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Burden and preference-based quality of life associated with bullying in children

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Abstract

Objectives: To assess the association between childhood bullying and preference-based health related quality of life (QoL) in Australian school children and their parents and estimate quality adjusted life years (QALYs) associated with bullying chronicity.

Methods: Children aged 8-10 years completed the Child Health Utilities (CHU-9D) while parents completed the Australian Quality of Life (AQoL-8D). Children were grouped into four categories of bullying involvement (no bullying, victim, perpetrator or both perpetrator and victim) based on the Revised Olweus Bully/Victim Questionnaire. Parental data were compared across two bullying involvement groups (bullying vs. no bullying). QALYs were calculated for children over three-time points (baseline, one and two year follow up) and comparisons made based on the number of assessments where bullying was reported.

Results: Children who were involved in bullying (victims and/or perpetrators) reported statistically significantly lower mean utility scores compared to children who were not involved in bullying. Parents whose child was involved in bullying had significantly lower mean utility scores compared to parents of children not involved with bullying. There appeared to be a dose-response relationship, with higher QALY losses associated with increasing frequency of reported bullying.

Conclusions: Bullying among Australian school children was associated with significantly lower preference-based QoL for themselves and their parents. This study also confirmed the significant burden of disease for bullying among children measured by an incremental decrease in QALY with an increasing chronicity of bullying over time.

Key words: bullying, perpetrator, preference-based quality of life, quality-adjusted life years.

Introduction

Bullying among children and adolescents is recognised as a major public concern and a leading risk factor for mental disorders (measured by Disability Adjusted Life Years (DALYs)), according to the Global Burden of Disease (GBD) study 2017 [1]. The GBD study found that bullying victimisation of children and adolescents attending school contributed to 2.57 million DALYs that were evenly attributable to anxiety disorders and major depressive disorder globally [1]. There is strong evidence that being a victim of bullying is associated with higher risk for mental health problems including depression, anxiety, symptoms and diagnosis of post-traumatic stress disorder, poor general health and suicidal ideation [2, 3]. Furthermore, bullying victimisation in childhood can lead to fewer quality social relationships, economic hardship and poor perceived quality of life at age 50[4]. In terms of health care services, being a victim of bullying is associated with increased visits to a General Practitioner (GP) or mental health specialist[5]. In Australia, the total annual health and non-health cost due to victimisation bullying was estimated at A$764 million in 2016[6]. These costs were largely attributable to health care costs for anxiety disorders, depressive disorders, intentional self-harm and tobacco use[6]. Evidence showed that bullying victimisation has predicted changes over time in a range of serious problems (psychosis, psychosomatic problems, internalising problems including depression and poor self-esteem) and bullying perpetration predicts deterioration in drug use, criminal offending, and overall violent aggression [7-9]. Evidence indicated an association between peer support, connectedness to school, pro-victim attitudes, outcome expectancies and level of bullying involvement [10]. Although victimisation bullying might have higher prevalence than bullying perpetration , these forms of involvement in bullying have been associated with increased risk of psychological distress, emotional and behavioural problems, substance use, self-harm and attempted suicide [11]. None of the evidence distinguished

between bullying victims and perpetrators, and many did not evaluate the preference based quality of life for children who involved in bullying or their caregivers.

Economic evaluation has become an important tool to assist decision-makers in allocating health resources effectively to reduce the burden of disease. To quantify disease burden, the quality-adjusted life year (QALY) is commonly used as a generic measure combining a person's quality of life (morbidity) and quantity of life (mortality) [12]. The most commonly used and accepted method to inform the 'Q-component' of the QALY is to use preference-based quality of life (QoL) measures (most commonly generic measures but occasionally disease-specific). The preference-based QoL measures move the measurement of QoL from rankings to judgments of worth and value and are able to allow comparison of QoL scores across diseases as well as estimation of summary scores [12]. Preference-based QoL measures have two parts: (i) a descriptive classification system that consists of questions and response options, which enable respondents to describe their health related quality of life (HRQoL) in one of a finite number of health states; and (ii) a valuation system that is a method of scoring each health state defined by the descriptive system [12]. Each preference-based QoL measure has a scoring algorithm that calculates the weighted preferences for the domains of quality of life assessed in questionnaires that are commonly referred to as preference-based QoL scores or "utility weights" and are anchored on a scale from 0 to 1 where a value of 1 represents full health and 0 is equivalent to death [12]. The utility weight is then multiplied by the length of time the individual is in that particular health state to derive estimated QALYs [13]. Several studies have examined reductions in QALYs using preference-based quality of life (QoL) instruments for people with mental disorders such as major depressive disorders, anxiety disorders, and other mental disorders [14-16]. While QALYs have been used in economic evaluations of bullying prevention interventions [17], the estimation of the QALYs lost for children involved in bullying compared to those who have not been has not been investigated.

Previous research in young people from Sweden and the UK has found that bullying victimisation is associated with decrements in utility values of 0.06 points on the Short Form – 6 dimensions (SF-6D) and 0.108 on the Child Health Utility – 9 dimensions (CHU-9D) [18, 19]. Both these studies, however, were cross-sectional and could not assess the impact of bullying over time measured by QALYs or DALYs. Furthermore, they did not assess the impacts of bullying, in terms of utility losses separately for victims and perpetrators of bullying. The impact of bullying on primary caregivers (usually parents) was also not investigated.

This analysis aims to extend previous research on bullying and preference-based quality of life to Australian school children and their parents. Trial data collected as part of the Preventing Anxiety and Victimisation through education (PAVe) randomized controlled trial were used to:

1. Examine the association between bullying and children's and their parents' preference based QoL.
2. Quantify the burden of disease measured by QALYs due to bullying chronicity using two-year follow up trial data.

Method

Trial information

The PAVe trial was a cluster randomized controlled trial assessing the effectiveness and cost-effectiveness of the addition to usual practice of a whole of school approach to bullying prevention (known as the *Friendly Schools Plus program*), a targeted approach to victims of bullying (*Cool Kids: taking control program*) or a concurrent combination of both programs compared to a waitlist control group, in reducing peer victimisation. The trial provided comprehensive data on bullying perpetration and victimisation, mental health, and HRQoL from a cohort of 8,822 year 3 and 4 students (aged 8-10 years) at baseline and two subsequent

time points over 2 years. The PAVe trial included 135 primary schools within the state government and non-government education systems of New South Wales and Western Australia. Schools ranged in approximate total school size from 102 to 1,011 students (mean[M]= 446.84, standard deviation [SD] = 163.94) [20]. Full details of the sampling methodology are available in the published primary outcome article [20]. Data pertinent to the analysis examining the association between bullying and each child's and their parent's utility scores were collected at the trial baseline prior to allocation of schools to intervention or comparator groups between 2014 and 2015. Self-report trial data collected across three time points (baseline, one-year and two-year follow-up) were used to estimate the burden of bullying (measured by QALYs).

Ethical approval

Ethical approval was granted through the Macquarie University Human Research Ethics Committee (Reference number 5201300641), and the Deakin University Human Research Ethics Committee.

Preference-based QoL measures

Preference-based QoL (or utility scores) for children was measured using the Child Health Utility 9D (CHU-9D) that was completed by children. The CHU-9D was developed specifically as a paediatric preference-based measure and includes nine dimensions (i.e. worried, sad, pain, tired, annoyed, schoolwork, sleep, daily routine and ability to join in activities). Within each dimension, there are five different levels indicating increasing levels of severity (e.g. level 1 to 5). We used the scaling algorithm published by Ratcliffe et al (2016) that used a best-worse scaling technique in an Australian population of adolescents aged 11-17 years old [21]. Utility scores derived from this CHU-9D algorithm range from 1.00 (representing perfect health or best possible health on that questionnaire), to a negative score

of -0.1059 (representing the worst possible health state that has been valued as worse than-death).

Parents' preference based QoL was assessed using the Assessment of Quality of Life measure eight dimension (AQoL-8D) [22]. The AQoL-8D contains 35 items derived from a review of existing HRQoL instruments and uses a descriptive system developed within the framework of the World Health Organization's classification of impairments, disabilities and handicaps. The AQoL-8D includes eight domains of HRQoL (including independent living, happiness, mental health, coping, relationships, self-worth, pain, senses). The published scoring algorithm from Richardson et al (2014)[23] was used. This algorithm uses preference weights calculated with the time trade-off technique in a general Australian population sample. The algorithm produces utility scores ranging from 1.00 (best possible health) to -0.4 (representing the worst possible health state that was valued as being worse than death).

Quality-adjusted life years (QALYs) were calculated for students over the time horizon of the study using the area under the curve method [12]. The formula of this method is shown as:

$$QALY_{\text{each person}} = (U_{BL}+U_{12moths})/2 + (U_{12months}+U_{24months})/2$$

Where U_{BL} is preference-based QoL score at baseline, $U_{12months}$ is preference-based QoL score at 12 months and $U_{24months}$ is preference-based QoL score at 24 months.

Other measures

The Revised Olweus Bully / Victim Questionnaire (OBVQ) includes 39 questions assessing physical, verbal, and relational bullying [24]. However, in this study, the shortened version with 13 questions was used to determine whether students were victims of bullying, the perpetrator of bullying or both the victim and perpetrator. In line with previous research [20, 25], the global score on the OBVQ was categorised as either no victimization (i.e. not victimized at all and victimized once or twice) in the previous school term or victimization (i.e.

victimized 3 or more times) while the global perpetration item from the OBVQ was used to assess bullying perpetration, dichotomized as per the measure of victimization.

Demographic student data collected in this study included sex, age, school sector (government, Catholic or independent), ethnicity, of Aboriginal/ATSI descent and socio-economic background. Socio-educational background was assessed using the Index of Community Socio-Educational Advantage (ICSEA) which is calculated by *Student Factors* (parents' occupation and parents' education) and *School Factors* (geographical location and proportion of Indigenous students). The school with a lower than average ICSEA (i.e. 1000) indicates a lower level of educational advantage for students. For parents, demographic data of sex, age, parental employment, parental marital status, and parental education were collected. Assessments at each time point were conducted in each school using standardized procedures with teachers' supervision. Measures were mostly delivered online using the Qualtrics software platform and via paper surveys in 15% of schools due to lack of technological infrastructure[20].

Statistical analysis

Analyses were carried out in STATA 15 SE (Stata Corporation, College Station, TX, USA) and were adjusted for clustering at the school level where possible. All statistical tests were two tailed and considered only complete cases. To determine if there were differences between the participants with complete data and those lost to follow-up, analysis of demographic characteristics of these subgroups was undertaken. Those with missing follow-up data were found to be younger (8.97 [SD 0.72] vs. 9.04 [SD 0.71], $p=0.049$) and in a lower socio-educational level (79.7% vs 85.3% above average for schools in Australia, $p<0.001$), but there was no significant difference in terms of utility scores (0.74 [SD 0.22] vs 0.73 [SD 0.22], $p=0.09$) and bullying status (81% vs 80% no bullying, $p=0.06$) at baseline. Baseline

characteristics of children and their parents with complete preference-based QoL data at each time point are described.

The first objective of this research was to explore the relationship between bullying (victims and/or perpetrators of bullying) and both children's and parents' health utility. To begin this analysis, we assessed the differences in child utility scores between four groups of children: non-involved, only victims of bullying, only perpetrators of bullying and both victims and perpetrators of bullying at any time point. For parent utility scores, only two groups were created due to limited parent sample size (see below) and included parents of children who were not bullied compared to those of children who were victims and/or perpetrators of bullying. The utility scores are left-skewed because of the bounded nature of utility values (0 to 1) and there are typically few people with low utility scores. Therefore, the data were analysed using a generalized linear model (GLM) with and without covariates as recommended by the International Society for Pharmacoeconomics and Outcomes Research guidelines [26]. In the analysis of child utility scores, the covariates included age, child gender, school sector, ethnicity, and socio-economic background while covariates of age, gender, marital status and employment status were included for analysis of parental utility scores.

Longitudinal associations between bullying and utility scores over 2 years were examined using fixed effects models. In the fixed effects models, those time-invariant characteristics are unique to the individual and should not be correlated with other individual characteristics. A Hausman test was conducted to determine whether the error terms were correlated where the null hypothesis is that the preferred model is random effects vs. the fixed effects [27]. Models were specified including involvement in bullying as a binary variable. Thus, models estimated the mean differences (with 95% confidence intervals) in utility scores between children with and without involvement in bullying (classified at each time point so that this can vary over the period of two years). Interaction between change in bullying status and change in utility score

during follow-up would be included in the multivariable model if the interaction term was statistically significant.

Secondly, to estimate the burden of bullying, QALYs were calculated using the area under the curve method (as shown in the formula above) based on the data from baseline, one-year and two-year follow up for children only. Burden of bullying in parents was not conducted given only half of parents provided utility data at baseline. Furthermore, both bullying victimization and perpetration were collapsed. In this analysis, the children were classified into four different groups according to bullying chronicity: no involvement in bullying within the three time points, involved in bullying (either as a victim or as a perpetrator or both) at one time-point, involved in bullying at two time-points and involved in bullying at all three time-points. The differences in QALYs were determined using GLM with or without covariates as in the utility score analysis.

Results

There were 8,822 students from 135 schools who agreed to participate in the PAVe trial. From these, 8,216 (93%) completed the CHU-9D at baseline and 6,279 (71%) of children completed the CHU-9D at all three time points (Figure 1). Of 4,363 parents who agreed to participate in the trial, 2,128 (49%) completed the AQOL-8D at baseline. The demographic characteristics of both students and their parents at baseline are presented in Table 1. Eighteen percent of students reported they were victims of bullying and less than 1% reported being either a perpetrator or both a victim and perpetrator of bullying. Overall, 51% of students were females and 49% had an Australian background. The majority of students (85%) came from high socio-educational backgrounds. The vast majority of parents who completed the baseline questionnaire were female (87.4%) and married (92.3%).

Children's preference based utilities

Table 2 presents cross sectional associations between bullying and QoL. Unadjusted multivariable regression analysis showed that children who were involved in bullying as a victim or perpetrator or both reported significant lower utility scores across time points compared to children who were not involved in bullying ($p<0.001$). The difference in utility scores remained significant after controlling for other covariates including child gender, age, socio-educational, and ethnicity background at time point (Table 2).

[Insert Table 2]

Table 3 presents longitudinal associations between bullying and QoL. There was no reliable evidence of a 'bullying x time' interaction since the interaction term was not statistically significant ($p=0.099$). Therefore, we used a simpler model without the interaction term to test for a group and time effect on utility scores. Examining the longitudinal association between bullying and utility scores with bullying status as a binary predictor, and accounting for potential confounders, children were only victims of bullying or reported both bullying victimisation and perpetration experienced significantly lower utility scores than children without bullying. In particular, the mean differences of utility scores between victims or victims + perpetrators and no victims/perpetrators were -0.09, 95%CI: -0.10 to -0.08; and -0.09, 95% CI: -0.14 to -0.04), respectively (Table 3). There was no statistically significant difference in utility scores between those who were perpetrators of bullying and those who were not involved in bullying.

[Insert Table 3]

Burden of bullying in children (QALYs)

Table 4 presents the association between QALY loss (over the period of the study) and the stability of bullying from baseline to the 24-month follow-up period across children. There

appeared to be a dose-response relationship, with more stable reporting of victimisation and/or perpetration of bullying associated with lower mean QALYs. Children who reported being a victim or perpetrator of bullying at three time points had the lowest mean total QALYs (mean 1.11, 95% CI: 1.05 to 1.17 QALYs) equivalent to a 16% QALY loss compared to those who did not report being bullied at any time point (adjusted analysis). Children who reported being involved with bullying at one or two time points had mean total QALYs of 1.40 (95% CI: 1.38 to 1.42) and 1.21 (95% CI: 1.17 to 1.25), equivalent to 5% and 13% QALY loss per child compared to those who were not bullied, respectively.

[Insert Table 4]

Parents' preference based utilities

Parents with a child who was categorised as a victim and/or perpetrator of bullying reported mean utility scores of 0.78 (95%CI: 0.77 to 0.80) which was significantly lower than the mean utility score of 0.81 (95%CI: 0.81 to 0.82) for parents whose children were not involved in bullying at baseline ($p<0.001$, $F=13.04$, $df=134$). This result remained statistically significant after adjusting for covariates ($p<0.001$, $F=6.64$, $df=134$).

Discussion

Our study has uniquely contributed new findings to the literature investigating the impact of bullying on health related quality of life. Firstly, we found that children involved with bullying, regardless of whether they were victims and/or perpetrators, had significantly lower preference-based quality of life than those who did not report any involvement with bullying. The longitudinal association supported the significant impairment in utility scores due to bullying victimisation or the combination of bullying victimisation and perpetration. However, the association between bullying perpetration and utility scores needs to be interpreted in caution given the small sample size. Previous studies have indicated that perpetration (either

cyberbullying or school bullying) was not associated with school-related happiness and specific domains of life satisfaction [28, 29]. Previous evidence has consistently shown an impairment of QoL among youth due to bullying victimisation in cross-sectional analyses [18, 19, 30] however no studies have reported preference-based QoL by bullying victimisation and/or perpetration within a single study as well as using longitudinal analysis especially in young to middle-aged children.

Secondly, findings from this analysis also suggest that bullying was associated with significant burden of disease over the two-year follow up. Children involved with bullying had a 5% to 16% loss in QALYs depending on the stability of bullying (i.e. number of times they reported bullying) over the two years (or 0.035 to 0.1 QALYs lost per year). To our knowledge, this is the first time a QALY loss associated with bullying over a long-term time horizon has been estimated. It is noteworthy that the burden of bullying is likely to be underestimated given that the burden of bullying in parents was not included and that the loss of QALYs was only estimated within a two-year window. It is noteworthy that a 0.1 QALY loss is comparable to the mean QALY loss for a traumatic brain injury treated in the emergency department or being admitted to hospital for an upper extremity fracture [31]. These findings indicate an urgent need for interventions to prevent both bullying victimisation and perpetration in school-aged children given the longer-term effects of bullying.

The decrement in CHU-9D utility scores between bullying victims and non-victims in our study was consistent with those reported in other two studies. In the study by Fantaguzzi et al. [18], adolescents aged 11-12 years who were bullied reported utility decrements ranging from 0.08 to 0.23 as measured with the CHU9D and using the Australian scoring algorithm [18]. Furthermore, it is important to consider that the method for identifying bullying victimisation differed across the two prior published studies and this study. Our study used the revised OBVQ while Fantaguzzi et al. 2018 [18] used the Gatehouse Bullying Scale, and the remaining

study utilised a self-report victimization index [19]. The different age groups of the target populations may be another explanation for the differences in utility scores among these studies. It is noteworthy that this is the first study to investigate preference based QoL in young to middle school-aged children where the impact of bullying on preference-based QoL is unclear.

This current study is the first to show that bullying was associated with poor preference-based QoL in parents of children who were involved in bullying. The decrement in utility scores in this study was equivalent to the decrement in utility scores of adults with mild substance use disorder compared to those without mental disorders or symptoms (0.04) [32]. Parents together with school, community, media are important to reduce experiences of bullying or to reduce harm from bullying. For example, parents can teach children social skills and ways to deal with the bullying and also that they do not blame and are encouraged to seek help in dealing with the bullying. There is a striking contrast between the robust statistical associations indicating that parenting can positively impact on bullying involvement, and parents' perplexity, uncertainty and even denial of their influence in bullying [33, 34].

Strengths and limitations

A strength of this analysis was the relatively large sample size of child participants. The use of reliable and valid measures of preference based QoL for both children and parents as well as the assessment and categorisation of bullying was an additional strength. Importantly, this is the first study to conduct longitudinal model analyses accounting for the correlation of repeated measures over time, and quantifying burden of disease due to bullying measured by loss of QALYs. Although the revised OBVQ is one of the few psychometrically valid and reliable measures of bullying and victimization, using a self-reported measure might be a limitation. It could be that using Olweus' definition up front inhibits students from labelling

their aggression as bullying as most know that bullying is not good behaviour. This implies the need for sensitivity analyses of utility values in economic evaluations. In addition, the short recall period (1 day) of the CHU-9D may limit its applicability as it may not be sufficiently sensitive to capture issues that irregularly affect respondents [18]. Furthermore, this study has not captured the full impact of cyberbullying on HRQoL given that children of this age are not legally able to access social media, potentially underestimating the burden associated with bullying. Other cofounders such as mental health disorders or disabilities were not taken into account in the analysis. Participants who completed follow-up were different to those lost at follow-up on some socio-demographics such as age and socioeconomic school status but not utility scores or bullying status at baseline. The low number of perpetrators found in this study may be a result of using self-reported bullying perpetration in this young age group. It was also not possible to implement a peer nomination measure of victimization since our public schools' ethics committee would not allow individual identification of children in this age group. In this study when parent identification was initiated by the school, the parent participation was poor (e.g. only half provided baseline data) [20]. This seems fairly typical for many studies which involved parents in school-based research [35]. Another limitation of the parental preference based utility data was that it relied on cross-sectional data, making it impossible to identify whether bullying was a cause or consequence of decrements in parental health-related QoL.

Conclusion

For Australian children aged 8-10 years, involvement in bullying, either as a victim or perpetrator, was associated with significantly lower preference-based health-related quality of life compared to children not reporting involvement in bullying. The preference-based quality of life of parents of children involved in bullying was also significantly lower than parents whose children were not involved in bullying. Furthermore, there appears to be a dose relationship for the stability of bullying over time and losses in QALYs. Those children

316 reporting bullying (victims and/or perpetrators) at all three assessment periods over 2 years had
317 substantively greater burden of disease compared to those who were not bullied or not
318 consistently bullied during this time. Given significance of the impact of bullying involvement
319 on childhood quality of life, there is an urgent call for greater efforts to focus on prevention of
320 bullying in early childhood.

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Conflict of interest.

The authors report no conflict of interest.

Ethical approval. Ethical approval was granted through the Macquarie University Human Research Ethics Committee (Reference number 5201300641), and the Deakin University Human Research Ethics Committee.

Informed consent. All participants included in the study were provided with details regarding the study and informed that return of the completed study implied their consent to participate in the study

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