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Problem Behaviours, Traditional Bullying and Cyberbullying among Adolescents: Longitudinal Analyses

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Abstract

Problem Behaviour Theory suggests that young people's problem behaviours tend to cluster. We examined the relationship between traditional bullying, cyberbullying and engagement in problem behaviours using longitudinal data from approximately 1,500 students. Levels of traditional victimisation and perpetration at the beginning of secondary school (Grade 8, age 12) predicted levels of engagement in problem behaviours at the end of Grade 9 (age 13). Levels of victimisation and perpetration were found to moderate each other's associations with engagement in problem behaviours. Cyberbullying did not represent an independent risk factor over and above levels of traditional victimisation and perpetration for higher levels of engagement in problem behaviours. The findings suggest that to reduce the clustering of cyberbullying behaviours with other problem behaviours, it may be necessary to focus interventions on traditional bullying, specifically direct bullying.

Keywords: bullying, cyberbullying, problem behaviours

Introduction

Relative to other age groups adolescents have a disproportionately higher risk of engaging in problem behaviours that can have serious consequences for the individual, their family, friends and the community (Bartlett, Holditch-Davis, & Belyea, 2007). Problem Behaviour Theory (Jessor & Jessor, 1977) is a psychosocial model used to explain dysfunction and maladaptation in adolescence. It suggests that proneness to specific problem behaviours entails involvement in other problem behaviours and less participation in conventional behaviours. The theory has previously been employed to investigate a wide range of behaviours defined socially as a problem or undesirable, and which elicit a negative social response. The generality and robustness of the theory has been tested investigating behavioural outcomes such as substance use, deviancy, delinquency and risky sexual behaviours.

During adolescence, problem behaviours including anti-social behaviour, school failure, precocious sexual behaviour, drinking, cigarette smoking and substance use are intercorrelated (Pettersen, 1993) and tend to covary (Barrera, Biglan, Ary, & Li, 2001). Jessor and Jessor (1977) suggest one reason young people's problem behaviours tend to cluster, is that society views each of them as unacceptable, deviant or rebellious. Social Cognitive Theory suggests adolescents model their friends' behaviours, including bullying and other anti-social behaviours (Moultapa, Valente, Gallaher, Rohrbach, & Unger, 2004). Consequently, adolescents who bully and/or cyberbully others may feel they have crossed the boundary of acceptable conduct, and become part of a "deviant" subculture, where these behaviours are more prevalent and acceptable.

Traditionally, bullying behaviour is defined as a type of aggressive behaviour involving the systematic abuse of power through unjustified and repeated acts intended to inflict harm (Smith, 2004) and includes both direct (overt) and indirect (covert) forms. Cyberbullying, or bullying using the internet and mobile phones, appears to be a form of bullying including both direct and indirect aggressive components (Dooley, Pyzalski, & Cross, 2009). Accordingly, problem behaviours associated with traditional bullying may also be associated with cyberbullying.

Cross-sectional research suggests that the perpetration of face-to-face bullying and cyberbullying are associated with problem behaviours such as poor academic achievement (Mitchell, Ybarra, & Finkelhor, 2007), drinking alcohol (Mitchell et al., 2007), smoking and other substance use problems (Niemelä et al., 2011), vandalism (Hay, Meldrum, & Mann, 2010), stealing (Hay et al., 2010), intentionally hurting other people (Hay et al., 2010), weapon-carrying (Dukes, Stein, & Zane, 2010) and other delinquent behaviours. Cyberbullying victimisation is significantly and positively related to school problems (such as absenteeism, cheating on an exam or being sent home for poor behaviour), shoplifting, carrying a weapon, and running away from home (Hinduja & Patchin, 2007, 2008). Both traditional and online victimisation are associated with stealing, vandalism, getting in trouble with the police, fighting and substance use (Hinduja & Patchin, 2007, 2008; Mitchell et al., 2007). This previous research measured either victimisation only or victimisation and perpetration separately, but did not take into account those who are bully-victims; which may explain the relationships found between victimisation (a non-problem behaviour) and problem behaviours.

Direct bullying perpetration has been found to be a stronger predictor than indirect bullying perpetration of violence, delinquency and other anti-social behaviours in adolescence (Bender & Lösel, 2011; Hampela, Manhalb, & Hayera, 2009), while indirect

perpetration was a stronger predictor of weapon carrying than direct perpetration (Dukes et al., 2010).

In a study of 7,200 students within Australia, 7% of secondary school students (Grades 8 and 9) reported being cyberbullied frequently (every few weeks or more often in the previous term), 4% reported cyberbullying others frequently, and 2% reported frequent cyber victimisation-perpetration. Frequent cyber victimisation was more prevalent for females and frequent cyber perpetration more prevalent for males (Cross et al., 2009).

Cyberbullying perpetration can be seen as a newer manifestation of deviant behaviour that adolescents are adopting. Moreover, reviews show high correlations between traditional bullying and cyberbullying with adolescents reporting traditional perpetration also reporting cyber perpetration and those reporting traditional victimisation also reporting cyber victimisation (Li, Cross, & Smith, 2012; Tokunaga, 2010) .

To test the hypotheses of a relationship between traditional bullying and engagement in problem behaviours, we examined traditional victimisation and perpetration simultaneously to take into account victims, perpetrators and bully-victims to determine if higher levels of traditional victimisation and perpetration predict higher levels of engagement in problem behaviours. As traditional bullying includes both direct and indirect forms and direct bullying has previously been linked with problem behaviours, we also examine the associations between these different forms of traditional victimisation and perpetration and levels of engagement in problem behaviours. Lastly, given that bullying at school has been found to be a gateway behaviour to other problem behaviours such as anti-social problems, delinquency, violence and aggression (Bender & Lösel, 2011), we examined whether cyberbullying also has a significant influence on levels of engagement in problem behaviours.

The following three hypotheses will be examined: (1) higher levels of traditional victimisation and perpetration at the beginning of secondary school (Grade 8) predict higher levels of engagement in problem behaviours at the end of Grade 9; (2) higher levels of traditional *direct* victimisation and perpetration at the beginning of secondary school (Grade 8) predict higher levels of engagement in problem behaviours at the end of Grade 9; and (3) levels of cyber victimisation and perpetration represent independent risk factors over and above levels of traditional victimisation and perpetration for higher levels of engagement in problem behaviours.

Methods

Sample and procedure

Data were obtained from the Supportive Schools Project. This project aimed to enhance the capacity of secondary schools to implement a whole-school bullying intervention (including strategies to enhance student transition to secondary school) and compare this intervention to the standard behaviour management practices used in Western Australian secondary schools using a cluster randomised comparison trial. The longitudinal data collected included adolescents' experiences of bullying victimisation and perpetration during the transition from primary school into secondary school. Secondary schools affiliated with the Catholic Education Office (CEO) of Western Australia were approached to participate in the study; students within Australian Catholic schools are more likely than students attending schools in other sectors (e.g. government schools) to move in intact groups, so this reduced the rate of transition attrition as students moved from primary to secondary schools.

Schools were stratified according to the total number of students enrolled and each school's Socio-Economic Status and then were randomly assigned within each stratum to an

intervention or comparison group. Twenty-one of the 29 schools approached, consented to participate; eight schools declined citing reasons including other priorities within their school and demanding staff workloads. Following Edith Cowan University's Human Research Ethics Committee approval of the research protocol, a combination of active and passive consent was obtained from parents of the Grade 8 students (13 years of age) enrolled in the schools in 2005. Parental consent was provided for 3,462 of the 3,769 (92%) students eligible to participate from 21 secondary schools in Perth, Western Australia. Data used in this paper were collected from 1,782 students assigned to 11 comparison schools. Data from intervention students were not used to ensure results are not confounded by the intervention program.

Four waves of student data were collected from 2005 to 2007. Here we analyse data from the second wave, after students transition to secondary school, when the cohort completed questionnaires in April 2006 at the beginning of Grade 8 (12 years old) (n=1,745, 98% of those eligible), and the fourth wave, in October/November 2007 at the end of Grade 9 (14 years of age) (n=1,616, 95% of those eligible). Over the three-year study period, approximately 50% of the participants were males and 70% attended a co-educational (n=8) versus single sex (n=3) secondary schools.

Measures

Traditional victimisation and perpetration. Traditional victimisation was assessed using a seven-item categorical index adapted from Rigby and Slee (1998) and Olweus (1996): being hit, kicked or pushed around; someone deliberately broke their things or took money or other things away; were made to feel afraid they would get hurt; were made fun of and teased in a hurtful way; were called mean and hurtful names; other students ignored them, didn't let them join in, or left them out on purpose; and others told lies about them and tried to make

other students not like them, over the previous school term. For each item students were asked how often they were bullied, rating each item on a 5 point scale (1 = never, 2 = only once or twice, 3 = every few weeks, 4 = about once a week, 5 = most days). A victimisation score was calculated for each student by averaging the seven victimisation items, with a higher score indicating more victimisation experiences ($\alpha=0.82$). Perpetration was assessed using a seven-item perpetration index, similar to the victimisation index, which asked students how often they bullied others in the different ways listed. A perpetration score was calculated for each student by averaging the perpetration items, with a higher score reflecting greater involvement in bullying perpetration ($\alpha=0.79$). In addition, an indirect victimisation and perpetration score was calculated by combining the relational items ($n=2$), and a direct victimisation and perpetration score was calculated by combining the verbal and physical items ($n=5$).

Cyber victimisation and perpetration. Cyber victimisation was assessed using two items from the 2004 Youth Internet Survey (Ybarra & Mitchell, 2004). The items assessed the frequency of receiving mean and hurtful text (SMS) messages (text messages, pictures or video clips) and mean and hurtful messages on the internet (email; pictures, webcam or video clips; chat rooms; MSN messenger or another form of instant messenger; social networking sites like MySpace; Internet game; Web log/Blog or Web page/Web site). Students rated each item on the same 5 point scale as for traditional victimisation. A cyber victimisation score was calculated for each student by averaging the two items ($r=0.46$), with a higher score indicating more cyber victimisation experiences. A cyber perpetration score was calculated in a corresponding way ($r=0.40$).

Problem Behaviours. Problem behaviours in the last month were assessed using six items adapted from Resnicow et. al (1995): stealing from a shop or person; being involved in a

physical fight; breaking something of their own on purpose; damaging or destroying things that did not belong to them; not paying for something like sneaking onto a bus or train or into a movie; smoking cigarettes and drinking alcohol without parental knowledge. All items were measured on a five point scale (1 = never, 2 = once, 3 = twice, 4 = three times, 5 = more than three times). Level of involvement in problem behaviours was calculated for each student by averaging all items, with a higher score reflecting a greater involvement (i.e. more behaviours, more frequently) (average $\alpha=0.83$). Involvement in individual problem behaviours was also examined with items recoded into binary variables of not being involved or being involved in the behaviour at least once in the past month.

Data Collection

Grade 8 and Grade 9 data collection was conducted by trained research staff who administered questionnaires to students during class time according to a strict procedural and verbal protocol. Students not participating were given alternate learning activities.

Statistical Analysis

Analyses were conducted using STATA v10 and PASW v18. Multi-level Tobit regression models with random effects were used to determine predictors of the level of involvement in problem behaviours at the end of Grade 9. Tobit regression models were used due to the extreme skew of problem behaviours with 47% at the minimum value. The level of involvement in problem behaviours at the beginning of Grade 8, gender, victimisation, perpetration, the interaction of victimisation and perpetration, and clustering at the school level were taken into account in all models. Direct and indirect forms of bullying were tested separately. Cyber victimisation and perpetration were added to the models. Multi-level logistic regression models with random effects were used to determine the predictors of

involvement in individual problem behaviours at the end of Grade 9, taking into account clustering and the variables mentioned above.

Results

Table 1 lists the means and standard deviations for victimisation, perpetration and engagement in problem behaviours at the two time points. On average students did not report frequent victimisation or perpetration through traditional bullying, or cyberbullying, and did not report engaging in many problem behaviours at either time point. However, involvement in traditional bullying, cyberbullying and problem behaviours increased from the beginning of Grade 8 to the end of Grade 9. By the end of Grade 9, at least 1 in 4 students were involved in physically fighting and drinking alcohol without their parents' knowledge in the previous month, while 1 in 5 students were not paying for something like sneaking onto a bus, train or in a movie and breaking something of their own on purpose.

---Table 1 here ---

Table 2 shows traditional bullying and cyberbullying were significantly correlated with each other and with the level of engagement in problem behaviours. Given the significant correlation between traditional and cyberbullying, the effects of traditional bullying were taken into account when estimating the effect of cyberbullying on the level of engagement in problem behaviours.

---Table 2 here ---

Level of engagement in problem behaviours, traditional victimisation and perpetration

Table 3 shows gender, problem behaviours, victimisation and perpetration at the beginning of Grade 8 were significant predictors of the level of engagement in problem behaviours at the

end of Grade 9. Boys were more engaged in problem behaviours than girls and higher engagement in Grade 8 was associated with higher engagement in Grade 9.

Levels of victimisation and perpetration were also found to moderate each other's associations with engagement in problem behaviours (the interaction term of victimisation and perpetration was significant). These effects are illustrated in Figure 1. Non-involved students (neither perpetrated nor victimised) were least involved in problem behaviours. Frequent perpetrators (every few weeks or more often) had the highest average levels of engagement in problem behaviours; however, the level of engagement in problem behaviours decreased if they also experienced some victimisation (i.e. if they were 'bully-victims'). In contrast, for those who did not bully others, their level of engagement in problem behaviours (although relatively low) increased as their level of victimisation increased. For those who bullied others once or twice, mean engagement in problem behaviours was similar for all levels of victimisation. No gender differences were found with regard to these moderation effects ($p=0.684$).

---Table 3 here ---

---Figure 1 here ---

Level of engagement in problem behaviours, traditional direct and indirect bullying

Table 4 shows results from the separate models testing direct and indirect forms of traditional bullying as predictors of level of engagement in problem behaviours, used to further examine the relationship between traditional bullying and level of involvement in problem behaviours. Gender, problem behaviours, traditional direct victimisation (verbal and physical) and traditional direct perpetration at the beginning of Grade 8 were significant predictors of the

level of engagement in problem behaviours at the end of Grade 9. Levels of traditional direct victimisation and direct perpetration were also found to moderate each other's associations with engagement in problem behaviours. Traditional indirect victimisation and perpetration were not significant predictors of the level of engagement in problem behaviours at the end of Grade 9.

---Table 4 here ---

Table 5 shows logistic regressions on individual problem behaviour involvement. Students with higher involvement in traditional victimisation and perpetration had increased odds of breaking something of their own on purpose, not paying for something like sneaking onto a bus, train or in to a movie and drinking alcohol without their parents' knowledge. In addition, traditional perpetration was a predictor of damaging and destroying things that did not belong to them.

---Table 5 here ---

Level of engagement in problem behaviours and cyber victimisation and perpetration

Cyber victimisation was added to the Tobit regression model to determine the independent effect of cyber victimisation over traditional victimisation and perpetration on engagement in problem behaviours. The same process was followed with cyber perpetration. After taking into account traditional victimisation and perpetration, neither cyber victimisation or cyber perpetration were significant independent predictors of the level of student engagement in problem behaviours (Table 3).

Discussion

The results of this study support the hypotheses that higher levels of traditional victimisation and perpetration at the beginning of secondary school (Grade 8) predict higher levels of

engagement in problem behaviours at the end of Grade 9, and specifically, traditional direct victimisation and perpetration are significant predictors of levels of engagement in problem behaviours. The hypothesis that cyberbullying represents an independent risk factor over and above levels of traditional bullying for higher levels of engagement in problem behaviours was not supported in this research.

The results for frequent perpetrators of traditional bullying provide further evidence of the clustering of some problem behaviours, as suggested by Problem Behaviour Theory (Jessor & Jessor, 1977). It appears that engagement in problem behaviours over time was higher for students who also perpetrated bullying frequently, however engagement in problem behaviours decreased as their level of victimisation increased. Adolescents' involvement in problem behaviours is more likely if supported by others as peer influence and association with deviant peers is the most proximal social influence on engagement in problem behaviours (Ary et al., 1999). Students who use proactive bullying are more likely to be part of a highly structured social group and are adept at negotiating allegiances, jostling for power positions, or coercing gang members to take orders (Sutton & Smith, 1999) while adolescents who are victimised are more likely to be lonely as other peers avoid them for fear of being bullied themselves or losing social status among their peers (Nansel et al., 2001) and perhaps therefore less likely to be involved in problem behaviours.

Social Cognitive Theory helps to understand a circular relationship between reprehensible behaviour and level of moral disengagement which allows one to engage in behaviours that are contrary to one's basic moral beliefs (Bandura, 1991). The association/relationship between bullying and engagement in problem behaviours shown in this research and other bullying-related research (Bender & Lösel, 2011) suggests perpetrators can more easily deactivate moral controls to justify themselves and their negative

behaviour, and that these cognitive mechanisms, in turn, can reinforce other negative behaviours (Menesini et al., 2003).

Further analysis of the relationship between traditional bullying and problem behaviours found that while direct forms of traditional bullying (both verbal and physical) were significantly associated with the level of engagement in problem behaviours, indirect bullying (relational) was not. Direct bullying by its nature (involving direct physical harm, or associated threats or challenges towards the target (Archer & Coyne, 2005)) may be more likely to be associated with problem behaviours intended to cause direct physical harm. Further, Nansel et al (2003) suggest bullying others is consistently associated with violence related behaviours (weapon carrying, weapon carrying in school, and physical fighting for boys and girls).

The Problem Behaviour Theory model is not supported in this study for cyber perpetration. This finding may be due to the largely indirect nature of cyberbullying afforded through opportunities for anonymity when a young person is bullying using technology. Recent studies have shown direct bullying to be a stronger predictor than indirect bullying of problem behaviours in adolescence (Bender & Lösel, 2011; Hampela et al., 2009). Problem Behaviour Theory suggests motives for involvement in problem behaviours include overt repudiation of conventional norms which result in a form of social control response (Jessor & Jessor, 1977). Respectively, the motives for perpetrating cyber and traditional bullying include revenge (cyber) and domination (traditional) (Vandebosch & Van Cleemput, 2009) resulting in harm or a reaction from the target person (Dooley et al., 2009).

Consequently, it appears essential for schools to implement actions to stop or reduce the frequency of all forms of traditional bullying but especially direct bullying (e.g. physical and verbal teasing) prior to transition and during the first few years of secondary school to

reduce the likelihood of perpetrators engaging in other problem behaviours. These actions by schools may similarly help to reduce the number of victimised students who will potentially engage in other problem behaviours. Encouragement of pro-social behaviour (Jessor & Jessor, 1977), high academic self-efficacy and involvement in extra-curricular activities are also protective against involvement in problem behaviours (Chung & Elias, 1996).

The correlations between traditional bullying, cyberbullying and problem behaviours were low, indicating that only a small proportion of variance in the problem behaviours measured is accounted for by victimisation and perpetration. Other confounders such as family structure, family functioning, socio-economic status, and parental substance use may impact on involvement in problem behaviours (Hayatbakhsh et al., 2008). Separate models were used to examine the independent effect of cyberbullying over and above the effects of traditional bullying on problem behaviours. The relatively low prevalence of cyberbullying behaviours compared to traditional bullying behaviours may however, have affected the results found in this study. As technology with online access becomes more readily available to adolescents, it is possible that increased time spent on the Internet combined with increasing technology expertise will increase the likelihood of cyberbullying behaviour (Walrave & Heirman, 2011). Future research needs to continue to investigate the relationship between traditional bullying, cyberbullying and involvement with problem behaviours as relationships may change as accessibility to technology increases. Research also needs to involve students from earlier younger age, especially as age of access to technology decreases, to identify opportunities for intervention.

The strengths of this study include the large sample size and the longitudinal nature of the research design enabling the examination of predictors as well as consequences of

victimisation-perpetration. The limitations include the reliance on student self-report of traditional and cyberbullying and involvement in problem behaviours during adolescence rather than peer, teacher or parent report. These self-report data may result in underreporting of involvement in bullying perpetration, victimisation and problem behaviours and may inflate the estimates of the correlation between bullying behaviours and problem behaviours.

The use of mean scores for the traditional and cyberbullying scales provides the students' frequency of involvement in different forms of bullying behaviours not the severity of the different acts in terms of impact on the targeted student. Impact as experienced by the victimised student, for example, could be assessed using separate questions asking students about the extent to which they were upset by the bullying. Similar limitations apply to the calculation of mean scores for involvement in problem behaviours. The equal weighting assigned to each of the different forms of bullying and problem behaviours may have impacted on the observed associations between these outcomes. The measurement of cyberbullying was also limited to only the number of nasty text messages or emails sent / received which may also have resulted in the under-reporting of involvement in these bullying behaviours.

Missing data from absentee students and students lost to attrition during transition may have led to fewer students who bully and engage in problem behaviours frequently being included in the analyses. To minimise this potential transition attrition the research was conducted with only Catholic secondary schools within the Perth metropolitan area. This does however, limit the generalisability of the results, and further research which includes students from rural areas and Government and Non-government schools is needed.

The results suggest that bullying intervention programs are critical prior to and at the beginning of secondary school as both direct victimisation and perpetration predict the level

of engagement in problem behaviours. In their meta-analysis and review of anti-bullying programs, Ttofi and Farrington (2009) found the anti-bullying intervention program components which had the greatest effect in decreasing victimisation and perpetration included the use of videos, working with peers, group work, parent training and information for parents, playground supervision, classroom rules and management and disciplinary methods. However, their conclusions with respect to working with peers and disciplinary methods have been challenged (Smith, Salmivalli, & Cowie, 2012). Pearce et al. (2011) conclude that raising awareness and educating the whole school community is one of the key strategies to help reducing cyberbullying in schools. The transition to secondary school provides an opportune period in which to intensify whole-school bullying intervention programs.

Conclusion

Problem Behaviour Theory is supported for traditional direct bullying but not for cyberbullying. Students engaging in cyber perpetration behaviours did not also engage in higher levels of other problem behaviours. While this study supports the correlation between cyberbullying and traditional forms of bullying, it found levels of traditional victimisation and perpetration at the beginning of secondary school (Grade 8) predicted levels of engagement in problem behaviours at the end of Grade 9. Cyberbullying was not found to represent an independent risk factor over and above levels of traditional victimisation and perpetration for higher levels of engagement in problem behaviours. The results suggest it will be most beneficial to focus interventions on traditional bullying, specifically reducing direct bullying during the first few years of secondary school.

Table 1 Descriptive statistics of sample and bullying involvement, and prevalence of problem behaviours

	Beg. of Grade 8	End of Grade 9
<i>Number of students</i>	<i>n (%)</i>	<i>n (%)</i>
Total	1745	1616
Male	847 (48.6)	791 (49.0)
Female	896 (51.4)	823 (51.0)
<i>Average Age</i>	<i>12</i>	<i>14</i>
<i>Descriptive Statistics^t</i>	<i>Mean (SD)</i>	<i>Mean (SD)</i>
Traditional victimisation (1-5)	1.30 (0.50)	1.49 (0.69)
Traditional perpetration (1-5)	1.13 (0.30)	1.28 (0.56)
Cyber victimisation (1-5)	1.06 (0.27)	1.17 (0.54)
Cyber perpetration (1-3)	1.02 (0.17)	1.12 (0.49)
Problem behaviours (1-5)	1.16 (0.39)	1.34 (0.62)
<i>Problem behaviours</i>	<i>n (%)</i>	<i>n (%)</i>
None in past month	1015 (56.1)	704 (39.5)
At least once in past month		
Stealing from a shop or person	159 (9.4)	255 (16.7)
In a physical fight	379 (22.5)	420 (27.6)
Breaking something of their own on purpose	250 (14.8)	297 (19.6)
Damaging or destroying things not belonging to them	92 (5.5)	161 (10.6)
Not paid for something like sneaking onto a bus, train or into a movie	177 (10.5)	342 (22.5)
Smoked cigarettes	51 (3.0)	111 (7.3)
Drunk alcohol without parents knowledge	163 (9.7)	377 (24.9)

^tHigher scores correspond to greater victimisation, greater perpetration and greater involvement in problem behaviours.

Table 2 Bivariate correlations between bullying and problem behaviours

	Traditional Victimisation	Traditional Perpetration	Cyber Victimisation	Cyber Perpetration
Traditional Victimisation [#]	1			
Traditional Perpetration [#]	.333**	1		
Cyber Victimisation [#]	.366**	.253**	1	
Cyber Perpetration [#]	.191**	.507**	.435**	1
Level of engagement in problem behaviours ^t	.073**	.216**	.042	.061*

[#]Measured at beginning of Grade 8, ^tMeasured at end of Grade 9, n ranges from 1494 to 1704

* Significant at 5% level **Significant at 1% level

Table 3 Tobit regression results for problem behaviours and victimisation and perpetration

	β	SE	95% Confidence interval	P value
<i>Traditional bullying and cyber victimisation</i>				
Problem behaviours Grade 9 (n=1465)				
Problem behaviours Grade 8	0.40	0.04	(0.32, 0.48)	<0.001**
Gender – male	0.14	0.03	(0.08, 0.21)	<0.001**
Victimisation	0.28	0.07	(0.14, 0.42)	<0.001**
Perpetration	0.52	0.11	(0.31, 0.74)	<0.001**
Cyber victimisation	0.03	0.06	(-0.09, 0.15)	0.651
Victimisation*perpetration	-0.22	0.05	(-0.32, -0.12)	<0.001**
<i>Traditional bullying and cyber perpetration</i>				
Problem behaviours Grade 9 (n=1465)				
Problem behaviours Grade 8	0.39	0.04	(0.31, 0.48)	<0.001**
Gender – male	0.14	0.03	(0.08, 0.21)	<0.001**
Victimisation	0.28	0.07	(0.14, 0.43)	<0.001**
Perpetration	0.51	0.11	(0.30, 0.73)	<0.001**
Cyber perpetration	0.06	0.08	(-0.09, 0.22)	0.419
Victimisation*perpetration	-0.21	0.05	(-0.31, -0.12)	0.007**

Predictors measured at beginning of Grade 8

*Significant at 5% level, **Significant at 1% level

Table 4 Tobit regression results for problem behaviours and traditional direct and indirect bullying

	β	SE	95% Confidence interval	P value
<i>Traditional direct bullying</i>				
Problem behaviours Grade 9 (n=1465)				
Problem behaviours Grade 8	0.42	0.04	(0.34, 0.50)	<0.001**
Gender – male	0.13	0.03	(0.10, 0.19)	<0.001**
Victimisation	0.23	0.06	(0.12, 0.35)	<0.001**
Perpetration	0.42	0.09	(0.25, 0.60)	<0.001**
Victimisation*perpetration	-0.18	0.04	(-0.25, -0.10)	<0.001**
<i>Traditional indirect bullying</i>				
Problem behaviours Grade 9 (n=1465)				
Problem behaviours Grade 8	0.43	0.04	(0.36, 0.51)	<0.001**
Gender – male	0.14	0.03	(0.09, 0.21)	<0.001**
Victimisation	-0.04	0.07	(-0.18, 0.10)	0.557
Perpetration	-0.001	0.10	(-0.20, 0.20)	0.990
Victimisation*perpetration	0.05	0.06	(-0.06, 0.16)	0.373

Predictors measured at beginning of Grade 8

*Significant at 5% level, **Significant at 1% level

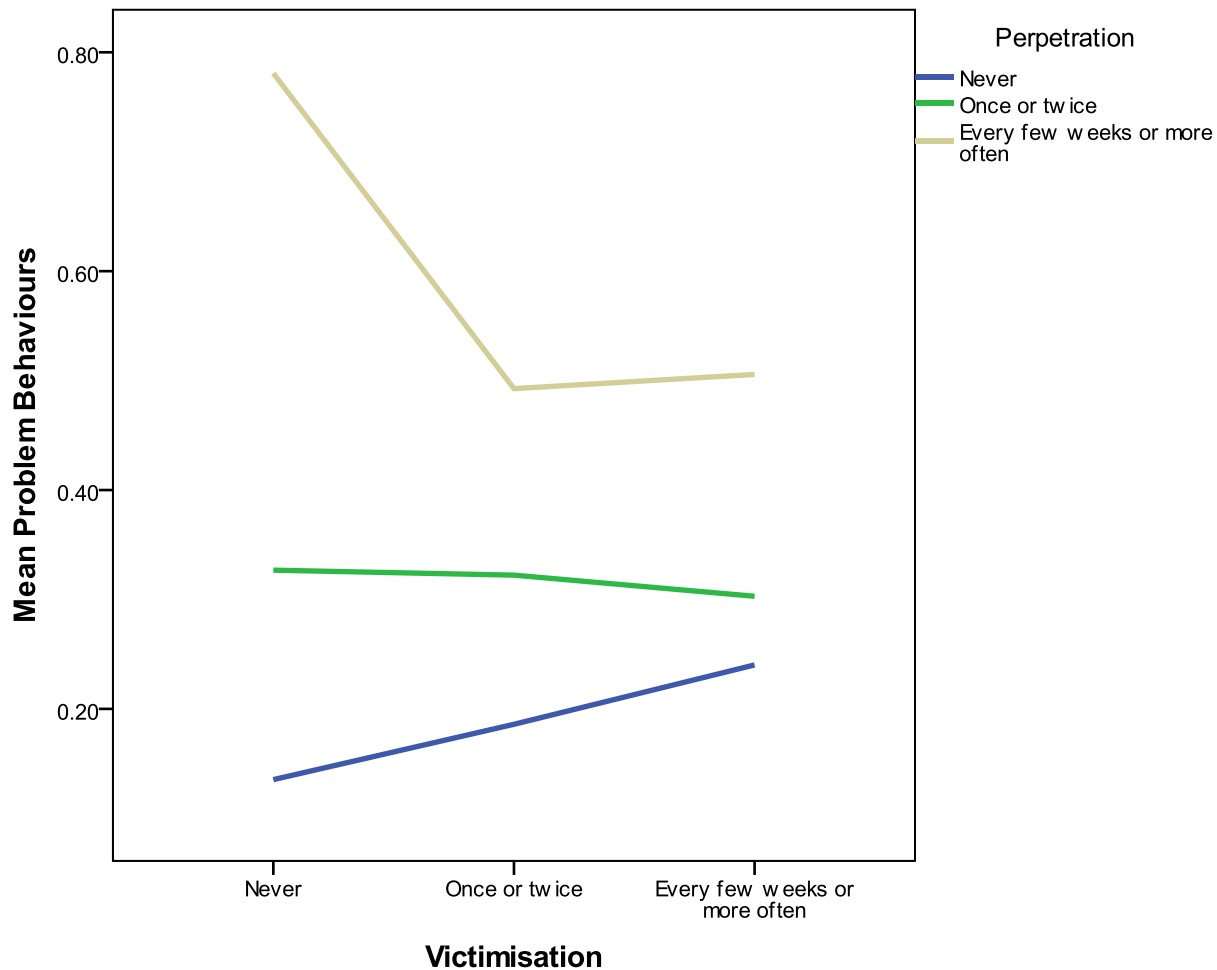
Table 5 Logistic regression results for involvement in individual problem behaviours and traditional victimisation and perpetration

OR (95% CI)	Victimisation	Perpetration
Stealing from a shop or person	1.3 (0.6,3.0)	1.7 (0.5,5.8)
In a physical fight	1.6 (0.7,3.5)	2.9 (0.9,9.6)
Breaking something of their own on purpose	2.4 (1.3,4.4)**	4.0 (1.5,10.3)**
Damaging or destroying things not belonging to them	1.9 (0.9,3.9)	3.5 (1.1,10.4)**
Not paid for something (ie sneaking onto a bus, train, into a movie)	3.3 (1.7,6.6)**	9.6 (3.2,28.6)**
Smoked cigarettes	1.6 (0.7,3.9)	3.2 (0.9,10.5)
Drunk alcohol without parents' knowledge	2.5 (1.2,4.9)*	9.5 (3.2,28.6)**

Models controlled for gender and level of involvement in problem behaviours at the beginning of Grade 8. n ranges from 1451 to 1463

*Significant at 5% level, **Significant at 1% level

Figure 1 Interaction of victimisation with perpetration and average problem behaviours.



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