



## Association of physical injury and mental health: Results from the national comorbidity survey- adolescent supplement



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### ABSTRACT

Nonfatal injury is common among adolescents in the U.S., but little is known about the bi-directional associations between injury and mental health. Utilizing a nationally representative sample of U.S. adolescents, we examined 1) associations between lifetime mental health history and subsequent injury; 2) concurrent associations between injury and mental health; and 3) associations between injury and subsequent mental disorders. Data were drawn from the National Comorbidity Survey Replication-Adolescent Supplement (NCS-A), a national survey of adolescents aged 13 through 17 years (N = 10,123). Twelve-month prevalence of nonfatal injury requiring medical attention was assessed along with lifetime, 12-month, and 30-day prevalence of DSM-IV depressive, anxiety, behavior, substance use, and bipolar disorders. We used Poisson regression to examine associations between 1) lifetime history of mental disorders and 12-month exposure to injury; 2) concurrent associations between 12-month exposure to injury and 12-month prevalence of mental disorders; and 3) 12-month exposure to injury and 30-day prevalence of mental disorders. A total of 11.6% of adolescents experienced an injury requiring medical attention in the year before the survey. Lifetime history of mental disorders was not associated with past-year injury. Behavior and bipolar disorders were concurrently associated with past-year injury. Past-year injury occurrence predicted increased risk for past-month anxiety disorders and decreased risk of past-month depressive disorders. Our findings reveal reciprocal associations between injury and mental disorders and highlight the need for systematic assessment, prevention, and treatment of mental disorders among injured youth.

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### 1. Introduction

Nonfatal injury accounts for 10–16% of all disability worldwide (Haagsma et al., 2016; Murray et al., 2013; World Health Organization, 2010) and is common among children and adolescents (Centers for Disease Control and Prevention (CDC) - National

Center for Injury Prevention and Control, 2014). In 2014 nonfatal injuries in children and adolescents accounted for over 8 million emergency department visits in the U.S. alone, with the highest rates among adolescents across both unintentional (i.e., struck, fall, overexertion) and intentional (i.e., assault) injuries (CDC - National Center for Injury Prevention and Centers for Disease Control and Prevention, 2014). Although substantial research has investigated physical disability outcomes post-injury (World Health Organization, 2013; World Health Organization, 2011), few studies have examined associations between a broad range of injury types and mental disorders in adolescents. The present study

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aimed to address this gap in the literature by examining the bi-directional associations between nonfatal injury and mental disorders in a nationally representative sample of U.S. adolescents.

Numerous studies have assessed the association between mental health and nonfatal traumatic injury requiring hospitalization in adult samples (Bryant, 2011; Schweininger et al., 2015; Wiseman et al., 2013; Zatzick et al., 2008, 2007). However, adolescents are at heightened risk for injury occurrence relative to children and adults and the majority of adolescent injuries require medical attention *without* the need for hospitalization (CDC - National Center for Injury Prevention and Control, 2014). Prior research examining associations between injury occurrence and youth mental disorders have typically focused on either a specific injury type or cause, such as traumatic brain injury (Mackelprang et al., 2014; Rivara et al., 2012) and motor vehicle crashes (Bryant et al., 2004; Williams et al., 2015), or a specific mental health outcome. Whether injury exposure, regardless of severity, contributes to mental disorder onset or exacerbation among adolescents warrants further attention.

Existing research among children and adolescents suggests that the associations between injury and mental disorders are bi-directional, although little research has examined a wide range of mental health outcomes as predictors and consequences of injury. Behavioral (Brehaut et al., 2003; Davidson, 1987; DiScala et al., 1998; Rowe et al., 2004) and substance use (Cho et al., 2007; Hingson et al., 2000; Mo et al., 2006) disorders are associated with increased risk of injury occurrence among children and adolescents; however, these conditions have infrequently been examined as post-injury outcomes in this age group (Rowe et al., 2007). Anxiety disorders and symptoms have been found to both increase (Rowe et al., 2007) and decrease (Jokela et al., 2009) risk for subsequent injury whereas depressive disorders and symptoms have been associated with increased risk for injury (Asbridge et al., 2014; Patten, 2010; Tiesman et al., 2006). With regard to consequences of injury, elevations in anxiety disorders and symptoms have been shown following injury and motor vehicle crashes (Bryant et al., 2004; Rowe et al., 2007); however, associations between injury occurrence and depressive disorders are inconsistent with some finding an association between injury and depression (Patten, 2010; Zatzick et al., 2006) and others findings no association (Rowe et al., 2007). While associations between injury and bipolar disorder have been rarely studied in adolescents, population-based studies of non-U.S. adults observed strong associations of bipolar disorder with rates of traumatic brain injury (Mortensen et al., 2003; Orlovskaya et al., 2014) and mortality due to both intentional and unintentional injury (Crump et al., 2013). Overall, no studies have investigated the bi-directional associations among a broad spectrum of both mental health disorders and injury exposures in a nationally representative sample of U.S. adolescents.

We examined the association of injury with mental disorders in the National Comorbidity Survey Replication Adolescent Supplement (NCS-A), a nationally representative sample of U.S. adolescents. The NCS-A dataset includes systematic assessments of mental disorder onset and persistence across the lifespan, which we used to understand the reciprocal associations between nonfatal injury and mental disorders. The objectives of this study were to examine: 1) associations between mental health history and subsequent risk for nonfatal injury; 2) concurrent associations between injury and mental health; and 3) associations between injury occurrence and presence of subsequent mental disorders. Given the high degree of diagnostic comorbidity within the NCS-A sample (Kessler et al., 2012b), we examined associations between nonfatal injury occurrence and comorbidity of mental health disorders across these three study aims. Finally, we conducted

sensitivity analyses adjusting for lifetime mental illness across all models examining the associations between injury and concurrent and subsequent risk for mental disorders.

## 2. Material and methods

### 2.1. Sample

The NCS-A was based on a national dual-frame household and school sample of adolescents aged 13 through 17 years, and is described in detail elsewhere (Kessler et al., 2009a; Kessler and Merikangas, 2004). Between February 2001 and January 2004, data were collected via in-person interviews with adolescents, and self-administered questionnaires (SAQs) given to one parent or guardian of each adolescent. Written informed adolescent assent was only obtained after consent was given by parents. Both adolescents and parents were paid \$50 for participation. Recruitment and consent procedures were approved by the Human Subjects Committees of Harvard Medical School and the University of Michigan.

The NCS-A household sample included adolescents recruited from households of adults who participated in the National Comorbidity Survey Replication (NCS-R), a survey of adult mental disorders (Kessler and Merikangas, 2004). A total of 879 school-attending adolescents participated in the household survey and an additional 9244 adolescents were recruited from a representative sample of schools in NCS-R sample areas (combined sample = 10,123). Although the proportion of initially selected schools that participated in the NCS-A was low (28.0%), replacement schools were matched to the original schools. No evidence of bias in estimates of either prevalence or correlates of mental disorders was found when household respondents from nonparticipating schools were compared to replacement school respondents (Kessler et al., 2009b). Among adolescent responders, 6483 parents completed the long form SAQ (approximately 1 h to complete).

The current report focused on the 10,123 adolescent responders for the majority of the analyses, including all analyses that examined associations between injury occurrence and depressive, anxiety, substance use, and bipolar disorders. We utilized the 6483 adolescent-parent pairs for whom data were available from both adolescent interviews and long-form SAQ when examining the association between injury and behavior disorders, because parent report has been shown to increase accuracy of behavioral disorder diagnostic classification (Johnston and Murray, 2003). Data from parent SAQs were utilized exclusively for behavior disorder diagnoses in the past 30 days because adolescent-reported behavior disorder data were not available for that timeframe.

Cases were weighted for variation in within-household probability of selection in the household sample. Cases were then weighted separately in the household and school samples for differential nonresponse based on available data about nonrespondents and for residual discrepancies between sample and population sociodemographic and geographic distributions. These weighting procedures are detailed elsewhere (Kessler et al., 2009b). The weighted sociodemographic distributions of the composite sample closely approximate those of the U.S. Census population (Kessler et al., 2009a).

### 2.2. Measures

**Mental Disorders.** Adolescents were administered a modified version of the Composite International Diagnostic Interview, a fully structured interview administered by trained lay interviewers that assesses DSM-IV disorders (Kessler et al., 2006; Merikangas et al., 2009). The present study included DSM-IV disorders across five

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