



Does country context matter? Investigating the predictors of teen sexting across Europe [☆]



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ABSTRACT

Despite growing research interest in sexting, not much is known about individual and country differences in engaging in sexting. Therefore, the aims of this study were to investigate (a) which individual and country characteristics explain sexting and (b) whether individual predictors vary across countries. On the individual level, we investigated age, gender, sensation seeking, and internet use. On the country level, we investigated traditionalism, gross domestic product, and broadband internet penetration. The sample consisted of 14,946 adolescents (49.7% boys) aged 11–16 from 20 European countries. Data were collected as part of the EU Kids Online project. Participants were interviewed at home. Using multilevel modeling, findings indicate that on the individual level, age, sensation seeking, and frequency of internet use predicted sexting across all countries. Gender differences in sexting varied across countries. Although country characteristics (GDP, broadband internet penetration, traditional values) had no direct effect on adolescent sexting, traditionalism significantly predicted gender differences in sexting. In more traditional countries, gender differences were more pronounced than in less traditional countries, with more boys than girls engaging in sexting. In less traditional countries, gender differences were smaller.

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1. Introduction

Sexting – the sending or posting of sexual photos or messages via electronic devices – has received considerable attention from media and researchers. Although the term originally derived from sending sexual pictures via mobile phones, it has recently been used more broadly as sending or posting sexual messages via any electronic device (Wolak & Finkelhor, 2011). This is due to the increasing convergence of the internet with mobile phones (e.g. smartphones) which makes a distinction between internet and mobile phones difficult.

Studies investigating this phenomenon have mainly investigated the prevalence of this behavior, as well as age and gender as predictors of sexting. The prevalence rates of these studies differ highly, ranging from 2% to 20% (Livingstone, Haddon, Görzig, & Olafsson, 2011a; Mitchell, Finkelhor, Jones, & Wolak, 2012; The National Campaign to Prevent Teen and Unplanned Pregnancy, 2009). Concerning the predictors of sexting, studies conclude that older adolescents are more likely to sext than younger adolescents

(Lenhart, 2009; Livingstone et al., 2011a; Mitchell et al., 2012). Findings on gender differences, however, are inconclusive. While some studies reported no gender differences in sexting (Hinduja & Patchin, 2010; Lenhart, 2009), other studies found that more boys than girls send sexts (Baumgartner, Valkenburg, & Peter, 2010; de Graaf, Meijer, Poelman, & Vanwesenbeeck, 2005; Dowdell, Burgess, & Flores, 2011). Some few studies also reported that more girls than boys engage in sexting (Mitchell et al., 2012; The National Campaign to Prevent Teen and Unplanned Pregnancy, 2009).

The differences in prevalence and predictors of sexting, particularly gender differences, may partly result from characteristics of the country in which the studies have been conducted. The vast majority of studies on sexting investigated this behavior in one specific country, while cross-national comparisons are widely missing. As a result, contextual factors on the country level have often been ignored. However, taking the country context into consideration is important for at least two reasons. First, the differences in prevalence and frequency of sexting across countries may be due to specific characteristics of a country. For example, in countries with higher internet penetration, adolescents may have more opportunities to engage in this behavior. Second, predictors of sexting may vary across countries. Whereas in some countries, specific individual predictors have a strong influence on sexting due to

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characteristics that these countries share, the same factors may have no or only a weak influence in other countries where the particular characteristics are absent. Investigating contextual factors next to individual factors across different countries may thus provide a more comprehensive picture of youth sexting.

The present study employs data from the EU Kids Online II project, including 14,946 11- to 16-year-old adolescents from 20 European countries. This dataset provides a unique opportunity to study sexting from a cross-national perspective. More specifically, the aim of this study is to investigate which factors on the individual and the contextual level explain why adolescents engage in sexting. On the individual level, we investigate age, gender, and sensation seeking. On the contextual level, we investigate traditional values. Frequency of internet use, gross domestic product and broadband internet penetration are included as control variables. Moreover, the study investigates whether individual predictors vary across countries and whether this can be explained by characteristics of the country.

1.1. Individual level predictors of sexting

Although in many countries only a minority of adolescents engages in sexting (Lenhart, 2009; Livingstone & Görzig, 2012; Livingstone et al., 2011a), it is important to identify these adolescents to be able to effectively prevent this behavior. Whether an adolescent engages in sexting is at least partly determined by specific individual characteristics. To date, age and gender are the most frequently studied predictors of sexting. Studies consistently report that older adolescents (aged 16 and 17) are more likely to engage in sexting than younger adolescents (aged 12–15). This is the case in the U.S. (Lenhart, 2009; Mitchell et al., 2012; The National Campaign to Prevent Teen and Unplanned Pregnancy, 2009) and in Europe (Livingstone et al., 2011a). For example, Lenhart (2009) showed that in a national representative sample, 8% of the 17-year olds but only 4% of the 12-year olds send sexts. The increase in sexting behaviors during this age period may be explained by the strong increase in sexual interest during this period (DeLamater & Friedrich, 2002) as well as with an increased use of the internet and mobile phones (Lenhart, Madden, & Hitlin, 2005; Livingstone et al., 2011a). Mid- and late-adolescents (aged 14–17) are much more interested in sexuality than early adolescents (aged 12 and 13). In addition, older adolescents use the internet more and may be less supervised in their use by parents. They may thus have more opportunities to engage in sexting.

Gender differences in sexting are less conclusive. Although typically more boys than girls use the Internet to satisfy their sexual interests (e.g. by using sexually explicit internet material) (Peter & Valkenburg, 2011), the results on gender differences in sexting are mixed. In the US, Mitchell et al. (2012) reported that more girls than boys send sexts (Mitchell et al., 2012). Several other studies reported no gender differences (Hinduja & Patchin, 2010; Lenhart, 2009). In a qualitative study, Ringrose, Gille, Livingstone, and Harvey (2012) examined the meanings of sexting for boys and girls. They found that in the case of sexting as with many types of sexual behavior a strong double-standard prevailed. Boys frequently pressured girls into sending sexual pictures, but for girls sending these sexual messages was not approved of by other girls and boys. In contrast, it was perceived as normal for boys to produce and show off with these images of themselves (Ringrose et al., 2012).

In addition to age and gender, psychological characteristics of youth may determine their sexting behavior. One of the most consistent predictors of adolescents' online and offline sexual behavior is sensation seeking. Individuals with high levels of sensation seeking typically report higher numbers of sexual partners (Bancroft et al., 2004; Donohew et al., 2000), are more likely to engage in

casual sex (Seto, Lalumiere, & Quinsey, 1995), and to have unprotected sex (Kalichman, Heckman, & Kelly, 1996). Sensation seeking has also been related to online sexual behaviors, such as compulsive sexual online behaviors (Cooper, Delmonico, & Burg, 2000), usage of online pornography (Peter & Valkenburg, 2006), and engagement in online sexual risk behavior (Baumgartner, Sumter, Valkenburg, & Peter, 2012). Adolescents with high levels of sensation seeking typically search for stimulations in their lives. They may be willing to send sexting messages because they value the excitement and are not easily scared by potential negative consequences.

1.2. Bringing context in: country differences in sexting

Most studies on the predictors of adolescents' online behavior, and their sexting behavior in particular, solely considered individual characteristics. Although individual factors are important in explaining behavior, there is evidence that also broader contextual variables may influence adolescents' online behavior. In many theories of adolescent development, the social and cultural context in which children grow up has been considered an important determinant of their behavior (Bronfenbrenner, 1979; Igra & Irwin, 1996). However, empirical studies taking the broader context into consideration are largely missing (Kotchick, Shaffer, & Forehand, 2001). To investigate the influence of country characteristics for teen sexting, it is necessary to compare different countries with each other. Comparing sexting across countries provides the opportunity to not only compare prevalence rates across countries but also to explain these country differences with specific country characteristics. Taking country characteristics into consideration thus helps to explain why sexting is more likely to occur in specific countries and less likely to occur in others.

One of the most important country characteristics that may influence sexting behavior are the cultural values that are prevailing in a society. Cultural values shape the daily practices, attitudes, and behaviors of a society (Schwartz & Boehnke, 2004). Values are supported and fortified by institutions, such as schools, families, and media and thereby influence the attitudes and behaviors of individuals within a society (DeLamater, 1981; Sprecher, Hatfield, Cortese, Potapova, & Levitskaya, 1994). In this study, we focus on one specific value, namely traditionalism. According to Schwartz' theory of basic human values, traditionalism is defined as "respect, commitment and acceptance of the customs and ideas that traditional culture or religion provide" (Schwartz, 1994, p. 22).

Traditional countries are characterized by conservative worldviews, unequal gender roles and restrictive sexual attitudes (Boehnke, 2011; Wood & Eagly, 2010). Previous research has shown that risk taking is less prominent in traditional countries (Arnett & Balle-Jensen, 1993; Kloep, Gueney, Cok, & Simsek, 2009). This may be due to the restrictive upbringing of children in traditional cultures (Alwin & Felson, 2010). In particular, in terms of sexuality, traditional countries may strongly restrict adolescents' behavior (Sharabany, Eshel, & Hakim, 2008; Widmer, Treas, & Newcomb, 1998).

Despite the homogeneity of European countries in many aspects, differences in cultural values still persist across these countries (Widmer et al., 1998). In particular, the north-western European countries, such as Sweden, Denmark, and Norway, are characterized by more sexual permissive attitudes (Arnett & Balle-Jensen, 1993; Weinberg, Lottes, & Shaver, 1995) than southern European countries, such as Italy, and some Eastern European countries, such as Poland (Widmer et al., 1998). These value differences are, for example, displayed in different sex education programs at schools (Parker, Wellings, & Lazarus, 2009). Adolescents in traditional countries may thus be less likely to engage in sexual behaviors. It may, therefore, be assumed that sexting is less prevalent in traditional countries.

1.3. Interactions between individual level and country level characteristics

National research on the individual level predictors of sexting typically assumes, at least implicitly, that the effects of these individual factors are generalizable to other countries. Whether this is true, however, has rarely been tested. Country characteristics may not only have a direct effect on adolescents' sexting behavior but they may also moderate the effects of individual predictors on sexting. Due to specific characteristics of a country, some individual characteristics may have a stronger effect on sexting in one country than in another.

Traditional values are strongly related to specific gender roles (Sprecher et al., 1994; Wood & Eagly, 2010). These values determine whether women are subjected to more or less social restrictions concerning the expression of their sexuality (DeLamater, 1981). As a result, countries can be characterized as sexually restrictive (traditional) or sexually permissive (non-traditional). Sexually permissive and restrictive countries have different views concerning gender-appropriate sexual behavior. In sexually restrictive countries, traditional gender roles promote sexual passiveness for women, and dominance and agency for men (Kiefer & Sanchez, 2007; Marston & King, 2006). In these countries, the sexuality of women is subjected to more social restrictions compared to the sexuality of men (Weinberg et al., 1995). In contrast, in more sexual permissive countries, such as in the Scandinavian countries, it is normative for women to express their sexual wishes and desires (Weinberg et al., 1995). In these countries, female sexuality is characterized by more active sexual behaviors of women. Gender differences in sexuality in permissive societies are generally much less pronounced than in traditional, sexually-restrictive societies (Petersen & Hyde, 2010).

It may, therefore, be expected that in less traditional societies, gender differences in sexting are less pronounced than in more traditional countries. This is in line with a recent meta-analysis (Petersen & Hyde, 2010) that found smaller gender differences in sexual behaviors in countries with greater gender equity. In permissive societies, it is more appropriate for adolescent girls to express their sexuality and they may, therefore, be more willing to send sexual messages or pictures. In more traditional countries, this behavior may be perceived as inappropriate for adolescent girls. In these countries, more boys than girls may engage in sexting. Inconsistent gender differences found in previous studies on sexting may at least partly be explained by the traditionalism of a country.

Although the effects of cultural values may be most prominent for culturally determined individual characteristics, such as gender, it may also influence how sensation seeking and age are related to sexting. For example, Arnett (1992) suggests that whether sensation seeking leads to risk behavior among adolescents depends on the social context of these adolescents. Arnett (1992) argues that sensation seeking makes risk behaviors more likely but it is the broader context of the socialization environment including cultural values that determines whether adolescents have the possibility to express this behavior. According to Arnett (1992), societies differ in the degree of restrictiveness they impose on individuals and the range of individual differences that are perceived as acceptable. In restrictive societies, sensation seeking may be expressed to a lesser degree because in these societies adolescents are restricted in their behavior and norms (Arnett, 1992; Arnett & Eisenberg, 2007). It may thus be argued that in traditional countries, which are typically characterized by more restrictive upbringing of children, the influence of sensation seeking on adolescents' sexting behavior is weaker than in countries with a more liberal upbringing.

The same may hold for age differences. In traditional, sexual restrictive countries, teenage sexuality may be perceived as inappropriate. In less traditional countries, teenage sexuality is perceived as part of normal adolescent development and may

therefore be less restricted (Weinberg et al., 1995; Widmer et al., 1998). In these countries, adolescents may thus engage in sexual behaviors at younger ages. Therefore, in these countries age differences in sexting may be less pronounced.

1.4. The present study

Because most previous studies have investigated sexting in one specific country, mainly in the US, it is not clear yet whether the predictors of sexting found in these studies are generalizable to other countries and contexts. The aim of the present study, therefore, was to investigate the predictors of adolescent sexting among 20 European countries. The study thereby examines individual as well as country characteristics that influence sexting.

Based on theoretical reasoning and previous findings we expect that individual characteristics such as age, gender, and sensation seeking have an influence on youth sexting. More specifically, we predict that older adolescents are more likely to engage in sexting. Moreover, we expect that adolescents with higher levels of sensation seeking are more likely to sext. The dominant view in the literature seems to be that individual characteristics are the driving force behind risk behavior. At the same time, we observe a variety in prevalence rates and strength of predictors which might partly reflect national diversity. This diversity calls for an approach in which the context of the study and its participants are taken into account. Thus, in addition to individual factors, we expect that traditionalism as a country characteristic predicts sexting behavior. We assume that sexting is less prevalent in more traditional countries. Finally, this study examines whether the effects of individual characteristics vary across countries. We assume that some of the inconclusive findings reported in previous studies may be explained by contextual factors. In particular, we expect that gender differences are greater in more traditional countries than in less traditional countries. Moreover, we expect that the influence of sensation seeking on sexting is less strong in traditional countries and that age differences in sexting are larger in traditional countries.

Because it has been shown in previous studies that the frequency of internet use has an influence on adolescents' online sexual risk behavior (Baumgartner et al., 2012), we included this variable as a control variable on the individual level. Moreover, we included percentage of broadband internet penetration and gross domestic product as control variables on the country level because both indicators were related to youth encountering online risks in previous studies (Lobe, Livingstone, Olafsson, & Vodeb, 2011).

To investigate individual and country characteristics across 20 countries we employed multilevel modeling. Multilevel modeling is the most appropriate method for analyzing data with a hierarchical structure (i.e. individuals nested within countries). Multilevel modeling is able to investigate the effect of country characteristics by simultaneously controlling for the effects of individual characteristics (Hox, 2010; Snijders & Bosker, 1999). Moreover, it allows us to examine cross-level interactions as postulated for the interaction between traditionalism and the individual predictors.

2. Method

2.1. Sample and procedure

We conducted a secondary analysis of the data collected within the EU KIDS Online II project.¹ Within this project, 25,142 internet

¹ The EU Kids Online project is a research network including 25 European countries. The aim of the project is to chart the online experiences of European children. The project is core funded by the EC Safer Internet Program. More information about the project, the data, as well as further findings can be found here: www.eukidsonline.net.

using children aged 9–16 from 25 European countries were interviewed about their online experiences (Hasebrink, Görzig, Haddon, Kalmus, & Livingstone, 2011). By means of random stratified sampling, approximately 1000 children per country were interviewed in spring and summer 2010. The survey was administered at the home of the children. The interview consisted of a face-to-face interview as well as of a self-completion part for sensitive questions. Questions about sexual experiences, including sexting, were only administered to adolescents aged 11–16. This resulted in a sample of 18,709 adolescents aged 11–16. Of the 25 European countries, 20 countries were included in the present study because only for those 20 countries data for all contextual variables were available. The included countries were: Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Netherlands, Norway, Poland, Portugal, Spain, Slovenia, Sweden, United Kingdom. The final sample consisted of 14,946 adolescents (49.7% boys) with a mean age of 13.49 ($SD = 1.39$). A detailed description of the recruitment and sampling procedures can be found elsewhere (Livingstone, Haddon, Görzig, & Olafsson, 2011b). The project received ethical clearance from the London School of Economics' Research Ethics Committee. Informed consent from parents and children was obtained. Children and parents were informed that they could stop the interview at any moment and that they may choose not to answer questions for any reason (see for more information on ethical considerations: Livingstone et al., 2011b).

2.2. Measures

2.2.1. Individual characteristics

2.2.1.1. Sexting. Sexting was measured by asking participants whether they have sent or posted a sexual message (example: words, pictures or videos) of any kind on the internet in the past 12 months. Answer options were “yes”, “no”, “don't know”, or “prefer not to say” (7.8%). The last two options were treated as missings in the analyses.

2.2.1.2. Sensation seeking. Sensation seeking was measured with the two-item short sensation seeking scale (Stephenson, Hoyle, Palmgree, & Slater, 2003). The two items were “I do dangerous things for fun” and “I do exciting things even if they are dangerous”. Response categories were 0 (*not true*), 1 (*a bit true*), and 2 (*very true*). Answers to these two questions were added, so that

the final variable could take values ranging from 0 to 4, $M = 0.80$ ($SD = 1.07$).

2.2.1.3. Internet use. The frequency of internet use was measured with three questions. “How often do you use the internet?” Response categories were: 1 (*every day or almost every day*), 2 (*once or twice a week*), 3 (*once or twice a month*), 4 (*less than once a month*). Moreover, participants indicated how long they use the internet for “on a normal school day” and “on a normal non-school day”. Response categories ranged from “none at all” to “more than four hours” in half hour intervals. Out of these three questions, internet use in minutes per day was calculated, $M = 104.43$ ($SD = 64.84$).

2.2.2. Country characteristics

2.2.2.1. Traditionalism. The indicator for traditionalism was taken from the *European Social Survey 5 (2010)*. The European Social Survey regularly investigates values in 26 European countries. Values in the European Social Survey were measured with a modified version of the Portrait Values Questionnaire (Schwartz et al., 2001). Each item describes a person that holds specific values, and participants have to evaluate how similar they are to this person. Response categories ranged from 1 (*very much like me*) to 6 (*not like me at all*). Two items measured traditionalism. Items were reversed coded so that higher values indicate more traditionalism (ranging from 0 to 5). The mean score of these two items for each individual within a specific country was aggregated to receive a general indicator of traditionalism for each country. These means were weighted using a design and a population weight (for more information on these weights and their calculation see *European Social Survey 5, 2010*). Mean traditionalism ratings ranged from 2.83 for Norway to 3.98 for Cyprus (see *Table 1*). All following analyses are based on these weighted traditionalism scores. Because there is a discussion on whether the scores of the Portrait Values Questionnaire need to be corrected for individual differences in use of response scales, we also calculated these corrected values (see *European Social Survey 5, 2010*). None of the reported findings differed if the corrected scores were used in the analyses. We, therefore, report findings based on the uncorrected values.

2.2.2.2. Gross-domestic product per capita (GDP). The GDP has been widely considered an indicator of a country's standard of living

Table 1
Percentages of sexting for boys and girls and country characteristics per country.

	Percentage sexting			Country characteristics		
	Boys (%)	Girls (%)	Total (%)	Traditionalism mean	GDP in 1000 €	Broadband internet (access lines per 100 inhabitants)
Belgium	5.3	3.6	4.4	3.41	32.60	30.00
Bulgaria	0.5	1.3	0.9	3.64	4.80	13.90
Cyprus	5.2	0.6	3.8	3.98	21.60	23.20
Czech Republic	10.3	10.1	10.2	3.06	14.20	20.40
Denmark	0.3	1.7	1.1	2.91	42.50	31.30
Estonia	2.2	3.8	3.0	3.17	10.70	26.00
Finland	2.8	3.0	2.9	2.95	33.60	29.10
France	4.9	1.6	3.1	3.14	29.80	31.50
Germany	4.1	0.6	2.4	3.26	30.30	31.30
Greece	3.1	0.7	2.0	3.73	20.10	18.60
Hungary	1.7	0.3	1.0	3.50	9.70	19.70
Ireland	4.4	2.6	3.5	3.28	34.90	22.90
Netherlands	1.1	0.7	0.9	2.98	35.40	38.40
Norway	1.3	2.2	1.8	2.83	64.50	35.30
Poland	2.6	1.1	1.9	3.50	9.30	14.90
Portugal	3.4	2.6	3.0	3.30	16.20	19.60
Slovenia	4.1	1.1	2.6	3.74	17.30	23.60
Spain	1.8	0.8	1.3	3.52	22.80	22.50
Sweden	12.9	10.2	11.5	2.95	37.00	31.90
UK	4.0	3.0	3.5	3.20	27.40	30.60

(Lobe et al., 2011). GDPs ranged from 4800 € for Bulgaria to 64,500 € for Norway (see Table 1).

2.2.2.3. Broadband internet penetration. As an indicator for technological infrastructure, broadband internet penetration was used (Lobe et al., 2011). This was defined as the number of broadband access lines per 100 inhabitants. Broadband internet penetration ranged from 13.9% in Bulgaria to 38.4% in the Netherlands (see Table 1).

2.3. Data analytical approach

For descriptive data analysis the EU Kids Online data was weighted using a weight that accounts for country-specific design as well as for country-specific non-response effects. The country-specific design weight corrects for unequal probabilities of participant selection. The country-specific non-response weight adjusts for biases due to under- or over-representation of specific respondent types. The weight is adjusted according to key demographic variables such as age, gender, religion, and education (see Livingstone et al., 2011b).

To investigate which of the individual as well as country level variables influence sexting, we conducted multilevel analysis using the statistical program HLM 6 (Raudenbush, Bryk, Cheong, Congdon, & du Toit, 2004). Multilevel analysis was used because it takes into account that individuals are clustered within countries and that there is variance within the countries as well as between the countries (Hox, 2010). Because of the hierarchical data structure, we have two data levels, the individual level (1st level) as well as the country level (2nd level).

Because the outcome variable 'sexting' was a binary variable, a multilevel logistic regression model was used based on a Bernoulli distribution. The parameters were estimated using the penalized quasi likelihood procedure with higher-order Laplace approximation. The Laplace procedure is meant to produce the most accurate estimates in cases of binary dependent variables (Guo & Zhao, 2000; Hox, 2010). All continuous individual and country level variables, except for gender, were entered grand-mean centered in the analysis (Hox, 2010).

The multilevel models were analyzed using a stepwise procedure (Hox, 2010). The first model that was analyzed is an "empty" model with no predictor variables included. This model is also called the intercept-only model. The intercept-only model estimates whether countries differ in the outcome variable 'sexting'. In the second model, fixed effects for all individual level predictors are added. An effect is fixed if it is expected that this effect does not differ across countries. Thus, the overall effects of these variables across all countries are estimated. The third model also includes the effects for the variables on the country level. This model allows us to estimate whether the country variables explain between country variance in sexting. In the fourth model, a random coefficient model is tested. In this model, it is examined whether any of the slopes of the individual level variables differ between countries. If a slope significantly varies between countries, it implies that the effect of this variable differs across countries. The fifth and final model includes the cross-level interactions. Interaction terms are added between all individual level variables that had a significant slope variation in the previous model and the country level variable traditionalism. This model examines whether country differences in traditionalism can explain the random slope variances of the individual level variables.

To investigate the model fit of the multilevel models, the deviance is calculated for each model. The smaller the deviance, the better the model fits the data. If the deviance of a model is significantly smaller than the deviance of the previous one, this indicates that model fit has improved (Hox, 2010; Raudenbush et al., 2004).

3. Results

3.1. Descriptives

Table 1 depicts the prevalence of sexting for adolescent boys and girls in the 20 European countries. In most countries, only 1–5% of boys and 1–4% of girls engaged in sexting. Only in the Czech Republic and Sweden, the prevalence of sexting was much higher, both for boys (10.3% and 12.9%), and girls (10.1% and 10.2%). In most countries, more boys than girls engaged in sexting. This gender difference was most pronounced in Cyprus, Italy, and Germany. Only in Finland, Denmark, and Norway, more girls than boys engaged in sexting. In a few countries, gender differences were very small (e.g. in the Czech Republic, Estonia, and the Netherlands). As expected, older adolescents were more likely to engage in sexting. From the 11–13 year olds, only 1.5% engaged in sexting, whereas among 14–16 year olds, 4.6% engaged in sexting.

3.2. Multilevel modeling

All multilevel models are depicted in Table 2. The first model (M1) is the intercept-only model and includes no predictors. The model shows that the probability of engaging in sexting across all countries is 0.026. The significant country level intercept indicates that sexting varies across countries, $p < .001$. Ten percent of the variance in sexting was between countries.²

Model 2 (M2) includes the fixed effects of the first level predictors: age, gender, sensation seeking, and frequency of internet use. As expected, older adolescents were significantly more likely to engage in sexting than younger adolescents, $p < .001$. Adolescents with higher levels of sensation seeking and adolescents who use the internet more frequently were also significantly more likely to engage in sexting, $p < .001$ and $p < .001$, respectively. Gender had no significant influence on sexting across all countries.

Model 3 (M3) additionally includes the effects for the country level predictors. This model thus investigates whether traditionalism, controlled for broadband internet penetration and GDP, has an influence on youth sexting beyond the effects of individual level characteristics. However, none of the country level predictors had a significant influence on sexting indicating that country characteristics had no direct effect on the prevalence of sexting in a country.

In the next model (M4), we assessed whether the slopes for age, gender, sensation seeking, and frequency of internet use had significant variance components. A significant variance component of a random slope of an individual level predictor indicates that the effect of this predictor varies across countries. Only the variance component for the random slope for gender was significant (variance component for gender = 0.30, $df = 19$, $\chi^2 = 45.40$, $p = .001$, all other variance components $\leq .003$, all p at least $\geq .28$). This indicates that, as expected, gender differences in sexting varied across countries. The effects of age, sensation seeking, and frequency of internet use were the same in each country.

The final model (M5) was conducted to investigate whether the varying gender differences across countries could be explained by traditionalism. Thus, the cross-level interaction between gender and traditionalism was included in this model. The interaction between traditionalism and gender was significant, $p < .05$. This indicates that gender differences in sexting across countries could be partly explained by traditional values. In more traditional countries, gender differences were more pronounced with more boys than girls engaging in sexting. In less traditional countries, these

² The second-level variance was calculated as follows: $u_0/(u_0 + \pi) = 0.371/(0.371 + 3.29) = 0.10$ (see Hox, 2010).

Table 2
Findings of the multilevel analysis.

	M1		M2		M3		M5	
	Coefficient (S.E.)	Odds ratio (CI)	Coefficient (S.E.)	Odds ratio (CI)	Coefficient (S.E.)	Odds ratio (CI)	Coefficient (S.E.)	Odds ratio (CI)
<i>Fixed effects</i>								
Individual level								
Gender			−0.18 (0.11)	0.83 (0.68, 1.03)	−0.18 (0.11)	0.83 (0.66, 1.05)	−0.31 (0.21)	0.74 (0.49, 1.10)
Age			0.26*** (0.04)	1.30 (1.21, 1.39)	0.26*** (0.05)	1.30 (1.18, 1.42)	0.26*** (0.05)	1.30 (1.18, 1.43)
Sens. seeking			0.49*** (0.67)	1.63 (1.43, 1.85)	0.49*** (0.07)	1.63 (1.43, 1.85)	0.49*** (0.07)	1.63 (1.41, 1.88)
Internet use			0.01*** (0.00)	1.01 (1.00, 1.01)	0.01*** (0.00)	1.01 (1.00, 1.01)	0.01*** (0.00)	1.01 (1.00, 1.01)
Country level								
Traditionalism					−0.69 (1.11)	0.51 (0.05, 5.75)	−0.06 (1.04)	0.94 (0.11, 8.49)
GDP					0.00 (0.00)	1.00 (1.00, 1.00)	0.00 (0.00)	1.00 (1.00, 1.00)
Broadband internet					−0.01 (0.04)	0.99 (1.00, 1.00)	−0.01 (0.05)	0.99 (0.90, 1.10)
Cross-level interact. gender × traditionalism								
Intercept							−1.78* (0.76)	0.17 (0.04, 0.75)
	−3.67*** (0.17)	0.03 (0.02, 0.04)	−3.98*** (0.22)	0.02 (0.01, 0.03)	−3.98*** (0.25)	0.02 (0.01, 0.03)	−3.97*** (0.27)	0.02 (0.01, 0.03)
<i>Random effects</i>								
Intercept country level	0.37*** (0.14)		0.36*** (0.13)		0.33*** (0.12)		0.34*** (0.13)	
Deviance	28858.04		27801.57		27800.39		27779.13	

Note: Model 4 is not included in this table. All variance components of Model 4 are mentioned in the text.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

gender differences were smaller, indicating that equal amounts of girls and boys engaged in sexting.

The model fit as indicated by the deviance significantly improved in each step of the modeling process. Only model fits for Model 2 and Model 3 did not significantly differ because the inclusion of the second level predictors did not improve the model. The explained variance on the second level only changed marginally from 10% to 8%. This is due to the fact that the second level characteristics had no direct influence on engaging in sexting.

4. Discussion

Although sexting has received research attention in recent years, it has been mainly investigated from a national perspective, predominantly in the US, with the result that most of our knowledge about sexting is based on US studies. Because the knowledge of sexting in Europe is limited, we do not know whether findings from the US can be generalized to European countries. The aim of the present study, therefore, was to broaden our understanding of sexting by investigating the predictors of this behavior among 20 European countries. By taking a cross-national perspective, this study was able to delineate individual as well as country characteristics that influence sexting. The study has three main findings.

The first main finding is that the individual level characteristics age and sensation seeking are rather universal predictors of sexting, at least in Europe. The effects of these two characteristics were the same across all 20 countries. Older adolescents and adolescents with higher levels of sensation seeking were more likely to engage in sexting. In line with studies among US teenagers, sexting seems to increase during adolescence (Hinduja & Patchin, 2010; Lenhart, 2009; Mitchell et al., 2012). This may be due to the typical developmental changes individuals undergo in this period, in par-

ticular pubertal development. Hormonal changes that characterize puberty have been consistently linked to an increase in sexual curiosity and exploration (DeLamater & Friedrich, 2002). Sexting may be considered as a part of these developments. The current study does not allow us to determine whether sexting peaks in middle or late adolescence or whether the prevalence of sexting even further increases during adulthood. The report of the National Campaign to Prevent Teen and Unplanned Pregnancy (2009) reported that even more young adults than adolescents engaged in sexting. In contrast, Baumgartner et al. (2012) have shown that the prevalence of online sexual risk behavior, including sexting, decreases in the transition to adulthood. Further studies are needed to investigate the development of these behaviors in more detail. The strong influence of individual characteristics on adolescents' sexting behavior emphasizes the importance of personality characteristics to explain this behavior. This indicates that no matter in which European country these adolescents live, these two characteristics influenced their sexting behavior. However, this is not the case for all individual characteristics.

The second and possibly most important finding of this study is that, although country characteristics had no direct effect on adolescent sexting, traditionalism significantly predicted gender differences in sexting. Taken all countries together, gender had no effect on sexting. However, we found that gender differences varied across countries. Whereas in some countries, more males than females engaged in sexting (e.g. Cyprus, Italy, Germany), in other countries more girls than boys engaged in sexting (e.g. Denmark, Finland, Norway). In some countries equal numbers of boys and girls engaged in sexting (e.g. the Netherlands, Czech Republic). These varying gender differences could be partly explained by the prevailing values in a country. In more traditional countries, gender differences were stronger with more boys than girls engaging in this behavior. In traditional countries, girls may be more

restricted in their behavior, in particular in their sexual behavior. In these countries, girls may be less able to express their sexuality. In less traditional countries, these gender differences were less apparent or even reversed.

This finding is in line with previous findings showing that gender differences in sexuality tend to be smaller in permissive societies (Petersen & Hyde, 2010). These findings support the idea that gender differences in adolescent risk behavior cannot solely be explained by biological factors (Perry & Pauletti, 2011; Wilsnack, Vogelanz, Wilsnack, & Harris, 2000). Although biological differences among boys and girls may make a specific behavior more likely, it is also the cultural context that determines whether adolescent girls and boys engage in this behavior (Block, 1983).

In the current study, we focused on traditional values based on Schwarz' classification system (1994). We have chosen "traditionalism" because we expected this value to be strongly linked to sex-related behaviors. However, a variety of other cultural values and cultural classifications may also influence sexting behavior. An alternative classification of cultural values are Hofstede's five cultural dimensions (2001). Hofstede's system classifies cultures on the dimensions masculinity–femininity, power–distance, uncertainty avoidance, individualism, and long-term orientation. It has been previously shown that these cultural values on the country level have an influence on individual behavior. For example, Nistor, Gögüş, and Lerche (2013) linked cultural values based on Hofstede's value system to technology use. Future research may further investigate the link between these cultural values and adolescents' sexting behavior.

Our finding that the influence of gender varied across countries, whereas the influence of sensation seeking did not, is not surprising. Gender and gender-appropriate behavior is highly culturally determined. The effect of sensation seeking as a psychological variable is less culturally influenced and may, therefore, be similar across countries. These findings are in contrast to Arnett (1992) who argued that the extent to which sensation seeking is related to risk behavior depends on the restrictiveness of the socialization environment. Although we found no evidence for this claim in our study, the effect of sensation seeking on sexting may still vary in societies that differ more strongly in their values than the European countries in this study. Moreover, Arnett (1992) explicitly argues that the socialization environment also includes parents, peers, schools, and neighborhoods. These less distal factors may still determine the strength of sensation seeking. For example, restrictive parenting may limit an adolescent's manifestation of sensation seeking, independent of the restrictiveness of the country as a whole.

The final finding of this study is that, in contrast to the strong effects of the individual characteristics, country characteristics had no direct influence on adolescent sexting above the effects of individual characteristics. Contextual factors on the country level may thus be less important in explaining individual behavior than personality characteristics. This is not surprising because the country characteristics we studied are more distal factors than individual characteristics. Moreover, the European countries in this study were homogenous in many aspects, including the prevalence of sexting. Only Sweden and the Czech Republic strongly deviated in their sexting rates from the other countries. This indicates that there may still be specific characteristics on the country level that explain the high prevalence rates in Sweden and the Czech Republic in comparison to the other countries. Future studies should, therefore, include other characteristics on the country level that may be able to account for these country differences. For example, factors that are more strongly related to online safety, such as safety programs at schools or country specific internet policies. Moreover, other cultural values may be taken into account.

4.1. Limitations

Several limitations should be considered when interpreting the results of this study. One of the main problems when studying rare behaviors such as sexting is that the data is highly skewed. In the case of sexting only few adolescents in each country engaged in this behavior. Skewed data challenges many common statistical methods and may lead to biased coefficient estimations. We tried to evade estimation problems by using a binary outcome variable. Logistic regressions are relatively robust to skewed data. Moreover, we estimated coefficients using Laplace numerical integration which has been shown to be the most robust estimation method (Guo & Zhao, 2000; Hox, 2010). Typically, the bias in logistic regressions with skewed data concerns underestimations of the effects (King & Zeng, 2001). The reported results are, therefore, more likely to be too conservative than too lenient. Nevertheless, some caution is required by interpreting and generalizing the findings.

Because sexting covers a sensitive topic, self-reports of this behavior may be biased due to social desirability in the answers. To minimize social desirability, participants filled in the questionnaire in a separate room at home without supervision of the interviewer or parents. Despite these precautions, a social desirability bias in the behavior studied in the present study cannot be precluded. Moreover, in particular younger participants may have difficulties to correctly estimate their behavior. However, the prevalence ratings of sexting in the present study are comparable to those found in other samples (e.g. Baumgartner et al., 2010; Lenhart, 2009).

Another limitation is that the study was limited to 20 European countries. Instead of the 25 countries that have been investigated within the EU Kids Online project, only those 20 countries were analyzed for which traditionalism values were available (see ESSS-5). Therefore, the interpretation of the findings should be limited to those specific 20 countries. More studies are needed to investigate whether findings are further generalizable.

Finally, the range in the traditionalism values in this study was rather limited (ranging from 2.83 to 3.98 on a scale from 1 to 6), suggesting that the countries did not differ much in traditionalism. This may be due to the specific measurement used in this study (Schwartz et al., 2001) that measures traditionalism in a rather specific way. Because of the similarities between countries in this study, the explanatory power of traditionalism may be limited. It may be that the effects found in this study are more pronounced when comparing more diverse countries such as western and non-western countries.

5. Conclusion

In sum, the present study shows that when investigating sexting, and possibly online risk behavior in general, the broader cultural context cannot be ignored. Although we found no direct influence of country characteristics on adolescent sexting behavior, country context still mattered. Despite the relative similarity of the 20 countries that were investigated in this study, gender differences varied in these countries and this variation was partly explained by traditional values.

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