Cyberbullying victimisation in context: the role of social inequalities in countries and regions

Cyberbullying victimisation in context:

The role of social inequalities in countries and regions

Anke Görzig[1,2]

Tijana Milosevic[3]

Elisabeth Staksrud[3]

[1]University of West London, School of Human and Social Sciences, 310 Paragon House, Brentford, TW8 9GA, UK

[2]London School of Economics and Political Science, Department of Media and Communications, Houghton Street, London, WC2A 2AE, UK

[3]University of Oslo, Department of Media and Communication, Faculty of Humanities, Forskningsparken, Gaustadalleen, 21, 0349, Oslo, Norway

Author Note

This article draws on the work of the 'EU Kids Online' network funded by the EC (DG Information Society) Safer Internet Programme (project code SIP-KEP-321803).

Correspondence may be sent to Dr Anke Görzig, School of Human and Social Sciences, 310 Paragon House, Brentford, TW8 9GA, UK (email: Anke.Goerzig@UWL.ac.uk; phone: 020 8209 4127).

Abstract

The phenomenon of cyberbullying is gaining ever more attention by media and policy makers in many countries. Theoretical frameworks using a socio-ecological approach emphasise the importance of contextual explanatory factors located at the societal level. It has been suggested that in addition to cross-national differences, the analysis of smaller units of more adjacent cultural contexts (i.e., regions) might yield more explanatory power. Leaning on previous findings and theory, the current paper aims to identify and compare contextual explanatory factors associated with social inequality (i.e., crime rates, GDP, life expectancy and population density) for variation in cyber- and face-to-face bullying victimisation rates within one sample. Moreover, corresponding explanatory factors are investigated across national and regional levels. Cyber- and face-to-face bullying victimisation of 15,813 9-16 year olds (50% female) from the cross-national survey data of EU Kids Online were linked with contextual variables of 18 countries and 179 regions obtained from data of the European Social Survey (ESS). Hierarchical multilevel-modelling analyses, adding first regional and then country level contextual predictors for bullying victimisation, were performed. Against expectations, differences for cyber- and face-to-face victimisation between regions within countries were smaller than differences between countries. Regional level life expectancy showed a negative and crime rates showed a marginal positive relation with both cyber- and face-to-face victimisation. Population density showed a negative and GDP a positive relationship with cyber- but not face-to-face victimisation. Adding the same predictors on the country level did not improve model fit. Possible research and policy implications are discussed.

Keywords: cyber-bullying, cross-national comparison, bullying victimisation, culture, contextual analyses, multi-level analyses

Introduction

Relying on ecological systems theory (Bronfenbrenner, 1979) suggesting that human behaviour is the consequence of a complex interplay between individuals and their wider social environment, the current research follows in the tradition of research that argues that bullying among youth needs to be studied across its multiple contexts by taking peer, family, school, community and cultural factors into account. This is known as the socio-ecological approach (Swearer & Espelage, 2004, 2011).

Following theoretical perspectives and research on traditional or face-to-face bullying, links with different levels within the socio-ecological system have also been put forward for cyberbullying (Aboujaoude, Savage, Starcevic, & Salame, 2015; Görzig & Machackova, 2015; Kowalski, Giumetti, Schroeder, & Lattanner, 2014; Livingstone & Smith, 2014; Smith, 2015). However, the evidence to date is limited in terms of understanding the contexts in which cyberbullying takes place (Cross et al., 2015; Smith et al., 2008). Most research in this tradition has investigated cyberbullying in the context of schools, families and peers; research looking at the wider cultural context, however, is scarce (Barlett et al., 2014). Moreover, cross-national evidence suggests that individual level differences are generally larger than the differences across countries (cf. Steele, 2008). Further, the role of regional policies and legislation has been emphasised for cyberbullying prevention and intervention (cf. Cassidy, Faucher, & Jackson, 2013). Hence, it has been suggested that analyses of smaller units of more adjacent cultures (i.e., regions and communities) might yield more explanatory power than considering culture at the wider national level (Swearer & Espelage, 2011). The current work aims to identify contextual level predictors for cyberbullying on national and regional levels by drawing from a widely supported theoretical perspective that links occurrences of power imbalance on the individual level (e.g., bullying) with power imbalances or social inequality on cultural contextual levels (cf. Pratto, Sidanius, & Levin, 2006).

Cyberbullying is mostly defined similar to traditional bullying, which is as an act of aggression that is intentional, repetitive, and towards an individual of lower power (Olweus, 1993), but extended

to electronic forms of contact (Smith et al., 2008). Cyberbullying can take various forms such as sending unwanted, derogatory, or threatening comments, spreading rumours, sending pictures or videos that are offensive or embarrassing as well as excluding someone via means of electronic communication (Ybarra & Mitchell, 2004a). Consensus on the concrete definition and measurement of cyberbullying has been lacking across studies (Slonje, Smith & Frisen, 2013) resulting in a wide range of prevalence estimates in cyberbullying victimisation ranging between 6.5% and 72% (Kowalski et al. 2014; Tokunaga, 2010). Reviews of cyberbullying studies suggest that most prevalence rates range between 20%-40% (Aboujaoude et al., 2015) with an average of 24% (Hinduja & Patchin, 2012), while thoroughly designed survey studies report significantly lower rates of 6% (Livingstone, Haddon, Görzig, & Ólafsson, 2011a) or 9% (NCES, 2013). Smith (2015) argued that those differences are mainly driven by how the frequency of occurrences is assessed, yielding around 20% for one-off occurrences and around 5% for repeated incidences. Recent research, using the large-scale European data set we draw from in the current study, has shown that, when applying the same definition and measurement, estimates for online bullying victimisation range from 2% to 14% across countries (Livingstone, Haddon, Görzig & Ólafsson, 2011a), while about 7% of variance in cyberbullying victimisation prevalence was explained by the country-level (cf. Görzig & Machackova, 2015). In line with other cross-national studies (Genta et al., 2012), the variance on the country level is rather low, underscoring the need to explore whether smaller regional level contexts might add to explain further differentiation in cyberbullying rates.

Research reporting correlates of cyberbullying on the individual level tends to differentiate between victimisation and perpetration. A similar distinction is made when reporting prevalence rates due to the fact that assessments via self-report measures, especially those on perpetration, often introduce a social desirability bias (e.g., Aboujaoude et al., 2015; Görzig, 2011; Ybarra & Mitchell, 2004a). However, on a contextual level, victimisation does not exist without perpetration. Hence, on an aggregated level both are associated with similar factors, i.e. correlates of perpetration on the

individual level will be correlates of victimisation on the aggregated contextual level and vice versa. Thus, research reporting associations with contextual level variables, such as those addressing factors that can be included in prevention and intervention strategies at schools or neighbourhoods (e.g., Cassidy et al., 2013; Slonje et al., 2013), will often refer to the concept cyberbullying in general (i.e., referring to both victimisation and perpetration). Accordingly, the terms "victimisation" and "perpetration" are employed when referring to bullying on the individual level or the exact prevalence on a contextual level, while the term "bullying" is employed when reporting on contextual level associations that are valid for both, victimisation and perpetration. Moreover, there is evidence that those who have been or have bullied offline are likely to have had these experiences online (Baldry, Farrington, & Sorrentino, 2015; Kowalski et al., 2014; Smith, 2012; Tokunaga, 2010). This is confirmed by recent research on the data source also employed in the present study, in which cyberbullying showed strong associations with face-to-face bullying, while victimisation and perpetration tended to co-occur also (Görzig & Machackova, 2015). The following theoretical review will draw from the literature on both, victimisation and perpetration, to inform our research questions with regards to contextual level correlates and will lean on theoretical and empirical evidence from face-to-face bullying in order to inform this research more thoroughly.

Cyber- as well as face-to-face victimisation were found to be connected with poorer psychological outcomes, poorer quality of social relationships and/or social inequality (Aboujaoude et al., 2015; Cappadocia, Craig & Pepler, 2013; Tippett & Wolke, 2014; Whittle, Hamilton-Giachritsis, Beech, & Collings, 2013). In concert with these findings, other research drawing from the data employed in the current study could show that being from a family which used minority languages at home or which had relatively low socio-economic status, belonging to a discriminated against group or being disabled, were associated with cyber-victimisation (Görzig, 2011; Livingstone, Görzig & Ólafsson, 2011). More than a decade of research has supported arguments that social power imbalances originate from multiple levels (e.g., cultural policies and practices as well as individual relations) and

that the maintenance of power imbalance in a culture is strongly related to individuals' tendency to engage in behaviours that maintain or enhance such power imbalances (cf. Pratto, Sidanius, & Levin, 2006). Much like bullying is a form of power imbalance, differences in contextual level social inequalities may be indicative of power differences within society at large. It remains yet to be investigated whether social inequality will show associations with cyberbullying when taken account for in the wider cultural context. Socio-economic factors at regional and country levels could be considered as indicators of social inequality and contextual power imbalances, which might then be mirrored in occurrences of bullying involvement at the individual level.

While the socio-ecological approach emphasizes the general influence of contextual or environmental factors at different levels on an individual's development (Bronfenbrenner, 1979; Swearer & Espelage, 2004, 2011), it does not specify the directions or mechanisms for specific environmental variables. Given that power imbalance is inherent in the nature of bullying, the current research will consider contextual factors that are associated with power imbalance or social inequality. Further, despite the empirical and definitional correspondence between cyber- and face-to-face bullying, there are also important distinctions that need to be considered. Although a lot is known about these differences on the individual level (e.g., Cassidy et al., 2013; Görzig & Ólafsson, 2013), we would like to explore the differences and similarities of cyber- and face-to-face bullying when this contextual level is taken into account.

In brief, this study will examine contextual variables based on country and regional levels that are indicative of cultural differences in social inequality and how these might be related to cyber- and face-to-face bullying as well as explore potential differences between the two. Specifically, four contextual factors that are indicative of social inequality at the cultural and/or regional level will be explored: crime rates, economic performance, life expectancy and population density or urbanicity. In the following, each of these factors will be outlined in their relation to bullying and social inequality.

Crime rates

A number of psychological and sociological theories have been put forward to explain linkages between social inequality and crime (e.g., relative deprivation theory, social distance theory, social disorganisation theory, group threat theory, and routine activities theory) and the topic has been subject of several reviews (e.g., Neckerman & Torche, 2007; Pratt & Cullen, 2005). Empirical evidence has shown crime rates to be linked with social inequality on the contextual level ranging from neighbourhood (e.g., Hipp, 2007) to national level contexts (e.g., Elgar & Aitken, 2011; Chamlin & Cochran, 2006).

On an individual level, bullying has been classified as a subcategory of and as having the same origin as aggression, deviant behaviours or conduct problems (Junger-Tas & van Kesteren, 1999; Patchin & Hinduja, 2010). Some studies suggested that perpetration of face-to-face bullying as well as cyberbullying were associated with problem behaviours and delinquency-related charges (Dukes, Stein & Zane, 2010; Hay, Meldrum & Mann, 2010; Patchin & Hinduja, 2010). Ample of evidence has shown that bullying and cyberbullying tend to increase in the transition period from primary to secondary school through contextual changes—such as having to make new friends while facing academic competition and increased access to technology (Cross et al., 2015; Pellegrini, 2002; Pellegrini et al., 2009). Accordingly, cyberbullying has shown to reach a peak during seventh/eighth grade (Tokunaga, 2010). The same age period has been associated with a high proportion of deviant behaviour (such as bullying or crime) also referred to as “adolescent-limited” anti-social behaviour largely due to peer influence (Moffitt, 1993). Given that cyberbullying peaks when youth can be vulnerable to deviant and criminal behaviours in their environment, criminality on the cultural level might also be a potential influential factor.

Economic performance

Economic inequalities on the contextual level are linked with social inequalities or disadvantages and individual level well-being (Diener & Seligman, 2004; Wilkinson & Pickett, 2006). While national wealth level has been considered one of the strongest determinants of adolescent health (Viner et al., 2012), to which bullying involvement is closely linked, research concerning the relationships between economic factors and bullying has shown mixed results. For example, it was shown that countries with lower *and* higher GDP (Growth Domestic Product) had greater incidence of bullying (victimisation and perpetration) compared to those with middle-range GDP (Fonseca Carvalhosa, 2009) supporting arguments that economic hardship (low GDP) as well as a more competitive society (high GDP) might be associated with inequalities and power-imbalances. Further, a study of 26 high-income countries found negative correlations between country socio-economic status and cyberbullying (Soares, Brochado, Barros, & Fraga, 2015). Given the mixed evidence base, as well as the postulated link between the distribution of wealth and social inequality, we consider it worthwhile to further explore the link between bullying and absolute wealth in terms of economic performance on the contextual level. Furthermore, other cross-national evidence indicates that while bullying victimisation was negatively associated with family and school level socio-economic status, country-level GDP was not; however, a measure of large economic inequality (GNI coefficient) was (Due et al., 2009). These findings suggest that beyond comparing absolute income between contexts, inequality within a context needs to be considered (see below).

Life expectancy

Bullying has been considered a major public health concern (Hertz, Donato, & Wright, 2013) and is closely linked with mental and physical health outcomes (Aboujaoude et al., 2015; Gini & Pozzoli, 2009).While life expectancy is a direct measure of various influences on an individual's health, on

the contextual level population life expectancy has been linked with a plethora of factors related to social inequality and disadvantage. It has been postulated that social disadvantage is causally related to poor health outcomes via various mechanisms (Phelan, Link, & Tehranifar, 2010). These mechanisms include psychological and social differences (e.g., mental health, discrimination), living conditions and health risk behaviours as well as health care provision (Braveman, Egerter, & Williams, 2011). Given the link between bullying and health outcomes on the individual level as well as its inherent power imbalance, contextual level life expectancy will be explored in the current study as a health indicator as well as a measure that closely mirrors social inequality. Furthermore, concluding from studies that show high negative contextual level associations between life expectancy and GNI (e.g. Kaplan, Pamuk, Lynch, Cohen, & Balfour, 1996; Wilkinson, 1992), analysing life expectancy might offer some further insights into the link of bullying with social inequality *within* contextual levels – as opposed to between (see above).

Population Density

In a recent review of cyberbullying research, it has been suggested that population density or urbanicity and its relationship to cyberbullying should be explored on the community level (Kowalski et al., 2014). Population density has been considered an important community level factor for traditional bullying behaviours due to increased levels of a combination of factors mentioned above (i.e., community violence, poverty and life expectancy) that exert their influence on individuals' development of aggressive behaviours including delinquency and bullying (Bradshaw, Waasdorp, Goldweber, & Johnson, 2013; Elliott et al., 1996; Singh & Siahpush, 2014; Tolan, Gorman-Smith, & Henry, 2003).

However, there is also some contrasting evidence for this proposed link between population density and bullying. Some found no relationship between population density and bullying (Chaux, Molano & Podlesky, 2009; Peterson & Ray, 2006) while others found that bullying perpetration

decreased with level of urbanicity while there was no association with bullying victimisation (Nansel et al., 2001). Moreover, it has been put forward that areas with higher population density can have a more diverse population, and hence being different by the virtue of belonging to a minority group or any personal characteristic, may not cause such a stigma or result in bullying. In line with this argument, it was found that the risk of suicide attempts of LGBT youth in the context of face-to-face victimisation was higher in communities with a lower density of same-sex couples and fewer schools with protective policies (Hatzenbuehler & Keyes, 2013). Indeed, minority status or being a member of a discriminated against group appears to alter the relationship between population density and bullying although this relationship is not always unequivocal. For example, it was found that victims in urban environments were more likely to report having been racially bullied (Goldweber, Waasdorp & Bradshaw, 2013) while others reported that fear of victimisation in urban settings was less likely among African Americans and more likely for Caucasians (Bachman, Randolph & Brown, 2011).

Although the exact mechanisms and directions are unclear, there appears to be some consent that population density is linked with social inequality and associated bullying involvement. In fact, recent public health research suggests that urbanicity, not race, may be a large determinant of health disparities (LaVeist, Pollack, Thorpe, Fesahazion, & Gaskin, 2011). Given the indication that involvement in bullying is associated with population density, we will explore population density further as a cultural level predictor that has been identified by others as particularly important on the community or regional level (Bradshaw et al., 2013; Kowalski et al., 2014).

In sum, this research aims to investigate the role of cultural ecologies on the regional and national levels to explain the prevalence of cyberbullying victimisation. Specifically, the current study seeks to explore whether, complementary to the country level, smaller, regional level contexts might be pivotal in explaining cyber-victimisation. Further, we aim to explore whether any contextual level explanations for cyber-victimisation are similar to those for traditional bullying victimisation. Selected and recently called for (cf. Kowalski et al., 2014) socio-structural contextual explanatory

factors that are connected with social inequality (e.g., crime rates, economic performance, life expectancy, population density) will be explored and compared within one large-scale cross-national sample in their associations with cyberbullying and traditional or face-to-face bullying victimisation.

Method

Sample

Survey data were collected from 9-16 year-olds in the 2010 EU Kids Online study (www.eukidsonline.net). The aim of this study was to enhance the knowledge base about new media use among European youth, with a specific focus on experiences with online risks, including cyberbullying. During 2010, a survey covering a large array of questions regarding internet access, use, activities, risks (including cyberbullying), parental mediation, coping and vulnerability was conducted. A random stratified sample of approximately 1,000 internet-using youths and one of their parents were interviewed in each of twenty-five European countries. Each country was further divided into regional levels according to levels of the "European Union's Nomenclature of Territorial Units for Statistics" (NUTS) (Eurostat, 2015). Interviews took place in youths' homes and were conducted face-to-face but with private questionnaires completed for sensitive questions. The London School of Economics' Research Ethics Committee approved the methodology and appropriate protocols were put in place to ensure that the rights and well-being of children and families were protected during the research process. For full details of sampling and procedures, see Livingstone, Haddon, Görzig and Ólafsson (2011b) and Görzig (2012).

Austria, Cyprus, Estonia, Ireland, Lithuania, Slovenia and Turkey were omitted from the current study due to unavailable contextual data on the regional or country level yielding data from 18 countries in total. Regions were generally obtained on the NUTS level 2 with the exceptions of Germany and United Kingdom, for which contextual data was only available for level 1. For Finland

the regions of "Oulu" and "Lapland" had to be merged due to a joint regional classification of contextual data. The Italian regions "Valle D'Aosta" and "Molise" had to be omitted due to unavailable contextual data. A total of 179 regions were submitted to the analyses. Further, participants who had not responded to the survey question on bullying have been excluded from the analyses. The final data used for this study came from 15,813 participants (49.5% female) with a mean age of 12.43 years (*SD* = 2.28). The average number and range of regions per country as well as participants per region can be seen in Table 1.

Measures and Procedures

Individual data. Individual level variables consisted of the dependent variables, cyber- and face-to-face bullying victimisation as well as of the socio-demographic control variables.

Cyber- and Face-to-face bullying victimisation. Respondents were given the following introductory text: "Sometimes children or teenagers say or do hurtful or nasty things to someone and this can often be quite a few times on different days over a period of time, for example. This can include: teasing someone in a way this person does not like, hitting, kicking or pushing someone around, leaving someone out of things" followed up by the question "Has someone acted in this kind of hurtful or nasty way to you in the PAST 12 MONTHS?" Those who had chosen "Yes" as the response option for this question were further asked how this has happened. Those who had chosen the response options "By mobile phone [. . .]" and/or "On the internet" were grouped as cybervictims and those who had chosen the response option "In person face-to-face" were categorized as face-to-face victims. Cyber- and face-to-face victimisation were entered as two separate dichotomously coded variables in the subsequent analyses. Those who had been grouped to be victims were coded as '1' while those who has responded "no" to the question whether this had not happened to them were grouped as either not being a cyber- or not being a face-to-face victim (coded '0'). Design weights were applied to aggregated data.

Socio-economic status. Information relating to a household's chief income earner's level of education and occupation was collected during the screening process of the survey. Responses to level of education and employment were then grouped and cross-referenced with each other to calculate one of three levels of SES: low, middle and high. However, it should be noted that, as is often the case with European research, a uniform approach was taken to the calculation of SES across all 25 countries, and therefore SES is not relative to the differences between the socio-demographic make-up of each country (for details see Livingstone et al., 2011b, p. 43).

Regional and country data. All of the regional and country level data were obtained through linkage with the European Social Survey (ESS; www.europeansocialsurvey.org). Data was generally obtained from ESS Round 5 (2010) with the exception of Italy for which all data stemmed from ESS Round 6 (2012) and Romania for which all data stemmed from ESS Round 4 (2008). In addition, data for population density was obtained from ESS Round 6 for the UK, data for GDP stemmed from ESS Round 6 and 2010 for all countries except Greece, Finland (both Round 5, 2009) and Romania (Round 4, 2009), data for life expectancy was obtained from ESS Round 6 for France and the UK.

Crime rates. Crime was measured using the individual's responses to the survey question "Have you or a member of your household been the victim of a burglary or assault in the last 5 years?". The dichotomously coded variable was aggregated across countries and regions applying design weights. The obtained measure represented the percentage of those who had reported to be a victim of burglary per geographic location.

Gross domestic product (GDP) per capita. GDP per capita at current market prices was standardised to Euros in the year of measurement and had been obtained via Eurostat (http://ec.europa.eu/eurostat).

Life expectancy. Life expectancy data are represented as the average number of years that a newborn is expected to live if current mortality rates apply. Mortality rates were accrued across all age groups. The data was originally obtained from the Global Health Observatory (GHO)

(http://www.who.int/gho/en/index.html).

Population density. Population density was measured as the ratio between (total) population and surface area and was measured as the average number of inhabitants per km^2 of an area. Population density had been obtained via Eurostat (http://ec.europa.eu/eurostat). A summary of the data for all key variables by country is shown in Table 1.

Table 1 here

Analyses and Results

Ecological Analyses

Associations were tested using ecological correlations at the regional and the country level separately (see Table 2). Individual level data were aggregated at the regional and country levels using design weights. At the regional level, cyber-victimisation was significantly correlated with face-to-face victimisation as well as life expectancy (r's = .56 and -.22; p's <.01). At the country level, cyber-victimisation was significantly correlated with face-to-face victimisation (r = .85; p <.01). Face-to-face victimisation did not show any significant correlations beyond cyber-victimisation at the country level; however, at the regional level it also correlated significantly with life expectancy (r = -.28; p <.01).

Table 2 here

Multilevel Analyses

Multilevel modelling (Rabe-Hesketh & Skrondal, 2008; Raudenbush & Bryk, 2002) was used to account for within region and within country dependencies and estimate the amount of variance in victimisation that can be explained by the regional and country levels. Further, this type of modelling allowed us to test whether any predictors on the country level would be associated with bullying

victimisation at the individual level above and beyond similar predictors on the regional level.

The data were analysed using a three-level structure with individuals grouped within regions and regions grouped within countries. Analogous logistic regressions were estimated with cyber- and face-to-face bullying victimisation as dichotomously coded dependent variables. Three random coefficient models were carried out. The first model included individual level control variables only, i.e. gender, age and socio-economic status without any predictor variables at the regional or country levels. This model specifies the amount of between group variations in victimisation at each of these levels. In the second model, all regional predictors (i.e., crime, GDP, life expectancy, population density) were added to assess whether any of these variables would predict victimisation independent of each other and to further show how much of the variance in victimisation could be explained by these predictors at each level. In the third model, country predictors mirroring those of the regional level predictors were added. This model shows whether any country level indicator predicts victimisation independent of their regional counterpart and vice versa. At the same time the additional amount of between group variation in victimisation that can be explained by the country level predictors can be assessed. All continuous predictor variables were grand mean centred at '0' and scaled to standard deviations of '1' in order to make the coefficients which were derived from vastly different original units of measurement comparable. The results of all three models are shown in Tables 3 and 4.

Table 3 and Table 4 here

Cyber-victimisation. Model 1 showed that cyber-victimisation was more likely among girls (*Exp(B)* = .63; $p < .001$) and increased with age (*Exp(B)* = 1.20; $p < .001$). Further, it was shown that adjusting for the effects of socio-demographic variables, 3.8% of variation in an individual's propensity to be a victim of cyberbullying is due to differences between regions while 6.6% is due to between-country differences (variance partitioning coefficient - VPC; cf. Browne, Subramanian,

Jones, & Goldstein, 2005).

Adding regional level predictors in Model 2, it was revealed that an individual's likelihood to be a victim of cyberbullying increased with a region's GDP (*Exp(B)* = 1.30; $p < .05$) while it decreased with life expectancy (*Exp(B)* = 0.74; $p = .01$) and population density (*Exp(B)* = 0.87; $p < .05$). Cyber-victimisation was also higher in regions with higher crime rates; however, this association showed only marginal significance (*Exp(B)* = 1.10; $p = .10$). Further, it was shown that 3.7% of variation in cyber-victimisation remains unexplained on the regional level while 4.2% remain unexplained on the country level, i.e. regional level predictors merely explained 0.1% of the regional level differences but 2.4% of the country level differences that contribute to the variance in cyber-victimisation. Adding regional level predictors increased the fit of the model significantly compared to Model 1 ($\chi^2_{(4)} = 11.15$; $p < .05$) confirming that adding regional predictors to the statistical model enhanced the accuracy in predicting cyber-victimisation.

Model 3 revealed that when adding country level predictors, none of the regional level predictors remained significant independent of the country level predictors (although, crime and population density remained marginally significant). In addition, it was shown that cyber-victimisation decreased with an increase in a country's life expectancy (*Exp(B)* = 0.56; $p < .05$). None of the other country level predictors could predict cyber-victimisation over and above the regional level predictors. Further, it was shown that 3.6% of variation in cyber-victimisation remains unexplained on the regional level while 3.3% remain unexplained on the country level, i.e. in addition to the regional level predictors, country level predictors merely explained 0.1% of the regional level and 0.9% of the country level differences that contribute to differences in cyber-victimisation. Hence, Model 3 did not improve model fit in comparison to Model 2 ($\chi^2_{(4)} = 5.64$; $p = .23$), i.e. the statistical model did not enhance the accuracy in predicting cyber-victimisation and was discarded in favour of Model 2.

Table 4 here

Face-to-face victimisation. Model 1 showed that face-to-face victimisation was more likely among boys (*Exp(B)* = 1.11; $p < .05$). Further, it was shown that adjusting for the effects of socio-demographic variables, 3.6% of variation in an individual's propensity to be a victim of face-to-face bullying is due to differences between regions while 4.5% is due to between-country differences.

Model 2 showed that face-to-face victimisation was more likely in regions with a lower life expectancy (*Exp(B)* = 0.77; $p = .01$). Face-to-face victimisation was also higher in regions with higher crime rates; however, this effect was only marginally significant (*Exp(B)* = 1.10; $p = .07$). Further, it was shown that the variance explained in face-to-face victimisation due to regional differences remained unchanged (VPC = 3.6%) while 3% remained unexplained on the country level, i.e. regional level predictors explained 0% of the regional level differences but 1.5% of country level differences that contribute to the variance in face-to-face victimisation. Adding regional level predictors increased the fit of the model significantly compared to Model 1 ($\chi^2_{(4)} = 9.73$; $p < .05$).

Model 3 revealed that when adding country level predictors, regional crime rates significantly predicted victimisation (*Exp(B)* = 1.12; $p < .05$) while life expectancy on the regional level ceased to remain statistically significant. In addition, it was shown that face-to-face victimisation marginally decreased with an increase in a country's life expectancy (*Exp(B)* = 0.69; $p = .06$). None of the other country level predictors could predict face-to-face victimisation over and above the regional level predictors. Further, it was shown that 3.5% of variation in face-to-face victimisation remains unexplained on the regional level, while 2.3% remain unexplained on the country level, i.e. in addition to the regional level predictors, country level predictors merely explained 0.1% of the regional level and 0.7% of the country level differences that contribute to variation in face-to-face victimisation. Hence, Model 3 did not improve model fit in comparison to Model 2 ($\chi^2_{(4)} = 5.77$; $p = .22$) and was discarded in favour of Model 2.

Overall it appears that a region's life expectancy shows a negative relationship with both cyber-

and face-to-face victimisation, while crime has shown a positive marginal relationship. Regional level GDP showed positive and population density negative associations only with cyber-victimisation but no significant relationships with face-to-face victimisation.

Discussion and Implications

The current study investigated the occurrence of cyberbullying compared to face-to-face bullying in light of their cultural context reflecting social inequality at the regional and national levels. Our analyses show that cyber- and face-to-face victimisation are significantly correlated at both regional and country levels, an association also revealed in previous research (Kowalski et al., 2014; Smith, 2012). Results support some previous findings that cyber-victimisation was more likely among girls and increased with age, while face-to-face victimisation was more likely among boys (Slonje & Smith, 2008; Tokunaga, 2010; Ybarra & Mitchell, 2004b). While some of the regional level predictors were found to be significant and improving the models' fit compared, adding the same predictors on the country level did not improve the fit of the model significantly and these factors were discarded as not being influential beyond their regional level counterparts.

The positive association of victimisation with crime rates, while only marginally significant, supports previous notions of crime rates as indicative of contextual level social inequality and further links with bullying on the individual level. The findings further suggest that a normalisation of delinquency could lead to higher prevalence of bullying behaviours. While both, cyber- and face-to-face victimisation peaks at an age period that is known for a peak in anti-social behaviour due to the influence of delinquent peers (Moffitt, 1993), the current study shows that beyond peers' behaviours, the general prevalence of criminal behaviours in the cultural and regional proximity does correspond with bullying victimisation rates. This appears to be the case for face-to-face bullying as well as for cyber-bullying, confirming previous notions that adolescent risk experiences, whether offline or online, are linked by common underlying factors (Görzig, 2016). Given the marginal significance,

however, these results and interpretations do need to be considered with caution.

Life expectancy, here employed as an indicator for differences in health and social inequality *within* countries or regions, showed negative associations with cyber- and face-to-face victimisation - indicating that lower well-being and higher social inequality are associated with higher rates of victimisation. Hence, the association of cyber- and face-to-face victimisation with well-being and social inequality on the individual level (e.g., Aboujaoude et al., 2015; Cappadocia, et al., 2013; Tippett et al., 2014; Whittle et al. 2013) also holds for social inequality within contextual levels. GDP was added as a measure to capture social inequality in terms of economic inequality (i.e. differences in wealth) between regions or countries. The positive relation of GDP with cyber-victimisation again confirmed the associations of cyber-victimisation with social inequality in the cultural context and hints at the notion that a more competitive society might be associated with more social inequality (Fonseca Carvalhosa, 2009). Notably, it was economic inequality *between* regions, which showed a relation to regional differences in cyber- but not face-to-face victimisation rates. These findings confirmed previous cross-national evidence showing associations of bullying with economic inequalities. Moreover, in line with previous cross-national findings on face-to-face bullying, while measures for inequality within a country or region (i.e., GNI, life expectancy) were associated with victimisation, GDP (a measure of a regions' relative wealth) was not (Due et al., 2009). Possibly this is an indicator that more affluent communities may have greater access to technology than those less well-off (Kowalski et al., 2014; cf. Wang, Iannotti & Nansel, 2009) contributing to differences between regions in cyber- but not face-to-face victimisation.

In contrast to previous findings on population density and face-to-face bullying (Hatzenbuehler & Keyes, 2013; Goldweber et al., 2013) the present study showed no relationship. Moreover, our findings of higher levels of cyber-victimisation in regions that are less densely populated are in contrast with findings that showed that racial bullying is more likely in urban environments (Goldweber et al., 2013) and in support of assertions and previous findings that bullying might be

lower in urban areas due to their higher diversity and lesser stigma of any kind (Bachman et al., 2011; Hatzenbuehler & Keyes, 2013). Given that previous evidence on bullying and population density yielded mixed results, our analyses were only exploratory at this point and other explanations in line with the current data need further considerations. Given that population density is highly linked with the other factors included in the present analyses (Bradshaw et al., 2013; Elliott et al., 1996; Singh & Siahpush, 2014; Tolan et al., 2003) it is important to note that the findings for other factors reported here are controlled for any of their effects that might be accounted for by population density and vice versa, i.e. any of the effects reported on population density are independent of the effects of other factors linking with social inequality (i.e., crime, poverty, life expectancy). Leaning on previous research, this might suggest that population density only plays a role for specific targets of bullying that benefit from more diverse contexts (e.g., minority group members). Moreover, the present findings that hold for cyber- but not face-to-face victimisation might hint at the possibility that fewer face-to-face encounters and/or higher internet use could contribute to the higher occurrence of electronic forms of bullying in less populated rural areas.

In line with previous studies employing the same data set (cf. Görzig & Machackova, 2015) the country level variance in cyber-victimisation remained around 7% despite controlling for variation on the regional level, which, however, explained an additional 4% of variation in cyber-victimisation. Hence, against expectations, regional level differences in cyber-victimisation within a country did not exceed but were lower than differences between the countries. Regional level differences did also not contribute in explaining any of the higher country level variance in cyber-victimisation. Nonetheless, regional level differences did present a further source of variation to be considered for occurrence of cyber-victimisation – adding up to a total variance of 10% in cyber-victimisation to be found between both cultural levels. Variation in face-to-face victimisation was equivalent on the regional level (4%) and slightly but not notably lower on the country level (5%). Upon adding predictor variables, country but not regional level variance did decrease and this was

significant only when adding regional level predictors. This finding indicates that even though adding country level predictors did not contribute to improving the model beyond regional level predictors, there was nonetheless a connection between country level differences in cyber-victimisation and regional level predictors. That is, the differences in the factors reflecting social inequality on a regional level are associated with the variation in victimisation between countries.

Limitations and Future Research

The current study confirmed previous findings on the relation between cyber- and face-to-face victimisation with social inequality as assessed via crime rates and life expectancy. However, findings for crime rates were only marginally significant. Further, the postulated mechanisms via which these variables might influence bullying victimisation (e.g., imbalance of power) still need further investigation. It appears that cultures with higher criminality and lower life expectancy are linked with higher victimisation rates but possible underlying factors for those links are not assessed. Future studies might seek to improve measurement validity and the inclusion of possible principal features that link the co-occurrence of certain factors within a culture (e.g. power imbalance; cf. Hofstede, 2001). Results for GDP and population density were mixed and partially unexpected. Possible explanations include differences in technology access (GDP) and use (population density). Future research might investigate further structural mechanism that might underlie these associations.

The unexpected low regional level variance might indicate that the regions as defined in this study were too large or distal to be reflected in the diversity of individuals' victimisation responses. The influence of smaller, more communal regions or neighbourhoods should be considered in further analyses (cf. Swearer & Espelage, 2011). Moreover, at a more distal level it is likely that structural aspects such as policies and laws are permeating various levels of the socio-ecological system and reach the individual. Within Europe legal and policy aspects are generally more influential on the country than regional level (Lijphart, 2012) and hence might explain the higher variance on the

country level. Furthermore, regional level predictors were connected with country level differences in cyber-victimisation. A finding indicating that higher level contexts (e.g. countries) might have an influence on lower level contexts (e.g. regions) possibly due to joint practices or policies. Future studies might consider investigating specific country and regional level policies as well as differences in political structures concerning the relative power of regions between countries (i.e., federal or unitary state governments). Another possible limitation that could have contributed to a bias in the regional level variance is that regions in geographic proximity that nonetheless belong to different countries, could share cultural traits that influence behaviour of individuals and that this study has not set out to measure or control for (e.g. assertiveness or aggressiveness). These cultural similarities that cut across established political and economic boundaries, as reflected in administrative division into regions and countries employed as units of analysis in this study, could thus also affect the inter-regional variance. Overall, these findings indicate some importance of policy interventions at both cultural levels of the socio-ecological system.

References

Aboujaoude, E., Savage, M. W., Starcevic, V., & Salame, W. O. (2015). Cyberbullying: review of an old problem gone viral. *Journal of Adolescent Health*, *57*(1), 10–18.

Bachman, R., Randolph, A., & Brown, B. L. (2011). Predicting perceptions of fear at school and going to and from school for African American and white students: The effects of school security measures. *Youth & Society, 43*(2), 705–726. doi: 10.1177/0044118x10366674.

Baldry, A. C., Farrington, D. P., & Sorrentino, A. (2015). “Am I at risk of cyberbullying”? A narrative review and conceptual framework for research on risk of cyberbullying and cybervictimization: The risk and needs assessment approach. *Aggression and Violent Behavior*, *23*, 36–51. doi:10.1016/j.avb.2015.05.014

Barlett, C. P., Gentile, D. A., Anderson, C. A., Suzuki, K., Sakamoto, A., Yamaoka, A., & Katsura, R. (2014). Cross-cultural differences in cyberbullying behavior: A short-term longitudinal study. *Journal of Cross-Cultural Psychology, 45*(2), 300-313.

Bradshaw, C. P., Waasdorp, T. E., Goldweber, A., & Johnson, S. L. (2013). Bullies, Gangs, Drugs, and School: Understanding the Overlap and the Role of Ethnicity and Urbanicity. *Journal of Youth and Adolescence*, *42*(2), 220–234. doi:10.1007/s10964-012-9863-7

Braveman, P., Egerter, S., & Williams, D. R. (2011). The Social Determinants of Health: Coming of

Age. *Annual Review of Public Health*, *32*(1), 381–398. doi:10.1146/annurev-publhealth-031210-101218 doi:10.1177/0022022113504622

Bronfenbrenner, U. (1979). *The Ecology of Human Development: Experiments by Nature and Design*. Cambridge, MA: Harvard University Press.

Browne, W. J., Subramanian, S. V., Jones, K., & Goldstein, H. (2005). Variance partitioning in multilevel logistic models that exhibit overdispersion. *Journal of the Royal Statistical Society: Series A (Statistics in Society), 168*(3), 599–613.

Cappadocia, M. C., Craig, W. M., & Pepler, D. (2013). Cyberbullying: Prevalence, stability, and risk factors during adolescence. *Canadian Journal of School Psychology, 28*(2), 171–92.

Cassidy, W., Faucher, C., & Jackson, M. (2013). Cyberbullying among youth: A comprehensive review of current international research and its implications and application to policy and practice. *School Psychology International*, 0143034313479697–. doi:10.1177/0143034313479697

Chaux, E., Molano, A., Podlesky, P. (2009). Socio-economic, socio-political and socio-emotional variables explaining school bullying: A country-wide multi-level analysis. *Aggressive Behavior*, *35*(6),520-529.

Chamlin, M. B., & Cochran, J. K. (2006). Economic inequality, legitimacy, and cross-national homicide rates. *Homicide Studies*, *10*(4), 231-252.

Cross, D., Barnes, A., Papageorgiou, A., Hadwen, K., Hearn, L., & Lester, L. (2015). A social–ecological framework for understanding and reducing cyberbullying behaviours. *Aggression and Violent Behavior, 23*, 109-117. doi:http://dx.doi.org/10.1016/j.avb.2015.05.016

Diener, E., & Seligman, M. E. P. (2004). Beyond Money: Toward an Economy of Well-Being. *Psychological Science in the Public Interest*, *5*(1), 1–31. doi:10.1111/j.0963-7214.2004.00501001.x

Due, P., Merlo, J., Harel-Fisch, Y., Damsgaard, Mogens, T., Holstein, B. E., … Lynch, J. (2009). Socioeconomic inequality in exposure to bullying during adolescence: A comparative, cross-sectional, multilevel study in 35 countries. *American Journal of Public Health*, *99*(5), 907–914. http://doi.org/10.2105/AJPH.2008.139303

Dukes, R. L., Stein, J.A., & Zane, J.I. (2010). Gender differences in the relative impact of physical and relational bullying on adolescent injury and weapon carrying. *Journal of School Psychology*, *48*(6), 511-532.

Elgar, F. J., & Aitken, N. (2011). Income inequality, trust and homicide in 33 countries. *The European Journal of Public Health*, *21*(2), 241-246.

Elliott, D. S., Wilson, W. J., Huizinga, D., Sampson, R. J., Elliott, A., & Rankin, B. (1996). The Effects of Neighborhood Disadvantage on Adolescent Development. *Journal of Research in Crime and Delinquency, 33*(4), 389–426. doi:10.1177/0022427896033004002

Eurostat (2015). *Regions of the European Union. Nomenclature of territorial units for statistics*

NUTS 2013/EU-28. Luxembourg: Publication Office of the European Union.

Fonseca Carvalhosa, S. (2009). Prevention of bullying in schools: An ecological model. *International Journal of Developmental and Educational Psychology*, *1*(4), 129-134.

Genta, M. L., Smith, P. K., Ortega, R., Brighi, A., Guarini, A., Thompson, F., Tippett, N., Mora-Merchán, J., & Calmaestra, J. (2012). Comparative aspects of cyberbullying in Italy, England and Spain: Findings from a DAPHNE project. In Q. Li, D. Cross, & P. K. Smith (Eds.), *Cyberbullying in the Global Playground: Research from International Perspectives,* (pp. 15-31). Chichester: Wiley-Blackwell.

Gini, G., & Pozzoli, T. (2009). Association between bullying and psychosomatic problems: a meta-analysis. *Pediatrics*, *123*(3), 1059–65. doi:10.1542/peds.2008-1215

Goldweber, A., Waasdorp, T., & Bradshaw, C. P. (2013). Examining associations between race, urbanicity, and patterns of bullying involvement. *Journal of Youth and Adolescence, 42*(2)*,* 206–219. doi:10.1007/ s10964-012-9843-y

Görzig, A. (2016). Adolescents' experience of offline and online risks: Separate and joint propensities. *Computers in Human Behavior*, *56*, 9–13.

Görzig, A. (2012). Methodological framework: The EU Kids Online project. In S. Livingstone, L. Haddon, & A. Goerzig (Eds.), *Children, Risk and Safety Online: Research and Policy Challenges in Comparative Perspective* (pp. 15-32). Bristol: The Policy Press.

Görzig, A. (2011). *Who Bullies and Who Is Bullied Online? A Study of 9-16 Year Old Internet Users in 25 European Countries*, London: EU Kids Online, London School of Economics and Political Science.

Görzig, A. & Machackova, H. (2015). Cyberbullying from a socio-ecological perspective. *Media@LSE Working Paper #36*. London, UK: London School of Economics and Political Science. Retrieved from: http://www.lse.ac.uk/media@lse/research/mediaWorkingPapers/pdf/WP36-FINAL.pdf

Görzig, A., & Ólafsson, K. (2013). What Makes a Bully a Cyberbully? Unravelling the Characteristics of Cyberbullies across Twenty-Five European Countries. *Journal of Children and Media*, *7*(1), 1–19. doi:10.1080/17482798.2012.739756

Hatzenbuehler, M. L., & Keyes, K. M. (2013). Inclusive anti-bullying policies and reduced risk of suicide attempts in lesbian and gay youth. *Journal of Adolescent Health, 53*(1, Suppl.), S21–S26. doi:10.1016/j .jadohealth.2012.08.010

Hay, C., Meldrum, R., & Mann, K. (2010). Traditional bullying, cyber bullying, and deviance: A general strain theory approach. *Journal of Contemporary Criminal Justice*, *26*(2), 130–147.

Hertz, M. F., Donato, I., & Wright, J. (2013). Bullying and suicide: a public health approach. *The Journal of Adolescent Health, 53*, S1–3. doi:10.1016/j.jadohealth.2013.05.002

Hinduja, S., & Patchin, J. W. (2012). Cyberbullying: Neither an epidemic nor a rarity. *European Journal of Developmental Psychology*, *9*(5), 539–543. doi:10.1080/17405629.2012.706448Hipp, J. R. (2007). Income inequality, race, and place: Does the distribution of race and class within

neighborhoods affect crime rates?. *Criminology*, *45*(3), 665-697.

Hofstede, G. (2001). *Culture's consequences: Comparing values, behaviors,institutions, and organizations across nations*. Thousand Oaks, CA:Sage.

Junger-Tas, J., & van Kesteren, J. N. (1999). *Bullying and delinquency in a Dutch school population.* The Hague: Kugler Publications.

Kaplan, G. A., Pamuk, E. R., Lynch, J. W., Cohen, R. D., & Balfour, J. L. (1996). Inequality in income and mortality in the United States: analysis of mortality and potential pathways. *BMJ : British Medical Journal*, *312*(7037), 999–1003.

Kowalski, R. M., Giumetti, G. W., Schroeder, A. N., & Lattanner, M. R. (2014). Bullying in the digital age: a critical review and meta-analysis of cyberbullying research among youth. *Psychological Bulletin, 140*(4), 1073–1137.

LaVeist, T., Pollack, K., Thorpe, R., Fesahazion, R., & Gaskin, D. (2011). Place, Not Race: Disparities Dissipate In Southwest Baltimore When Blacks And Whites Live Under Similar Conditions. *Health Affairs*, *30*(10), 1880–1887. doi:10.1377/hlthaff.2011.0640

Lijphart, A. (2012). *Patterns of democracy: Government forms and performance in thirty-six countries*. Yale University Press.

Livingstone, S., Görzig, A., & Ólafsson, K. (2011). *Disadvantaged Children and Online Risk.* LSE, London: EU Kids Online. London: EU Kids Online.

Livingstone, S., Haddon, L., Görzig, A., & Ólafsson, K. (2011a). *Risks and safety on the internet: the perspective of European children: full findings*. London, UK: EU Kids Online, London School of Economics and Political Science: EU Kids Online. Retrieved from http://eprints.lse.ac.uk/33731/

Livingstone, S., Haddon, L. G., Görzig, A., & Ólafsson, K. (2011b). *Technical Report and User Guide: The 2010 EU Kids Online Survey*. LSE, London: EU Kids Online.

Livingstone, S., & Smith, P.K. (2014). Annual Research Review: Harms experienced by child users of online and mobile technologies: the nature, prevalence and management of sexual and aggressive risks in the digital age. *Journal of Child Psychology and Psychiatry, 55*(6), 635-54.

Moffitt T. E. (1993). Adolescence-limited and life-course-persistent antisocial behavior: A developmental taxonomy. *Psychological Review*, *100*(4), 674-701. doi:10.1037/0033-295X.100.4.674.

NCES - National Center for Education Statistics (2013). *Student reports of bullying and cyber-bullying: Results from the 2011 School Crime Supplement to the National Crime Victimization Survey*. Available at: http://nces.ed.gov/ pubs2013/2013329.pdf Nansel , T. R. , Overpeck , M. , Pilla , R. S. , Ruan , W. J. , Simons-Morton , B. & Scheidt , P. (2001). Bullying behaviors among US youth. *Journal of the American Medical Association, 285*: 2094–2100. doi:10.1001/jama.285.16.2094

Neckerman, K. M., & Torche, F. (2007). Inequality: Causes and consequences. *Annual Review of Sociology*, *33*, 335-357.

Olweus, D. (1993). *Bullying at school: What we know and what we can do*. Cambridge, MA: Blackwell.

Patchin, J.W., & Hinduja, S. (2010). Traditional and nontraditional bullying among youth: A test of General Strain Theory. *Youth & Society, 20*(2), 1–25.

Pellegrini, A.D., & Long, J.D. (2002). A longitudinal study of bullying, dominance, and victimization during the transition from primary school through secondary school. *British Journal of Developmental Psychology*, *20*(2), 259–280.

Pellegrini, A.D., Long, J.D., Solberg, D., Roseth, C., Dupuis, D., & Bohn, C. (2009). Bullying and social status during school transitions. In S. Jimerson, S. Swearer, & D. Espelage (Eds.), *Handbook of Bullying in Schools: An International Perspective*. Hoboken, NJ: Routledge.

Peterson, J.S., & Ray, K.E. (2006). Bullying and the gifted: Victims, perpetrators, prevalence and effects. *Gifted Child Quarterly*, *52*(2), 148–168.

Phelan, J. C., Link, B. G., & Tehranifar, P. (2010). Social Conditions as Fundamental Causes of Health Inequalities: Theory, Evidence, and Policy Implications. *Journal of Health and Social Behavior*, *51*(1 Suppl), S28–S40. doi:10.1177/0022146510383498

Pratt, T. C., & Cullen, F. T. (2005). Assessing macro-level predictors and theories of crime: A meta-analysis. *Crime and justice*, 373-450.

Pratto, F., Sidanius, J., & Levin, S. (2006). Social dominance theory and the dynamics of intergroup relations: Taking stock and looking forward. *European Review of Social Psychology*, *17*(1), 271–320. doi:10.1080/10463280601055772

Rabe-Hesketh, S., & Skrondal, A. (2008). *Multilevel and longitudinal modeling using Stata (2nd Ed.)*. College Station, TX: STATA press.

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical Linear Models: Applications and Data Analysis Methods (Vol. 1)*. Thousand Oaks, CA: Sage.

Singh, G. K., & Siahpush, M. (2014). Widening Rural–Urban Disparities in Life Expectancy, U.S., 1969–2009. *American Journal of Preventive Medicine*, *46*(2), e19–e29. doi:10.1016/j.amepre.2013.10.017

Slonje, R., Smith, P. K., & Frisén, A. (2013). The nature of cyberbullying, and strategies for prevention. *Computers in Human Behavior*, *29*(1), 26–32.

Slonje, R. & Smith, P. (2008). Cyberbullying: Another main type of bullying? *Scandinavian Journal of Psychology, 49*(2)*, 147-154.*

Smith, P. K. (2015). The nature of cyberbullying and what we can do about it. *Journal of Research in Special Educational Needs, 15*(3), 176–184.

Smith, P.K. (2012). Cyberbullying and cyber aggression. In Shane R. Jimerson, Amanda B. Nickerson, Matthew J. Mayer, & Michael J. Furlong (Eds.), *Handbook of School Violence and School Safety: International Research and Practice* (pp.93-103). New York, NY: Routledge,.

Smith, P. K., Mahdavi, J., Carvalho, M., Fisher, S., Russell, S., & Tippett, N. (2008). Cyberbullying: Its nature and impact in secondary school pupils. *Journal of Child Psychology and Psychiatry, 49*(4), 376-385.

Sterne, J. A. C., White, I. R., Carlin, J. B., Spratt, M., Royston, P., Kenward, M. G., &Wood, A. M. (2009). Multiple imputation for missing data in epidemiological and clinical research: potential and pitfalls. *BMJ*, *338*(b2393), 157–160. doi:10.1136/bmj.b2393

Soares, S., Brochado, S., Barros, H., & Fraga, S. (2015). Does cyberbullying relate with country-indicators? An ecological study in 26 high income countries. *European Journal of Public Health*, *25*(suppl 3), 206-207.

Steele, F. (2008). Module 5: Introduction to multilevel modelling concepts. *LEMMA (Learning Environment for Multilevel Methodology and Applications), Centre for Multilevel Modelling, University of Bristol*.

Swearer S. M. & Espelage, D. L. (2011). Expanding the social-ecological framework of bullying among youth: Lessons learned from the past and directions for the future. *Educational Psychology Papers and Publications*. Paper 140. Retrieved from http://digitalcommons.unl.edu/edpsychpapers/140

Swearer, S. M. & Espelage, D. L. (2004). Introduction: A social- ecological framework of bullying among youth. In D. L. Espelage and S. M. Swearer (Eds.), *Bullying in American Schools: A Social-Ecological Perspective on Prevention and Intervention*, (pp. 1–12). Mahwah, NJ: Lawrence Erlbaum.

Tippett, N., & Wolke, D. (2014). Socioeconomic status and bullying: a meta-analysis. *American Journal of Public Health*, *104*(6), e48-e59.

Tokunaga, R. S. (2010). Following you home from school: A critical review and synthesis of research on cyberbullying victimization. *Computers in Human Behavior 26*(3), 277-287.

Tolan, P. H., Gorman-Smith, D., & Henry, D. B. (2003). The developmental ecology of urban males' youth violence. *Developmental Psychology, 39*(2), 274–291. doi:10.1037/0012-1649.39.2.274

Viner, R. M., Ozer, E. M., Denny, S., Marmot, M., Resnick, M., Fatusi, A., & Currie, C. (2012). Adolescence and the social determinants of health. *The Lancet*, *379*(9826), 1641–1652. doi:10.1016/S0140-6736(12)60149-4

Von Hippel, P. T. (2007). Regression with missing ys: an improved strategy for analyzing multiply imputed data. *Sociological Methodology*, *37*(1), 83–117. doi:10.1111/j.1467-9531.2007.00180.x

Wang, J., Iannotti, R. J., & Nansel, T. R. (2009). School bullying among adolescents in the United States: Physical, verbal, relational, and cyber. *Journal of Adolescent Health, 45*(4), 368-375.

Whittle, H., Hamilton-Giachritsis, C., Beech, A., & Collings, G. (2013). A review of young people's vulnerabilities to online grooming. *Aggression and violent behavior*, *18*(1), 135-146.

Wilkinson, R. G. (1992). Income distribution and life expectancy. *BMJ : British Medical Journal*, *304*(6820), 165–168.

Wilkinson, R. G., & Pickett, K. E. (2006). Income inequality and population health: A review and explanation of the evidence. *Social Science & Medicine*, *62*(7), 1768–1784. doi:10.1016/j.socscimed.2005.08.036

Ybarra, M. L., & Mitchell, K. J. (2004a). Online aggressor/targets, aggressors, and targets: A comparison of associated youth characteristics. *Journal of Child Psychology and Psychiatry, 45*(7), 1308−1316.

Ybarra, M. L., & Mitchell, K. J. (2004b). Youth engaging in online harassment: with caregiver-child relationships, Internet use, and personal characteristics. *Journal of Adolescence, 27*(3), 319−336.

Table 1.
Key Variables and Descriptive Statistics by Country.

Country	% Cyberbullying victims (95% CI)	% Face-to-face bullying victims (95% CI)	Crime (% victims of burglary)	GDP (Euro per inhabitant)	Life expectancy (years)	Population density (inhabitants per km^2)	Regions with valid cases	Valid cases
Belgium	8.7 (6.9 - 10.5)	12.8 (10.6 - 14.9)	21.7	32700	80	359	11	899
Bulgaria	6.9 (5.3 - 8.4)	15.5 (13.3 - 17.7)	15.8	4800	74	69	6	1000
Czech Republic	9.4 (7.6 - 11.3)	17.9 (15.5 - 20.4)	11.6	14300	77	136	8	927
Germany	5.3 (3.9 - 6.7)	10.7 (8.8 - 12.6)	9.5	30500	80	229	16	899
Denmark	13.1 (10.8 - 15.3)	13.7 (11.4 - 16.0)	24.0	42600	79	129	5	783
Greece	5.2 (3.8 - 6.6)	11.5 (9.5 - 13.6)	20.0	20143	80	86	11	956
Spain	5.0 (3.7 - 6.4)	10.6 (8.7 - 12.5)	23.4	22700	82	92	17	998
Finland	5.3 (3.8 - 6.8)	11.1 (9.0 - 13.2)	27.1	33300	80	18	4	866
France	9.5 (7.7 - 11.4)	19.8 (17.3 - 22.4)	21.6	29900	81	102	15	950
Hungary	6.5 (4.9 - 8.1)	14.6 (12.4 - 16.9)	13.9	9600	74	108	7	907
Italy	2.9 (1.9 - 4.0)	8.3 (6.6 - 10.0)	21.6	25700	82	201	11	383
Netherlands	5.1 (3.7 - 6.5)	7.0 (5.4 - 8.7)	18.0	35300	81	492	12	833
Norway	10.3 (8.2 - 12.3)	17.8 (15.2 - 20.4)	18.6	65000	81	16	7	820
Poland	7.0 (5.4 - 8.6)	13.1 (11.0 - 15.3)	10.7	9200	76	122	16	906
Portugal	2.8 (1.7 - 3.8)	5.8 (4.3 - 7.2)	13.6	16300	79	115	5	961
Romania	15.4 (13.1 - 17.6)	24.8 (22.1 - 27.6)	11.4	5717	73	93	8	967
Sweden	13.0 (10.8 - 15.3)	17.0 (14.5 - 19.5)	25.3	37300	81	23	8	833
UK	10.2 (8.3 - 12.1)	16.5 (14.1 - 18.8)	20.3	27800	80	257	12	943

Note. CI = Confidence interval.

Table 2.

Ecological Correlations of Key Variables across Regions and Countries.

	1	2	3	4	5
Regional-level correlations					
1. Cyber-victimisation					
2. Face-to-face victimisation	.56**	-			
3. Crime	.12	.04	-		
4. GDP	.01	-.06	.41**	-	
5. Life expectancy	-.22**	-.28**	.34**	.67**	-
6. Population density	-.04	.02	.25**	.37**	.09
Country-level correlations					
1. Cyber-victimisation					
2. Face-to-face victimisation	.85**	-			
3. Crime	.07	-.12	-		
4. GDP	.18	-.07	.53*	-	
5. Life expectancy	-.28	-.45	.63**	.71**	-
6. Population density	-.21	-.39	-.11	.07	.22

Notes. *$p < .05$; **$p < .01$

Table 3.
Hierarchical Multilevel Logistic Regression Models Predicting Cyber-Victimisation.

	Model 1			Model 2			Model 3		
	B(SE)	*Exp(B)*	*p*	*B(SE)*	*Exp(B)*	*p*	*B(SE)*	*Exp(B)*	*p*
Individual level									
Age	.18 (.01)	1.20	.00	.18 (.01)	1.20	.00	.18 (.01)	1.20	.00
Gender (female =0)	-.46 (.06)	.63	.00	-.46 (.06)	.63	.00	-.46 (.06)	.63	.00
SES (reference: low)									
Med	-.06 (.09)	.94	.49	-.06 (.09)	.94	.50	-.07 (.09)	.93	.43
High	-.07 (.10)	.93	.45	-.07 (.10)	.93	.47	-.09 (.10)	.92	.35
Regional level									
Crime				.10 (.06)	1.10	.10	.11 (.06)	1.12	.08
GDP				.26 (.12)	1.30	.02	.17 (.14)	1.18	.24
Life expectancy				-.31 (.12)	.74	.01	-.01 (.18)	.99	.97
Population density				-.14 (.06)	.87	.02	-.12 (.07)	.89	.06
Country level									
Crime							.11 (.14)	1.12	.42
GDP							.24 (.17)	1.27	.17
Life expectancy							-.57 (.24)	.56	.02
Population density							.05 (.10)	1.05	.63
VPC									
Regional level		3.8%			3.7%			3.6%	
Country level		6.6%			4.2%			3.3%	
-2 Log likelihood ratio					11.15 (4)*			5.64 (4)	

Notes. OR = Odds Ratio; VPC = Variance Partitioning Coefficient; * $p < .05$.
Country and regional level predictors were mean centred at 0 and scaled to a standard deviation of 1.

Table 4.
Hierarchical Multilevel Logistic Regression Models Predicting Face-to-Face Victimisation.

	Model 1			Model 2			Model 3		
	B(SE)	*Exp(B)*	*p*	*B(SE)*	*Exp(B)*	*p*	*B(SE)*	*Exp(B)*	*p*
Individual level									
Age	.01 (.01)	1.01	.28	.01 (.01)	1.01	.28	.01 (.01)	1.01	.28
Gender (female =0)	.11 (.05)	1.11	.02	.11 (.05)	1.12	.02	.11 (.05)	1.11	.02
SES (reference: low)									
Med	-.11 (.07)	.90	.11	-.11 (.07)	.90	.11	-.11 (.07)	.89	.10
High	-.11 (.07)	.90	.14	-.10 (.07)	.90	.15	-.11 (.07)	.89	.12
Regional level									
Crime				.09 (.05)	1.10	.07	.11 (.05)	1.12	.04
GDP				.14 (.10)	1.14	.17	.04 (.12)	1.04	.75
Life expectancy				-.26 (.10)	.77	.01	-.03 (.15)	.97	.85
Population density				-.04 (.05)	.96	.41	-.02 (.05)	.98	.73
Country level									
Crime							-.01 (.11)	.99	.94
GDP							.21 (.15)	1.23	.15
Life expectancy							-.37 (.20)	.69	.06
Population density							-.08 (.08)	.92	.34
VPC									
regional level		3.6%			3.6%			3.5%	
country level		4.5%			3.0%			2.3%	
-2 Log likelihood ratio					9.73(4)*			5.77(4)	

Notes. OR = Odds Ratio; VPC = Variance Partitioning Coefficient; * p < .05.
Country and regional level predictors were mean centred at 0 and scaled to a standard deviation of 1.