



Relationship between Bullying, Substance Use, Psychiatric Disorders, and Social Problems in a Sample of Kenyan Secondary Schools

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Abstract

We aimed to investigate how direct bullying and victimization relate with substance use, the presence of psychiatric disorders, poor school performance, disruptive behaviors, and social problems among secondary school students. A cross-sectional study was conducted in 20 randomly selected mixed-day secondary school students in forms one to three in Machakos County, equivalent to students in grades 1 to 11. From a random starting point, every sixth student in the class was invited to participate. The Drug Use Screening Inventory (revised) (DUSI-R) and the Olweus Bully/Victim Questionnaire (OBVQ) were administered in a classroom-setting by trained research assistants with experience in data collection. Four categories, i.e., bully only, bully-victim, victim only, and neither bully nor victims (neutrals) were developed and problem density scores computed. Descriptive statistics, bivariate, and multinomial logistic regression analysis summarized the findings. Of the 471 students, 13.6% had not experienced bullying problems. Bully-victim was the most prevalent form of bullying. No significant gender differences were reported across categories. Bully-victims reported significant higher problem density scores in eight out of the nine problem domains, and effect sizes of the differences in problem scores between neutrals and bully-victims were larger compared with other categories. Behavioral and family system problem scores retained a significant relationship with bully-victim category ($p < 0.001$). A high prevalence of bullying problems was documented in both genders. However, bully-victims had a higher risk of multiple negative individual and environmental and social problems. Assessment of bullying problems is an indirect route to identifying significant youth problems. Bullying interventions should be multifaceted to address psycho-socio-behavioral problems.

Keywords Direct bullying · Substance use · Psychiatric disorders · School performance · Kenya

Introduction

The World Health Organization (WHO) considers bullying as a major public health threat affecting people across all life stages (Srabstein and Leventhal 2010). It is described as a systematic misuse of authority and repeated violent attitude of peers with the intention to harm others (Lyznicki et al. 2004). Bullying illustrates unequal perceived or actual power

distribution between the victim and the oppressor (Wolke and Lereya 2015). There has been recent interest to examine the long-term consequences of bullying during childhood and adolescence (Wolke et al. 2013). Past studies have documented both direct (physical and verbal) and indirect (psychological and relational) bullying patterns in schools globally, including Kenya (Due et al. 2005; Ndeti et al. 2007; Baldry 2004). According to local studies, bullying rates exceed the world's average with two-thirds of school children in Kenya reporting to have experienced some form of bullying (Ndeti et al. 2007).

Alongside school bullying, substance use (inclusive of alcohol use) is a key problem among Kenyan youngsters. Moreover, drug abuse rates remain at a high level among the Kenyan youth (Chesang 2013), predisposing specifically those within the age group 16 and 30 years to irresponsible sexual practices or driving behavior, potentially leading to serious infections, injury, or death (Chesang 2013; Palen

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et al. 2006; Shope et al. 2001) and could have far-reaching, long-term effects (Chesang 2013).

Bullying as a phenomenon has been widely studied, and often leads to psychiatric problems and poor academic performance (Srabstein and Leventhal 2010). Being bullied at school poses a variety of developmental and psychological threats during adolescence, cascading into early adulthood problems, including an increased risk of substance use (Srabstein and Leventhal 2010). Depression, suicidal ideations, and anxiety problems constitute only a fraction of possible psychiatric consequences of bullying or victimization (Brunstein Klomek et al. 2007; Fleming and Jacobsen 2009; Smokowski and Kopasz 2005). In addition, the psychological consequences of bullying result in self-destructive behaviors which include self-harm, running away from home, non-attendance, and concentration problems in schools (Glew et al. 2005; Roby 2003; Srabstein and Leventhal 2010). All of which adversely affect the overall school performance.

The bullying or victimization phenomenon in school children does not exist in isolation and co-occurs with other problems (Arseneault et al. 2010). Studies mostly associate bullying problems with other behavioral disturbances in both perpetrators and victims. For instance, bullying co-exists with substance use (Patel et al. 2007; Whiteford et al. 2013) and psychiatric disorders (Patel et al. 2007; Whiteford et al. 2013) and results in reduced interest and performance in school (Glick and Sahn 2010; Patel et al. 2007). There is existing controversy on whether bullying precedes other disruptive youth problems or the reverse. The onset of bullying problems is influenced by several postulated individual, social, home, and school environment factors (Poipoi et al. 2011). A theoretical framework for the proposed relationship between bullying and relevant youth problems is illustrated in Fig. 1. In this framework, a bi-directional relationship exists between bullying or victimization and relevant youth problems. In this relationship, bullying is postulated as an outcome of experiencing multiple youth problems moderated by individual, social, interpersonal, and environmental factors with a possibility of the reverse happening (Hong and Espelage 2012). This bi-directional relationship also exists between perpetration and victimization, so that victims of bullying in turn retaliate and perpetrate bullying on others. The interaction between the bullying phenomenon and other disruptive behaviors is not only detrimental and self-destructive to the youth but also creates a complexity which must be addressed through multi-component interventions. For instance, the co-existence of bullying behavior with other youthful behavioral disruptions might explain a recent wave of school riots and school property destruction witnessed across the country. Identification of any risk and protective factors that are operative in any particular context is necessary for effective bullying interventions. Further, coupling bullying interventions with other interventions to address co-existing youth problems

is a plausible measure toward averting crises bedeviling the Kenyan education system.

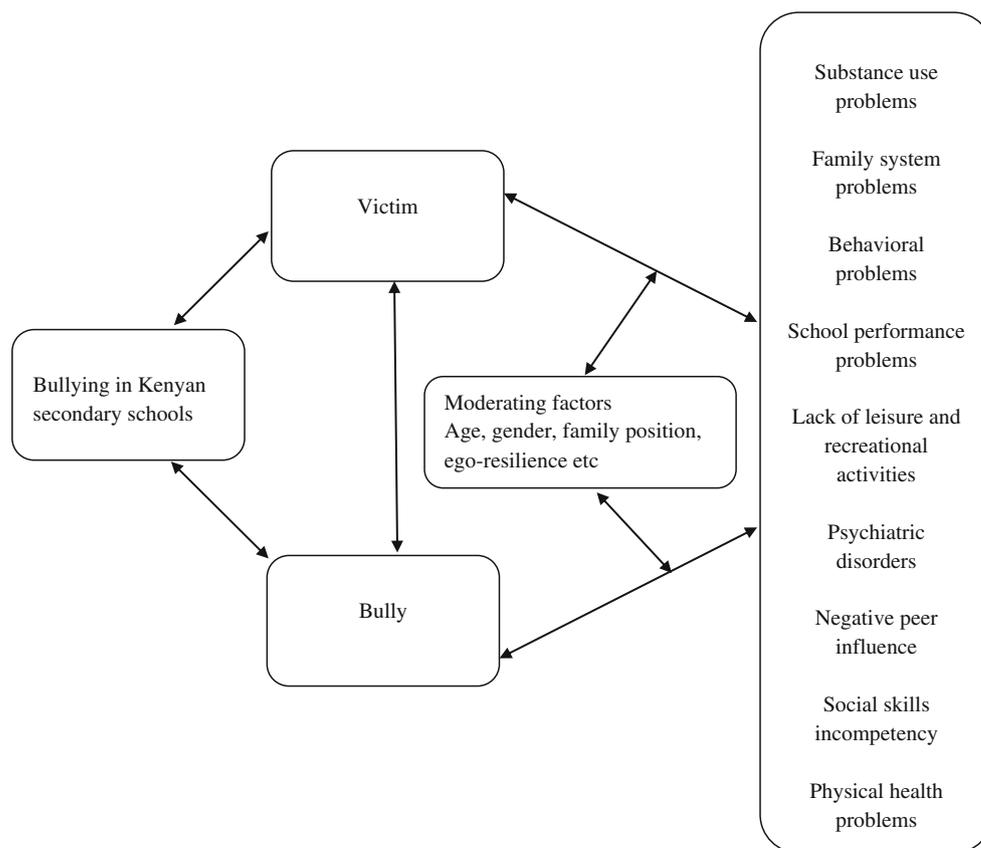
Little research has been conducted to illustrate how bullying behaviors co-exist with other behavioral or social disruptions in the Kenyan context (Ndetei et al. 2007). It is imperative that research delves into this topic in order to establish whether any relationships exist. In the current study, we describe how bullying behaviors were distributed in the study sample and describe the relationship between bullying problems and nine significant youth problems.

Methods

This was a cross-sectional study conducted in 20 secondary schools in Machakos County, located 64 km southeast of Nairobi, Kenya. It is estimated that 59.6% of households in this county live below the poverty line against a national average of 47.2% and nearly 50% of the school-going children like the rest in Kenya travel for 5 or more kilometers to school (Kenya National Bureau of Statistics 2009). In addition, there is a 4.7% drop-out rate in secondary schools, contributing to a substantive population faced by disproportionate exposure to high health and social risk, and lack of opportunities to participate in decisions that affect their lives in Kenya (Machakos County 2012). The schools were randomly selected from a pool of 69 schools in one of the eight sub-counties, which had been randomly selected to host a different project and for which requisite permissions and community entry procedures had been achieved. Students attending high school grades (forms) 1–3 in the selected schools were eligible to participate in the study. This study used a random selection of participants in a class-sitting arrangement instead of using class registers to increase transparency in the selection process. Using registers to develop a randomization list could have been misconstrued whereby those selected could have felt singled out and potentially misrepresented. This also averted non-response related to pre-selected absentees.

After a detailed description of the purpose of the study, the randomization procedures and reassurance that the information volunteered would not be shared with the school administration, we used a random starting point in class and every subsequent sixth student in each class was selected to voluntarily participate. Those who were not selected were requested to either walk out of the class or to stay in. Reasonable distances were kept between each of the students in the class. Participants were expected to complete self-report questionnaires in the classrooms with the assistance of trained research assistants with a minimum qualification of a diploma in a health discipline and experience in data collection. Prior to this, research assistants were comprehensively trained on how to administer the questionnaires, consenting procedures and ethical issues pertaining to research on human subjects.

Fig. 1 Relationship between bullying, victimization, and youth problems in Kenyan secondary schools



Their presence in the classrooms during data collection was to provide guidance to the respondents, clarify any ambiguity, respond to arising questions, and to ensure that there was no communication among participants. The whole exercise was supervised by part of the authorship to this article. The questionnaires were administered in the English language.

In order to calculate the sample size required for this study, Fischer's formula illustrated below was used; $n = \frac{z^2 \times pq}{\delta^2}$

where

z = at 95% confidence level = 1.96

p = a conservative 50% prevalence based on an earlier study by Ndeti et al. (2007), which reported that at least 63.2% of secondary school students in an urban setting to have experienced some form of bullying

$$q = 1 - p$$

level of significance = 0.05

Accordingly, using the above formula : n

$$= \frac{1.96^2 \times 0.5 \times 0.5}{0.05^2}$$

therefore, $n = 384$.

Assuming a non-response rate of 25%, the sample size was adjusted upwards to 480 students.

Study Measures

The two internationally accepted tools were used on the study subjects and are described below;

The Olweus Bully/Victim Questionnaire (OBVQ): the OBVQ is a self-report questionnaire and presents adequate and concurrent psychometric properties, particularly in its reliability and construct validity. Studies have consistently shown good to excellent reliability of scale scores of between 0.80 and 0.95 in different populations and among children between grades 3–12 (Gonçalves et al. 2016; Kyriakides et al. 2006). Furthermore, this tool has been used in studies published in over 100 peer-reviewed articles and had previously been used in a Kenyan sample. The tool is divided into two parts; the first part asks questions about perpetrating bullying and the second has questions about being a victim of bullying. Core questions in each section identify if the subject has experienced any of the forms of bullying problems. Each of these key questions is defined via dichotomous answers as a “yes” or “no.” A “yes” endorses the experience of the bullying problem and the reverse holds. If a

participant endorses “yes” as an answer, further sub-questions concerning the frequency, type of perpetrator or victim, and the place of occurrence of bullying are answered (Solberg and Olweus 2003). The questions were defined to identify bullying problems within a time frame of the past 6 months. Respondents were encouraged to appropriately answer all the questions.

The Drug Use Screening Inventory (revised) (DUSI-R): this is a valid self-report questionnaire used to measure the severity of diverse disruptions preceding or co-appearing with substance use. It consists of 159 question items and is rated on a dichotomous scale with a “yes” to endorse the presence of the attribute and a “no” as a decline. The questionnaire screens substance use on the first domain and the other nine domains assess the individual’s behavioral patterns, health status, psychiatric disorders, social competence, family system problems, school performance or adjustment, work adjustment, peer relationships, and leisure or recreations (quality of activities during leisure time with reference to whether the activities are active, passive, solitary, or are associated with boredom or adult supervision) (Kirisci et al. 2008). The tool has demonstrated good construct validity and rates of both sensitivity and specificity are above 70% on all the domains across various ages and cultures (Fidalgo et al. 2010; Kirisci et al. 2008). For the purpose of this study, we excluded the domain on work adjustment as it did not apply to the sample. The tool has a lie question on each domain, confirming if the participant answered truthfully to the items. A score of five or more generated by summation of the ten lie questions is used as a cut-off for invalidity and indicates a higher degree of inaccuracy of the responses (Dalla-Déa et al. 2003). This tool had been widely used in North and South America, and had previously been used on Kenyan youth by the last author (De Micheli and Formigoni 2004; Ndeti et al. 2007).

Statistical Analyses

To increase the accuracy of identifying bullying or being bullied, we used a two-stage consideration. First, the only students who indicated to have experienced bullying or victimization in the last 6 months were considered. Thereafter, they needed to have selected how frequently this phenomenon happened. Answer possibilities on the frequency of bullying varied from never, seldom (1–3 times), frequently (4 times or more), and very frequently. Second, only those who indicated to have experienced the phenomenon above the seldom frequency were considered to have been bullied or perpetrated bullying. We excluded all those who indicated to have experienced the phenomenon and did not select the frequency. In

this paper, we will present results about direct bullying, which has been described as face-to-face aggression characterized by hitting, punching, snatching things from people, verbal humiliation, and threatening (Gonçalves et al. 2016). Two criteria for determining the cut-offs for bullying or victimization using the frequency of occurrence of the bullying experiences have previously been determined. Studies have recommended the use of “lesser stringent criteria” because of the public health implications related to potential underreporting of bullying behaviors using strict criteria. We used the lesser stringent criteria for our study. Participants who indicated experiencing a bullying problem but left the frequency questions blank and those whose cut-off criteria could not be used were excluded from analysis. Participants were grouped into four distinct categories based on their experiences with bullying either as neither bully nor victims referred to as “Neutrals,” “Bully only,” “Victim only,” or “Bully-victim.”

Scores were computed for the relevant DUSI-R domains. An absolute problem density score for each domain was independently computed by dividing the number of positively endorsed items by the total number of items on the domain then multiplying by 100. The work adjustment domain had no relevance to the sample and was excluded. The scores for each domain range between 0 and 100%. An overall problem index score was computed by summing up all the endorsed items by the total number of items in the whole questionnaire, excluding the items in the work adjustment domain and multiplying by 100. The internal consistencies of scales scores for the nine problem domains ranged between .63 and .95 and are presented in detail in Table 2.

All the analysis was conducted using IBM SPSS version 20. Descriptive statistics were used to examine the general distribution of the bullying problems and to explore the gender and age differences. Analysis of variance (ANOVA) was used to compare differences in problem scores across the four categories employing the least significance differences (LSD) for pair-wise comparisons. Factors that were significant at the bivariate level were entered into a multinomial regression model with the neutral category as the reference group. The threshold for statistical significance was set at $p < 0.05$ and all tests were two-sided.

Results

Baseline Demographic Characteristics

Out of 567 participants who completed both the DUSI-R and the OBVQ questionnaires, only 471 were included in our analysis; 96 (17%) were incomplete or had inconsistencies related to the dependent variable and were excluded from the analysis. This sample was drawn from a population of 2745 students who were in the school registers for grades

(forms) 1–3 in the 20 schools during the time of conducting the study. The participants drawn from each of the participating school were proportionate to enrollment. The study sample consisted of an almost equal ratio of males to females; 251 (53.3%) were females and 220 (46.7%) were males. The mean age was 16.33 (SD = 1.29) years, and 55.4% were aged between 13 and 16 years while 44.6% were aged between 17 and 20 years. The mean age for females was 16.10 (SD = 1.26) and lower than that of males which was 16.59 (SD = 1.30). Among female participants, the proportion aged between 13 and 16 years was 62.8% while 37.2% were aged between 17 and 20 years. For male participants, the proportion aged between 13 and 16 years was 46.8% and those aged 17–20 years was 52.7%.

Differences in Direct Bullying Disaggregated by Gender and Age

Both males and females in the sampled secondary schools reported multiple forms of direct bullying. Most of the participants were classified as bully-victim with only a small percentage of the subjects being classified as bully only. Just over a tenth had not experienced any of the bullying problems. Overall, both males and females reported the same pattern of bullying. Bullying was reported to have occurred mostly in the playgrounds (36.0%), in the toilets, or on the way to/from

school and to have been equally perpetrated by females and males. Table 1 describes the number and percentage of males and females that experienced or imposed direct bullying within the past 6 months in their school setting. Both physical aggression and verbal forms of bullying were perpetrated or experienced by the victims in nearly equal proportions among the subjects.

Association between Bullying Problems, Substance Use, Behavioral, and Health Problems

One-way ANOVA analysis was conducted to compare problem density mean scores for each of the nine youth problems across the four categories. Similarly, a chi-square test was conducted to compare differences for gender and age across the four categories of bullying problems. These results are summarized in Table 2. Higher mean scores were consistently reported for the bully-victim category for all youth problems except substance use. Those who reported not to have experienced bullying problems had the least mean scores on nearly all problems. There were no significant differences in the mean scores for substance use problems across all the categories, though the lowest scores were reported among those who had not experienced bullying problems. There were cross-cutting significant differences in the mean scores between bully-victim and the other three categories

Table 1 Prevalence of bullying problems among the participants; overall and by gender (N = 471)

Individual	Question	Overall		Females		Males	
		n (%)	95% C.I	n (%)	95% C.I	n (%)	95% C.I
Victim	Have you been called bad or nasty names?	136 (70.5)	(63.7–76.7)	75 (69.4)	(60.2–77.8)	61 (71.8)	(62.4–80.0)
	Have you had your belonging taken?	149 (77.2)	(71.0–82.9)	83 (76.9)	(69.4–85.2)	66 (77.6)	(69.4–85.9)
	Have you had lies told about you?	143 (74.1)	(67.9–80.3)	84 (77.8)	(70.4–86.1)	59 (69.4)	(60.0–78.8)
	Have you had nastily tricks played on you?	136 (70.5)	(63.7–76.7)	78 (72.2)	(63.9–80.6)	58 (68.2)	(58.9–77.6)
	Have you been threatened or blackmailed?	121 (62.7)	(55.5–69.9)	65 (60.2)	(50.9–70.4)	56 (65.9)	(56.5–75.3)
	Have you been beaten up or hit?	136 (70.5)	(64.2–77.2)	75 (69.4)	(61.1–78.7)	61 (71.8)	(62.4–80.0)
Bully	Have you called any other student bad or nasty names in the past 6 months?	133 (68.9)	(62.2–75.1)	72 (66.7)	(57.4–75.0)	61 (71.8)	(62.4–81.2)
	Have you taken belonging from any other student in the past 6 months?	101 (52.3)	(45.1–59.1)	54 (50.0)	(40.8–60.2)	47 (55.3)	(44.7–65.9)
	Have you told liars about other students in the past 6 months?	73 (37.8)	(31.1–44.6)	37 (34.3)	(25.0–43.5)	36 (42.4)	(32.9–52.9)
	Have you played nasty tricks on other students?	132 (68.4)	(61.7–75.1)	68 (63.0)	(53.7–72.2)	64 (75.3)	(65.9–84.7)
	Have you threatened or blackmailed any student in the past 6 months?	105 (54.4)	(47.2–61.1)	59 (54.6)	(46.3–64.8)	46 (54.1)	(44.7–64.7)
	Have you hit or beaten up another students in the past 6 months?	104 (53.9)	(46.6–60.6)	55 (50.9)	(41.7–60.2)	49 (57.6)	(47.1–68.2)
Victim only		75 (15.9)	(12.5–19.1)	42 (16.7)	(12.4–21.5)	33 (15.0)	(10.5–20.0)
Bully only		12 (2.5)	(1.3–4.0)	5 (2.0)	(0.4–4.0)	7 (3.2)	(0.9–5.9)
Both bully and victim		320 (67.9)	(63.7–72.2)	169 (67.3)	(61.4–72.9)	151 (68.6)	(63.2–75.0)
Neither bully nor victim		64 (13.6)	(10.6–16.8)	35 (13.9)	(10.0–18.3)	29 (13.2)	(9.1–17.3)

The 95% confidence interval is for the prevalence (%)

Table 2 Univariate association between bullying, age, gender, and nine problem domain scores

Domain/variable	Reliability (Cronbach's Alpha)	No. items	Neither bully nor victim (N = 64) Mean (SD)	Victim only (N = 75) Mean (SD)	Bully only (N = 12) Mean (SD)	Bully and victim (N = 320) Mean (SD)	Group differences
DomIB Substance use	0.843	15	3.9 (10.5)	5.8(15.7)	7.2(19.2)	7.1 (13.9)	$F_{(3, 467)} = 1.01$; $P = 0.386$
DomII Behavior pattern	0.812	20	13.7 (16.1)	17.7(17.0)	15.8(14.4)	27.9 (20.3)	$F_{(3, 467)} = 14.07$; $P < 0.001$
DomIII Health status	0.630	10	11.4 (16.2)	12.6(13.9)	10.0(11.3)	21.3 (18.2)	$F_{(3, 467)} = 10.26$; $P < 0.001$
DomIV Psychiatric disorder	0.841	20	12.1 (17.3)	14.3(15.4)	15.4(16.7)	24.5 (20.5)	$F_{(3, 467)} = 11.24$; $P < 0.001$
DomV Social competence	0.750	14	19.9 (23.5)	19.0 (17.0)	20.8 (18.1)	27.3 (20.2)	$F_{(3, 467)} = 5.21$; $P = 0.002$
DomVI Family system	0.692	14	14.1 (16.6)	16.4 (14.2)	19.6(17.5)	24.8 (19.6)	$F_{(3, 467)} = 8.72$; $P < 0.001$
DomVII School performance	0.822	20	14.8 (18.4)	13.9 (14.2)	15.0(19.4)	21.5 (18.9)	$F_{(3, 467)} = 5.28$; $P = 0.001$
DomIX Peer relationship	0.792	14	13.4 (15.5)	11.8 (13.5)	13.1(18.7)	23.0 (21.8)	$F_{(3, 467)} = 9.36$; $P < 0.001$
DomX Leisure/recreation	0.673	10	17.5 (18.9)	17.5 (17.5)	18.3(20.4)	25.4 (20.8)	$F_{(3, 467)} = 5.26$; $P = 0.001$
Overall Overall score	0.953	137	13.2 (13.9)	14.3 (11.5)	15.1(14.4)	22.6 (14.7)	$F_{(3, 467)} = 13.16$; $P < 0.001$
Age 13-16 years n (%)	n/a	n/a	30 (11.5)	40 (15.4)	7(2.7)	183 (70.4)	$\chi^2_{(3, 470)} = 2.05$; $P = 0.561$
Age 17-20 years n (%)	n/a	n/a	33 (15.8)	34 (16.3)	5 (2.4)	137 (65.6)	
Gender Female n (%)	n/a	n/a	35 (13.9)	42 (16.7)	5 (2.0)	169 (67.3)	$\chi^2_{(3, 470)} = 0.95$; $P = 0.813$
Gender Male n (%)	n/a	n/a	29 (13.2)	33 (15.0)	7 (3.2)	151 (68.6)	

(victims only, neutrals, bully only) for behavioral problems and physical health problems ($p < 0.001$) (Table 3). Post-hoc tests using least significant differences (LSD) revealed that there were only significant differences in the mean problem scores of bully-victims and all other categories for these two problems (summarized in Table 4).

Direct Bullying, Psychiatric Symptoms, Social Competence, Family System, School Performance, Peer Relationship, Leisure, and Recreation Problems

There were significant group differences in the problem mean scores for all the six problems (summarized in Table 2). Post-hoc tests using LSD (summarized in Table 4) revealed only significant difference in the problem mean scores between bully-victim and neutrals between bully-victim and victims. No significant differences were observed between the rest of the pairs (neutrals and victims only; neutrals and bully only; bully only and victims only; bully-victim and bully only). No differences were identified between categories in their gender and age compositions.

At the multivariate level, all the variables were entered simultaneously, after controlling for age and gender, the only significant difference in the problem scores was observed between bully-victim and neutrals, for the domain on behavioral problems and family system problems. Participants who were bully-victim (compared with neutrals) were more likely to have experienced these two problem areas. Effect sizes for the differences in problem scores between the neutrals (reference category) and each of the other categories were mostly medium to large for bully-victim and small to medium for the bully only and victim only categories. Behavioral and family system problem scores consistently demonstrated large effect sizes on the between-group differences. Results of the multivariate analysis, effect sizes, and adjusted odds ratios (AORs) for all the nine problems, age and gender and the four bullying categories are illustrated in Table 3.

Discussion

Our study aimed at investigating the relationship between direct bullying and victimization and substance use and the presence of psychiatric disorders, poor school performance, and other relevant youth problems. In congruent with an earlier similar study (Ndeti et al. 2007), direct bullying and victimization were found to be highly prevalent in both males and females from the sampled secondary schools and only a small proportion had not experienced bullying problems. In contrast to other studies in similar settings (Alex-Hart et al. 2015; Brownlee et al. 2014; Fleming and Jacobsen 2009; Ndeti et al. 2007; Wei et al. 2010), we did not find significant gender differences in terms of direct bullying.

Table 3 Association between bullying and youth characteristics of the participants analyzed using multinomial regression

Variable/domain	Neither victim nor bully		Victim only		Bully only		Neither victim nor bully		Bully and victim		Effect size Cohen's d	AOR (95%CI)
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)				
Substance use	3.9 (10.5)	5.8 (15.7)	3.9 (10.5)	7.2 (19.2)	3.9 (10.5)	1.02 (0.97–1.08)	7.1 (13.9)	3.9 (10.5)	7.1 (13.9)	n/s	0.99 (0.96–1.02)	
Behavior pattern	13.7 (16.1)	17.7 (17.0)	13.7 (16.1)	15.8 (14.4)	13.7 (16.1)	1.00 (0.94–1.06)	27.9 (20.3)	13.7 (16.1)	27.9 (20.3)	0.77	1.04 (1.01–1.07)**	
Health status	11.4 (16.2)	12.6 (13.9)	11.4 (16.2)	10.0 (11.3)	11.4 (16.2)	0.97 (0.91–1.04)	21.3 (18.2)	11.4 (16.2)	21.3 (18.2)	n/s	1.02 (0.99–1.05)	
Psychiatric disorder	12.1 (17.3)	14.3 (15.4)	12.1 (17.3)	15.4 (16.7)	12.1 (17.3)	1.03 (0.96–1.10)	24.5 (20.5)	12.1 (17.3)	24.5 (20.5)	n/s	1.01 (0.98–1.05)	
Social Competence	19.9 (23.5)	19.0 (17.0)	19.9 (23.5)	20.8 (18.1)	19.9 (23.5)	0.99 (0.94–1.04)	27.3 (20.2)	19.9 (23.5)	27.3 (20.2)	n/s	0.98 (0.96–1.00)	
Family system	14.1 (16.6)	16.4 (14.2)	14.1 (16.6)	19.6 (17.5)	14.1 (16.6)	1.04 (0.99–1.09)	24.8 (19.6)	14.1 (16.6)	24.8 (19.6)	0.58	1.03 (1.01–1.06)*	
School performance	14.8 (18.4)	13.9 (14.2)	14.8 (18.4)	15.0 (19.4)	14.8 (18.4)	0.98 (0.93–1.04)	21.5 (18.9)	14.8 (18.4)	21.5 (18.9)	n/s	0.99 (0.96–1.02)	
Peer relationship	13.4 (15.5)	11.8 (13.5)	13.4 (15.5)	13.1 (18.7)	13.4 (15.5)	0.98 (0.93–1.04)	23.0 (21.8)	13.4 (15.5)	23.0 (21.8)	n/s	1.00 (0.98–1.03)	
Lack of leisure/recreation	17.5 (18.9)	17.5 (17.5)	17.5 (18.9)	18.3 (20.4)	17.5 (18.9)	1.00 (0.95–1.05)	25.4 (20.8)	17.5 (18.9)	25.4 (20.8)	n/s	0.99 (0.97–1.01)	
Female	35 (45.5)	42 (54.5)	35 (87.5)	5 (12.5)	35 (87.5)	0.48 (0.13–1.78)	169 (82.8)	35 (17.2)	169 (82.8)	n/a	0.80 (0.44–1.46)	
Male	29 (46.8)	33 (53.2)	29 (80.6)	7 (19.4)	29 (80.6)	Ref	151 (83.9)	29 (16.1)	151 (83.9)	n/a	Ref	
13–16 years	30 (42.9)	40 (57.1)	30 (81.1)	7 (18.9)	30 (81.1)	1.94 (0.52–7.22)	183 (85.9)	30 (14.1)	183 (85.9)	n/a	1.64 (0.91–2.93)	
17–20 years	33 (49.3)	34 (50.7)	33 (86.8)	5 (13.2)	33 (86.8)	Ref	137 (80.6)	33 (19.4)	137 (80.6)	n/a	Ref	

** Significant at $p < 0.01$; * significant at $p < 0.05$; Neither victim or bully was used as the reference category in all the 3 categories; n/s, not significant; n/a, not applicable

Table 4 Summary of post-hoc analysis (least significant difference LSD)

Test variable (scores)	Bullying category (I)	Bullying category (J)	Mean difference (S.E) (I-J)	95% C.I mean difference	P value
I. Substance use—degree of involvement, severity of consequences	Bully victim	Neither bully nor victim	3.2 (1.9)	-0.5-7.0	0.094
		Victim only	1.3 (1.8)	-2.2-4.8	0.473
II. Behavior pattern—social isolation, anger, acting out, self-control	Bully victim	Bully only	-0.2(4.1)	-8.2-7.9	0.969
		Neither bully nor victim	14.2(2.6)	9.1-19.4	<0.001
III. Health status—accidents, injuries, illnesses	Bully victim	Victim only	10.2 (2.5)	5.3-15.0	<0.001
		Bully only	12.1 (5.6)	1.0-23.1	0.032
IV. Psychiatric disorder—anxiety, depression, antisociality, psychotic symptoms	Bully victim	Neither bully nor victim	9.8 (2.4)	5.2-14.5	<0.001
		Victim only	8.7 (2.2)	4.3-13.0	<0.001
V. Social competence—social interactions, social skills, refusal skills	Bully victim	Bully only	11.3 (5.1)	1.3-21.2	0.026
		Neither bully nor victim	12.3 (2.6)	7.1-17.5	<0.001
VI. Family system—dysfunction, conflict, parental supervision, marital agility	Bully victim	Victim only	10.1 (2.5)	5.3-15.0	<0.001
		Bully only	9.0 (5.7)	-2.1-20.2	0.112
VII. School performance—academic performance, school adjustment	Bully victim	Neither bully nor victim	7.5 (2.8)	2.0-12.9	0.007
		Victim only	8.4 (2.6)	3.3-13.4	0.001
VIII. Work adjustment—work competence, motivation	Bully victim	Bully only	6.5 (5.9)	-5.1-18.1	0.274
		Neither bully nor victim	10.7 (2.5)	5.8-15.7	<0.001
IX. Peer relationship—social network, gang involvement, quality of friendships	Bully victim	Victim only	8.4 (2.4)	3.7-13.1	<0.001
		Bully only	5.2 (5.4)	-5.5-15.8	0.341
X. Leisure/recreation—quality of activities during leisure time	Bully victim	Neither bully nor victim	6.7 (2.5)	1.8-11.6	0.008
		Victim only	7.6 (2.3)	3.0-12.2	0.001
XI. Overall problem density scores	Bully victim	Bully only	6.5 (5.4)	-4.0-17.1	0.222
		Neither bully nor victim	8.1 (2.0)	4.1-12.0	<0.001
XII. Overall problem density scores	Bully victim	Victim only	5.2 (1.9)	1.5-8.9	0.006
		Bully only	2.7 (4.3)	-5.8-11.1	0.539
XIII. Overall problem density scores	Bully victim	Neither bully nor victim	9.6 (2.7)	4.3-15.0	<0.001
		Victim only	11.2 (2.6)	6.1-16.2	<0.001
XIV. Overall problem density scores	Bully victim	Bully only	9.9 (5.8)	-1.6-21.4	0.090
		Neither bully nor victim	7.9 (2.7)	2.5-13.3	0.004
XV. Overall problem density scores	Bully victim	Victim only	7.9 (2.6)	2.9-13.0	0.002
		Bully only	7.1 (5.9)	-4.5-18.6	0.231
XVI. Overall problem density scores	Bully victim	Neither bully nor victim	9.4 (1.9)	5.6-13.2	<0.001
		Victim only	8.3 (1.8)	4.8-11.9	<0.001
XVII. Overall problem density scores	Bully victim	Bully only	7.5 (4.1)	-0.6-15.7	0.070

Dissimilar to earlier literature (Holt and Espelage 2007; Liang et al. 2007; Solberg et al. 2007; Solberg and Olweus 2003), there was a higher prevalence of bully-victim in this population. This could have been explained by the self-reporting in the present study which provides opportunities for exploring multiple informants in future research. However, it is important to note that the higher prevalence has public health and social implications as this group has been described in literature as a distinctively problematic group which should be a target for strategic interventions (Stein et al. 2007). Although gaps exist in research about which behavior between bullying and victimization begins first among bully-victim, a low prevalence of the “victims” category in this sample suggests reactive aggression (Nansel et al. 2001). A genetic predisposition, a higher tendency to externalizing coping strategies, and a higher justification of antisocial behaviors have been linked to the bully-victim relationship (Marini et al. 2006). Bully-victims might erroneously be identified as being undisciplined and therefore the opportunity for structured interventions missed.

We did not find any relationship between the four categories of bullying and substance use problem scores. On the contrary, studies in different societies have validated substance use as a risk factor for bullying behaviors (Fleming and Jacobsen 2009; Liang et al. 2007; Radliff et al. 2012). The lack of significant associations in this study is surprising but plausible, first because substance use problems score was generated based on the current presence of 15 substance use problems instead of exposure within a specified time period. Although most studies have used substance exposure within a specified duration and frequency of use in their methodology, the presence of substance use problems is a better indicator of substance use severity and findings with no association might be correct. Another possible explanation could be attributed to the high number of students with bullying behavior in the current study, which might be considerably different from groups examined in previous studies.

At the multivariate level, behavior patterns such as social isolation, anger, acting out, and self-control were significant predictors of bully-victim. This is consistent with previous research that found that bully-victim have a more controversial profile as they have the highest levels of self-confidence, incapability, and irritability (Seixas et al. 2013). There is also a common understanding that victims who turn to be aggressors (a bully-victim category in this study) have been associated with higher likelihood of negative emotions, depression, social withdrawal, and impulsivity (Fite et al. 2009). Behavior patterns could thus be used as avenues to prevent bullying in schools in future studies.

Family system problems which have been shown to moderate the onset of bullying behavior (Poipoi et al. 2011) also retained significance at multivariate analysis. Similar to other studies, high scores on perceived poor family relationships,

witnessed parental violence, autocratic parenting, and poor parental supervision have been associated with a higher risk for the bully-victim category (Georgiou and Stavrinides 2013; Knous-Westfall et al. 2012). Therefore, there is a need to create conducive social environments (within and out of school) to bolster efforts to reduce bullying behavior including provision of recreational activities (Salgado et al. 2014).

Strengths and Limitations

These findings have widened existing knowledge about the relationship between individual characteristics, perceived individual, and environmental factors on bullying. This is the first study in Kenya to study these relationships. The study also highlights clear distinctions between three independent categories based on the experience of bullying problems, i.e., pure victims, pure bullies, and bully-victim and concisely removes the overlap between bullies and victims as reported in previous local research. Despite the highly informative findings, certain limitations need to be taken into account. First, the nature of the cross-sectional design merely permits investigation of associations to a certain point of time and thus does not allow establishment of the causal link between examined factors. Second, one should bear in mind that the OBVQ and DUSI-R both represent self-report measures, which may encompass bias. Bullying and substance use are sensitive topics and students are more likely to answer questions untruthfully or introduce self-report bias. Nonetheless, to prevent bias, all questionnaires were completed anonymously and assigned unique codes at the time of collection. The assessment tools are also widely accepted as reliable and valid instruments. Again, teachers were not allowed to have contact with any of the survey tools and assessments were conducted in the absence of school staff. Third, this study only presents findings on bullying problems within the school environment and therefore might not be applicable to bullying which occurs in other settings. Future studies should compare findings from self-reports with teachers’, peers’, and parents’ reports as informants. Despite these limitations, these findings add to the existing body of knowledge in illustrating how bullying problems are uniquely intertwined with other youth problems and present a good foundation for further research.

Conclusion

The findings from this study indicate that both genders of students experience and perpetrate bullying problems at an equal measure. Further, bully-victim was identified as an entity with a high risk of experiencing behavioral and family problems which may have far-reaching implications to the life trajectories of those involved. A contrasting relationship was found for the other categories. While the casual relationship

between these factors and bullying is not known, their identification deserves merit.

Efforts to reverse the current trends in bullying must integrate measures to address both school and out-of-school environmental factors. Close supervision of student by parents and teachers in schools and routine assessment for any forms of bullying or victimization, psychosocial problems, school adjustment, and their associated modifying factors is a potential avenue for improving the well-being of students in the education system. Finally, prospective research is needed to consolidate the causality pathways between bullying and the identified associated factors and to document the life trajectories of those engaged in bullying.

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Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no competing interest.

Ethical Approval Ethical approval was sought from the Ethics Board of the University of Nairobi and Kenyatta National Hospital in Kenya. All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed Consent Permission to conduct the study was obtained from the headmasters of the participating schools. Parents or guardians were requested to provide informed consent for children under the age of 18. All children whose parents or guardians consented were also requested to participate by providing a written assent. Only those who had both parental consent and a written assent were involved. Informed consent was obtained from all individual participants included in the study. Children absent on the day of assessment were excluded from the study.

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