



Gender Profiles of Internet and Mobile Phone Use among Norwegian Adolescents

Reidulf G. Watten¹, Jo Kleiven², Knut Inge Fostervold³, Halvor Fauske⁴ and Frode Volden⁵

^{1,2}) Department Health and Social Science – Psychology
Lillehammer University College, Norway
E-mail: reidulf.g.watten@hil.no
E-mail: jo.kleiven@hil.no

³) Institute of Psychology, University of Oslo and
Lillehammer University College, Norway
E-mail: knut.inge.fostervold@hil.no

⁴) Department of Health and Social Science
Lillehammer University College, Norway
E-mail: halvor.fauske@hil.no

⁵) Institute of Media Design and Communication, Gjøvik University College
and Department of Health and Social Science - Psychology
Lillehammer University College, Norway
E-mail: frode.volden@hig.no

Abstract

The aim of this current project was to investigate gender profiles in the use of Information and Communication Technology (ICT), primarily the Internet and mobile phones, and problems encountered in the use of these technologies. The sample survey consisted of teenagers, 4294 15-16 year olds (2067 females and 2227 males) from two counties in Eastern Norway, who had participated in a nationwide survey administered by the National Institute of Public Health. The results showed that Norwegian girls used the Internet far more often social activities such as chatting and e-mail while boys preferred to use it for entertainment and computational activities, such as Gaming, E-commerce, viewing multimedia, and for programming. Girls used their mobile phones far more often for Text messaging (Short Message Service - SMS) than boys, who more frequently used their mobile phones for technical functions (alarm, gaming, Internet, etc.). There was no gender gap in everyday phone usage. Both genders experienced few of the problems associated with ICT use. The most frequent problem encountered by both genders was increased economic costs.

Introduction

In most European countries, there has been a marked increase in the use of ICT over the past decade. This has also been the case in the Norway (Vaage, 2002), most notably among young people (e.g. Torgersen, 2004; 2007; Øia and Fauske, 2005). Consequently, a number of studies have been conducted in order to explore the consequences of greater ICT usage, inclusive of gender (e.g. Lie, 1997; Volman et al. 2001; Li and Kirkup 2007). Already in 1998 Kraut et al. in a pioneering longitudinal investigation showed that frequent use of the Internet could be linked to participants' smaller social circles, poor communication with family, and loneliness and/or depression. Six years later, however, Bargh and McKenna (2004), in a comprehensive review on a number of Internet-related issues reached more optimistic conclusions. Although increased Internet usage was found to have adverse consequences, the authors presented evidence that showed people "to be adapting pretty well to the brave new wired (and soon to become wireless) social world" (p. 586). However, the rising importance of ICT in modern societies and developmental trends in gender-ICT relationships suggest that more research should be devoted to male and female usage of ICT. It not only seems that ICT is gendered in terms of use and design, but also in the way in which males and females position themselves in relation to information technology. For instance Kelan (2007) reported that men and women make different assumptions about technology in describing ICT as "toys" and "tools", respectively. Crump et al. (2007) found that women described their gender identity as an important and integral part of ICT, although the positions were different. Men had a functional perspective on ICT while women preferred its more human and softer side. However, Griffiths et al. (2007) found the continued male domination of the ICT workplace, the existence of informal gendered networks, and female ICT professionals reporting a "long hours" and a "presenteeism" culture.

In the case of mobile phones, most research has been done on possible health hazards posed by these devices to adult users; it focuses on topics such as social and psychological problems (Bianchi and Phillips, 2005), safety and accidents (Pouysti et al. 2005), and radiation (Blettner, 2000). Other consequences such as bullying and economic problems have largely been neglected, especially among children and adolescents (Brettingham, 2005).

The gender aspects of ICT usage need to be fleshed out because the above aforementioned findings suggest that a negative trend could threaten gender equality in an information and knowledge society. It is especially important to look at children and adolescents. The majority of studies on gender issues related to ICT have been focused on adult populations and less research attention has concentrated on issues important to young people (Livingstone and Helsper, 2007). Both gender attitudes and user profiles of ICT are established in youth, but changes in user behaviour and attitudes are also probably easier to induce among teenagers rather than adults. The aim of this project was, therefore, to generate greater empirical knowledge of user profiles of ICT and mobile phones among adolescents in a large representative sample. Gender issues were approached to in terms of possible differences in usage and problems associated with Internet and mobile phone use. The design also enabled us to look at the use of Internet and mobile phones at the same time in the same sample, which is a methodological advantage when investigating ICT behaviour.

Materials and methods

Subjects

As part of nationwide survey undertaken by the National Institute of Public Health in 2003 all 15-16 year old adolescents in two counties in Eastern Norway were invited to take part in a study of lifestyle factors and health. The study included questions about the use of modern communication, computer technology, and mobile phones.. After obtaining their parents' informed consent, 4294 adolescents (2067 young females and 2227 males) were included in the sample.

Internet use

Internet use was assessed by self-report concerning the following domains: the subjects were asked if they used the Internet for the following six purposes: 1) Information purposes/"surfing," 2) Electronic mail, 3) E-commerce, 4) Chatting, 5) Gaming and 6) Other activities (i.e. videos, films, software). The responses were measured as a dichotomous variable (yes/no). Moreover, they were also asked to report if their Internet use had negative consequences in these six life domains: 1) School, 2) Family life, 3) Friends, 4) Social activities, 5) Economy and 6) Other activities. The responses were measured as a dichotomous variable (yes/no). There were no further specifications of potential problems. All valid respondents had access to the Internet both at home and at school.

Mobile phone use

The use of mobile phones was also assessed by self-report and the subjects were asked if they used a mobile phone for the following purposes: 1) Verbal telephone calls, 2) Text messaging (Short Message Service - SMS), 3) Playing games on the phone, 4) Internet activities (WAP), 5) Sending and receiving fax, 6) Watch (keep the time)/alarm purposes, and 7) Memory aid (i.e. shopping lists, time tables etc.). The responses were measured as a dichotomous variable (yes/no). A large majority of the sample had their own mobile phones (92.8%).

Statistical analyses

In addition to descriptive statistics, gender differences in Internet and mobile phone use and problems associated with usage of the Internet were tested by using mixed-design analyses of variance (ANOVA). Here, gender was treated as a between-subjects factor. The within-subjects factors in the three different analyses were: 1) the six forms of Internet use, 2) the seven forms of mobile phone use and 3) the six categories of problems associated with Internet use. Dichotomous data (no use/problems = 0; use/problems =1) constituting a "dummy" type variable were used in these analyses. The sample was quite large and effect size statistics could be discussed instead of parametric statistics such as ANOVA. However, since the testing of statistical interactions was important, neither effect size (*d*) nor Chi-square was an appropriate approach here.

Ethics

Informed consent was obtained from the adolescents' parents and the project was conducted in accordance with the Norwegian Research Council's standards of research ethics.

Results

Figure 1 depicts the results broken down for gender and the six domains of Internet use.

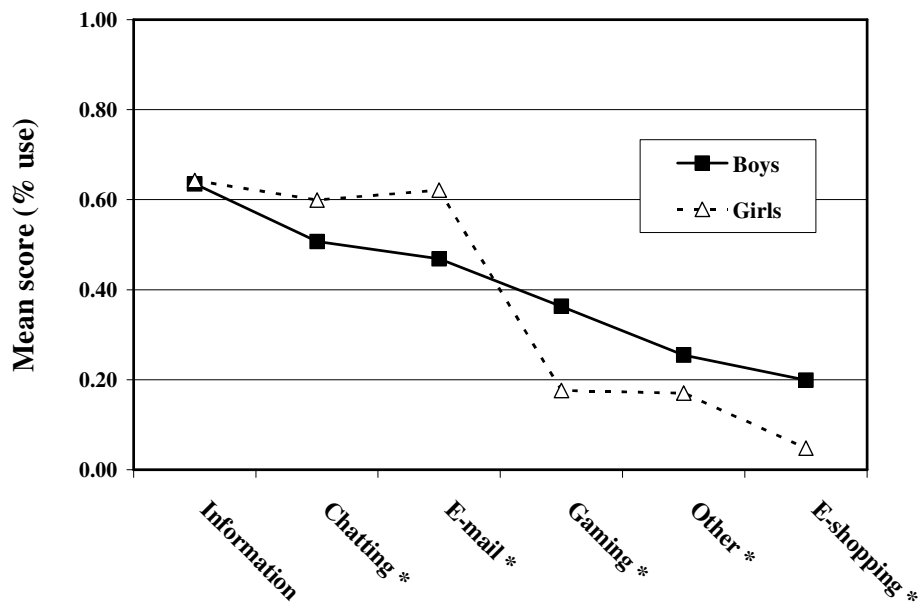


Figure 1. Gender and the six domains of Internet use. $N=4294$ adolescents (2067 females and 2227 males). Asterisks mark the domains exhibiting significant gender differences when considered separately.

The ANOVA is summed up in table 1. Clearly, both the two main effects and their interaction are statistically significant.

Source	Type III SS	df	M. S.	F	Sig.
Domains	985.30	5	197.06	1419.22	0.00
Domains * Gender	98.79	5	19.76	142.29	0.00
Error (Usage)	2979.73	21460	0.14		
Intercept	3918.27	1	3918.27	8076.89	0.00
Gender	5.17	1	5.17	10.67	0.00
Error	2082.14	4292	0.49		

ANOVA table 1. Gender and the six domains of Internet use.

First, the significant Domains effect shows the six forms of Internet use to be employed to quite different degrees. Irrespective of gender differences, there were marked differences in usage between the six domains. Information acquisition, or “surfing,” was the most frequently used, and e-commerce was the least frequently used among the six domains.

Second, the significant Gender effect indicates that boys **in general** used the Internet more than girls. Across all six domains, boys reported greater Internet use than the girls do.

Most importantly, the significant interaction effect (Domains * Gender) shows that the two genders employed the six domains of use differently. There are marked gender differences in several domains of use. Girls actually reported more use than boys in two of the domains while boys scored higher in three other domains.

Examining the data in more detail, no outstanding gender difference can be found in the Internet use domain of Information acquisition/“net surfing.” Among both genders, about 64% of respondents use the Internet to as reference tool.

Chatting and E-mail, however, were more used by the females. Significantly more girls (1284 out of 2067, or 62.1%) than boys (1043 out of 2227, or 46.8%) used the Internet for E-mail (Chi-square = 100.89; df =1; p < 0.001). For Chatting the corresponding percentages were 59.9 % and 50.7% (Chi-square = 37.05; df = 1; p < 0.001).

The three remaining forms of use were more popular with the boys. First, there was a considerable gender difference in E-commerce. Among the boys, 19.9% had been using E-commerce, but only 4.7% of the girls (Chi-square = 223.5; df = 1; p < .000). Second, boys (36.3%) played Games on the Internet more frequently than with the girls (17.6%), and the difference was statistically significant (Chi-square = 188.4; df = 1; p < 0.001). In so far as “Other” use of the Internet was concerned, the males were ahead (25.5%) of the females (17.0%), exhibiting yet another significant effect (Chi-square = 45.9; df = 1; p < 0,001).

Figure 2 shows the Internet related problem categories experienced by girls and boys.

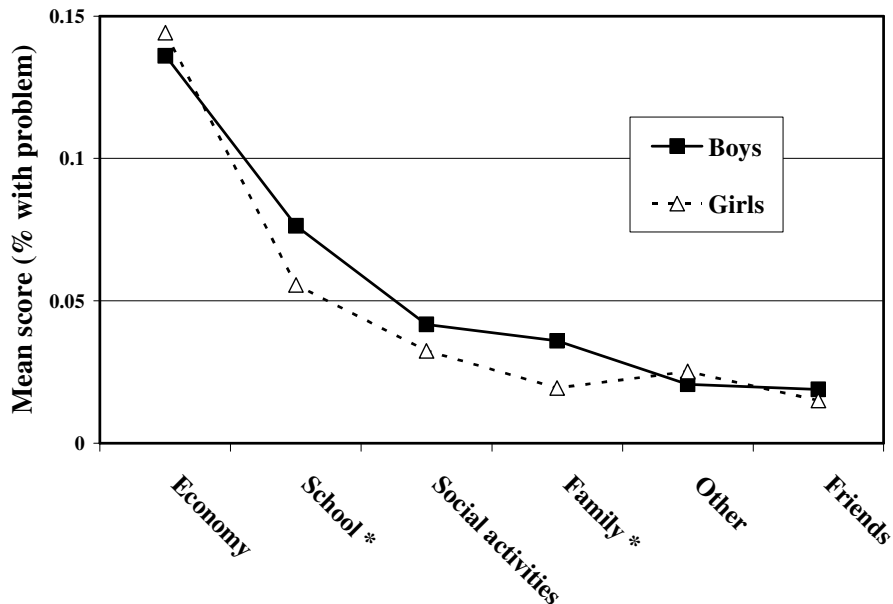


Figure 2. Gender and problems associated with Internet use. N=4294 adolescents (2067 young females and 2227 males). Asterisks mark the problem categories exhibiting significant gender differences when considered separately.

Variance analysis was applied to these results. In this case, both the main effects and the interaction effect were statistically significant. In sum, the six problem categories exhibited far greater differences between the boys and girls

than their ICT usage patterns; boys **generally** reported more problems than girls and the prevalence of problems was very dependent on gender (see ANOVA table 2).

Source	Type III S.S.	Df	M.S.	F	Sig.
Problems	46.53	5	9.31	223.23	0.00
Problems * Gender	0.70	5	0.14	3.36	0.00
Error (Problems)	894.69	21460	0.04		
Intercept	68.97	1	68.97	909.38	0.00
Gender	0.26	1	0.26	3.38	0.07
Error	325.53	4292	0.08		

ANOVA table 2.

However, if considered independently, most problem domains showed no significant gender differences. Boys experienced more problems than girls only in school and in the home. While 170 out of 2227 boys (7.6%) reported school problems related to Internet use, only 115 out of 2067 girls (5.6%) did so. This difference is statistically significant (Chi-square = 7.4; df = 1; p < 0.001). Family problems were also reported by a larger proportion of the boys (3.6%) than girls (1.9%)(Chi-square = 10.8; df = 1; p = 0.001). There were no significant gender differences in the other domains.

Figure 3 shows the gender profiles for the seven domains of mobile phone use.

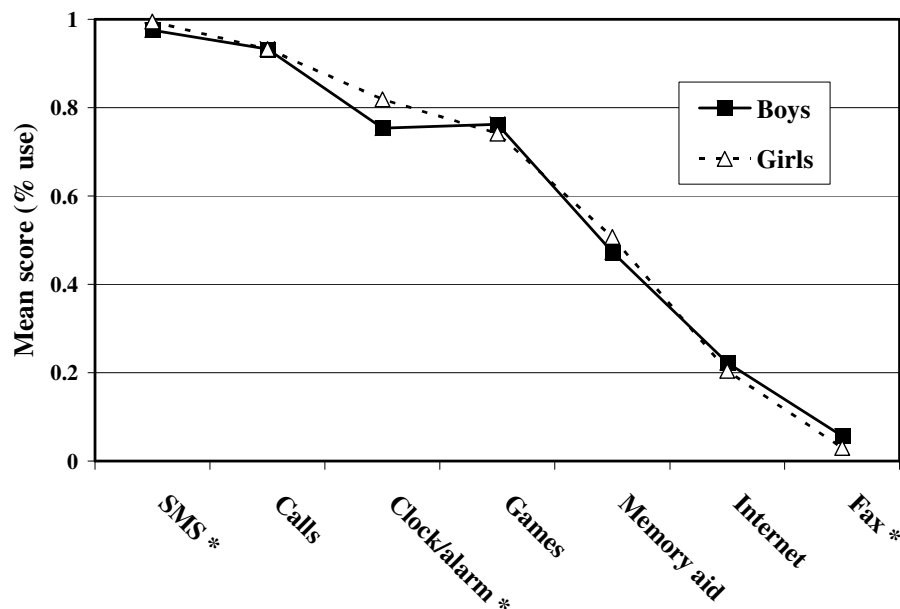


Figure 3. Gender and the seven domains of mobile phone use. N=3053 adolescents (1577 females and 1476 males). Asterisks mark the domains yielding significant gender differences when considered separately.

Even here, an analysis of variance was useful. Gender proved not to be a significant factor in this case. However, large differences could be found

among the seven domains of use. While SMS were almost universally used, very few had used their mobile phones for fax services. The interaction effect was clearly significant (see ANOVA table 3).

Source	Type III S.S.	Df	M.S.	F	Sig.
Usage	2402.25	6	400.38	3598.67	0.00
Usage * Gender	5.26	6	0.88	7.88	0.00
Error (Usage)	2036.66	18306	0.11		
Intercept	7690.85	1	7690.85	34661.23	0.00
Gender	0.30	1	0.30	1.34	0.25
Error	676.98	3051	0.22		

ANOVA table 3.

In this case, a closer examination of the data is still needed to understand the significant interaction effect. When the use domains were considered independently, no significant gender differences were found for ordinary phone calls, Internet use, gaming or memory aid.

However, 99.4% of the girls reported using the mobile phone for text messaging (SMS), while 97.5% of the boys did so. This difference yields a significant Chi value (Chi-square = 18.1; df = 1; p < 0.001). Girls also used their mobile phones as either watches or alarms more frequently than boys (81.9% vs. 75.9%; Chi = 17.9; df = 1; p < 0.001), but boys more frequently used their phone as a fax machine. While 6.1% of the boys had used their cellular phones for fax purposes, only 3.2% of the girls had done so (Chi = 15.6; df = 1; p < 0.001).

Discussion

The present study confirms that adolescents have easy access to the Internet at home, school, or in an other locale. Mobile phones also seem to be available to almost everyone and Internet access from mobiles phones is also common, especially in the Nordic countries. Therefore, use of ICT seems to be an everyday socio-cultural phenomenon for young Norwegian adolescents, like most of other European adolescents.

Although both girls and boy frequently mobile phones and the Internet, our results show marked gender differences in both ICT areas. In the case of Internet use, the three main purposes both girls and boys were information acquisition, Chatting and Electronic mail, while gaming, other purposes (such as software testing, viewing videos and films), and E-commerce were the three least frequent purposes. There were no significant gender differences for Information acquisition, but the girls used the Internet far more frequently for Chatting and e-mail than boys. On the other hand, boys invested more time in Gaming, E-commerce, and other purposes (videos, films, software). These gender differences were quite considerable.

Both genders used mobile phones mostly for text messaging and ordinary telephone calls and less frequently for other purposes such as keeping the time or for alarms (like a watch), for gaming, as memory aid, and, by far the rarest, as a fax. For most use domains, there were no gender differences. However,

girls used text messaging and clock/alarm functions far more often than boys. Only the fax function was more often used by boys than by girls.

The gender differences found for both Internet and mobile phone use were not unexpected. Differences observed between men and women in everyday life have been shown to found in the ICT usage as well. (cf., e.g., Cotton and Jelenewicz, 2006; Odell et al. 2000). For both Internet and mobile phone use, we see a female preponderance for activities which involve relational aspects of behaviour such as Chatting, E-mail, and text messaging SMS. It is common knowledge both from general psychology and social psychology that in social and group dynamics females are more competent, skilled, devote more time to, and exhibit greater engagement than men. The key issues here are creating, developing, and sustaining human relations (Carlson, 2003; Hogg and Vaughan, 2005). Moreover, the girls might have better psychomotor skills (Aschcraft, 2006) than boys when using ICT. Likewise, the young males in the study exhibited the anticipated predisposition for technical, instrumental, and game-related ICT behaviour, thus, exhibiting gender-typical behaviour already well documented in cognitive and developmental psychology. Very early in life, boys seem to be more interested in mechanical toys, puzzles etc. than do girls; these differences might reveal gender specific differences in brain functions in addition to gender roles. Moreover, boys also tend to be more risk-prone and adventurous than girls (Aschcraft 2005; Siegler et al. 2006). Therefore, it is to be expected that boys are more frequently engaged in ICT activities such as gaming, e-commerce, and other activities. The last category in our study is somewhat heterogenic, including both software installation and testing, viewing videos and films, i.e. technical and computational activities which consistently have been shown to favour boys (Li and Kirkup, 2007). The large gender difference in E-commerce could also explained as hobby related, since most products bought on-line are probably software, hardware, and peripheral equipment. Although we have no data on which category of films and videos viewed by adolescent boys, findings from other countries with a comparable technological and educational level suggest that pornography could be one possibility. For instance, Flood (2007) in a large-scale investigation of Australian 16 and 17 year-olds, showed that males were more likely to both seek out and visit X-rated movies and pornographic websites than girls. Norwegian young males are probably similar to Australian males in this respect.

We researched problems associated with ICT usage in five important life domains and discovered very few negative consequences. Economic problems were the most, frequently raised concern, probably reflecting the simple fact that it is rather expensive for young people to be "online." They are at an age when they have no regular income and are dependent on their family for economic support (telephone bills, commodities, software, etc.). In the case of the other domains (school, social, family, friends, other), the inimical effects of ICT usage were marginal, ranging between 6 and 2 % reported problems. We found gender differences in two domains; boys reported far more deleterious impact on their schoolwork and family life than did girls. There were no significant differences for the other life domains. All in all, a large majority of Norwegian adolescents experience few negative side effects of their ICT use.

Conclusion

Norwegian girls use the Internet far more often for social activities such as chatting and e-mail while boys prefer other activities such as gaming, e-commerce, viewing videos/films, and programming. Comparable results were found in mobile phone use: girls are more frequent users of text messaging than boys, who, on the other hand, use their mobile phones' functions such as gaming, fax service, and e-commerce. There were no gender differences for

ordinary telephone calls. Both genders experience rather few problems associated with ICT use.

References

- Aschcraft, M.H. (2006). *Cognition*. N.J. USA: Pearson Education.
- Bargh, J.A., McKenna, K.Y.A. (2004). The Internet and social life. *Annual Review of Psychology*, 55, 573-590.
- Bianchi, A., Phillips, J.G. (2005) Psychological predictors of mobile phone use. *CyberPsychology and Behavior* 8, 39-51.
- Blettner, M. (2000) Are mobile phones harmful? *Acta Oncologica*, 39, 927-930.
- Brettingham, M. (2005). Parents should restrict children's use of mobile phones. *British Medical Journal*, 330, 109.
- Carlson, N.R., Martin, G.N., Buskist, W. (2003). *Psychology*. London: Prentice Hall.
- Cotton, S.R., Jelenewicz, S.M. (2006). A disappearing digital divide among college students? Peeling away the layers of the digital divide. *Social Science Computer Review*, 24, 497-506.
- Crump, B.J., Logan, K.A., McIlroy, A. (2007) Does gender still matter? A study of the views of women in the ICT industry in New Zealand. *Gender, Work & Organization*, 14, 349-370.
- Flood, M. (2007). Exposure to pornography among youth in Australia. *Journal of Sociology*, 43, 45-60.
- Griffiths, M., Moore, K., Richardson, H. (2007) Celebrating heterogeneity? A survey of female ICT professionals in England. *Information, Communication, & Society*, 10, 338-357.
- Hogg, M.A., Vaughan, G.M. (2005). *Social Psychology*. Harlow: Prentice Hall.
- Kelan, E. (2007). Tools and toys: Communicating gendered positions towards technology. *Information, Communication, & Society*, 10, 358-383.
- Kraut, R., Lundmark, V., Patterson, M., Kiesler, S., Mukopadhyay, T., Scherlis, W. (1998). Internet paradox. A social technology that reduces social involvement and psychological well-being? *American Psychologist*, 53, 1017-1031.
- Li, N. and Kirkup, G. (2007). Gender and cultural differences in the Internet use: A study of China and the UK. *Computers and Education*, 48, 301-317.
- Lie, M. (1997) Technology and gender versus technology and work: Social work and computers. *Acta Sociologica*, 40, 123-141.
- Ling, R., Yttri, B (2003). *Kontroll, frigjøring og status. Mobiltelefon og maktforhold i familier og ungdomsgrupper (in Norwegian)*. In F. Engelstad and G. Ødegård (Eds.) *Ungdom, makt og mening*. Oslo: Gyldendal Akademisk.
- Livingstone, S. & Helsper, E. (2007). Gradations in digital inclusion: children, young people, and the digital divide. *New Media & Society*, 9, 671-696.
- Odell, P.M., Korgen, K.O., Schumacher, Ph., Delucci, M. (2000). Internet use among female and male college students. *CyberPsychology and Behavior*, 3, 855-862.
- Poysti, L., Rajalin, S., Summala, H. (2005). Factors influencing the use of cellular (mobile) phone during driving and hazards while using it. *Accident Analysis and Prevention*, 37: 47-51.

- Siegler,R., Deloache,J., Eisenberg,N (2006). *How Children Develop*. N.Y.: Worth Publishers.
- Torgersen, L. (2004). *Ungdoms digitale hverdag*. (in Norwegian). Oslo: Report nr. 8/04, NOVA.
- Torgersen, L. (2007). Kjønnforskjeller i ungdoms bruk av PC, TV-spill og mobiltelefon (in Norwegian). *Tidsskrift for Ungdomsforskning*, 7,103-112.
- Vaage, O.F. (2002). *Norsk kulturbarometer* (in Norwegian). Oslo: Report. Central Bureau of Statistics.
- Øia, T., Fauske, H. (2005) *Oppvekst i Norge* (in Norwegian). Oslo: Abstrakt Forlag A/S.