Self-reported injury in Australian young adults: demographic and lifestyle predictors

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Abstract

Objectives: Injury is the major cause of mortality and morbidity among adolescents and young adults. This study examined the use of injury self-reports and various causes of injury among adolescents.

Methods: A cohort recruited in 2002 as a representative sample of students from the State of Victoria in south-east Australia was followed and resurveyed in young adulthood in 2010 (mean age 21.0) and 2012 (mean age 23.1) with 75% of the target sample retained (N=2,154, 55.8% female).

Results: Prior injuries were reported by 55.5% in 2010 and 54.6% in 2012, leaving 18% with continuing disability. Reported causes of injury in 2012 were sports (55.1%) and alcohol use (9.7%). Logistic regression revealed that injury in 2012 was predicted by rural school attendance in 2002 (Adjusted Odds Ratio [OR] 1.4 CI 1.1–1.7) and in 2010 by male gender (OR 2.2, CI 1.8–2.6), reported self-harm (OR 1.6 CI 1.1–2.2), and unemployment (OR 0.7, CI 0.5–1.0).

Conclusions: Self-reported injury among young adults is reliably reported, and suggests the need to further examine gender, rural communities and self-harm, and indicates modifiable contributors to injury.

Implications for public health: Modifiable contributors to injury prevention are revealed as work environment, sports participation and alcohol use.

Key words: injury, youth, rural, alcohol, self-report

Injury is the major cause of mortality and morbidity among adolescents and young adults. Around the world, the evidence regarding youth injury and mortality is clear; the causes of unintentional harm are preventable.[1-3] Youth are injured or killed due to a variety of reasons. A comparison of the World Health Organization (WHO) data from 45 Organisation for Economic Co-operation and Development and industrialised countries found that more than three-quarters of these countries had unintentional injury mortality rates higher than 20%.[4] It is also clear that injuries in children and young adults worldwide are the main cause of their disability[5,6] and mortality, with injury accounting for a considerable share of the burden of morbidity among this group.[7] Analyses by the Centers for Disease Control and Prevention indicate that the greater proportion of these arise from behavioural causes that are ameliorable to intervention.[8,9] It is therefore essential to monitor youth injury rates and examine causes with the aim to enhance prevention strategies.

Youth, gender, community demographic factors and socioeconomic factors have been found to be reliable predictors of injury. A large-scale study by Scheidt et al.[10] found each of these among 17,110 young people surveyed (1- to 17-years), around 27% had experienced injuries with boys being significantly more injured than girls. The results showed that younger children had the lowest rate of injury and serious injuries, while adolescents aged 14–17 years of age experienced the highest rate and more serious types of injuries. Almost one half (44%) of the injuries were reported in the home and about 19% at school. Socioeconomic status (SES) was associated with the extent of injuries such that a higher level of the mother's education, family income and health insurance were all related to lower reported injury rates.[10] The workplace is also associated with youth injuries, especially with young males.[11] However, in a large study of Canadian orthopaedic trauma, Arshi, et al.[12] found that as unemployment increased, the rate of injury reduced, although the effect only accounted for about 2% of variance. Finally, studies suggest that overall injury rates include an important component of self-inflicted injuries in the 15–29-year age group.[13]

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In the Australian context, demographic factors have also been found important correlates of injury. Based on hospital injury surveillance data in Victoria, Australia, Clapperton[14] found 8% of youth aged 15–24 years were treated in hospital for unintentional injury during 2011. Of these, 14,844 were admitted to hospital and 47,070 were Emergency Department (ED) presentations. The frequency of ED presentations in this age group increased by 23% over the period, 2000–2011. Males were over-represented, accounting for 69% of all hospital-treated injury cases. While these patterns are not replicated exactly over time, they have remained stable and generally consistent for many years.[15]

Low SES is associated with increased injury in Australia. Using a large-scale state-based collection capturing 80% of all deaths, hospitalisations and admissions, the Victorian Injury Surveillance Unit reported that compared to children of the highest socioeconomic bracket, children of low SES were 1.2 times more likely to be killed and 1.85 times more likely to experience an injury.[16] Hence, it may be concluded that children and youth from low SES and males experience elevated injuries.

One method to investigate injury risk factors is to have individuals self-report their injuries and to use longitudinal follow-up to identify antecedent risk factors. There has been little longitudinal research into self-reported injury in young adult population samples. There are few Australian studies that have examined the longitudinal reliability of young adult injury self-reports or their use in replicating demographic patterns observed in hospital injury surveillance studies. One study[17] reported that 70 community football players were able to accurately recall their injuries in 80% of occasions; in four instances, these were overstated due to changes in the way the study was conducted, but in 14 instances these were under-reported.

The aim of the present study was therefore to examine the prevalence of self-reported injury in a longitudinal sample of Australian young adults originally recruited to be representative of school students in Victoria. We examined factors at average age 21 as predictors of self-reported injury at average age 23. We hypothesised that self-reported injury rates would be higher than the 8% reported in the available hospital surveillance studies and would be prospectively predicted by male gender and employment status and self-harm.

Method

Participants

Participants were drawn from the International Youth Development Study (IYDS), a longitudinal study of problem and healthy behaviour in Washington State, United States (US) and the State of Victoria, Australia. Full details of recruitment and participation rates in the IYDS are described elsewhere.[18] In brief, a two-stage cluster sampling approach was used for school and student recruitment in 2002. In the first stage, within each state and grade level, public and private schools containing Grades 5, 7, or 9 were randomly selected using a probability proportionate to grade-level size sampling procedure.[19] In the second stage, one class at each grade level (Grade 5, 7, and 9) within each school was selected at random. Across the three age cohorts (Grade 5, 7 and 9) in Victoria, 3,926 students were eligible, of whom 2,884 (73.5%) consented and participated. In each state, the Grade 5 cohort was composed almost entirely of 10- and 11-year-olds, the Grade 7 cohort of 12- and 13-year-olds, and the Grade 9 cohort of 14- and 15-year-olds. This paper reports on 2,154 participants in the Victorian sample who completed surveys at two waves of post-secondary school (young adult) follow-up in 2010 and 2012. These data were not collected from the US sample in 2010 and 2012. Overall, 44% of the participants were male and the average age in 2010 was 20.99 years (SD = 1.67).

Measures

The self-reported measures of young adult injury (collected in 2010 and 2012) and demographic factors were contained within a modified version of the Communities that Care youth survey, used in the IYDS. The survey has acceptable psychometric properties in the US[20] and has been adapted for use in Australia.[21]

Injury: In both 2010 and 2012, respondents were asked: "Have you ever had a serious physical injury that required medical attention (e.g. bandaging, stitches, loss of a tooth, broken bones, or an amputation)?" The response options were: *No*; *Yes, but not in the past 12 months*; *Yes, once in the past 12 months*; and *Yes, more than once in the past 12 months*. Those participants reporting at least one prior injury event were then asked: "Was the injury (or injuries) related to any of the following? (choose all that apply): Alcohol use; Violence; Other drug use; Sport; or Other". The response options were *Yes/No*. Finally, respondents were asked: "Have you experienced any disability or ongoing medical problems because of the injury (or injuries)?" The response options were *Yes/No*.

Demographic factors: Respondents had previously provided information on gender. Metropolitan, regional, or rural living status was based on school location at the first survey in 2002 (based on the 2001 Australian National Census population residential density of their school neighbourhood).[18] Parents' responses to a telephone interview in 2002 were used to measure family income and parent education. These were averaged to calculate family SES. In the 2010 survey, respondents were asked to provide information on their gender, age, prior self-harm status, accommodation context (living with parents or with house-mates or friends relative to other contexts) and prior and current education and workforce status.

Procedure

Ethics approval was obtained from the Royal Children's Hospital Ethics in Human Research Committee in 2002 and from The University of Melbourne Human Ethics in Research Committee in 2010 and 2012. In 2002, approval was also sought from relevant educational authorities and permission to administer the 2002 survey was obtained from each school principal. In 2002, parents provided written consent for themselves and their children to participate in the study and children provided assent to complete each paper and pen survey. School-based surveys were group-administered within the students' classrooms and required approximately 50–60 minutes to complete. Students who were absent on the day of the survey were surveyed individually by trained personnel. Students received a small gift after the return of their consent forms. Parents completed a telephone interview in 2002 to report family demographic data. In 2010 and 2012, participants consented to the web-based survey and received a gift voucher upon completion of the survey.

Analyses

Data analyses were completed using Stata/IC for Windows 13.0 for all participants with complete data on all variables analysed. First, prevalence estimates including 95% confidence intervals were calculated. Next, unadjusted and fully adjusted logistic

regression analyses were completed to examine associations between earlier demographic factors (2002 urbanicity and family SES, as well as 2012 young adult demographic factors including level of education completed and whether participants were employed, studying, and living with their parents) and 2012 self-reported injury. All analyses adjusted for the clustering of students within the original school sampling unit in 2002.

Results

Rates of self-reported injury

Overall, 55.5% (*n*=1187; 95%CI 52.3-57.9) and 54.6% (*n*=1176; 95%CI 52.1-57.1%) reported one or more prior injury events in 2010 and 2012, respectively. For participants reporting injury in 2010, 64.4% (765) reported it had not been in the past 12 months, 22.7% (270) reported they had been injured once in the past 12 months, and 12.8% (152) had been injured more than once in the past 12 months. Similarly, of those reporting prior injury in 2012, 65.0% (764) reported it had not been in the past 12-months, 24.2% (285) reported they had been injured once in the past 12 months, and 10.8% (127) had been injured more than once in the past 12 months. Table 1 presents the rates of self-reported injury causes in 2010 and 2012 and the number reporting associated disability.

The most common cause of self-reported injury by participants in 2010 and 2012 was sport (more than 55%), followed by "other", and alcohol use was the nominated cause for approximately 10% of participants. More than 15% of participants reported an injury-related disability in 2010 and 2012.

Self-reported injury showed high stability across the two years examined. In an unadjusted logistic regression analysis, those self-reporting injury in 2010 had an above seven-fold likelihood of reporting injury in 2012 (Odds Ratio 7.7, (95%CI 6.4–9.4).

Predictors of self-reported injury

The results of unadjusted and fully adjusted logistic regression analyses are reported in Table 2. In the unadjusted analyses, demographic factors significantly associated with self-reported injury in 2012 were being male, attending school in a rural area in 2002, having completed a post-secondary school certificate or diploma, having been unemployed in the past year, and living with housemates. The results of the fully adjusted logistic regression analysis showed that being male remained the strongest predictor of self-reported injury. Other predictors of higher injury rates were attending school in a rural area in 2002 and in 2010 and engaging in self-harm. Having been unemployed in the past year (measured in 2010) reduced the likelihood of reporting an injury in 2012.

Discussion

In line with hypotheses, self-reported injury rates were higher than hospital surveillance rates and prospectively predicted for males, workers (rather than those unemployed) and prior self-harm. The strongest predictor of self-reported injury was male gender. This was true of both unadjusted and adjusted analyses. Having attended school in a rural community was also a strong prospective predictor of self-reported injury in both unadjusted and adjusted analyses. While we did not directly test employment status (employed, underemployed, etc), we did test unemployment as a predictor, and we found that it was associated with reduced odds of self-reported injury. Descriptive reporting by participants revealed approximately 10% of all self-reported injuries were associated with consumption of alcohol. Highlighting the importance of injury prevention, 18.0% reported their injuries were associated with disability.

We examined associations with socioeconomic (SES) disadvantage evaluated by unemployed status, by education, and by family SES. Of these, being unemployed predicted a *reduced* level of injury, contrary to Arshi et al.[12] This is unsurprising because young workers have been found to have a high rate of injuries,[11] and being unemployed

Table 1: Prevalence estimates with 95% CI of self-reported injury causes and associated disability in 2010 and 2012.

Reported injury causes	2010 n=1,187 injured % (95% CI)	2012 n=1,137 injured* % (95% CI)
Alcohol use	9.7 (7.9–11.6)	9.7 (8.1–11.2)
Violence	4.6 (3.3–5.9)	3.3 (2.2–4.5)
Other drug use	1.9 (1.1–2.8)	1.2 (0.6–1.9)
Sport	56.3 (53.3–59.3)	55.1 (52.1–58.2)
Other	37.6 (34.8–40.4)	39.5 (36.7–42.2)
Injury-related disability	15.3 (13.5–17.2)	18.0 (15.6–20.3)#

Note:

**1,137 participants are reported here for 2012 as 39 participants did not give data specifying injury cause as reported herein; # n=1,174.*

Table 2: Results of unadjusted and fully adjusted logistic regression analysis for 2012 self-reported injury (N=2,154).

Predictors	Unadjusted OR (95% CI)	Fully adjusted OR (95% CI)
2002 Predictors		
Family SES (higher values indicate higher SES)	1.1 (0.9–1.3)	1.1 (0.9–1.3)
School Location (Referent = Urban)		
Large or small town	1.3 (1.0–1.6)	1.2 (0.9–1.5)
Rural	1.4 (1.1–1.7)**	1.4 (1.1–1.7)*
2010 Predictors		
Age	1.1 (1.0–1.13)	1.1 (1.0–1.1)
Male gender	2.2 (1.8–2.7)***	2.2 (1.8–2.6)***
Did not complete Year 12	1.2 (0.9–1.5)	1.1 (0.9–1.4)
Post-secondary education (Referent = None)		
Post-secondary certificate or diploma	1.4 (1.1–1.9)*	1.2 (0.9–1.7)
Post-secondary degree or higher	0.8 (0.6–1.1)	0.7 (0.5–1.1)
Unemployed Past Year	0.7 (0.5–0.9)*	0.7 (0.5–1.0)
Currently Studying	0.9 (0.8–1.1)	1.0 (0.8–1.3)
Live with parents	0.9 (0.7–1.1)	1.0 (0.8–1.3)
Live with housemates or friends	1.3 (1.0–1.6)*	1.2 (0.9–1.5)
Self-harm	1.4 (1.0–2.0)	1.6 (1.1–2.2)*

Note:

** p < .05; ** p < .01; *** p < .001. OR >1 indicate the outcome (injury) is more likely to occur within the group than within the reference group (i.e., Male gender indicates the odds of males experiencing injury compared to females.*

reduced exposure to workplace injury causes in this sample. These findings suggest the importance of workplace injury prevention as Pek et al.[22] found that young workers' injuries could be reduced through workplace prevention strategies, such as clear statements by parents and educators of expected safety behaviours and injunctive statements of safety norms (i.e. what a young person is expected to do and not do). Other SES measures did not predict self-reported injury in the adjusted analyses. Finally, we did not directly evaluate the difference in proportion for self-reported injury compared to hospital surveillance rates for reasons detailed below.

The rate of self-reported injury among this group in their early twenties was apparently high. At average ages 21 and 23, 55% of respondents reported having had a previous injury event. Further, considering only those who reported an injury in the past 12 months, approximately 35% of all those surveyed revealed one or more injuries in that timeframe. In 2011, data for adolescents aged 15 to 24 years reveal that within Victoria, Australia, 61,914 individuals attended an Emergency Department (ED) or were admitted subsequent to an injury,[14] while in 2012/2013 this figure was approximately 58,522.[23] When linked to Australian Bureau of Statistics population data (ABS, 2015), this gives rates of approximately 8.1% and 7.5%, respectively, for youth aged 15 to 24 in Victoria. However, it is important to note that not all injuries are recorded in this data. Emergency Department (ED) presentations and hospital admissions are not all the medically treated injuries in Victoria. General Practitioners (GPs) also treat injuries. There are few studies available estimating the number of injuries medically treated by GPs, however, one such study[24] found that there are approximately 12 presentations to general practitioners (GPs) in Victoria for each hospital admission, meaning that approximately 23.2% and 17.1% of adolescents would have presented to GPs in 2011 and 2012/13, respectively. Summing the hospital and GP estimates, around 31% and 25% of adolescents aged 15–24 were treated for an injury in 2011 and 2012/13 respectively. The figures summating adolescent hospital admissions, ED presentations and GP presentations are closer to the 35% annual prevalence estimated by the present survey. Others have obtained similar estimates of medically treated injuries. The Australian Bureau of Statistics (ABS) national health survey found 25.2% of all individuals aged 18–24 reported an injury in the period preceding the survey.[25]

The present study found that family SES did not prospectively predict youth injury. Clapperton and Cassell[25] found that 15–24-year-olds in the lower three SES quintiles had markedly higher rates of injury admissions compared to those in the top one/two quintiles. Similarly, Stokes, Ashby and Clapperton[16] found that, for all age groups, those in the lower three quintiles had higher rates of injury, and that the disparity was greatest for children and youth aged 0–24 years. In addition to injury prevalence, SES has been associated with the severity of injuries with low SES being associated with higher levels of injury severity,[26-30] and higher rates of intentional injury.[31] Once injury cause is considered, a more complex picture arises. Falls have been found to decrease but motor vehicle injuries rise with increasing SES in Sweden among 15–19-year-old adolescents[32] and in Spain among 20–24-year-olds.[33] While motor vehicle injury is also found to increase with rising SES in Australia, fall injuries have also been found more common in the highest SES groups in Australia,[27] although earlier data found these were both more common in lower SES.[16] This variation across studies may suggest that SES is not a consistent predictor of injury.

Male gender was found to strongly predict injury, with males being more than twice as likely to be injured. This result concords with almost all published injury data where gender has been considered.[26,29,30,34] Moreover, males have been elsewhere reported to be more likely to undertake risky behaviours.[35] That adolescent males engage in more risky behaviours, leading to higher rates of injury, may in part relate to their higher alcohol consumption.[29,36]

Alcohol was self-reported to be involved in up to 10% of injuries in the present data. Alcohol use is frequently represented in many serious causes of injury including motor vehicle accidents,[37] drowning[6,38] and falls.[39] Other authors[40] have found that these associations may arise due to alcohol use increasing involvement in high-risk behaviours.

Strengths of the current study are the state-representative sample, longitudinal follow-up of a large young adult sample, and multivariate analysis of predictors. An important limitation was the failure to retain all participants into the longitudinal analysis. Previous IYDS analyses have suggested the retained young adult sample are a reasonable approximation of the state population.[41] A further limitation was the selective range of predictive measures examined and another was that we did not collect details of the severity and nature of the injuries reported. This means that our data cannot be easily compared to epidemiological data, as these usually exclude less severe injuries.

This paper is one of few to examine a self-report measure of youth injury. Our findings suggest the self-report measure has promise as a means of assessing injury, based on prospective associations that are congruent with prior research. Future studies can use this measure to investigate a wider range of predictors.

In summary, we did not find clear evidence that self-reported rates of injury prevalence are an underestimate of injury. However, this is only after considering GP presentations and ED presentations. The current study suggests the importance of examining: masculinity, rural communities, work environments, self-harm, sports participation and alcohol as potentially modifiable contributors to young adult injury. Further, the survey as used could be developed further to profile communities, given it extends the Communities That Care youth survey into young adulthood. This extension into young adulthood is particularly useful, given how intractable youth injury has proven to be in many domains.

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