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International trends in electronic media communication among 11- to 15-year-olds in 30 countries from 2002 to 2010: association with ease of communication with friends of the opposite sex

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Background: Electronic media has become a central part of the lives of adolescents. Therefore, this study examines trends in adolescent electronic media communication (EMC) and its relationship with ease of communication with friends of the opposite sex, from 2002 to 10 in 30 European and North American regions. **Methods:** Data from the HBSC study were collected using self-report questionnaires from 11-, 13- and 15-year-old participants ($N = 404\,523$). **Results:** EMC use has grown over the years in most of these regions and increases with age. Even though Internet usage is often blamed for its negative effects on teenagers' social interactions in the physical world, in this study EMC was found to predict ease of communication with friends. Especially, the more they use EMC, the easier they find it to talk with friends of the opposite sex. Although these findings suggest that EMC reinforces communication, the interaction between year (2002–2006–2010) and EMC usage was not significant. **Conclusion:** This finding contradicts research that suggests that EMC contributes to loneliness and isolation, and supports other studies that present electronic media as a powerful tool for helping to connect people.

Introduction

Electronic media has become a central part of the lives of adolescents. They are intensive users of new technology. Thirty-one per cent of American teenagers aged 14–17 have a smartphone, with texting being the dominant daily mode of communication.[1] More than half (55%) of American youths aged 12–17 use online social networking; 48% of teenagers use it daily.[2] Technology facilitates bonding; research shows that Electronic Media Communication (EMC) reinforces existing relationships rather than exacerbating loneliness and isolation.[3,4]

Social relations are important for teenagers' health and well-being. Most health indicators are socially patterned in adolescence and track into adulthood.[5–8] During adolescence, teenagers are engaged in establishing their position with their peers. They need their peer group to learn and practice social skills, share information and talk about things that bother them. Furthermore, within their peer group, teenagers tend to pay more attention and show more interest in friends of the opposite sex.[6,9]

EMC helps adolescents foster their interpersonal communication and widen their friendships.[4,10] Therefore, it is important to investigate whether EMC can help adolescents talk with friends of the opposite sex about things that really bother them. In the 1990s, several studies suggested that EMC damages social connectedness,[11] while recent studies tend to report the opposite effect.[12] Thus, it is essential to explore adolescents' EMC use and its association with ease of communication with friends of the opposite sex over the years. Furthermore, only few studies have looked at region and age differences.[9] Technological development, such as broadband, telecommunications technology and smartphones, has progressively made the use of electronic media easier. However, this development occurs at different rates in different ages and regions due to economic, cultural and social reasons.

Consequently, this study's aims are to describe trends of EMC use in a cross-regional sample of 11-, 13- and 15-year-old participants; to investigate the relationship between EMC and ease of communication with the opposite sex; and to investigate whether the relationship between EMC and ease of communication with the opposite sex has changed over the years.

Methods

This study reports data from 30 European and North American regions in the 2002, 2006 and 2010 Health Behaviour in School-aged Children (HBSC) surveys; a standardized, cross-national study carried out in collaboration with the World Health Organization (WHO) Region for Europe.[13] Data were collected through a school-based survey using classroom administered self-completion questionnaires. Each national study included students in the relevant age groups (11-, 13- and 15-year-old participants) from a random sample of schools or school classes (a detailed description of the sampling procedure can be found in the International Report of the survey[14]). Following data cleansing, the final international file used for the study contained 404 523 students (49% boys; 33% 11-year-olds, 34% 13-year-olds, 33% 15-year-olds).

Measures

EMC per week

Frequency of EMC was measured by asking how often one talks to friend(s) on the phone, sends them text messages or has contact through the Internet. Responses were measured on a 5-point scale (1 = *never or rarely* to 5 = *every day*). Following Kuntsche et al.,[15]

a dichotomized variable was created with responses indicating '<than 5 days a week' recoded as 0, and '5 days or more per week' as 1.

Sociodemographic information

Participants reported their gender.

Access to computers

Access to computers was measured by asking participants the number of computers in their home. The answers were dichotomized into 0 'none' or 1 'one or more'.

Number of close friends

Number of close friends was measured by asking: 'At present, how many close friends do you have?' with separate responses for male and female friends (response categories 1 = *none*; 2 = *one*; 3 = *two*; 4 = *three or more*). Responses were included in the model matching participants' opposite sex.

Ease of communication with friends of opposite sex

Ease of communication with friends of opposite sex was measured by the following item: 'How easy is it for you to talk to friends from the opposite sex about things that really bother you?'. Response categories were: '*very easy*', '*easy*', '*difficult*' and '*very difficult*'. For the analyses, responses were dichotomized with responses indicating 'very difficult or difficult' recoded as 0, and 'very easy or easy' as 1.

Statistical analyses

Chi-square analyses were used to examine EMC by region, year and age group. Secondly, hierarchical logistic regression analyses were carried out including all the control variables and EMC, and interaction EMC by year. Then, for each region, hierarchical logistic regression analyses were used to investigate the relationship between EMC use and ease of communication with the opposite sex and the change over time. The following control variables were included: Year of survey, gender, age, the presence of a computer at home and the number of close friends of the same and opposite sex. Data were entered in three blocks. In the first block, the control variables were added. In the second, EMC was added and in the third, EMC by year. Analyses were conducted using SPSS 20.

Results

In 2010, across regions, almost 42% of 11-year-olds, about 62% of 13-year-olds and almost 73% of 15-year-olds communicated with their friends using electronic media 5 days or more a week (table 1). From 2002 to 2010, EMC increased significantly in most of the participating regions. Notable increases can be observed in

Table 1 EMC (5 days or more per week) in the years 2002, 2006 and 2010 (in %) according to age group and region

	11				13				15			
	2002	2006	2010	χ^2	2002	2006	2010	χ^2	2002	2006	2010	χ^2
Israel	45.3	53.1	46.2	23.59**	57.8	63.9	62.5	16.18**	63.0	72.1	72.8	42.99**
North America												
Canada	48.8	43.3	41.6	24.76**	60.3	59.8	60.3	0.49	60.8	66.0	71.4	60.2**
USA	38.7	32.2	36.2	11.49**	49.9	46.6	56.2	37.73**	56.8	58.4	69.5	70.23**
North Europe												
Denmark	29.0	59.9	59.0	419.41**	53.4	76.7	73.5	240.44**	66.2	81.8	79.5	107.82**
England	37.1	45.5	50.0	199.45**	48.7	57.4	65.2	54.44**	61.0	72.2	79.4	83.57**
Estonia	30.1	46.9	43.8	88.42**	38.9	56.5	56.1	116.14**	43.1	65.6	67.2	199.45**
Finland	38.5	47.0	53.9	97.48**	51.5	61.8	67.8	104.92**	58.0	69.5	73.4	105.47**
Ireland	26.9	43.4	43.3	81.09**	44.9	58.7	67.6	129.94**	58.0	64.0	73.9	73.49**
Latvia	21.0	44.4	40.8	171.51**	28.3	59.7	60.9	336.71**	33.0	67.3	70.4	419.51**
Lithuania	12.8	61.1	60.1	1,115.63**	19.5	73.7	74.5	1,471.48**	26.7	83.7	81.7	1,680.85**
Scotland	35.9	45.6	46.6	50.54**	56.8	65.3	70.6	72.91**	66.2	71.0	79.1	79.51**
Sweden	27.3	43.3	48.6	169.98**	45.6	61.4	74.1	274.92**	57.5	71.9	82.5	242.27**
Wales	42.7	45.5	44.7	2.13	50.9	59.0	64.5	58.45**	57.3	65.5	75.6	102.69**
Central & Eastern Europe												
Croatia	40.0	46.0	47.2	18.39**	55.8	60.5	58.7	7.39*	62.9	64.5	68.5	14.36**
Czech Republic	19.1	28.3	34.4	92.40**	36.6	52.6	60.1	179.41**	54.2	61.4	73.6	128.06**
Macedonia	32.0	28.8	37.4	21.78**	44.5	39.2	52.9	55.38**	53.5	45.7	66.7	150.00**
Poland	18.5	40.6	46.7	355.13**	28.9	61.4	61.9	536.52**	36.2	71.8	72.3	710.20**
Russia	54.8	60.9	60.1	22.70**	58.7	67.3	63.3	45.10**	60.4	71.1	69.6	76.29**
Ukraine	27.7	36.9	45.5	111.28**	35.0	45.7	55.6	132.68**	33.0	57.5	68.1	408.83**
South Europe												
Italy	30.5	34.5	35.5	9.36**	53.5	56.7	62.4	27.1**	61.1	65.2	78.1	104.39**
Portugal	18.2	29.4	41.5	149.68**	40.6	54.4	65.2	134.22**	53.3	65.8	77.6	147.24**
West Europe												
Austria	17.5	22.9	37.1	156.01**	36.2	45.7	63.2	245.39**	52.4	59.6	74.7	172.01**
Belgium (FL)[a]	17.2	25.4	33.7	129.48**	39.7	48.9	66.8	235.26**	57.3	63.5	79.8	159.66**
Belgium (FR)[b]	13.7	25.3	30.2	111.98**	30.6	45.9	56.0	190.40**	45.9	54.9	69.0	146.43**
France	6.0	22.6	29.5	470.54**	17.4	45.4	52.0	746.52**	31.6	60.7	70.1	746.29**
Germany	25.0	26.6	27.0	2.07	43.8	50.0	51.0	22.51**	56.2	59.1	63.6	19.25**
The Netherlands	12.1	26.5	17.1	97.4**	34.3	50.6	49.4	100.26**	47.1	67.8	68.2	162.10**
Switzerland	17.3	17.9	20.8	7.66*	42.5	50.1	53.2	45.10**	56.5	65.1	67.0	44.91**
Total	29.0	39.5	41.8	2,312.39**	42.8	56.7	61.5	3,656.14**	51.7	65.9	72.8	4,412.05**

a: Flemish Speaking Belgium.
b: French Speaking Belgium.
*$P < 05$.
**$P < 01$.

Table 2 Hierarchical logistic regression model for easy talk to opposite sex by region

Region	Variable	OR	CI for OR	
			Lower	Upper
ALL	2002	–	–	–
	2006	0.96**	0.93	0.98
	2010	0.98	0.95	1.00
	Female	–	–	–
	Male	1.58**	1.56	1.61
	11-year-old	–	–	–
	13-year-old	1.34**	1.32	1.37
	15-year-old	2.24**	2.20	2.29
	No computers	–	–	–
	One or more computers	1.03**	1.01	1.06
	Number friends opposite sex	0.85**	0.84	0.86
	EMC[a]	1.68**	1.63	1.72
	EMC by 2002	–	–	–
	EMC by 2006	0.95**	0.92	0.99
	EMC by 2010	0.98	0.94	1.02
Israel	EMC	1.43**	1.25	1.64
	EMC by 2002	–	–	–
	EMC by 2006	1.07	0.88	1.30
	EMC by 2010	1.11	0.90	1.35
North America				
USA	EMC	1.88**	1.65	2.14
	EMC by 2002	–	–	–
	EMC by 2006	1.05	0.86	1.28
	EMC by 2010	0.93	0.78	1.11
Canada	EMC	1.77**	1.53	2.03
	EMC by 2002	–	–	–
	EMC by 2006	1.06	0.87	1.27
	EMC by 2010	1.00	0.85	1.18
North Europe				
Denmark	EMC	1.41**	1.22	1.63
	EMC by 2002	–	–	–
	EMC by 2006	1.31**	1.07	1.61
	EMC by 2010	1.11	0.89	1.38
England	EMC	1.82**	1.61	2.06
	EMC by 2002	–	–	–
	EMC by 2006	1.08	0.89	1.30
	EMC by 2010	1.05	0.85	1.29
Estonia	EMC	1.33**	1.15	1.54
	EMC by 2002	–	–	–
	EMC by 2006	1.12	0.92	1.37
	EMC by 2010	1.03	0.84	1.26
Finland	EMC	1.49**	1.30	1.71
	EMC by 2002	–	–	–
	EMC by 2006	0.90	0.74	1.09
	EMC by 2010	0.99	0.82	1.19
Ireland	EMC	1.65**	1.38	1.97
	EMC by 2002	–	–	–
	EMC by 2006	0.92	0.74	1.15
	EMC by 2010	1.17	0.93	1.48
Latvia	EMC	1.71**	1.42	2.07
	EMC by 2002	–	–	–
	EMC by 2006	1.05	0.83	1.34
	EMC by 2010	0.98	0.77	1.24
Lithuania	EMC	2.12**	1.83	2.46
	EMC by 2002	–	–	–
	EMC by 2006	0.63**	0.51	0.78
	EMC by 2010	0.64**	0.52	0.79
Scotland	EMC	1.89**	1.64	2.19
	EMC by 2002	–	–	–
	EMC by 2006	0.86	0.71	1.04
	EMC by 2010	0.99	0.81	1.20
Sweden	EMC	1.78**	1.53	2.07
	EMC by 2002	–	–	–
	EMC by 2006	0.85	0.69	1.05
	EMC by 2010	0.85	0.70	1.03
Wales	EMC	1.78**	1.54	2.06
	EMC by 2002	–	–	–
	EMC by 2006	0.89	0.73	1.09
	EMC by 2010	0.93	0.76	1.13
Central & Eastern Europe				
Croatia	EMC	1.33**	1.16	1.53
	EMC by 2002	–	–	–
	EMC by 2006	1.26*	1.04	1.52
	EMC by 2010	1.17*	0.98	1.40
Czech Republic	EMC	1.72**	1.50	1.98
	EMC by 2002	–	–	–
	EMC by 2006	0.89	0.74	1.08
	EMC by 2010	0.91	0.75	1.10
Macedonia	EMC	1.32**	1.14	1.53
	EMC by 2002	–	–	–
	EMC by 2006	1.23*	1.01	1.49
	EMC by 2010	1.32**	1.06	1.64
Poland	EMC	1.87**	1.62	2.15
	EMC by 2002	–	–	–
	EMC by 2006	0.86	0.71	1.04
	EMC by 2010	0.84	0.69	1.03
Russia	EMC	1.42**	1.28	1.57
	EMC by 2002	–	–	–
	EMC by 2006	0.96	0.82	1.11
	EMC by 2010	0.94	0.79	1.12
Ukraine	EMC	1.38**	1.18	1.63
	EMC by 2002	–	–	–
	EMC by 2006	1.18	0.96	1.47
	EMC by 2010	1.03	0.84	1.27
South Europe				
Italy	EMC	1.83**	1.59	2.10
	EMC by 2002	–	–	–
	EMC by 2006	0.93	0.77	1.14
	EMC by 2010	0.95	0.79	1.15
Portugal	EMC	1.72**	1.41	2.10
	EMC by 2002	–	–	–
	EMC by 2006	1.08	0.85	1.38
	EMC by 2010	1.16	0.91	1.49
West Europe				
Austria	EMC	2.14**	1.81	2.54
	EMC by 2002	–	–	–
	EMC by 2006	0.98	0.78	1.22
	EMC by 2010	0.87	0.70	1.09
Flemish-speaking Belgium (FL)	EMC	1.76**	1.56	1.99
	EMC by 2002	–	–	–
	EMC by 2006	1.04	0.86	1.25
	EMC by 2010	0.85	0.70	1.03
French-speaking Belgium (FR)	EMC	1.52**	1.29	1.78
	EMC by 2002	–	–	–
	EMC by 2006	1.04	0.83	1.29
	EMC by 2010	1.17	0.93	1.46
France	EMC	1.66**	1.44	1.92
	EMC by 2002	–	–	–
	EMC by 2006	0.99	0.83	1.19
	EMC by 2010	1.26**	1.05	1.51
Germany	EMC	1.83**	1.60	2.10
	EMC by 2002	–	–	–
	EMC by 2006	0.82*	0.69	0.98
	EMC by 2010	1.08	0.90	1.31
The Netherlands	EMC	1.5**	1.25	1.78
	EMC by 2002	–	–	–
	EMC by 2006	1.12	0.89	1.41
	EMC by 2010	1.12	0.88	1.41
Switzerland	EMC	2.25**	1.94	2.60
	EMC by 2002	–	–	–
	EMC by 2006	0.76**	0.63	0.93
	EMC by 2010	0.82*	0.68	0.99

a: EMC, electronic media communication.
b: First block introduced: year of survey, gender, age category, presence of computer at home, number of close friends of the same sex, number of close friends of the opposite sex (Nagelkerke R^2 ranged from 0.06 to 0.22). Second block introduced: EMC (Nagelkerke R^2 ranged from 0.07 to 0.23). Third block introduced: EMC by Year (Nagelkerke R^2 ranged from 0.07 to 0.23).
c: For ALL (all regions combined), the ORs for the full model have been presented, for individual regions only the ORs for the variable EMC and its interaction with survey year have been presented.
d: OR for the predictors varied differently between countries were year of survey ranged from 0.42 to 1.44, gender 0.96–1.97 age category 0.91–3.21, presence of computer at home 0.78–1.43, number of close friends of the same sex 0.76–1.17, number of close friends of the opposite sex 1.35–1.84.
e: Only the predictors of EMC and the interaction for EMC by year, under the third block as presented.
*$P < 0.05$.
**$P < 0.01$.

Western European regions between 2002, 06 and 10. Similar trends were reported in Southern Europe and in some Central and Eastern European regions. Some Northern European regions showed increase mostly between 2002 and 06.

In spite of the general growth of EMC within the regions, mixed trends were observed in some regions, for example, in Canada. No significant change across years and with age was found for Wales (at age 11), Germany (at age 11) and Canada (at age 13).

In the general model, hierarchical logistic regression analyses were carried out for all regions together, including all the control variables and EMC, and the EMC interaction by year (see table 2: ALL). With respect to the association between EMC and ease of communication with friends, across all regions, the higher the frequency of EMC, the easier the communication with friends of the opposite sex.

Communication with the opposite sex was shown to be significantly easier in 2006 compared with 2002, if you were: older, had a computer in the house, had more friends of the opposite sex and made use of EMC. Finally, although the predictor EMC by year overall was not found to be significant ($P = 0.06$); however, the interaction did show a significant OR (0.96) for 2006 compared with 2002.

Furthermore, the same model was applied for each region (table 2). While EMC is positively associated with ease of communication with friends of the opposite sex in all of the regions, in 23 regions (out of 30) the interaction with year was not significant. The only seven regions with significant interaction between EMC and year (compared with 2002) were Lithuania, Croatia, Macedonia, Switzerland, Denmark, Germany and France.

Discussion

The first aim of this study was to describe the trends of EMC in a cross-regional sample of 11-, 13- and 15-year-olds. Findings indicate that EMC is widely used among adolescents in European and North American regions. EMC is more frequently used among 15-year-olds than 11-year-olds. Growth in EMC between 2002 and 10 was observed in the majority of regions included in the study as can be seen in previous research.[16,17] With the appearance of smartphones and the growing popularity of social virtual networks,[18] it is understandable that the use of EMC is increased.

The second aim of the study was to investigate the relationship between EMC and ease of communication with friends of the opposite sex. It was found that the more teenagers use EMC, the easier it is for them to talk to friends of the opposite sex. This finding is supported by other studies showing that EMC helps teenagers to develop better social skills, which in turn helps them to expand and strengthen their peer group.[18] It has been suggested that the lack of eye contact and possible invisibility, that characterize EMC, help teenagers to communicate more freely about personal issues.[19]

The third aim of this study was to investigate whether the interaction between EMC and the ease of communication with the opposite sex had changed over the years (2002–10). The general model showed no influence of year on the interaction between EMC and ease of communication with friends of the opposite sex, except for the years 2002–06. The analysis that investigated each region suggested only seven regions (out of 30) with significant influence of year on the interaction between EMC and ease of communication. It is possible that the emergence of social networks during that period (e.g. Facebook in 2004) influenced the association between EMC and ease of communication with friends of the opposite sex.

Findings presented in this article must be considered in the context of the study's general strengths and limitations, which are discussed elsewhere in this supplement. A specific limitation of this study is that the EMC measure combines various forms of EMC hence the unique contribution of individual types of EMC cannot be explored. Further research should elaborate on the forms of EMC and test each one individually. Nevertheless, the results suggest no influence of year on the interaction between EMC and ease of communication with friends of the opposite sex. Meaning that, despite the growth in EMC, communication with friends appears to remain stable over the years with no apparent negative influence of EMC. This finding contradicts research that suggests that EMC contributes to loneliness and isolation[20] and supports other studies that present electronic media as a powerful tool for helping people to connect.[4,15]

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Conflicts of interest: None declared.

Key points

- Adolescent EMC has grown over the years and increases with age.
- Adolescent who use EMC more frequently finds it easier to talk with friends of the opposite sex.
- This study indicates that Electronic Media can be a powerful tool for helping adolescents to connect.

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