescent smoking: A critical review of the literature. *Tobacco Control*, 7, 409–420.
- Uusitalo, L. (1998). Consumption in postmodernity: Social structuration and the construction of the self. In M. Bianchi (Ed.), *The active consumer: novelty and surprise in consumer choice* (pp. 215–235). London: Routledge.
- West, P., & Sweeting, H. (1997). “Lost souls” and “rebels”: A challenge to the assumption that low self-esteem and unhealthy lifestyles are related. *Health Education Number*, 97, 161–167.

- Wilska, T.A. (1999). *Survival with dignity? The consumption of young adults during the economic repression: A comparative study of Finland and Britain 1990–1994*. Publications of Turku School of Economics. Series A-3: 1999. Turku: Turku School of Business Administration.
- Wilska, T.A. (2002a). *Uusi teknologia ja nuorten kulutustyyli*. A paper presented in Sosiologipäivät 15.-16.3.2002, Tampere.
- Wilska, T.A. (2002b). *New technology and consumption styles among Finnish young people*. A paper presented in the Nordic Sociological Conference, Reykjavik 15.-17.8.2002, Session: Child/Adolescence/Youth Sociology.