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## Adolescent Orofacial Injury: Association with Psychological Symptoms

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### Abstract

Ethnic minority youth living in urban areas experience disproportionately high rates of violent intentional injuries. This study investigates the association of violent intentional injuries with psychological distress and alcohol use among adolescents treated in trauma centers for facial injuries. Interviews were conducted with 67 adolescents treated at two urban trauma centers (predominantly male [86%], and minority [Latino, 72%; African American, 19%]). Adolescents reported experiencing several different types of accidental and assault-related injuries that required medical attention in the past six months. About half (53%) reported experiencing only unintentional injuries (e.g., car accidents, falls, sports injury); 23% experienced one type of intentional injury resulting from either fighting or being attacked; and 24% experienced two types of intentional injuries resulting from both fighting and being attacked. Measures of alcohol use and psychological distress were examined in relation to these three types of injuries. Overall, 30% of study participants reported they had been drinking alcohol at the time of injury. Compared to adolescents without intentional injuries, those who experienced a physical fight and/or attack had higher levels of alcohol problems, depression, paranoia and somatic symptoms, and were more likely to have family members with alcohol problems. There is a considerable need for adolescents with intentional assault-related injuries to be screened for alcohol and mental health problems, and to be referred for appropriate treatment interventions if they score at problem levels.

### Keywords

facial injury; adolescents; psychological distress; substance use behaviors

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Orofacial injury forms a distinct subset of injuries treated at urban trauma centers. The face is a common target for interpersonal violence and thus orofacial injury in vulnerable youths presenting to urban trauma centers is frequently considered an empirical marker of an individuals' propensity to risk taking behaviors. Young men have increasingly emerged as the main group presenting to hospitals with mandibular fractures, frequently occurring after alcohol involvement (Lee, 2008). In a retrospective study at one oral and maxillofacial surgery service over an 11-year period, males accounted for 88% of alcohol-related

fractures, with 59% in the 15 - 29 year age group; 76% of alcohol-related fractures were due to interpersonal violence (Lee & Snape, 2008). In a community sample of Brazilian adolescents, orofacial injury was associated with male sex, nonnuclear family, high paternal punishment, and poor school performance (Hall & Ofodile, 1991). Yet while orofacial injuries comprise a distinct subset of all injuries in adolescents, little is known about the antecedent risk factors for orofacial injury.

Although much of the research available on adolescent orofacial injury is focused on unintentional injury (e.g., sports injuries), there is growing interest in injuries attributable to violence, due to their disproportionate impact on vulnerable youth and the attendant morbidity and mortality. At one urban level 1 trauma center, 86% of youth reported physical violence, with the violence resulting in an injury requiring medical attention in 22% of the cases (Cunningham, Walton, Weber, & Maio, 2005). Risk factors associated with violent behaviors and victimization included depression, nonviolent delinquency, and community exposure to violence. Findings from a study by Pickett et al. (2006) suggest risk-taking plays a role in the etiology of injury, as adolescents with supportive home and school environments were less likely to engage in risk taking behavior and thus sustained fewer forms of some injuries; however, once an adolescent engages in multiple risk taking behavior, a supportive environment did not protect them from injury. Mattila et al. (2008) examined health behaviors related to alcohol and tobacco use, and found problem levels of these behaviors did not differ significantly for adolescents who experienced unintentional compared to intentional injury deaths. In contrast, another study found adolescents who experienced assault-related injuries were more likely to report using alcohol, tobacco, and other substances compared with those with unintentional injuries (Murphy et al., 2009).

This study examines adolescent injury and psychological distress within a conceptual framework in which contextual factors, (i.e., adolescent exposure to unintentional and intentional injuries), contribute to, maintain, or exacerbate problems of adolescent psychopathology, as described in Steinberg and Avenevoli (2000). Similar to the “diathesis-stress” model of the development of psychological dysfunction, this theory proposes contextual factors operate in the exacerbation of psychopathology, cast as problems of self-regulation in the face of high arousal, through strengthening already established biological pathways. For example, high-risk contexts, such as exposure to violence, provoke high levels of psychobiologic arousal and/or interfere with arousal regulation in the adolescent. In the absence of environmental intervention, individuals with mental health problems will, over time, be more likely to continue along this psychopathological trajectory, because the psychopathology influences the sorts of experiences the individual has, and these experiences tend to strengthen existing behavior (Steinberg & Avenevoli, 2000). It is further argued that exposure to multiple risk factors has cumulative effects, in that the probability of psychological distress increases as a function of the number, duration and severity of risk factors encountered until the level of risk becomes extremely high (Coie et al., 1993).

The use of alcohol has been closely linked with adolescent injury. Among 13 to 19 year olds admitted to a Level I Pediatric Trauma Center, 34% screened positive for alcohol or drugs on admission (Loiselle, Baker, Templeton, Schwartz, & Drott, 1993). Murphy et al. (2009) found that more than half (55%) of adolescents presenting at inner-city trauma centers had problem levels of substance use. Other studies confirm that a significant number of adolescents admitted for trauma have positive blood alcohol levels, ranging from 41% to 48% (Hicks, Morris, Bass, Holcomb, & Neblett, 1990; Rivara et al., 1992), with a surprising 49% of youth in one study having behavioral evidence of chronic alcohol abuse. Loiselle et al. (1993) found that recent use of alcohol was more common among adolescents treated for intentional injury than those treated for unintentional injury.

The purpose of this study was to investigate the association of alcohol use and psychological symptomatology with orofacial injury among adolescents in Los Angeles trauma centers. Specifically, we examined the types of injuries adolescents sustained, (i.e., physical assault, fighting or unintentional injury) in relation to levels of alcohol use and psychological distress.

## Method

### Participants

We conducted interviews with a sample of 67 adolescents aged 14 - 20 years who presented to two Level 1 trauma centers in Los Angeles County from July 2006 to March 2008. Inclusion criteria were: received emergency treatment for orofacial injury as verified by hospital records; under 21 years old at the time of treatment, but at least 14 years old; the injury occurred within the past 12 months; English or Spanish speaking; and provided consent (18 years or older) or assent (14 to 17 years). For patients under 18 years of age, a parent or legal guardian provided written permission for participation. Previous research indicates the period of major risk for substance use and violence is frequently initiated in high school (Saner & Ellickson, 1996) and is often completed by age 20 (Kandel & Logan, 1984), consequently, this age range was selected for the study. It is expected that the majority of respondents will be members of ethnic minority groups, as previous studies indicate few non-minority adolescent patients with orofacial and/or intentional or unintentional injuries presented in similar settings, regardless of whether they were enrolled in the research (Cheng et al., 2003; Glynn et al., 2003).

### Procedures

IRB-approved recruitment procedures and consents/assents were used at both recruitment sites. The interviews were conducted at Children's Hospital Los Angeles (CHLA) and Los Angeles County/University of Southern California Hospital (LAC/USC), and averaged one hour in length. On average, interviews were conducted 50.7 ( $SD = 64.4$ ) days after the injury date reported on the trauma center admission form. All enrolled subjects received \$35 for their participation. Clinic staff and study staff at the recruitment sites reviewed patient files, identified potentially eligible adolescents, and obtained verbal consent to contact potential participants. Potentially eligible patients were identified from the trauma log at LAC/USC, and the Current Procedural Terminology at CHLA, which recorded patient information at the time of the emergency department visit. Adolescents were screened for eligibility in person or by telephone. A total of 106 adolescents met eligibility criteria; 39 declined to participate ( $n = 31$  at LAC/USC and  $n = 8$  at CHLA) and 67 (63%) signed the assent/consent form and completed the face-to-face interview ( $n = 50$  at LAC/USC and  $n = 17$  at CHLA). Interviews were conducted by trained bilingual interviewers with prior interviewing experience.

### Measures

**Injury Type**—Although all of the adolescents were treated for orofacial injuries in the past 12 months, the Adolescent Injury Checklist (Jelalian et al., 1997) was used to assess circumstances related to a comprehensive list of injuries (e.g., physical fight, fall, motor vehicle accident, and sports injury) in the past six months. Circumstances such as whether medical attention was sought, and whether the adolescent was drinking alcohol at the time of the injury were examined. Cronbach's alpha for the 17 item-scale assessing injuries for which medical attention was sought was .92 in this sample. This paper focuses on two injury types for which medical treatment was needed: "being in a physical fight with someone" and "being physically attacked." The combination of these two injury items was used to construct a measure of intentional injuries reported in the past 6 months. Thus, a three-level

variable was created in which adolescents who experienced only unintentional injuries (e.g., accidents, sports injury) were compared to those who experienced one type of intentional injury resulting from either fighting or being attacked, and those who experienced two types of intentional injuries resulting from both fighting and being attacked.

**Alcohol Use**—The Alcohol Use Disorders Identification Test (AUDIT) (Babor, de la Fuente, Saunders, & Grant, 1989) was developed by the World Health Organization and designed to assess three related constructs related to alcohol use in the past year: alcohol consumption, drinking-related problems, and alcohol dependence. The AUDIT is widely used and has excellent reliability and validity as a screening instrument for use in medical settings to assess potentially hazardous drinking (Bohn, Babor, & Kranzler, 1995). Alpha for the current sample was .86.

**Brief Symptom Inventory**—The Brief Symptom Inventory (Derogatis, 1993) assesses nine primary symptom dimensions and 3 global indices of distress in the past week, and is written at a 6th grade reading level. Cronbach's alphas were computed for all subscales, of which seven ranged from .67 to .78: Obsessive Compulsive (.78), Depression (.74), Anxiety (.72), Hostility (.73), Somatization (.68), Paranoia (.67), and Psychoticism (.78). As such, these BSI subscales were included in the analysis. The remaining subscales were not included. The Global BSI scale had a Cronbach's alpha of .95.

**Demographic and background characteristics**—Respondents were asked to provide their age, race, ethnicity, country of origin, and whether they were in school, and if they were, what grade they were in. In addition, respondents were asked whether their parents/siblings (biological, adoptive, step) ever had alcohol problems.

## Data analysis

Data were analyzed using SPSS for Windows, Version 16.0. Descriptive statistics (frequencies, observed means, standard deviations) were conducted on demographic and injury variables. Cross tabulations (chi square tests) were used to examine demographic characteristics by adolescent injury type (unintentional injury, one type of intentional injury, or two types of intentional injury). Comparisons of means (one-way analyses of variance tests) were used to examine the association of adolescent injury type with demographics, alcohol use and mental health variables. If a significant finding was observed, Scheffe's tests of post hoc pairwise comparisons were completed to evaluate the nature of the between-group differences.

## Results

### Sample description

Patients were predominately male (86%), with an average age of 17.72 years ( $SD = 1.56$ ; range 14 - 20 years). The ethnic makeup of the participants was primarily Latino (72%) and the remainder primarily African-Americans (19%). Sixteen percent were born outside the United States. Thirty percent were currently employed and an additional 44% were seeking employment. Of those who were employed, 11% reported working full time (35 or more hrs. per week), and most were employed in unskilled or low-skill occupations such as shipping, stocking, movie theater work, babysitting, or furniture delivery. More than half of the adolescents (59%) experienced multiple types of injuries in the past six months (i.e., injuries due to several causes including fighting, accidents, participating in sports). On average, adolescents reported experiencing 2.4 ( $SD = 2.0$ ) different types of injuries, and 30% reported they had been drinking alcohol at the time of one or more of their injuries.

Almost half of the adolescent sample reported an intentional injury in the past 6 months that required medical attention. Accordingly, 53% of the study sample reported no intentional injuries that required medical attention, 23% experienced injuries from a physical fight or by being physically attacked that required medical treatment, and 24% of the study sample experienced injuries from both a physical fight and being physically attacked that required medical treatment. Background and sociodemographic characteristics of the sample by intentional injuries requiring medical attention are summarized in Table 1. Compared to adolescents without serious intentional injuries, those in the intentionally injured groups were less likely to be in school and were more likely to have a family member with an alcohol problem.

The association of mean AUDIT scores by injury group suggests there are group differences associated with type of injury ( $p = .026$ ). The unintentionally injured group has the lowest mean AUDIT score, the group with one intentional injury has the next lowest mean AUDIT score, and the group with two intentional injuries has the highest mean AUDIT score (Table 2). Post-hoc comparisons indicate the statistically significant finding was observed for the unintentionally injured group compared to the group with two-intentional injuries ( $p = .030$ ); no other statistically significant group differences were observed for AUDIT scores.

Mean BSI scores for the seven subscales by injury type indicate there is a statistically significant association between injury type and depression; mean depression scores were 0.24, 0.60 and 0.45 for those with unintentional injuries, one intentional injury, and two intentional injuries, respectively ( $p = .036$ , see Table 2). The group with one intentional injury had the highest mean depression score, although post-hoc comparisons of means show no statistically significant differences between the group with one and both types of intentional injuries. Post-hoc analyses further indicate that the group with one intentional injury has a significantly higher mean depression score than the group with unintentional injuries ( $p = .030$ ). Symptoms of paranoia were also associated with type of injury. Post-hoc comparisons show the groups with one intentional injury ( $p = .049$ ) and two intentional injuries ( $p = .030$ ) had significantly higher levels of paranoia than the unintentionally injured group. Similarly, symptoms of somatization differed among injury groups, with a post-hoc comparisons showing a significant difference for the group with two intentional injuries compared to the unintentionally injured group ( $p = .026$ ); differences between those with one and no intentional injuries was approaching significance ( $p = .101$ ).

## Discussion

Consistent with previous research indicating a high proportion of adolescents treated for interpersonal violence injuries reported having problems with alcohol use (41%; Zun & Rosen, 2003), our findings indicate that among adolescents treated in trauma centers for facial injuries, alcohol use is more problematic for those who experienced intentional/assault-related injuries as compared to those who had unintentional/accidental injuries. While it would be prudent to screen all adolescents being treated at emergency rooms for orofacial injury for alcohol use, and provide referrals for treatment if they score at problem levels of use, it may be particularly important to do so for youth with multiple assault-related injuries.

Results from this study also indicate that there is a relationship between psychological symptoms and intentional orofacial injury among adolescents. However, this relationship is somewhat complicated and difficult to interpret. The trauma of being seriously injured in a physical assault, whether victimized in a physical attack or possibly being equally culpable as in a physical fight, was associated with higher levels of depression, paranoia and somatic symptoms relative to those who experienced unintentional injuries. No differences were

observed between adolescents who experienced either or both types of assault, suggesting either of these injuries alone may contribute to elevated psychological distress. This may be due to the fact that adolescents who fight back (both type injuries) feel more in control, albeit depressed that they were a victim of violence, than those who are depressed primarily because they felt victimized and did not fight back. Further research is needed to better understand the circumstances surrounding assault-related injuries as they relate to adolescents' psychological well-being.

Similar to our findings, other studies have documented a relationship between adolescent injury, depression and substance use. For example, a study by Peltzer (2008) indicates the risk of injury (both intentional and unintentional (i.e., injuries from sports, motor vehicles, fighting) increased consistently and strongly with an increasing number of risk behaviors and mental health problems including loneliness, hunger, truancy, depression, drug use, and excessive drinking. Borowsky and Ireland (2004) identified factors that predict the occurrence of a fight-related injury that required medical attention in the National Longitudinal Study of Adolescent Health. They reported that among boys, illicit drug use was a predictor of injury, and girls who reported a high level of depressive symptoms were much more likely to report fight-related injury than non-depressed girls. Another study of psychosocial needs of young people who were victims of interpersonal violence reported that one of the top psychosocial needs was mental health services (Zun & Rosen, 2003).

Thus, the findings of this study are consistent with these previous studies, and all indicate that for adolescents who present for assault-related injury treatment at trauma centers, many could benefit not only from referral for alcohol treatment, but from mental health services counseling. This supports the model proposed by Steinberg and Avenevoli (2000), in that an appropriate environmental intervention may attenuate the psychopathologic trajectory and the cumulative effects of exposure to multiple risk factors including violence. However, such referrals may need to be for fairly intensive treatment, as pilot case management services provided to families through a violence prevention intervention initiated after an assault injury did not increase service utilization significantly or reduce risk factors for injury (Cheng, Wright, Markakis, Copeland-Linder, & Menvielle, 2008). The authors noted that more intensive prevention was needed to address youth involved in this type of situation. Similar to previous research (Schwab-Stone et al., 1999), our study findings carry implications for direct clinical work, suggesting the need for comprehensive assessment of the nature of the adolescent's injuries, violence exposure, and associated psychological and substance abuse symptoms. Interventions may be needed that focus on helping youth cope with feelings and fears aroused by exposure to violence.

There are a number of limitations to this study. First, the sample size is fairly restricted, both in size and to one geographical area of the country. The sample comprised primarily African American and Latino males, and may not generalize to other populations. Reliance on retrospective self-reported measures of injuries sustained in the past six months may have been affected by respondents' ability to remember and accurately report their injuries. In addition, due to the study design, no causal or temporal associations can be made regarding the association between psychopathology and injury. Although the intentionally injured group reported higher levels of depression, somaticism, and paranoia than the unintentionally injured group, psychopathology was measured post-injury and could accrue as a result of the injury or could be a trait characteristic of the intentionally injured group.

The study adds to existing literature by providing further information on the association of alcohol use and specific mental health problems with various types of intentional and unintentional injuries among ethnic-minority adolescents treated at urban trauma centers. Identifying factors that place youth at risk for serious injury and re-injury could set the stage

for development of proactive interventions that target underlying problem behaviors. Adolescents who sustain a violence-related injury are less likely to have follow-up advised at the time of their emergency department visit than are adolescents presenting with other complaints (Melzer-Lange, Lye, & Calhoun, 1998). There is a need to change this ongoing pattern, through recognizing that orofacial injury itself can be used as a marker to assist in identifying at-risk adolescents and serve as the basis for secondary prevention efforts. Organizations including the American Academy of Pediatrics (1999) are advocating that health professionals be involved proactively in the identification of these youth.

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**Table 1**  
**Adolescent demographic characteristics by injury type requiring medical attention**

	Unintentional injury only ( <i>n</i> = 35)	One type of intentional injury <sup><i>a</i></sup> ( <i>n</i> = 15)	Two types of intentional injuries <sup><i>b</i></sup> ( <i>n</i> = 16)	Test of significance
Sex (%)				$X^2(2) = 5.6; p = .060$
Male	77.1%	100.0%	93.8%	
Female	22.9%	0.0%	6.3%	
Ethnicity (%)				$X^2(6) = 8.2; p = .227$
Black	14.3%	26.7%	18.8%	
Latino, Mexican	60.0%	73.3%	50.0%	
Latino, Central/ South American	11.4%	0.0%	25.0%	
Other	14.3%	0.0%	6.3%	
Grade (%)				$X^2(6) = 14.7; p = .023$
10th	13.8%	8.3%	0.0%	
11th	34.5%	8.3%	6.3%	
12th	24.1%	16.7%	12.5%	
Not in school	27.6%	66.7%	81.3%	
Family member has/had alcohol problem (%)	17.1%	33.3%	56.3%	$X^2(2) = 8.0; p = .018$
Country of Birth (%)				$X^2(2) = 1.9; p = .390$
USA	82.9%	93.3%	75.0%	
Other	17.1%	6.7%	25.0%	
Mean (SD) age	17.3 (1.5)	18.1 (1.8)	18.3 (0.9)	$F(2,63) = 3.1; p = .053$

<sup>*a*</sup>Injured due to either fighting or was physically attacked.

<sup>*b*</sup>Injured due to fighting and was physically attacked.

**Table 2**  
**Alcohol use and BSI dimensions by injury type requiring medical attention**

AUDIT and BSI Dimensions	Unintentional injury only (n = 35)	One type of intentional injury <sup>a</sup> (n = 15)	Two types of intentional injuries <sup>b</sup> (n = 16)	F(df)	p <sup>c</sup>
	Mean (SD)				
AUDIT - Total	3.63 (4.44)	7.13 (7.53)	9.19 (9.10)	F(2, 63)=3.7	.026
BSI					
Obsessive-Compulsive	.65 (.72)	.79 (.78)	.81 (.49)	F(2, 63)=0.9	.663
Depression	.24 (.34)	.60 (.66)	.45 (.47)	F(2, 63)=3.6	.036
Anxiety	.49 (.52)	.56 (.59)	.51 (.56)	F(2, 63)=0.4	.938
Hostility	.51 (.51)	.75 (.73)	.81 (.60)	F(2, 63)=1.9	.170
Psychoticism	.26 (.50)	.64 (.81)	.45 (.56)	F(2, 63)=2.3	.119
Somatization	.40 (.41)	.71 (.67)	.76 (.58)	F(2, 63)=3.6	.037
Paranoia	.62 (.44)	1.13 (1.05)	1.09 (.75)	F(2, 63)=3.7	.023
Total	.45 (.35)	.70 (.61)	.70 (.46)	F(2, 63)=2.5	.102

<sup>a</sup>Injured due to either fighting or was physically attacked.

<sup>b</sup>Injured due to fighting and was physically attacked.

<sup>c</sup>Based on one-way ANOVA comparing mean values for AUDIT and BSI scores by injury group.