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Antecedents of bullying victimisation in adolescents: a fresh look at Aotearoa New Zealand

Michael Birchall ^a, Aaron Drummond^b and Matthew N. Williams^a

^aSchool of Psychology, Massey University, Albany, New Zealand; ^bSchool of Psychological Sciences, University of Tasmania, Hobart, Australia

ABSTRACT

Research has consistently demonstrated that the prevalence of school bullying in Aotearoa New Zealand exceeds those observed in other developed countries. Despite the need to understand the risk and protective factors for bullying victimisation, there remains a paucity of research in the New Zealand context. The present study aimed to investigate the risk factors for bullying victimisation by conducting a secondary data analysis on a large and representative sample of 15-year-olds from New Zealand using data collected during the 2018 Programme for International Student Assessment ($N = 4137$). A multiple regression analysis identified eight risk factors which were significantly associated with at least one form of school bullying. The strongest effects indicated that increased parental support and school belonging were associated with lower victimisation, while classroom disorder and school competitiveness were associated with greater victimisation risk. The implications of these findings for future research are discussed.

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Peer victimisation; risk factors; PISA; direct bullying; indirect bullying

Main text

Bullying, or peer victimisation, is a ubiquitous and harmful form of aggression characterised by the intention to cause physical or psychological harm to another person on repeated occasions. Being a child or adolescent victim of bullying is associated with decrements in students' mental and physical health, as well as long-term life outcomes (Schoeler et al. 2018). Despite 40 years of research into the phenomena, prevalence rates remain around 13% globally, suggesting that bullying affects a significant number of students around the world (Craig et al. 2009). Due to the detrimental impact on victims, global focus on addressing and preventing bullying remains steadfast, evident through the considerable volume of research dedicated to this issue internationally (Casper 2021). The present study aimed to understand the risk factors for bullying victimisation within Aotearoa New Zealand specifically.

CONTACT Aaron Drummond  aaron.drummond@utas.edu.au

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Research suggests that the long-term consequences of bullying victimisation can be prolonged and severe. For example, one longitudinal study indicates that victimisation is linked to the increased likelihood of major depression, suicidal ideation, and both attempted and completed suicide (Kljakovic et al. 2015). Moreover, chronic stressors (such as ongoing victimisation) appear to upregulate the production of cortisol and subsequently lead to impaired immune function (Segerstrom and Miller 2004). Not only does this contribute to the risk of developing other illnesses, it may contribute to an increased number of physical health complaints and student absenteeism during the school years (Gruber and Fineran 2008).

Prevalence rates of bullying vary across countries, suggesting that there may be unique social or cultural influences underlying victimisation risk (Kljakovic et al. 2015). Accordingly, it is important to study whether and how risk factors of bullying vary between countries. Despite acknowledgment of the pervasiveness of bullying, uncertainties persist regarding its exact prevalence rates due to differences in terminology, definitions, and measurement challenges (Casper 2021). Although the operationalisation of bullying victimisation varies throughout the literature, one study of 40 countries reported that around 13% of 11–15-year-old students had been bullied in the preceding two months (Craig et al. 2009). Furthermore, a meta-analysis of 80 studies conducted worldwide found that approximately one-third (36%) of children experience bullying victimisation, while a similar proportion (35%) engage in bullying behaviour themselves (Modecki et al. 2014).

A closer examination of bullying within Aotearoa New Zealand, has been made possible by longitudinal studies such as the Youth 2000 studies. The first Youth 2000 Study, conducted anonymously among high school students in 2001, revealed that approximately 30% of students reported experiencing bullying within the past year, with 7% reporting frequent victimisation occurring weekly or more often. Further, a significant portion of students, about 20%, reported not feeling safe within their school environment (Fleming et al. 2007).

Subsequent iterations of the study underscored persistent challenges within the school environment. The Youth 2007 Study found that 7.1% of male students and 5% of female students reporting being bullied at least weekly. Moreover, only 82% of males and 85% of females reported feeling secure within their school setting (Clark et al. 2009). Similarly, the Youth 2012 Study, unveiled emerging issues surrounding cyberbullying, with 12% of students reporting receiving threatening messages via mobile phones and 9% through online platforms. Despite efforts to address safety concerns, only 86% of males and 89% of females reported feeling safe at school (Clark et al. 2013).

The most recent Youth 2019 Study continues to underscore the pervasive nature of bullying within New Zealand schools with only 13% of students expressing feeling unsafe in their school environment (Fleming et al. 2021).

Prevalence rates from the Youth studies are supported by data from the 2014/2015 Trends in International Mathematics and Science Study (TIMSS) demonstrated that New Zealand had the highest rate of school bullying among 51 countries (Ministry of Education 2015). Moreover, the 2018 Programme of International Student Assessment (PISA) showed that 15% of New Zealand students reported being bullied frequently compared to the OECD average of around 8% (Jang-Jones and McGregor 2019). Unfortunately, the reasons for this difference remain poorly understood and understudied.

Finally, a 2013 survey by Green et al., asked a large sample of New Zealand teachers ($n = 860$) about bullying prevalence in their respective schools. Of the respondents, 94%

reported bullying taking place in their schools with social/relational bullying (70%) and verbal bullying (67%) being the most prevalent. In contrast, cyberbullying (39%) and physical bullying (35%) were less commonly reported. This finding is supported by further research showing substantive impacts upon the families of victims of bullying both domestically within New Zealand (Harcourt et al. 2015) and internationally (Harcourt et al. 2014). New Zealand parents show substantial variability in the strategies they recommend to their children to address bullying, often influenced by their own experiences of childhood bullying (Boddy et al. 2024). Most promisingly, recent pilot studies suggest that intervention programmes such as the KiVa anti-bullying programme might prove effective at reducing bullying for at least some students (Green et al. 2020). However, there was also substantial variability in the effectiveness of the intervention programme by demographic characteristics, reinforcing the need for greater understanding of factors which might amplify or reduce bullying victimisation in Aotearoa New Zealand (Green et al. 2020). Nonetheless, taken together, the evidence suggests that New Zealand has high rates of bullying which may risk factors for poor psychosocial outcomes, though there remains a relative paucity of understanding of factors contributing to bullying victimisation in New Zealand.

In addition to high bullying rates, New Zealand consistently reports some of the highest youth suicide rates when compared to other developed countries. Data collected between 2013 and 2015 indicated the rate as 14.9 per 100,000 for young people aged 15–19 making it the second highest in a group of 40 other developed countries (Gromada et al. 2020). As such, given the long-term negative consequences for mental health, it is important to understanding bullying in the New Zealand context as a potential contributing factor to these high suicide rates.

Until recently, the study of risk factors for bullying victimisation has largely focused on the individual characteristics of victims, such as personality traits, internalising symptoms, and anti-social tendencies (Carrera et al. 2011; Hamarus and Kaikkonen 2008). As a result, broader social and cultural factors have been overlooked. More recent studies of these latter factors have used Bronfenbrenner's (1977) ecological systems theory (EST) to guide their approach to the study of victimisation risk (Cross et al. 2015; Ding et al. 2020; Zych et al. 2019). EST acknowledges that bullying is a group process and that factors beyond the individual must be understood to paint a more complete picture of what gives rise to victimisation (Espelage 2014; Espelage and Swearer 2010).

A broad review of the literature reveals mixed levels of support for various risk factors. Factors associated with lower victimisation risk include higher academic performance (Cook et al. 2010; Kowalski et al. 2014; Zych et al. 2019), socioeconomic status (Fu et al. 2013; Khamis 2015; Tippett and Wolke 2014), parental support (Biswas et al. 2020; Lereya et al. 2013), sense of belonging (Arango et al. 2018; Carney et al. 2018; Duggins et al. 2016), and greater classroom order (Koth et al. 2008; Låftman et al. 2017; Modin et al. 2018). Moreover, use of technology, including increased video game use (Chang et al. 2015; Lenhart et al. 2015; Rostad et al. 2021) and social media use (Craig et al. 2020; Muntaha et al. 2022), are also associated with an increased risk of a bullying attack.

The relationship between students' sex and victimisation is less clear with studies demonstrating that being female can act as both a significant protective factor (Lam et al. 2015) and a significant risk factor for victimisation (Low and Espelage 2013).

Some evidence suggests that males are more likely to experience direct forms of victimisation whereas females tend to experience more indirect attacks (Feijóo et al. 2021).

A narrower review of the literature guided by EST sheds light on environmental risk factors associated with victimisation at the classroom level. It has been proposed that the overall characteristics of the peer network within a classroom, such as social norms or the level of hierarchical structure among classmates, can either discourage or enable bullying and may influence its impact on victims (Casper 2021). The relationship between students' involvement in bullying has been shown to depend on their peer status and goals with the strength and direction of this effect varying from one classroom to another (Casper 2021). For example, while bullies typically enjoy popularity during adolescence, there are classrooms where they hold no popularity at all.

Another characteristic which appears to be important is the classroom hierarchy. While the evolutionary perspective suggests that the emergence of a status hierarchy within a group generally prevents aggression (Savin-Williams 1979), this does not appear to hold up in the bullying literature. Empirical evidence suggests that a higher level of classroom status hierarchy was related to increases in classroom bullying (Garandeanu et al. 2014). Likewise, classrooms with higher levels of hierarchy in elementary schools were linked to an increased probability of children becoming targets of relational aggression later on (Wolke et al. 2009), as well as to a sustained victimisation during middle school for those who had already experienced bullying by their peers (Schäfer et al. 2005).

Given the current state of the literature, there remains uncertainty about the validity of this research as it extends to the New Zealand context. To address this lack of research, the present study aimed to (a) conduct confirmatory analyses on those factors which are well-evidenced to be associated with bullying in other Nations to determine their relevance to Aotearoa New Zealand and (b) explore the relevance of these latter, more uncertain, risk factors. Specifically, it was hypothesised that:

1. Being a male will be associated with greater physical bullying victimisation than female in the past 12 months. Being female will be associated with greater relational victimisation than male in the past 12 months.
2. There will be a negative relationship between Economic, Social, and Cultural Status Index (ESCS) and both physical and relational bullying victimisation in the past 12 months. In other words, higher ESCS will be associated with lower victimisation.
3. There will be a negative relationship between parental support and both physical and relational bullying victimisation in the past 12 months.
4. There will be a negative relationship between the student's classroom climate (the amount of behavioural order/teacher control) and both physical and relational bullying victimisation in the past 12 months.
5. There will be a positive relationship between the students' video game use and both physical and relational bullying victimisation in the past 12 months.
6. There will be a negative relationship between the students' academic performance (on mathematics, reading, and science) and both physical and relational bullying victimisation in the past 12 months.
7. There will be a negative relationship between the students' sense of belongingness at school and both physical and relational bullying victimisation in the past 12 months.

8. There will be a positive relationship between the students' social media use and both physical and relational bullying victimisation in the past 12 months.
9. There will be a positive relationship between a competitive school climate and both physical and relational bullying victimisation in the past 12 months.
10. There will be a negative relationship between a co-operative school climate and both physical and relational bullying victimisation in the past 12 months.

Methods

Participants & design

In the present study, we analysed publicly available data collected as part of the OECD's 2018 Programme for International Student Assessment (PISA). This triennial survey is designed to measure academic performance around the world with 79 countries taking part in 2018 (Education Counts 2018). The deidentified data was made publicly available on the PISA website for research purposes (with participant consent) and was downloaded for use in our study on 10th November 2020 (<https://www.oecd.org/pisa/data/>). Finally, ethics approval was obtained from the Massey University Human Ethics Committee by way of a Low-Risk Notification (notification # 4000023097).

The target population in this study were adolescents from Aotearoa New Zealand. The PISA survey samples 15-year-old students because it is a point at which most children are still enrolled in formal education and where they are soon to be faced with major life decisions like whether to enter the workforce or to pursue further education (OECD 2019). Participants were recruited by first using stratified sampling at the school level. Once schools had been selected, they were contacted and asked to produce a list of PISA-eligible students from which 42 students were then randomly selected to participate. Schools at which fewer than 50% of the invited students agreed to take part were excluded and a replacement school was contacted to take their place.

At the time of assessment, there were 59,700 15-year-olds in the New Zealand population. Of these, 58,131 were enrolled at grade 7 (year 11) or above. The sample taken by PISA included 6,173 students representing approximately 11% of the 15-year-olds nationwide (OECD 2018). The remaining sample contained 6,173 students. After the exclusion of cases with missing responses, 4,137 students remained in the sample. The mean age of the sample was 15.78 years ($SD = 0.29$) and included 53.5% females ($n = 2,215$) and 46.5% males ($n = 1,922$). A sensitivity power analysis was completed assuming an alpha level of 0.05 and revealed that, given the size of the sample, our multiple linear regression analysis would be capable of detecting a small effect, $f^2 = .0059$.

Materials & measures

The New Zealand version of the 2018 PISA consisted of three computer-based questionnaires: the Educational Career Questionnaire, the Information and Communications Technology (ICT) Familiarity Questionnaire, and the Student Questionnaire. Responses to self-report items in the latter two questionnaires were used in the present study. Reliability estimates can be found in the PISA Technical Report (OECD 2018) for scales created by the PISA.

Bullying victimisation. Bullying victimisation was measured using PISA's bullying victimisation scale. Students were asked how frequently they were targeted by others with respect to three examples of direct bullying and three examples of indirect bullying. Response categories appeared on a four-point Likert scale ranging from 'Never or almost never' to 'Once a week or more'. Two composite variables were created to represent direct and indirect bullying by summing the responses from the relevant items. Higher scores reflected more frequent victimisation.

Academic performance. Academic performance was measured using tests of reading, mathematics, and science literacy. The PISA used Rasch model estimation to produce 10 estimates of the students' score on each test and the average of these 30 scores was used to represent overall academic performance (OECD 2018).

Socio-economic status. Socio-Economic Status was measured using PISA's Index of Economic, Social, and Cultural Status (ESCS). The index is a composite variable based on the student's highest parental occupation, parental education, and their home possessions. It was calculated using the arithmetic mean of each indicator after being imputed and standardised with higher scores reflecting higher SES (Avvisati 2020).

Parental support. Parental support was measured using a three item 4-point Likert scale which asked students how much they felt their parents supported them with their educational efforts, with difficulties at school, and the degree of encouragement they provided. The responses to each item were summed to create a composite variable with higher scores representing greater perceived support.

School belonging. Belonging was measured using a seven-item scale 4-point Likert scale which asked students about positive and negative aspects of school belonging. Positively worded items were reverse coded before the scale was summed to produce a composite variable. Higher scores represented greater feelings of belonging.

Video game play. Video game play was measured using two items in the ICT Familiarity Questionnaire. Students reported how often they played one-player games and collaborative online games using a 5-point Likert scale. Response options included: 'Never or hardly never', 'Once or twice a month', 'Once or twice a week', 'Almost every day', and 'Every day'. A composite variable was created by summing student responses, with higher scores reflecting more frequent video game use.

Social media use. Social media use was measured using three items from the digital device scale. Students were asked to report how often they chatted online, participated in social networks, and play online social media games. Their responses on a 5-point Likert scale (same response items as *Video game play*) were summed to create a composite variable in which higher scores reflected more frequent social media use.

Classroom climate. Classroom climate aimed to measure the extent to which classroom order (i.e. discipline) was maintained in English classes. Students responded to six items about various aspects of classroom order and their responses on a 4-point Likert scale were summed to represent the classroom climate. Higher scores on this scale represented greater classroom order.

School climate. School climate was measured similarly to classroom climate except that students were asked to report the competitive or co-operative nature of the school climate. Four items were used to measure each aspect and responses were given using a 4-point Likert scale. The responses were summed for each scale with higher scores indicating a greater perception of competitiveness and co-operation, respectively.

Data analysis

Our study was pre-registered using the Open Science Framework website (https://osf.io/9fb2c/?view_only=effb9da62f9a4d03aa4829771d4147fa). The pre-registration document outlined our analysis procedure and hypotheses. No inferential analysis of these data was undertaken by our research team prior to the hypotheses being pre-registered on OSF. After the data was downloaded and prepared for analysis, it was entered into JASP Version 13.1 where subsequent analyses were carried out. We used multiple linear regression analysis to test our hypothesis. Given that our aim was to investigate the relationship between individual risk factors and bullying outcomes, while controlling for the presence of other potential risk factors, and given the current dearth of research on this topic within the New Zealand context, this method seemed an appropriate first step toward understanding the issue.

Separate models were tested for both direct and indirect forms of bullying, and coefficients were subsequently transformed into standardised beta scores for interpretation. We also pre-registered analyses relating to a series of anti-bullying attitude items as an alternative outcome variable. Given that this analysis did not reveal any relationships of interest, these results were excluded from the primary manuscript. Interested readers can see the results of these additional analyses in the supplementary materials available online.

Traditionally, a-priori cut-off points have been used to determine the smallest effect size of interest (Anvari et al. 2023), for example, 0.1 according to Cohen (Cohen 1988). An alternative, and perhaps a more practically meaningful method for determining the smallest effect size of interest, is to measure the strength of the relationship between theoretically implausible independent variables and the outcome variable under investigation. This procedure has been employed in recent research examining relationships between psychological wellbeing and digital technology use (Orben and Przybylski 2019). As such, three neutral variables were selected from the original dataset for which no plausible theoretical rationale predicted a meaningful association with the dependent variables. These included how often the student downloads a new app to a mobile device, whether they have been taught how to detect phishing (scams) or spam emails at school, and whether they have a USB (memory) stick available for use at home. These analyses of theoretically irrelevant variables revealed non-significant relationships with an mean effect size of $r = -.042$. Subsequently, we established (and pre-registered) three essential inference criteria for the present study which were used to conclude that the effects were likely to be meaningful: (1) following a two-tail significance test they produced a p -value below the traditional alpha level of .05; (2) the standardised beta coefficient needed to exceed the average effect of the three theoretically irrelevant variables – i.e. $+/- .042$; and (3) that the 95% confidence interval of the standardised coefficient did not overlap with the minimum effect size of interest (.042).

Results

Direct bullying

Our first model, which analysed direct forms of bullying, accounted for 17.7% of the variance, $F(10, 4126) = 88.48$, $p < .001$, $r^2 = .177$. The analysis revealed that six of the ten

independent variables met the inference criteria (see Table 1). Lower belonging ($\beta = -.250$), being male ($\beta = .173$), and a more competitive school climate ($\beta = .098$) were all associated with increased direct victimisation. Higher academic performance ($\beta = -.152$), a more disciplined classroom climate ($\beta = -.111$), and higher parental support were associated with lower direct bullying victimisation ($\beta = -.100$). According to the interpretative standards suggested by Cohen (Cohen 1988), all of these effects are considered small to moderate.

Indirect bullying

Our second model, which analysed indirect victimisation, accounted for 23.3% of the variance, $F(10, 4126) = 125.56$, $p < .001$, $r^2 = .233$. The analysis indicated that five variables met the pre-determined inference criteria for indirect bullying (see Table 2). Lower belonging ($\beta = -.380$), higher school competitiveness ($\beta = .164$), increased social media use ($\beta = .074$), and higher academic performance ($\beta = -.103$) were all associated with increased indirect victimisation. A more disciplined classroom climate ($\beta = -.102$) was associated with a decrease in indirect victimisation. These effects are all are small, except for belonging, which had a medium effect size above .3 [45].

Discussion

The present study aimed to investigate the risk factors for bullying victimisation in a sample of New Zealand adolescents. We examined several risk factors and their association with direct and indirect forms of bullying. Our study replicated existing risk factors for bullying victimisation previously identified in other countries within the Aotearoa context, but also highlighted some important differences.

Results demonstrated a significant association between students' sense of belonging and the frequency in which they were victimised in both forms. As belonging increased, victimisation decreased. Notably, these relationships yielded the largest effect size of all the predictors in our analysis. This result replicates previous findings showing that belongingness and bullying victimisation are interrelated (Arango et al. 2018; Carney et al. 2018; Duggins et al. 2016). The growing body of evidence in support of this relationship suggests that belongingness could be an effective factor for identifying students who are at increased risk of bullying.

Table 1. Unstandardised (B) and standardised (β) coefficients for the effect on direct bullying.

Variable	β [95% CI]	<i>t</i>	<i>p</i>
Sex*	.173 [.138, .207]	9.83	< .001
Socioeconomic Status	.046 [.015, .076]	2.92	.004
Parental Support*	-.100 [-.129, -.070]	-6.62	< .001
Classroom Climate*	-.111 [-.140, -.081]	-7.42	< .001
Video Game Use	.029 [-.006, .065]	1.62	.105
Academic Performance*	-.152 [-.183, -.121]	-9.62	< .001
Belonging*	-.250 [-.280, -.220]	-16.37	< .001
Social Media Use	.026 [-.004, .055]	1.69	.091
Competitiveness*	.098 [.070, .127]	6.75	< .001
Co-operation	.004 [-.026, .033]	0.25	.804

*Variable satisfies inference criteria.

Table 2. Unstandardised (B) and standardised (β) coefficients for the effect on indirect bullying.

Variable	β [95% CI]	<i>t</i>	<i>p</i>
Sex	.040 [.007, .074]	2.382	.017
Socioeconomic Status	.043 [.014, .073]	2.88	.004
Parental Support	-.058 [-.096, -.033]	-4.00	< .001
Classroom Climate*	-.102 [-.130, -.073]	-7.07	< .001
Video Game Use	.026 [-.009, .060]	1.47	.142
Academic Performance*	-.103 [-.133, -.073]	-6.78	< .001
Belonging*	-.380 [-.409, -.351]	-25.84	< .001
Social Media Use*	.074 [.045, .102]	5.03	< .001
Competitiveness*	.164 [.137, .192]	11.69	< .001
Co-operation	-.014 [-.042, .015]	-0.94	.346

*Variable satisfies inference criteria.

Our study also replicated previous research involving other important risk factors. In line with previous findings (Feijóo et al. 2021), results demonstrated that male students were significantly more likely than female students to report being the victim of direct bullying, such as physical and verbal attacks. The consistency in these findings implies that interventions directed at males might be particularly effective for reducing direct forms of victimisation. In contrast, there was no significant relationship between indirect bullying and sex, suggesting that both male and female students were equally likely to experience indirect bullying.

Results also demonstrated that increased parental support was associated with lower direct, but not indirect, victimisation, which is partially consistent with previous findings (Lereya et al. 2013). Previous research has indicated that parenting style has a considerable impact on a child's social skills (Suat 2018) and that social skill deficits are associated with an increased risk of victimisation (Reijntjes et al. 2010). It is unclear why this relationship was not consistent across both types of victimisations; however, limitations in the measurement of indirect victimisation may explain this.

Student perceptions of a good classroom climate (i.e. marked by more behavioural discipline and order) were associated with a decrease in both forms of victimisation, suggesting that less bullying may take place in classrooms with a more disciplinary climate. This supports previous research on classroom climate (Koth et al. 2008; Låftman et al. 2017; Modin et al. 2018) and highlights the importance of educators' maintaining a good classroom climate.

One of the unique findings from our study was that a more competitive school climate was associated with both increased direct and indirect victimisation. However, there is likely more to this relationship. For instance, competitive schools may be more common in high socioeconomic areas; therefore, SES may contribute, at least partially, to these findings. Given the lack of research on this risk factor, further research in this area is required before speculating about the role it might play in victimisation risk.

Finally, lower academic performance was associated with an increase in both forms of victimisation, therefore supporting other recent findings (Cook et al. 2010; Kowalski et al. 2014; Zych et al. 2019). Again, several explanations are offered for this relationship. Because this is a correlational result, it is possible that being bullied may actually be the cause of the lower academic performance (i.e. rather than the other way around) by interfering with a student's academic performance through difficulties with concentrating in class or increased absenteeism.

The remaining factors, SES, social media use, video game use, and cooperative school environment, did not satisfy our pre-registered inference criteria stipulated at the outset of our study. The null findings regarding SES could be attributable to cultural differences in New Zealand, however, additional research is required in this area and future studies should examine SES using other validated SES measures as well as with more sensitive instruments. Although social media use was significantly related to indirect victimisation, the effect size was small and fell below the traditional cut-off of .10 (Cohen 1988).

The current analysis suggests that the frequency of one's video game use is not associated with an increased risk of being victimised in either form. Although this finding contradicts previous research (Chang et al. 2015; Lenhart et al. 2015; Rostad et al. 2021), the lack of consistency may be attributable to a limitation in the video game use scale design. The items in this scale asked how frequently one plays games using a 5-point Likert-type scale and therefore exclusively measured frequency rather than the total amount of time spent gaming, which may have resulted in a relatively coarse-grained measure of students' video gameplay habits.

Perception of within-school cooperation was not significantly associated with either form of victimisation. It is possible that the composite co-operation variable shared a some amount of variance with the variable examining competitiveness, with a Pearson's correlation analysis revealing an $r(4136) = .118, p < .001$. As such, some shared variance may have been attributed to the latter variable by the regression analyses.

The present study had some notable limitations. Firstly, this was a cross-sectional study meaning that while we found evidence of associations between risk factors and bullying we cannot determine any causal relationships or whether bullying is the cause or effect of the observed relationships. Although our data was consistent with some previous overseas, there is still a lack of longitudinal studies to investigate the directionality of the relationships we found support for. Future research in New Zealand would benefit more of these longitudinal studies and randomised controlled trials.

Second, this study used self-report scales, which can lead to socially desirable responding and self-report bias. Accuracy in victimisation measurement could be improved by using a multi-informant method that combines self-reports with teacher reports, peer reports, and ethnographic observations. Thirdly, some of the significant effects detected in the present study were, by conventional social science standards, small, or very small, in magnitude. Some of the results which satisfied the pre-registered inference criteria did not, however, meet the .10 cut-off for a small effect and others were only barely higher (Cohen 1988). This suggests that some of the observed effects may be relatively subtle, and potentially not likely to be effective targets of interventions to reduce bullying victimisation. Finally, although our study allowed us to identify risk factors for bullying victimisation, this is only one piece of the puzzle. With the data we had available to us, we were unable to identify perpetrators and bully-victims, which would have provided valuable insight into the factors related to perpetration of bullies and bully-victims who both perpetrate and are the target of bullying.

The application of more parsimonious theories of victimisation may also prove advantageous for advancing our understanding of victimisation risk. The catalyst model appears to have promise for application to bullying research given that it accounts for both proximal (i.e. genetic variation) and distal (i.e. social influences) risk factors which predict anti-social behaviour (Ferguson et al. 2013). In contrast to ecological

systems theory, the catalyst model acknowledges that not all risk factors have an equal influence, and that there is a need to parse out the most influential factors. The subsequent hierarchical organisation of risk factors provides more cogent guidance for practice because it identifies which are the most important variables to target with public policy interventions to ensure the greatest return on investment.

In summary, the findings suggest that adolescents in Aotearoa, New Zealand may share similar risk factors to those in other countries; however, there may also be some unique differences. The present study demonstrates the need for more longitudinal research on bullying in the New Zealand context which would extend our understanding of the potentially causal factors underlying bullying victimisation. As a result, schools and policymakers would be more informed before employing interventions designed to reduce bullying behaviour.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Data availability statement

Data are available at <https://www.oecd.org/pisa/data/2018database/>.

Author contributions

Conceptualised the study: MB, AD; Analysed the data: MB, AD; Supervision: AD, MNW; Writing – Original Draft: MB, AD; Writing – Review & Editing: MB, AD, MNW.

ORCID

Michael Birchall  <http://orcid.org/0009-0004-2104-9353>

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