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EXPOSURE TO ONLINE SEXUAL MATERIALS AND CROSS-COUNTRY DIFFERENCES IN EUROPE

ANNA ŠEVČÍKOVÁ, JAN ŠEREK AND HANA MACHÁČKOVÁ
Institute for Research on Children, Youth and Family
Masaryk University, Czech Republic

Abstract. This study examined individual-level factors and country-level factors which predict exposure to online sexual materials (EOSM) among European children. The sample consisted of children aged 11-15 years (N=12,472) who were surveyed within the project EU Kids Online II. A cross-cultural comparison has shown that the country-level factors accounted for 11 % of the variation in EOSM within the European sample. However, neither broadband penetration, nor religious faith were significant as studied country-level factors, while all individual-level predictors such as advanced age, being male, increased amount of time spent online, emotional problems, sensation seeking, and excessive internet use predicted EOSM. On the other hand, gender had a different effect on EOSM at the cross-country level. The countries with higher rates of exposure indicated lower gender differences in EOSM. The implications of the findings are discussed.

1. Introduction

The expansion of the internet into the bedrooms of children has raised concerns regarding the nature of some of its contents. In particular, these concerns deal with exposure to online sexual materials (EOSM) at a young age as this can negatively affect children´s attitudes towards sex or sexual well-being (Brown and L´Engle, 2009; Peter and Valkenburg, 2006, 2007).

Even though this concern is present in most of the modern countries, a recent cross-national research on 25 European countries has shown differences in prevalence of EOSM among young internet users. For instance, the highest rates of EOSM were found in Norway where 34% of children at age 9-16 years saw sexual images on websites, while the lowest prevalence was documented in Germany with 4% of children reporting EOSM (Livingstone, Haddon, Görzig, and Ólafsson, 2011).

Previous studies provide evidence that children with more psychological difficulties and risk factors are more likely to experience EOSM (Peter and Valkenburg, 2006; Wolak, Mitchell, and Finkelhor, 2007; Ybarra and Mitchell, 2005). Children suffering from depression (Ybarra and Mitchell, 2005), who scored higher on impulsiveness (Wolak et al. 2007) and sensation seeking (Peter and Valkenburg, 2006) seem to be more vulnerable to seeing sexual images online. Also, an increased time

spent online has been found to predict EOSM (Mesch, 2009; Mitchell Finkelhor, and Wolak, 2003). Within the perspective of psychological difficulties and risk factors, higher frequency of internet use can be a manifestation of excessive internet use, i.e. pathological internet use (Young, 1998).

Considering the relation of cross-national differences in EOSM and psychological difficulties/risk factors as the predictors of EOSM, there are few explanations why children with psychological difficulties and risk factors might differ in their prevalence across countries. For instance, a lower standard of living which varies across countries has been found to affect children´s well-being (Gallo and Matthews, 2003). However, focusing on the European context from where comparative data are available, an analysis of EOSM across 25 European countries provides evidence that children's EOSM seems to be highest in Nordic countries and some Eastern European countries, and lowest in Southern Europe and predominantly Catholic countries (Livingstone et al. 2011). This indicates that some cultural specifics other than standard of living may be behind the differences in the rate of EOSM across Europe.

COUNTRY-LEVEL CHARACTERISTICS IN RELATION TO VARIABILITY OF EOSM

Considering previous research, the North, the East and the South of Europe differ in the level of internet use and internet access (Eurostat, 2009; Livingstone et al. 2011). For instance, South Europe is known for lower internet penetration in comparison to Nordic countries and some Eastern countries, among which particularly Estonia and the Czech Republic have experienced rapid growth of internet penetration (Internet World Stats, 2011). In relation to EOSM, the expansion of broadband penetration may be related to the extent of EOSM as high speed internet connections allow access to a relatively large amount of data in a short time, including sexual images. Therefore, we hypothesize that broadband penetration rates might help explain the cross-country differences in EOSM.

Furthermore, the findings have shown that lower EOSM was found in the Southern catholic European countries. In general, it is known that religiosity varies across European countries (EVS, 2008) and, at the same time, it has a regulatory effect on sexual behavior. For instance, higher religiosity delays sexual development (Hardy and Raffaelli, 2003). In terms of EOSM, children with lower religiosity have been found to be more likely to see sexual images online (Mesch, 2009). Therefore, we hypothesize that religious faith may contribute to the differences in EOSM in Europe.

Finally, Nordic countries are known for progressive gender role attitudes (e.g. Sjöberg, 2004). Considering strong evidence for gender differences in EOSM in the fact that more boys have seen sexual images on the internet than girls (Mesch, 2009; Peter and Valkenburg, 2006; Wolak et al. 2007), we hypothesize that in countries with liberal sexual norms women might be more sexually empowered and thus more active in seeking sexual stimulations (see Clement, Schmidt, and Kruse, 1984). With this in mind, we expect that countries with lower gender differences in EOSM might have higher rates of EOSM than countries with greater gender differences.

To sum up, the study aimed to examine to what extent cultural specifics might explain variations in EOSM across Europe and to identify country-level factors that could be responsible for these national differences. Considering the important role of

psychological difficulties and risk factors in EOSM, emotional problems, sensation seeking and excessive internet use were also included in the analyses. Demographic characteristics such as age and gender were controlled as well.

2. Methods

PARTICIPANTS

The present study used data from the international research project EU Kids Online II, which aimed to enhance the knowledge of European children's and parents' experiences and practices regarding risky and safer use of the internet and new online technologies. This study was conducted during April/October 2010 across 25 European countries, where 25 142 children (50% girls) aged 9-16 years were interviewed together with their parents. The representative samples of the countries were stratified by region and level of urbanization. Addresses of households were selected randomly by using Random Walk procedures in most countries. In a small number of countries an alternative random-selection approach to recruitment was adopted. At each address, one child was randomly selected from all eligible children in the household (i.e. all those aged 9-16 who use the internet). More detailed information about the recruitment is available at http://www2.lse.ac.uk/media@lse/research/EUKidsOnline/EUKidsII%20(2009-11)/Survey/Technical%20report.PDF. In our study we focused only on young adolescents aged 11-15 years (N=12,472) who answered all the analyzed questions. Additionally, the sample was reduced from the original 25 to 20 European countries due to the missing values of utilized country-level factors.

PROCEDURE

Data gathering was performed via a survey, which was preceded by instructions and two rounds of testing that the children understand. The professional agency Ipsos MORI provided support for designing the questionnaire and cooperated with local fieldwork agencies to ensure that a unified, standard approach was used in each country. Data was collected at children´s homes where one child (together with one parent) was interviewed. The whole research was conducted in line with ESOMAR ethical guidelines and approved by the LSE Research Ethic Committee. Confidentiality and anonymity were guaranteed and all the information and questions were stated and explained to parents and children in an age-appropriate way and in the local language.

MEASURES

Exposure to online sexual materials. This variable was measured using two filter questions: (1) "In the past year, you have seen lots of different images. Some of these might be sexual. Have you seen anything of this kind in the past 12 months?" indicating general exposure (see Table 1) and (2) "Have you seen these kind of things on any websites in the past 12 months?". These items examined the occurrence of exposure

(Yes or No). Children who answered "yes" on both the questions were identified as those having experience with EOSM.

Frequency of internet use. Next, how often adolescents used internet was assessed. Respondents were asked: "How often do you use the internet?" with possible answers being: "less than once a month" (= 1), "once or twice a month" (= 2), "once or twice a week" (= 3), "every day or almost every day" (= 4). This scale was treated as continuous, higher scores indicating more frequent internet use.

Emotional problems. The participants were also asked a set of questions that dealt with emotional problems which were derived from the Strength and Difficulty Questionnaire (Goodman, Ford, Simmons, Gatward, and Meltzer, 2003). The variable included 6 items using a 3-point Likert scale from "not true" (1), "a bit true" (2), to "very true" (3). The questions addressed problems such as a) having a lot of headaches, stomach-aches or sickness, b) being very angry and often losing temper, c) often feeling unhappy, sad or tearful, d) being nervous in new situations and easily losing confidence, e) being easily distracted and finding it difficult to concentrate, and f) having many fears, being easily scared. The scale scores were computed by averaging the items; a higher score indicated greater emotional problems. The scale was internally consistent (α=.65).

Sensation seeking. To assess the extent of sensation seeking, the items suggested by Stephenson, Hoyle, Palmgreen, and Slater (2003) were adopted. Participants were asked: "I do dangerous things for fun", "I do exciting things, even if they are dangerous". These were answered on a scale ranging from "not true" (1), "a bit true" (2) or "very true" (3). Scale scores were computed by averaging the items and a higher score indicated more sensation seeking. The scale was internally consistent (α=.76).

Excessive internet use. This variable was measured by using a five-item scale with a four-point response scale (from "never" (1) to "very often" (4)). The participants were asked how often, in the past 12 months, they had gone without eating or sleeping because of the internet, how often they felt bothered when they could not be online, how often they caught themselves surfing when they had not really been interested, whether they dedicated less time to their family, friends or schoolwork because of the time spent on the internet, and whether they tried to spend less time on the internet without success. These five items were derived from the ten item version of the scale (see Šmahel, Vondrácková, Blinka, and Godoy-Etcheverry, 2009) using the concept of behavioral addiction developed by Griffiths (2000). The scale covers five proposed criteria: salience, mood modifications, tolerance, conflicts, time restriction. Scale scores were computed by averaging the items; a higher score indicated more problematic internet use. The scale was internally consistent (α=.75).

Country-level indicators.

Broadband penetration. This factor indicates the percentage of European households using broadband connection in 2009. The data was obtained from EUROSTAT (see http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=tsiir150&plugin=1).

Religious faith. This factor indicates the percentage of religious people within the European countries that was assessed by the European Value Study in 2008 (see http://www.europeanvaluesstudy.eu/)
See Table 1 for a more detailed description of the variables.

Table 1. Variable description within European sample

	Europe (N=9,664)		
	M (SD)	Range	%
Gender (girls)			50.0
Age	12.99(1.41)	11/15	
Frequency of Internet use	3.66 (.59)	1/4	
Emotional problems	1.42 (.36)	1/3	
Sensation seeking	1.69 (1.02)	1/3	
Excessive internet use	1.44 (.51)	1/4	
Broadband	53.50(14.53)	24.00/77.00	
Religion	22.90(19.99)	6.90/82.20	

DATA ANALYSIS

We used the multilevel modeling approach with random effects to examine the relevance of individual and contextual influences when predicting EOSM. Data from 20 European countries was used. Multilevel analysis is an extension of simple regression analysis and assumes that the studied people are divided into groups with both individual- and group-level predictors explaining the variance in individual-level outcomes. In our dataset, children were divided into twenty countries; thus a two-level model with individual (level-1) and country (level-2) variables was employed. Since the outcome variable was dichotomous in our case, a model assuming Bernoulli distribution and using the logistic link function on the individual level was estimated (Hox, 2002; Raudenbush, Bryk, Cheong, Congdon, and du Toit, 2004). Three multilevel models were estimated in total. The level-1 part was identical for all three models, and it comprised the six above-mentioned individual-level predictors:

$$\text{Log}(p_{ij}/(1-p_{ij})) = \beta_{0j} + \beta_{1j}(\text{Gender})_{ij} + \beta_{2j}(\text{Age})_{ij} + \beta_{3j}(\text{Frequency})_{ij} + \beta_{4j}(\text{EMO})_{ij} + \beta_{5j}(\text{Sensation Seeking})_{ij} + \beta_{6j}(\text{Addiction})_{ij}$$

where p was the probability that the child i from the country j had seen on-line sexual images, β_{0j} was the intercept for the country j, and other βs were regression coefficients for the given predictors. However, the models differed in their specification of the level-2 parts. The first model (Model 1) assumed that children from different countries have different initial log-odds of EOSM. Therefore, a random intercept (u_{0j}) was included to account for the inter-country variation. Individual-level regression coefficients were assumed to be the same across countries, and no country-level predictors were included:

$\beta_{0j} = \gamma_{00} + u_{0j}$,
$\beta_{1j} = \gamma^{10}$, $\beta_{2j} = \gamma_{20}, \ldots, \beta_{6j} = \gamma_{60}$.

Next, two country-level predictors (broadband penetration and religion) were added (Model 2). Therefore the intercept part of the level-2 model changed to:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{Broadband})_j + \gamma_{02}(\text{Religiosity})_j + u_{0j}$$

where γ_{01} and γ_{02} were regression coefficients for country-level predictors. Finally, we tested whether the effect of gender on EOSM varied across the countries (Model 3). Thus, we added a random slope for gender (u_{1j}) to the model:

$$\beta_{1j} = \gamma_{10} + u_{1j}.$$

The models were estimated using the restricted penalized quasi-likelihood estimation procedure in HLM for Windows 6.08. For the sake of easier interpretation, gender (female = 0; male = 1) and age (age 11 = 0; age 12 = 1; etc.) variables were added to all analyses as uncentered, while all other predictors were grand-mean centered before the analysis. This was done after the list-wise exclusion of missing data from all analyses (except description of prevalence of EOSM in Table 2).

3. Results

First we performed a basic comparison of the prevalence among children in Europe (see Table 2). The results show that Czech internet users have the highest EOSM (33,8%), while the lowest EOSM was reported by children from Germany (4,9%).

In the next step, we conducted a multilevel regression analysis predicting the odds of being exposed to sexual materials on the internet (vs. not being exposed) in 20 European countries. The results are presented in Table 3.

In Model l, the intercept tells us that an "average" girl from an "average" European country had .08 odds of EOSM. All individual-level predictors significantly predicted the children's EOSM. Being a boy increased the odds 1.38 times. With advancing age, the odds increased 1.45 times for every additional year of age. The odds also increased with greater frequency of internet use, emotional problems, sensation seeking, and excessive internet use (see odds ratios in Table 3).

The random part of the model indicated that children from different countries significantly differed in their EOSM, and this could not be attributed to individual-level predictors. Since the outcome variable was dichotomous, it was not possible to simply compute the percentage of its variance which was attributable to the country level. However, there are at least two ways to deal with this problem. First, a median odds ratio (MOR) can be computed. If we repeatedly randomly choose two children from different countries who have the same covariates and compute the odds ratios between the person of higher and the person of lower propensity, the MOR is the median of these odds ratios. MOR can be equal to or higher than 1, with a MOR of 1 meaning no

inter-country variation (Larsen and Merlo, 2005). The MOR of our model was 1.84, which meant that children from different countries considerably differed in their EOSM. The second way is based on assuming that the dichotomous outcome variable arises from an underlying continuous variable. Since we know its variance ($\sigma_e 2 = \pi^2/3$ for the standard logistic distribution), we can easily compute the ratio between the country-level and total variance (Goldstein, Browne, and Rasbash, 2002). For our data, $\sigma u02 / (\sigma_{u0}2 + \sigma_e 2) = .11$, meaning that country-level differences accounted for 11 % of the variation in EOSM.

Table 2. Sample description and basic variable frequency

Country	N	Percent of females	Exposure on the Internet
Austria	605	49.4	18.0
Belgium	596	50.8	20.4
Bulgaria	685	49.1	22.5
Cyprus	555	50.7	12.5
Czech Republic	610	50.2	33.8
Germany	626	46.0	4.9
Denmark	666	54.5	30.0
Estonia	612	49.4	33.4
Greece	501	43.7	17.7
Spain	678	47.1	10.0
Finland	686	51.9	29.3
France	543	52.3	25.0
Hungary	648	50.7	13.4
Ireland	675	50.0	12.0
Lithuania	603	49.7	28.1
Netherlands	665	53.7	28.0
Poland	668	47.6	15.0
Portugal	574	50.3	16.8
Romania	653	50.1	22.9
Slovenia	623	50.6	22.9
Total	12,472	49.9	20.6

Note. All results in this table are displayed with "country weight" except for N, which is the actual number of respondents in each country.

Table 3. Multilevel regression with Exposure to sexual materials on the internet as the dependent dichotomous variable (unit-specific models)

	Model 1			Model 2			Model 3	
	B (SE)	*OR*	*95% CI*	*B (SE)*	*OR*	*95% CI*	*B (SE)*	*OR*
Fixed effect								
Level-1 variables								
Intercept	-2.56(.16)**			-2.56(.16)**			-2.56(.16)**	
Gender (male)	.32(.06)**	1.38	(1.23-1.55)	.32(.06)**	1.38	(1.23-1.55)	.32(.08)**	1.38
Age	.37(.02)**	1.45	(1.40-1.52)	.37(.02)**	1.45	(1.40-1.52)	.38(.02)**	1.46
Frequency	.39(.06)**	1.47	(1.30-1.66)	.38(.06)**	1.47	(1.30-1.66)	.38(.06)**	1.46
Emotional problems	.39(.08)**	1.47	(1.26-1.73)	.39(.08)**	1.47	(1.26-1.73)	.39(.08)**	1.47
Sensation seeking	.37(.03)**	1.45	(1.38-1.53)	.37(.03)**	1.45	(1.38-1.53)	.37(.03)**	1.45
Excessive internet use	.73(.05)**	2.07	(1.86-2.30)	.73(.05)**	2.07	(1.86-2.30)	.73(.05)**	2.08
Level-2 variables								
Broadband		-		-.01(.01)	.99	(.96-1.02)		-
Religiosity		-		-.01(.01)	.99	(.97-1.01)		-
Random effect								
$\sigma_{u0}2$		.41**			.42**			.42**
$\sigma_{u1}2$		-			-			.07*

Note. B = unstandardized regression coefficient. SE = standard error. OR = odds ratio. CI = confidence interval for OR. $\sigma_{u0}2$ = inter-country variance. $\sigma_{u1}2$ = random slope variance (gender). N = 9,664.
** $p < .001$.
* $p < .01$.

None of the country-level predictors were able to explain the inter-country differences in the participants' EOSM. As can be seen in Model 2, the predictors of broadband penetration and religiosity were both non-significant and only had a negligible effect on the odds of being exposed[1].

However, we found that the countries differed significantly in the effect of gender. In some countries, gender mattered more than in others when predicting EOSM – this follows from the fact that the regression coefficients for gender significantly varied across countries (variance .07 and standard deviation .27; see Model 3). Assuming that the coefficients are normally distributed, we can expect that in 67 % of countries the regression coefficient lied between .32 ± .27, i.e. from .05 to .59. Obviously, the gender effect ranged from none to considerable. Moreover, tau correlation between random slopes and random intercepts was found to be -.22. This suggests that in countries with higher average EOSM, gender mattered moderately less than in the countries with lower average EOSM.

4. Discussion

This study has shown that all individual-level predictors, including demographic characteristics of children, frequency of internet use, psychosocial difficulties, and risk factors were significant, while culture-level predictors such as broadband and religiosity could not explain the country difference in EOSM. However, it has been found that in countries with greater average EOSM gender mattered moderately less than in countries with lower average EOSM.

The findings on individual-level predictors are in line with prior research in that older children tend to consume sexual contents online more often than younger internet users (Mitchell et al. 2003; Wolak et al. 2007; Ybarra and Mitchell, 2005). This might be given in relation to psychosexual development: one's interest in sexuality increases with age. Furthermore, the results are also consistent with previous studies documenting that boys are more likely to see sexual images on the internet than girls (Mesch, 2009; Wolak et al. 2007). The observed gender differences might be related to the differences in socialization of boys; interest in sexuality is generally supported among boys and the social status of boys in male peer groups is influenced by their knowledge of sexuality, which may increase their need to consume sexual materials on the internet (Macek, 2003).

Also, frequency of internet use as a significant predictor of EOSM has been documented in similar studies on exposure to sexual materials on the internet (Mesch, 2009; Mitchell et al. 2003). Increased time spent online may be a manifestation of pathological/excessive internet use on one hand. On the other hand, EOSM may be an

[1] Since the country-level predictors appeared to be insignificant, we tested several other predictors for explorative purposes. They were added to the model "two-by-two" to keep a reasonable ratio between the number of predictors in the model and the number of cases on the second level (N=20). These predictors were: internet usage (Eurostat), percentage of young people who have had sexual intercourse (Unicef), ICT Development Index (ITU), percentage of young people living in single-parent family structures (Unicef). None of them was found to have a significant effect.

outcome of non-problematic internet use, since malicious software may cause sexual images to unexpectedly popup on the (whole) screen (Wolak, Mitchell and Finkelhor, 2006).

The study confirms on the cross-national sample that vulnerable children, facing emotional problems, increased sensation seeking and excessive internet use, are more likely to experience EOSM (see Peter and Valkenburg, 2006; Wolak et al.; Ybarra and Mitchell, 2005) which again raises the question of how to protect vulnerable children from the risk of EOSM and at the same time to allow/empower them to profit from the opportunities that the internet brings.

Although the country-level factors accounted for 11 % of the variation in EOSM within this cross-country sample, none of the studied cross-national-level indicators significantly explained the differences in EOSM. This indicates the complexity of EOSM and that further research is needed. Even the findings that in countries with greater average EOSM gender mattered moderately less than in countries with lower average EOSM should be interpreted with caution. In the introduction we suggested that this could advert to the gender-related cultural specifics of studied countries. In those cultures where gender differences in EOSM are less distinct, girls might be more empowered in their sexually-related activities on the internet, which in turn could increase the occurrence of EOSM in general. However, this cultural interpretation of the gender effect on EOSM could also be clarified by another relevant explanation. Previous research work has shown that gender differences appear in the context of wanted - intentional EOSM while these differences disappear when examining unwanted EOSM among young internet users (Mitchell et al. 2003; Wolak et al. 2007). Then the finding of the present study might indicate that greater average EOSM in some countries could be rather the outcome of unwanted – unintentional EOSM than the result of progressed gender role attitudes.

Therefore, the study suggests the need to reflect a type and place of EOSM when exploring cultural indicators which could explain differences in the rates of EOSM. Specifically, it might be important to consider how internet usage patterns may affect a type of EOSM; whether EOSM occurs intentionally (visiting X-rated websites) or unintentionally (pop-up advertisements) or whether it occurs in a private setting (computers in bedrooms) or in public (computers in living rooms or schools). All such information related to EOSM may help in identifying country-level indicators responsible for the observed national differences.

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