Abstract

Background

Cyberbullying differs from face-to-face bullying and may negatively influence adolescent mental health but there is a lack of definitive research on this topic. This study examines longitudinal associations between cyberbullying involvement and adolescent mental health.

Methods

Participants were 2,480 teenagers taking part in the Olympic Regeneration in East London (ORiEL) study. We collected information from participants when they were 12-13 years old and again one year later to examine links between involvement in cyberbullying and future symptoms of depression and social anxiety, and mental well-being.

Results

At baseline, 14% reported being cybervictims, 8% reported being cyberbullies, and 20% reported being cyberbully-victims in the previous year. Compared to uninvolved adolescents, cybervictims and cyberbully-victims were significantly more likely to report symptoms of depression (cybervictims: OR=1.44, 95% CI [1.00, 2.06]; cyberbully-victims: OR=1.54, 95% CI [1.13, 2.09]) and social anxiety (cybervictims: OR=1.52, 95% CI [1.11, 2.07]; cyberbully-victims: OR=1.44, 95% CI [1.10, 1.89]) but not below average well-being (cybervictims: RRR=1.28, 95% CI [0.86, 1.91]; cyberbully-victims: RRR=1.38, 95% CI [0.95, 1.99]) at one year follow-up, after adjustment for confounding factors including baseline mental health.

Conclusion

This study emphasises the high prevalence of cyberbullying and the potential of cybervictimisation as a risk factor for future depressive symptoms, social anxiety symptoms,

and below-average well-being among adolescents. Future research should identify protective factors and possible interventions to reduce adolescent cyberbullying.

Keywords: adolescence, mental health, depression, social anxiety, well-being, cyberbullying

Implications and contribution

Cybervictims and cyberbully-victims reported poorer mental health 12-months later, even after adjustment for demographic factors and baseline mental health. This is the first longitudinal study to examine social anxiety and well-being outcomes, and the first UK-based study of cyberbullying and mental health. Evidence-based cyberbullying interventions may improve adolescent mental health.

Online bullying – cyberbullying – has a number of features which distinguish it from face-to-face bullying including the permanence, publicity, and permeability of online messaging. These features may exacerbate effects on adolescent mental health outcomes (1) and may challenge factors central to traditional bullying including repetition, power imbalance, and intentionality (2). The permanence and ease of sharing online messages means single acts of online harassment may be repeated when viewed or distributed by others (3-5). Rather than physical strength, cyberbullies' power may be linked to psychological power and technical skills as perpetrators can affect a cybervictims' reputations and relationships via the distribution of online messages (6, 7). Intentionality online is complicated by online disinhibition effects as lack of nonverbal cues and social feedback can desensitise individuals and lead to more aggressive behaviour online compared to face-to-face settings (7). Cyberbullying also tends to occur in online environments lacking adult supervision and unrestricted to any specific geographical location, possibly preventing those victimised from escaping its impact (8). Given issues in defining cyberbullying, inconsistency in estimates of prevalence is unsurprising (3).

The influence of cyberbullying on adolescent mental health has elicited public health concern. Longitudinal research on this topic is rare; though existing studies indicate significant mental health problems associated with cyberbullying involvement. Cybervictimisation has shown associations with depressive symptoms six months later among Spanish adolescents (4); US adolescents (9); and after adjusting for gender, traditional bullying, and age, among Swiss adolescents (10). Cybervictims may report more social difficulties and higher anxiety and depression than traditional victims (6) and mental health correlates of traditional bullying and cyberbullying may differ. Sjursø, Fandrem and Roland (11) found a stronger association between traditional bullying and depressive symptoms and between cyberbullying and anxiety symptoms. Different, and potentially poorer, mental

health associated with cyberbullying compared to traditional bullying is likely attributable to the features distinguishing these two forms of bullying.

The ability to draw conclusions from existing studies as to associations between cyberbullying involvement and adolescent mental health is hindered by a lack of high-quality studies (2, 3, 5). Most notably, existing research is primarily cross-sectional (4, 5). Additional limitations of previous research include: lack of adjustment for confounding factors (4, 9, 12); lack of validated mental health measures (5); and not using longitudinal data to enable adjustment for pre-existing mental illness (13). Also studies have not compared longitudinal mental health outcomes for cybervictims, cyberbullies, and cyberbully-victims. Outcomes may differ for these three groups; distinguishing them may improve precision in prevalence estimates and clarify existing inconsistencies in evidence for gender differences in cyberbullying (1); individuals in these three groups may also respond differently to intervention. Previous research has suggested that the cyberbully-victim group may be larger than the traditional bully-victim group (14), and that mental health outcomes may be poorer for cyberbully-victims than cybervictims (4).

Using a psychiatric epidemiological approach, this study aims to use data from a large, multi-ethnic adolescent cohort in East London to examine whether involvement in cyberbullying at baseline (as cybervictim, cyberbully, or cyberbully-victim) is associated with poorer mental health (depressive symptoms, social anxiety symptoms, and mental well-being) at one year follow-up.

Methods

Study Design and Participants

The Olympic Regeneration in East London (ORiEL) study was designed to evaluate the impact of urban regeneration associated with the London 2012 Olympic Games on a prospective cohort of adolescents in East London (15). Twenty five schools participated (61.0% of those invited). No schools dropped out across the three waves. Information was available for 3088 Year 7 students (aged 11-12) across 25 randomly selected schools in four East London boroughs in 2012, a response rate of 86.8%. These adolescents were followed up in January-July 2013 and January-July 2014. **Baseline** cyberbullying measures were collected from participants at Wave 2 (aged 12-13) and **follow-up** measures at Wave 3 (aged 13-14). Students absent at Wave 1 or who joined participating classes were eligible to take part at subsequent waves. All participants in analyses for this paper were present at Wave 2 and Wave 3, though some are not members of the original ORiEL cohort (15). Response rate at baseline was 84% (n=3213; Wave 2). After exclusion criteria, 77% (n=2480) provided follow-up data.

Ethical Considerations

Head teachers provided informed consent. Adolescents were enrolled via passive parental consent – parents were given information sheets and opt-out forms in advance. Adolescents provided written assent at each wave following a verbal description of the study. Ethical approval was granted for ORiEL through Queen Mary University of London Ethics Committee (QMREC2011/40), the Association of Directors of Children's Services (RGE110927) and the London Boroughs Research Governance Framework (CERGF113).

Measurement Instruments

Outcome measures. Measure of depressive symptoms (16), social anxiety symptoms (17, 18), and mental well-being (19, 20) related to feelings and experiences during the two weeks prior to the survey and are described in detail in Table 1.

Table 1

Cyberbullying involvement. A six item (6 response category) scale used by Ybarra, Diener-West and Leaf (21) assessed cyberbullying involvement. This scale included three cybervictimisation items (In the past 12 months how often have you: received rude or nasty comments from someone online?/Become the target of rumours spread online?/Received threatening or aggressive comments online?) and three cyberbullying items (Now thinking about things you might have done - in the past 12 months, how often have you: Sent rude or nasty comments to someone online?/Spread rumours about someone else online?/Sent threatening or aggressive comments online?). Participants who reported any victimisation and no perpetration over the past year were coded as "cybervictims", those who reported no victimisation and any perpetration of cyberbullying over the past 12 months were coded as "cyberbullies", and those who reported any victimisation and any perpetration of cyberbullying over the past year were coded as "cyberbully-victims". The cybervictimisation items showed high reliability in this sample: Cronbach's $\alpha=0.89$ (n=1749); as did the cyberbullying perpetration items: Cronbach's $\alpha=0.91$ (n=1737).

Covariates. Gender, ethnicity and socioeconomic status (SES) were identified a priori as covariates. Participants reported ethnicity using a Census-based question adapted to capture characteristics of the highly ethnically diverse East London population (see Table 2).

The 4-item Family Affluence Scale II (FAS II) measured SES (22) categorised as low (score=0,1,2), medium (score=3,4,5) or high affluence (score= 6,7,8,9). As in other studies, (23, 24) this scale showed poor internal consistency at baseline ($\alpha =0.37$) and follow-up ($\alpha=0.36$). Therefore, analyses were additionally adjusted for self-reported free school meals status.

Multilevel modelling by school was not feasible in this study due as the REALCOM software only allowed for two-level multiple imputation. School could not be included in the imputation as a random effect, after we include survey wave at level 1 and participants at level 2. Therefore, analyses were adjusted for school as a fixed effect to account for the clustering of students within schools.

Analysis Plan

Missing data. Missing data ranged from 0.0% to 31.9% (Median=9.1%). Participants missing all mental health information or all social media information were excluded, as were participants who moved schools and those without ethnicity information as it was not possible to impute these variables based on available data (n=166 (6.3%) excluded in total). Missing data patterns yielded no evidence against the "Missing At Random" (MAR) assumption. We imputed the data using multilevel multiple imputation under the MAR assumption in the REALCOM software (25) which uses a joint multivariate normal modelling approach through the Markov Chain Monte Carlo (MCMC) method.

We imputed with 2 levels (1st=wave and 2nd=pupil). In addition to the variables listed in the method, the following variables were included in the imputation: peer and family social support (26), parental monitoring (27), parental involvement in school, lifetime experience of bullying, number of negative life events, and mother's employment status. We used a `burn-in' period of 35,000 iterations, followed by 25,000 iterations producing a dataset every 500th iteration, resulting in 50 imputed datasets. The MCMC chains were found to converge.

Analytic approach. Rubin's rules (28) were applied to combine estimates from imputed datasets. A series of binary (for depression and social anxiety) and multinomial (for mental well-being) logistic regression models were conducted on a PC using Stata (Version 12) (29). Unadjusted models regressed each mental health outcome on cyberbullying

involvement. These models were then adjusted for gender, ethnicity, SES, and school. Finally, models were additionally adjusted for baseline mental health.

Results

Loss to follow-up. Females were less likely than males to be lost to follow-up (Odds Ratio (OR =0.77, 95% Confidence Interval (CI) [0.65, 0.91]). Participants who reported their ethnicity as Black Caribbean (OR=1.59, 95% CI [1.08, 2.34]) were more likely to be lost to follow-up than White UK students, as were those who received free school meals (OR=1.32, 95% CI [1.12, 1.57]). No other socio-demographic, social media, or mental health factors were associated with loss to follow-up.

Socio-demographic characteristics. The longitudinal sample contains a higher proportion of males (55.2%) than females (44.8%;) (Table 2). The largest ethnic groups include White UK (16.9%), White other (15.2%), Bangladeshi (15.4%), Black African (10.6%), and Black other (11.2%). At baseline, 37% reported receiving free school meals, while 58% reported having low/moderate family affluence. Sample size within the longitudinal sample for each school ranged from 75 to 184 students.

Table 2

Cyberbullying involvement. At baseline, 42.2% of participants reported involvement in cyberbullying in the previous 12 months – 13.6% as cybervictims, 8.2% as cyberbullies, and 20.4% as cyberbully-victims. Involvement as cyberbully-victims was significantly lower among females (17.1%) than males (23.0%; RRR=0.76, 95% CI [0.60, 0.96]).

Adolescent mental health. At follow-up, 24.8% of participants reported depressive symptoms and 28.5% reported social anxiety symptoms. Females were significantly more likely to report depressive symptoms (OR=2.13, 95% CI [1.75, 2.61]), social anxiety

(OR=1.75, 95% CI [1.45, 2.13]), and below-average well-being (RRR=1.56, 95% CI [1.24, 1.98]) than males and less likely than males to report above average well-being (RRR=0.66, 95% CI [0.54, 0.89]).

Cyberbullying Involvement and Depressive Symptoms

Cybervictims were almost twice as likely as uninvolved participants to report depressive symptoms at follow-up in the unadjusted (OR=1.96, 95% CI [1.45, 2.67]) and adjusted (OR=1.95, 95% CI [1.40, 2.71]) models. After additionally adjusting for depressive symptoms at baseline the effect reduced though cybervictims were still significantly more likely to report depressive symptoms at follow-up (OR=1.44, 95% CI [1.00, 2.06]). In addition, baseline cyberbully-victims were over twice as likely to report significant depressive symptoms at follow-up in the unadjusted (OR=2.14, 95% CI [1.66, 2.76]) and adjusted model (OR=2.42, 95% CI [1.83, 3.19]). After further adjusting for baseline depressive symptoms the effect becomes smaller though remains significant (OR=1.54, 95% CI [1.13, 2.09]). There was no significant difference in reports of depressive symptoms at follow-up for cyberbullies compared to uninvolved peers (Table 3).

Table 3

Cyberbullying Involvement and Social Anxiety Symptoms

Cybervictims were 1.68 (95% CI [1.27, 2.22]) times more likely to report social anxiety symptoms at follow-up than those uninvolved (Table 4). This effect remained in the adjusted model (OR=1.72, 95% CI [1.28, 2.30]) and following additional adjustment for baseline social anxiety (OR=1.52, 95% CI [1.11, 2.07]). Similarly, cyberbully-victims were 1.52 (95% CI [1.19, 1.94]) times more likely than those uninvolved at baseline to report social anxiety symptoms at follow-up in the unadjusted model. Effect sizes were similar in

the adjusted (OR=1.63, 95% CI [1.26, 2.10]), and fully adjusted models (OR=1.44, 95% CI [1.10, 1.89]). Being a cyberbully at baseline was not significantly associated with reports of social anxiety symptoms at follow-up.

Table 4

Cyberbullying Involvement and Mental Well-Being

Cybervictims were significantly more likely than those uninvolved to report below average well-being relative to average well-being at follow up (Table 5). This was significant in the unadjusted (RRR=1.55, 95% CI [1.09, 2.21]) and adjusted (RRR=1.54, 95% CI [1.06, 2.24]) models. Baseline cyberbully-victims were 1.65 (95% CI [1.19, 2.28]) times more likely than their uninvolved peers to report below average well-being at follow-up in the unadjusted model. This effect was similar in the adjusted model (RRR=1.73, 95% CI [1.23, 2.45]). Associations with below average well-being at follow-up were no longer significant after adjusting for baseline well-being for cybervictims (RRR=1.28; 95% CI [0.86, 1.91]) or cyberbully-victims (RRR=1.38; 95% CI [0.95, 1.99]). There was no significant difference in well-being for cyberbullies compared with those uninvolved.

Cyberbully-victims were significantly less likely to report above average relative to average mental well-being both in the unadjusted (RRR=0.68, 95% CI [0.48, 0.96]) and adjusted models (RRR=0.63, 95% CI [0.44, 0.90]), but not after additionally adjusting for baseline mental well-being.

Table 5

Discussion

Consistent with the study hypothesis, cybervictims and cyberbully-victims were significantly more likely to report depressive symptoms, social anxiety symptoms, and below

average well-being at follow-up, after adjusting for covariates, than their uninvolved peers. The associations were sustained after adjusting for baseline mental health with the exception of associations with well-being. Contrary to our hypothesis, we did not find evidence to suggest that cyberbullies report significantly poorer mental health than their uninvolved peers at follow-up.

High-quality empirical research on this topic is rare. To the best of our knowledge this is the first study to explore longitudinal associations between cyberbullying and adolescent mental health in the UK, advancing the methodological approach of previous studies. Strengths of this study included: high participant retention which decreased biases in the sample; a large representative sample of adolescent data which increased statistical power to detect effects; adjustment for confounding effects of gender, ethnicity, SES, and school (no adjustment for demographic factors reported in some previous longitudinal studies on this topic (4, 9)); validated mental health measures; social anxiety and mental well-being in addition to depressive symptoms which enabled the comparison of findings across multiple mental health domains; and multiple imputation to deal with missing data which has rarely been addressed explicitly (3).

However there were also a number of limitations which must be acknowledged. There is still not an agreed consensus on a cyberbullying definition in the literature. The cyberbullying measure included any incidents over the previous year though it is acknowledged that students involved at high frequencies may experience more severe outcomes and that those at low frequencies who may have experienced an isolated incident of harassment rather than cyberbullying *per se* (4). Validated measures of cybervictimisation and cyberbullying suitable for use with early adolescents in a multi-ethnic cohort are needed. While the psychometric properties of the scale used were not evaluated by the measure's authors, the high Cronbach's alpha value was a strength. The cyberbullying measure was limited to nasty

online messages, rumour spreading online and online threats. This is not an exhaustive list of cyberbullying behaviours. It does not address social exclusion online, though the mental health impact of this requires investigation. It is also difficult to capture and define "online" activity given adolescents' rapidly changing online landscapes and rise in young peoples' use of mobile devices to go online (30).

It was not possible to adjust for involvement in traditional forms of bullying. Results of the recent EU-wide study suggest that cyberbullying involvement rates have begun to exceed rates of involvement in traditional bullying for the first time suggesting it is not merely a sub-category of traditional bullying forms (30). However, studies have also shown considerable overlap between cyberbullying and traditional forms of bullying (31-33). Future studies should expand longitudinally on cross-sectional literature suggesting cyberbullying and traditional bullying may be differentially associated with adolescent mental health (6, 11) with a view to designing evidence-based interventions. To overcome the effect of the poor Cronbach's alpha observed for the FAS II measure of SES, we additionally adjusted models for free school meals status. However, it is possible that analyses remain under-adjusted for SES.

Findings related to depressive symptoms are consistent with those of Gamez-Guadix *et al.* (4) where baseline cybervictimisation was associated with depressive symptoms at follow-up. The finding that cybervictims and cyberbully-victims are more likely than those uninvolved to report social anxiety symptoms over time extends previous cross-sectional findings (34) and offers support for continued research into the impact of peer victimisation online and adolescent social anxiety, particularly given that stressful social environments including peer victimisation are believed to contribute to the development of this disorder during adolescence (35). Though longitudinal associations between cyberbullying and mental well-being have not previously been examined, the finding that cybervictims and cyberbully-

victims are more likely to report below average well-being is theoretically supported and consistent with our study hypothesis. The differences in mental well-being were no longer significant after adjusting for baseline well-being which may be attributed to the stability in the well-being measure over time. The findings of this study extend longitudinal research on peer victimisation to an online context by illustrating the association between cybervictimisation and poor outcomes across domains of internalising problems in adolescence.

We found that perpetrators of cyberbullying were not prone to internalising symptoms. This may be attributable to online disinhibition effects and reduced empathy among cyberbullies (36). Perpetration of cyberbullying may show stronger longitudinal associations with externalising problems including aggression, substance abuse, and delinquency, which were not in this study. A cross-sectional study by Fletcher and colleagues (37) found that compared to uninvolved adolescents, cyberbullies were more likely to report conduct problems and hyperactivity but not poorer mental well-being, though that study did not distinguish cyberbullies from cyberbully-victims.

Findings suggest that cybervictimisation – even at low levels - may be a risk factor for future adolescent mental health problems. Cyberbullying prevalence rates were high with 42.2% of participants reporting involvement in the past year; the majority (20.4%) of these involved as cyberbully-victims. These rates of cybervictimisation are consistent with other studies using similar measures (21). In addition, cyberbullying involvement was significantly greater among males. Tokunaga (1) highlighted the inconsistent research findings relating to gender involvement in cyberbullying. Higher male involvement is less common, however, in our study males were more likely to be cyberbully-victims, a group often not explored specifically in cyberbullying research.

The finding that the cyberbully-victim group represented the largest group involved in cyberbullying is consistent with previous studies (4). Unclear power imbalances in online settings may explain the higher rate of cyberbully-victims (38). However, much cyberbullying research fails to distinguish this group. Results suggest similar effect sizes for cybervictims and cyberbully-victims in terms of depression, social anxiety, and mental well-being. This is in contrast with Gamez-Guadix *et al.* (4) whose findings suggested more negative outcomes for cyberbully-victims. It is possible that this discrepancy may be attributed to participant age differences (13-17 years at baseline compared to 12-13 years in this study). Older adolescents tend to report higher frequency cyberbullying involvement (39) which may lead to more pronounced negative effects on mental health.

In conclusion, cyberbullying may contribute to the public health burden of internalising symptoms during adolescence. While those working with adolescents should continue to consider cyberbullying within a broader peer aggression framework (5), cyberbullying represents a shift in adolescent bullying behaviour, the implications of which need to be better understood. There is a pressing need to reach a consensus in cyberbullying measurement and definitions to enable cross-study comparison and inform policy recommendations. Future studies should expand mental health focus to include internalising and externalising problems, and should aim to improve understanding of the relationship between traditional and cyberbullying. In addition, next steps may include an examination of the extent to which observed associations of cyberbullying with mental health outcomes may be linked to unique features of online communication (e.g. message permanence and publicity, online disinhibition) theorised to exacerbate its impact on adolescent mental health compared to traditional bullying.

References

[1] Tokunaga RS. Following you home from school: A critical review and synthesis of research on cyberbullying victimization. Computers in Human Behavior 2010;26:277-287.

[2] Livingstone S, Smith PK. 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 2014;55:635-654.

[3] Selkie EM, Fales JL, Moreno MA. Cyberbullying Prevalence Among US Middle and High School-Aged Adolescents: A Systematic Review and Quality Assessment. Journal of Adolescent Health 2016;58:125-133.

[4] Gamez-Guadix M, Orue I, Smith PK, et al. Longitudinal and Reciprocal Relations of Cyberbullying With Depression, Substance Use, and Problematic Internet Use Among Adolescents. Journal of Adolescent Health 2013;53:446-452.

[5] Aboujaoude E, Savage MW, Starcevic V, et al. Cyberbullying: Review of an Old Problem Gone Viral. Journal of Adolescent Health 2015;57:10-18.

[6] Campbell M, Spears B, Slee P, et al. Victims' perceptions of traditional and cyberbullying, and the psychosocial correlates of their victimisation. Emotional and Behavioural Difficulties 2012;17:389-401.

[7] Suler J. The Online Disinhibition Effect. CyberPsychology & Behavior 2004;7:321-326.

[8] Hinduja S, Patchin JW. Offline Consequences of Online Victimization : School Violence and Delinquency. Journal of School Violence 2007;6:89-112.

[9] Rose CA, Tynes BM. Longitudinal Associations Between Cybervictimization and Mental Health Among U.S. Adolescents. Journal of Adolescent Health 2015;57:305-312.

[10] Machmutow K, Perren S, Sticca F, et al. Peer victimisation and depressive symptoms: can specific coping strategies buffer the negative impact of cybervictimisation? Emotional and Behavioural Difficulties 2012;17:403-420.

[11] Sjursø IR, Fandrem H, Roland E. Emotional Problems in Traditional and Cyber Victimization. Journal of School Violence 2016;15:114-131.

[12] Patchin JW, Hinduja S. Cyberbullying Among Adolescents: Implications for Empirical Research. Journal of Adolescent Health 2013;53:431-432.

[13] Valkenburg PM, Peter J. Online communication among adolescents: an integrated model of its attraction, opportunities, and risks. Journal of Adolescent Health 2011;48:121-127.

[14] Mishna F, Khoury-Kassabri M, Gadalla T, et al. Risk factors for involvement in cyber bullying: Victims, bullies and bully–victims. Children and Youth Services Review 2012;34:63-70.

[15] Smith NR, Clark C, Fahy AE, et al. The Olympic Regeneration in East London (ORiEL) study: protocol for a prospective controlled quasi-experiment to evaluate the impact of urban regeneration on young people and their families. BMJ open 2012;2.

[16] Angold A, Costello EJ, Messer SC, et al. Development of a short questionnaire for use in epidemiological studies of depression in children and adolescents. International Journal of Methods in Psychiatric Research 1995.

[17] Connor KM, Kobak KA, Churchill LE, et al. Mini-SPIN: A brief screening assessment for generalized social anxiety disorder. Depression and Anxiety 2001;14:137-140.

[18] Ranta K, Kaltiala-Heino R, Rantanen P, et al. The Mini-Social Phobia Inventory: psychometric properties in an adolescent general population sample. Comprehensive psychiatry 2012;53:630-637.

[19] Tennant R, Hiller L, Fishwick R, et al. The Warwick-Edinburgh Mental Well-being Scale (WEMWBS): development and UK validation. Health and quality of life outcomes 2007;5:63.

[20] Stranges S, Samaraweera PC, Taggart F, et al. Major health-related behaviours and mental well-being in the general population: the Health Survey for England. BMJ open 2014;4:e005878.

[21] Ybarra ML, Diener-West M, Leaf PJ. Examining the overlap in internet harassment and school bullying: implications for school intervention. Journal of Adolescent Health 2007;41:S42-50.

[22] Boyce W, Torsheim T, Currie C, et al. The Family Affluence Scale as a Measure of National Wealth: Validation of an Adolescent Self-Report Measure. Social Indicators Research 2006;78:473-487.

[23] Boudreau B, Poulin C. An examination of the validity of the Family Affluence Scale II (FAS II) in a general adolescent population of Canada. Social indicators research 2009;94:29-42.

[24] Molcho M, Gabhainn S, Kelleher C. Assessing the use of the Family Affluence Scale (FAS) among Irish schoolchildren. Irish medical journal 2007;100:suppl 37.

[25] Carpenter JR, Goldstein H, Kenward MG. REALCOM-IMPUTE software for multilevel multiple imputation with mixed response types. J Stat Softw 2011;45:1-14.

[26] Zimet GD, Dahlem NW, Zimet SG, et al. The Multidimensional Scale of Perceived Social Support. Journal of Personality Assessment 1988;52:30-41.

[27] Frick P. The Alabama Parenting Questionnaire (APQ). Unpublished rating scales The University of Alabama 1991.

[28] Rubin DB. Multiple Imputation for Nonresponse in Surveys. New York: Wiley, 1987.

[29] StataCorp. Stata Statistical Software: Release 12. College Station, TX: StataCorp LP, 2011.

[30] Livingstone S, Haddon L, Vincent J, et al. Net Children Go Mobile: The UK Report: a comparative report with findings from the UK 2010 survey by EU Kids Online. Milan, Italy: Net Children Go Mobile; 2014.

[31] Raskauskas J, Stoltz AD. Involvement in traditional and electronic bullying among adolescents. Developmental psychology 2007;43:564-575.

[32] Gradinger P, Strohmeier D, Spiel C. Traditional Bullying and Cyberbullying Identification of Risk Groups for Adjustment Problems. Zeitschrift Fur Psychologie/Journal of Psychology 2009;217:205-213.

[33] Olweus D. Cyberbullying: An overrated phenomenon? European Journal of Developmental Psychology 2012;9:520-538.

[34] Juvonen J, Gross EF. Extending the school grounds?--Bullying experiences in cyberspace. The Journal of school health 2008;78:496-505.

[35] Storch EA, Masia-Warner C, Crisp H, et al. Peer victimization and social anxiety in adolescence: a prospective study. Aggressive Behavior 2005;31:437-452.

[36] Steffgen G, König A, Pfetsch J, et al. Are cyberbullies less empathic? Adolescents' cyberbullying behavior and empathic responsiveness. Cyberpsychology Behavior and Social Networking 2011;14:643-648.

[37] Fletcher A, Fitzgerald-Yau N, Jones R, et al. Brief report: Cyberbullying perpetration and its associations with socio-demographics, aggressive behaviour at school, and mental health outcomes. Journal of Adolescence 2014;37:1393-1398.

[38] Roberto AJ, Eden J, Savage MW, et al. Prevalence and Predictors of Cyberbullying Perpetration by High School Seniors. Communication Quarterly 2014;62:97-114.

[39] Campbell MA, Slee PT, Spears B, et al. Do cyberbullies suffer too? Cyberbullies' perceptions of the harm they cause to others and to their own mental health. School Psychology International 2013;34:613-629.