Adolescents at Risk: Depression, Low Academic Performance, Violence, and Alcohol Increase Bolivian Teenagers' Risk of Attempted Suicide

Kirk A. Dearden, DrPH, MPH; Natalie G. De La Cruz, CHES, BS; Benjamin T. Crookston, BS; M. Lelinneth B. Novilla, MD, MPH; Matthew Clark

All authors are affiliated with the Department of Health Science, Brigham Young University
Corresponding Author: Kirk A. Dearden, Department of Health Science, 229 C Richards Building, Brigham Young University, Provo, Utah, 84602; phone: (801) 422-1891; fax: (801) 422-0273; e-mail: kirk_dearden@byu.edu

Submitted April 6, 2005; Revised and Accepted June 2, 2005

Abstract

This paper describes the prevalence of depression and suicidal tendencies as well as risk factors for attempted suicide among students in Bolivia. Adolescents 13-18 years old (182 females, 394 males) from randomly selected schools in La Paz completed the Youth Risk Behavior Survey. Frequencies and logistic regression were used to identify factors—including academic performance, violence, and sex—associated with suicidal attempts. One fourth (26.9%) of females and one in ten males (8.9%) attempted suicide at least once. Depression was highly correlated with suicidal attempts. Additional risk factors for females included ethnicity, low academic performance, violence (including forced sex), and drinking. Females who experienced forced sex and who drank 20 or more days in their life were 20.1 (95% CI: 2.3, 178.7) and 37.3 (95% CI: 4.7, 297.2) times more likely respectively than females without these risks to attempt suicide. An additional risk factor for males included being threatened or injured with a weapon. For parents, school administrators, policy makers and program planners this study represents an important step toward identifying risk factors for attempted suicide and for developing prevention programs.

Key Words: suicide, adolescents, Bolivia, academic performance, violence

Introduction

Like many countries in Latin America, Bolivia experiences a double disease burden: a large percentage of the population—including women and children—suffer from a range of communicable diseases while those who survive infancy are at risk for a variety of health challenges associated with Westernizing economies (PAHO, 2000). Globally, adolescents are particularly vulnerable to substance abuse, depression, early and unprotected sexual relations, poor diets, and lack of exercise. Whether these patterns prevail in Bolivia is largely unknown because of the lack of well established national vital statistics, surveillance systems and research studies.

Suicide among adolescent populations is a leading public health priority, currently ranking among the five leading causes of mortality in all world regions. In South America, suicide and self-inflicted injuries are the third leading cause of death among individuals aged 15-29, with homicide/war/other intentional injuries and unintentional injuries ranking first and second, respectively (Blum & Nelson-MMari, 2004). Regionally, 18% of reported suicides are among persons 15-24 years of age (Weaver & Maddaleno, 1999). According to the Pan American Health Organization, Bolivian police recorded a total of 1,007 suicide deaths among all age groups in 1998 and only 391 deaths in 2000 (Health in the Americas, 2002). However, suicide deaths are most likely underreported, and such records offer no information as to the incidence of suicide attempts nor the prevalence of suicidal ideations in the country. It is likely that suicidal tendencies and attempts are much higher, particularly among adolescents.

Adolescent suicide remains a well-researched but poorly understood phenomenon. The obvious difficulty of studying adolescents who have successfully completed suicide, in combination with the low base rates of completed suicide, limit the information needed to draw conclusions about factors associated with suicide. Suicide ideation ("thoughts or wishes to be dead or to kill oneself") and suicide attempts ("self-inflicted behaviors intended to result in death") therefore must be studied as the most proximate links (Lewinsohn, Rohde & Seeley, 1996). The importance of studying such tendencies and behaviors for the prevention and treatment of adolescent suicide is apparent from studies that suggest a large majority of adolescents think about suicide before actually attempting it. Additionally, a previous attempt signifies the strongest documented risk factor for future suicide attempts as well as completion (Lewinsohn et al., 1996; Sofront, Dalgliesh & Kosky, 2005; Wild, Flisher & Lombard, 2004). Other identified risks for suicide include intrinsic factors and personality traits such as gender, sexuality, depression and other psychiatric conditions, and genetic predisposition, as well as stressful life events, abuse as a child, family dysfunction, interpersonal relationships and other environmental factors (Sofront et al., 2005). However, these risk factors are also present in the lives of many youth who do not attempt nor commit suicide and cannot fully predict or entirely account for suicidal ideations and behaviors.

Thoughts of suicide and death among adolescents are consistently associated with psychopathology and particularly with depression (Lewinsohn et al., 1996; Wild et al., 2004). A history of depression and current mood disorders have both been strongly correlated with suicide in each of eight psychological autopsy studies included in a review of completed suicides. Such studies documented depression, or affective illness, in 35-76% of adolescents (Brent, 1995). Depression is documented as second only to a previous suicide attempt as the strongest predictor of future suicidal tendencies (Sofront et al., 2005). In addition, adolescents who have made a former suicide attempt and are also depressed are more likely than their non-depressed counterparts to make an additional attempt at ending their own lives (Sofront et al. 2005).

Many studies have documented the fact that females are more predisposed to depression, suicidal thoughts and suicide attempts than are males. For example, roughly 1 in 10 adolescent females report engaging in some form of suicide attempt, while 1 in 25 adolescent males report doing the same (Lewinsohn et al., 1996; Sen, 2004; Wild et al., 2004). Males, however, are more likely to complete suicide, in part because they more frequently utilize firearms, hanging or other typically fatal techniques (Lewinsohn et al. 1996; Robbins, 1998; Sofront et al., 2005).

In addition to the gender of the individual, adolescent suicide also appears to be associated with academic performance and the school experience. Often, school grades and performance are linked with a student's feelings of confidence. Lack of success and low grades

have been shown to have an impact on the self-image of adolescents, increasing the possibility for suicidal thoughts and behaviors (Butler, Novy, Kagan & Gates, 1994; Robbins, 1998).

Though not as well documented, the possibility that adolescents with suicidal tendencies or depression are more likely than their non-suicidal peers to have been subjects of sexual and/or physical abuse is suggested (Sofront et al., 2005).

In addition to childhood sexual and physical abuse, other forms of childhood trauma also potentially contribute to increased tendency towards suicidal behaviors. There is some evidence to suggest that merely witnessing violence in the home or elsewhere contributes to an increased risk for suicidal behavior (Dube et al., 2001).

Use of alcohol, drugs and tobacco as well as other risky behaviors such as sexual activity have also been linked to increased suicidal behaviors among adolescents. Participation in any sexual activity or consumption of alcohol, illicit drugs or tobacco were found to significantly increase the odds of depression, suicidal thoughts and suicide attempts among adolescents compared to those who were not involved in the identified risk behaviors (Hallfors et al., 2004).

Finally, body image and attitudes may also have a relationship with adolescent suicidality. Orbach and colleagues (1995) found that suicidal adolescents expressed a significantly greater discrepancy between their perceived and ideal body features as well as significantly more negative feelings towards their bodies than did a comparison group of non-depressed, non-suicidal adolescents. The presence of negative body attitudes was particularly pronounced among females.

Bolivian youth represent a large segment of the population: more than half (50.3%) of the overall population is under the age of 20 (U.S. Census Bureau, 2004). Descriptive studies are needed to identify factors associated with risky behaviors, social problems, and morbidity and mortality and to guide interventions for adolescents. This study represents an important first step toward describing risky behaviors among adolescents in Bolivia and in formulating an appropriate programmatic response. In particular, it describes the prevalence of depression and suicidal tendencies among a group of adolescents aged 13-18 enrolled in public and private schools in La Paz and suggests topics for future research as well as programmatic implications. It is hypothesized that the following adolescents are at increased risk of attempted suicide: females; those with poor academic performance; those who engage in sexual activity; those with poor body image; and those who report feeling depressed, using alcohol and other illicit substances, and exposure to violence. Findings from this study are important not only within Bolivia but in Latin America as well, where there has been a dearth of information about suicide among adolescents.

Methods

This study is part of a larger research project designed to investigate risky behaviors and correlates using the Youth Risk Behavior Survey in Bolivia, the Ukraine and the Philippines.

Instrument

The Youth Risk Behavior Surveillance System (YRBSS) was developed in 1990 by the Division of Adolescent and School Health (DASH) of the United States Center for Disease Control and Prevention (CDC). As a component of the YRBSS, the Youth Risk Behavior Survey (YRBS) was developed for the purpose of analyzing and monitoring trends related to six priority areas of risk behavior among high-school aged youth (ages 13-18) that contribute substantially to leading causes of morbidity, mortality and social problems in the United States (Brener et al., 2004; Kolby, Kann & Collins, 1993). Priority areas were selected following an in-depth review of the leading causes of death, disability and social problems among young people and adults. Youth behaviors are important in the context of adult mortality and morbidity, as several of the behaviors contributing to high levels of significant chronic diseases (i.e. heart disease, cancer and stroke) later in life are often established during adolescence including smoking, an unhealthy diet, and inadequate physical activity. Identified priority areas for the YRBS therefore include: (1) behaviors that contribute to intentional and unintentional injuries, (2) drug and alcohol use, (3) sexual behaviors resulting in unintended pregnancies and sexually transmitted infections, including HIV, (4) tobacco use, (5) unhealthy dietary behaviors; and (6) low levels of physical activity, including levels of overweight (Kolby et al.,

1993). The school-based survey is administered biennially in the United States to representative samples of 9th-12th grade students (Brener et al., 2004).

Though designed as a national survey for the United States, modified versions of the YRBS have been successfully conducted in several geographical locations around the world, including Hong Kong (Lee, Tsang, Lee & To, 2001), Zimbabwe (Gwede et al., 2001), the Dominican Republic (Westhoff, McDermott & Holcomb, 1996), and Russia (McDermott et al., 1998; Westhoff, Klein, McDermott, Schmidt & Holcomb, 1996), among others. Reliability of the YRBS as an instrument relying on self-reported behaviors has been evaluated and affirmed, and evidence of question validity has also been demonstrated using modified data collection instruments (Brener, Collins, Kann, Warren & Williams, 1995; Brener et al., 2002; Gast, Sarvela, Caravella & McDermott, 1995).

In this study, the Youth Risk Behavior Survey (YRBS) was used to examine risk behaviors of youth aged 13-18 in District II of La Paz, Bolivia. There are three school districts in the city of La Paz, with District II representing the largest portion of schools when compared to the other two districts (194/441 public schools and 91/148 private schools). District II also has a larger percentage of students attending private schools, with 35.8% versus 16.8% and 20.3% in Districts I and III, respectively (República de Bolivia Ministerio de Educación, 2002). The study was limited to District II because our information and permission from the Director of the *Servicio Departamental de Educación* (SEDUCA) to administer the survey was restricted to this District.

The survey instrument consisted of 89 multiple-choice questions divided into six sections: (1) behaviors that contribute to intentional and unintentional injuries (2) drug and alcohol use (3) sexual behaviors resulting in unintended pregnancies (4) tobacco use (5) dietary behaviors, and (6) physical activity.

For the purposes of this study, the YRBS was translated into Spanish by the first author who is fluent in Spanish and verified by a professional bilingual translator. It was then modified to reflect local language. For example, an informal pilot test of the survey instrument among high school students in La Paz provided local brand names for cigarettes, chewing tobacco and illicit drugs. The pretest was also used to modify questions about age, academic grades in school, and ethnicity. Other sociodemographic questions included in this self-administered questionnaire included region of residence, grade in school, height, and weight. The entire questionnaire was backtranslated into English to ensure that the original meaning of each question remained. No problems were encountered when translating the questionnaire from English to Spanish or backtranslating the questionnaire.

Sample Selection and Data Collection

Numbers from 1-287 (the total number of schools located in District II of La Paz) were randomly generated, and corresponding schools were visited one by one to secure permission for administering the survey until at least 500 individuals had fully responded to the questionnaire. District II of La Paz includes the *Zona Sur* and the *Zona Central* of the city as well as several outlying sectors such as *Villa Copacabana*, *Villa San Antonio*, and *Alto Obrajes*. Though the *Zona Sur* and the *Zona Central* are often regarded as wealthier areas of the city, some of the outlying sectors included in District II are less so. Overall, the district represents a cross-section of social classes. Because the list provided by SEDUCA was outdated and included both public and private nursery, primary and secondary schools, a much larger number of schools than necessary was visited. From the randomly selected schools, all nursery schools were eliminated as well as most primary schools because their students did not meet the age criteria. Additionally, all schools surveyed with the exception of one were private schools: public school students were largely inaccessible because of a public school teachers' strike that began shortly after the initiation of the project and extended beyond the duration of data collection. Some schools were eliminated because they were no longer operating or could not be located. In one instance, the administrator of a selected school denied the investigators permission to administer the survey. While researchers randomly selected the schools, students within those schools were selected at the discretion of headmasters, resulting in a sample of 576 students aged 13-18 from 6 schools.

Each student signed an informed consent sheet which indicated that his/her participation in the study was completely voluntary and that his/her responses would remain anonymous. The consent form also stated that the student's grades would not be affected based on his/her decision to participate. Parental

consent was not obtained. Prior to initiation of the study, the Institutional Review Board at Brigham Young University in Provo, UT, USA, granted approval for the study. The director of SEDUCA granted universal access to all schools in District II of La Paz. Subsequent permission to administer the survey was granted by the administrators of participating schools.

Two undergraduate students from Brigham Young University who were fluent in Spanish administered the questionnaire to students during normal classroom hours. The two undergraduate students briefly explained the purpose of the survey and how it was to be completed (self-administered). Students taking part in the survey were informed that they had as much time as needed to complete the survey and that they could ask those administering the questionnaire about issues they had regarding the data collection instrument. Interviewers explained informed consent procedures and secured consent from all students before administering the questionnaire. All data collection procedures and informed consent were overseen by the first author.

Data Analysis

All data were entered into the computer using EpiInfo (version 6.0, Centers for Disease Control and Prevention, Atlanta, GA, USA) and analyzed using SAS statistical software (version 9.1, Cary, NC, USA). Statistical analyses described the characteristics of respondents and compared females and males for a range of suicidal tendencies as well as potential risk factors for attempted suicide. Percentages, Pearson chi-square tests and Fisher's Exact Test were used to compare females for a variety of risk factors and (separately) males for those same risk factors. Logistic regression analyses identified characteristics that were associated with suicidal tendencies for females, males and both sexes. Variables were retained or dropped from the model based on *p* values (<.1), the Wald statistic, estimated coefficients, and changes in the likelihood ratio test. Interaction terms were included, and all models were checked for overfitting. Odds ratios and 95% confidence intervals were calculated for retained variables.

Results

Table 1 provides information about the background characteristics of the 576 respondents. Of note, most individuals described themselves as either *mestizo*/indigenous or of dark complexion, mulatto or Afro-Bolivian. Males made up two-thirds of the sample.

Table 1. Characteristics of survey participants, Youth Risk Behavior Survey, La Paz, Bolivia, 2004

Characteristic	**n**	**%**
Age (years)	574	
13-14		26.0
15		20.0
16		27.4
17-18		26.7
Sex	576	
Female		31.6
Male		68.4
Ethnicity	541	
Mestizo/Indigenous		36.6
Dark complexion/ Mulatto/Afro-Bolivian		42.3
White		21.1
Academic Performance	563	
0-40 (low)		20.3
41-50		40.5
51-70 (high)		39.3

Suicidal tendencies differed considerably for females and males. Females were significantly more likely than males to report being sad or depressed for two or more weeks, to have seriously considered suicide, to have made plans to commit suicide and to have attempted suicide one or more times. More than one-third of females indicated they had seriously considered suicide and made plans for committing suicide. More than one-fourth of young women had actually attempted suicide (figure 1). Because of pronounced differences between females and males, all subsequent analyses were stratified by sex.

Risk factors for suicidal tendencies among adolescent females were numerous and included low academic performance, carrying a weapon, missing school because they felt unsafe, being threatened or injured with a weapon on school property, witnessing adults hurting others, being forced to have sex, depression, smoking, drinking, the use of marijuana, and sexual intercourse (Table 2). In all cases, females who

experienced such risks were more likely than females who did not experience the same risks to attempt suicide. In almost all cases, the more frequent the exposure to a given risk factor, the greater the likelihood that females had attempted suicide. For example, 72.3% of females who carried a weapon two or more days in the previous 30 days had attempted suicide compared to 55.6% of females carrying weapons once in the previous 30 days and 22.4% of females not carrying weapons. Fifty percent of females who had seen adults in their families hurt others at home two or more times in the previous year indicated they had ever attempted suicide, compared with 21.1% of females who had only witnessed one act of violence at home and 19.4% of females who had not seen adults in their family hurting others.

Risk factors for suicidal tendencies among adolescent males were not as numerous and included low academic performance, being threatened or injured with a weapon on school property, witnessing adults hurting others, being forced to have sex, depression, drinking, and sexual intercourse (Table 2).

As indicated in Table 2, females' risk for attempted suicide was greater than that of males for all measures of background characteristics, academic performance, violence, depression, substance abuse, sexual relations and body image. In most cases, differences were substantial. For example, 57.1% of females who drank alcohol 20 or more days in their life reported having attempted suicide one or more times. On the other hand, only 13.3% of males who indicated they drank alcohol 20 or more days reported attempting suicide.

Results from logistic regression analyses for females (Table 3) indicate that feeling sad or depressed for extended periods of time was the single greatest risk factor for attempted suicide, though 95% confidence intervals are wide owing to the small number of females who had attempted suicide. Additional risk factors associated with attempted suicide among females included ethnicity, academic performance, missing school because they felt unsafe, being forced to have sex, and drinking. For example, after adjusting for other variables, *mestizas* were 11.3 times (95% CI: 1.8, 73.3) more likely than whites to have attempted suicide. Females who had low academic performance were 6.0 times (95% CI: 1.1, 34.1) more likely than females with high academic performance to have attempted suicide. Females who had been forced to have sex were 20.1 times (95% CI: 2.3, 178.7) more likely to have attempted suicide than females who had not been forced to have sex and females who had had at least one alcoholic drink 20 or more days in their life were 37.3 times (95% CI: 4.7, 297.2) more likely to attempt suicide than females who had never had a drink.

After adjusting for the effects of other variables, there were fewer risk factors for males (Table 3). In particular, being threatened or injured on school property, being forced to have sex, experiencing sadness or depression, and consumption of alcohol were all associated with suicidal tendencies among males. It is interesting to note the small magnitude of effect of sadness and depression on suicidal attempts in males (OR: 4.6, 95% CI: 1.7, 12.2) relative to females.

When females and males were included in a single model, depression emerged as the single most important predictor of attempted suicide, though ethnicity and gender of the respondent—along with violence and substance abuse—were also correlated with suicidal attempts.

Discussion

Results from the Youth Risk Behavior Survey conducted in La Paz, Bolivia, indicate that depression was highly correlated with suicidal attempts among a sample of 13-18 year old students attending private schools. Risk factors for females attempting suicide were depression, ethnicity, academic performance, missing school because they felt unsafe, being forced to have sex, and drinking. Risk factors for males included depression, being threatened or injured on school property, being forced to have sex, and consumption of alcohol.

This study suffers from several limitations. Notably, data were collected at one point in time, making it difficult to draw conclusions about trends in the prevalence of suicidal attempts as well as changes in risk factors over time. Neither the selection of respondents within schools nor the identification of school districts was random. However, schools within District II of La Paz were selected randomly from a complete listing. This sample is also underrepresentative of females, in part, because school administrators were more likely to have interviewers administer the questionnaire among males. As with all self-administered surveys, there exists the possibility that students completing the questionnaire did not understand

certain questions. A review of experience while collecting data suggests that only a few students were not able to complete questionnaires. Results from data checking indicate that there were no questions that were consistently difficult for students to complete.

Results from this study mirror findings from previous research. For example, a history of depression has been strongly correlated with suicide in each of eight psychological autopsy studies included in a review of completed suicides (Brent, 1995). In fact, as Sofront and colleagues (Sofront et al., 2005) have noted, depression is documented as second only to a previous suicide attempt as the strongest predictor of future suicidal tendencies. Likewise, similar to findings from previous research, Bolivian female adolescents were more predisposed to depression, suicidal thoughts and suicide attempts than were males, though rates of suicide attempts among Bolivian females and males were higher than reported in some studies. For example, 26.9% of female adolescents surveyed in La Paz (compared with approximately 1 in 10 adolescent females reported elsewhere) made at least one attempt at suicide; rates for Bolivian males were also elevated (8.9% vs. approximately 4% reported elsewhere)(Lewinsohn et al., 1996; Sen B, 2004; Wild et al., 2004).

With respect to risk factors for suicidal attempts, several studies have documented the relationship between school performance and suicidality. Paluszny and colleagues (1991) found that among adolescents admitted to a pediatric ward, those who had attempted suicide were significantly more likely to report poor performance in school than individuals in a control group. Similarly, a study in Mexico reported low grades and an acknowledgement of poor school performance to be among the strongest sociodemographic descriptors of female students scoring high on measures of suicidal ideation (Gonzalez-Forteza et al., 1998). However, the pathway between low school performance and suicidal behaviors, as with many other variables implicated in adolescent suicide, is not always clear. Butler and colleagues (1994), for example, showed that adolescents with suicidal ideations had less motivation for schooling, less instructional mastery, and less confidence in their capacity to control their own school performance.

Results from the YRBS indicate that both females and males who were forced to have sex were at greater risk of attempting suicide. Similarly, a recent study among young adolescents in Australia revealed a strong relationship between sexual abuse and suicidality in both males and females. For males, a self-report of sexual abuse was found to be independently associated with suicidal ideation, suicide attempts and other forms of self-injury; while the effect among females was mediated by depression, feelings of hopelessness and family dysfunction. The same study found that males reporting high levels of current distress regarding their sexual abuse were ten times more likely than non-abused males to make suicidal threats and plans and fifteen times more likely to attempt suicide. Females with high levels of distress associated with sexual abuse had roughly three times the risk of suicidal thoughts and plans. More than half of the sexually abused males (55%) and nearly a third (29%) of the sexually abused females attempted suicide (Martin, Bergen, Richardson, Roeger & Allison, 2004). Similar findings have been reported elsewhere (Dube et al., 2001; Wiederman, Sansone & Sansone, 1998; Ystgaard, Hestetun, Loeb & Mehlum, 2004).

With respect to witnessing violence in the home, results from the YRBS indicate that both females and males who saw adults in their family hurting others at home were more likely to attempt suicide. Dube et al. (2001) found that individuals who had witnessed their mother being battered had a lifetime history of attempted suicide that was nearly three times greater than the risk among individuals who had not witnessed battering. However, it was also noted that such traumatic experiences rarely occurred in isolation. With each increase in the number of adverse experiences, the risk of lifetime attempted suicide, including suicide attempts during childhood or adolescence, increased dramatically. The authors also suggested that, for some, adverse childhood experiences lead to problems with substance abuse and depression, which may act as mediating forces for suicidal behaviors following traumatic childhood experiences (Berenson, Wiemann & McCombs, 2001; Dube et al., 2001). However, the results of several studies (Berenson, et al., 2001; Wiederman et al., 1998), suggest that if individuals only witnessed violence they were not more likely to attempt suicide; but if they personally experienced violence or physical or sexual abuse, they were more likely to make an attempt.

Results from the YRBS indicate a relationship between smoking, sex and attempted

suicide (as well as drinking among females). Other researchers have noted similar patterns in other settings. For example, after adjusting for sociodemographic characteristics and the presence of a mood or disruptive disorder, King et al. (2001) found a significant association between sexual activity, smoking and recent drunkenness and suicidal ideation or attempts. Additionally, a comparison of smoking versus non-smoking adolescents in an inpatient psychiatric facility revealed that those who were daily smokers had a significantly increased risk of suicide attempts and occasional or frequent self-mutilating behaviors (Makikyro et al., 2004). In a study of Canadian high school students, alcohol use was among the best individual predictors of suicidal ideation, while drug use was also found to have a significant association with suicidal thoughts, retaining its significance even after adjusting for the effects of depression (De Man & Leduc, 1995).

Findings from this research suggest exceptionally high rates of suicidal ideation and attempts among adolescents attending school in La Paz. Results from this research are not unlike findings from similar studies: females and males who attempt suicide suffer from poor academic performance, engage in a variety of risky behaviors (including carrying weapons to school, smoking, drinking, using marijuana, and having sex), and witness violence at home and at school. However, findings from this study are remarkable for a variety of reasons. First, this study represents one of the only efforts to document the prevalence of suicidal ideation and attempts among adolescents in Bolivia. Second, this study documents exceptionally high rates of suicidal ideation and attempts, especially among females. Third, and perhaps most importantly, this research identifies risk factors for attempted suicide among Bolivian youth. Findings from this study point to a variety of risk factors that were significantly associated with attempted suicide even after adjusting for the impact of depression. For parents, school administrators, policy makers and program planners, these findings represent an important first step in advocacy for youth, sensitization regarding depression and suicide, and programmatic efforts to strengthen the prevention of adolescent suicide. In particular, results reported here suggest a web of factors associated with attempted suicide, including depression, low academic performance, sexual abuse, the use of illicit substances, and violence (including witnessing violence at home). While it may be difficult to determine which students have been subjected to sexual abuse and violence in the home, it may be easier to identify adolescents who are at risk for attempted suicide through other means, including depression at home and at school, low academic performance and the use of illicit substances. Parents, teachers, and community and religious leaders should be trained to identify these early warning signs among adolescents and provide referral to appropriate professional services, including counseling and peer support groups. Additionally, the initial efforts of government and non-governmental organizations which target adolescents need to be strengthened through increased funding, additional pilot testing of innovative strategies and replication of successful interventions nationwide.

Future research—in Bolivia and elsewhere—should include longitudinal studies to determine changes in attempted suicide over time. In-depth qualitative research would help provide important details regarding adolescents' motivations for attempting suicide and could yield valuable insights into how some adolescents are able to avoid suicidal ideation while others are not able to do so. Perhaps most importantly, programmatic efforts to address suicide need to be accompanied by rigorous evaluation and operations research to identify which interventions are most successful in preventing suicide among adolescents.

Acknowledgements

The authors would like to acknowledge the assistance and participation of the *Servicio Departamental de Educación* (SEDUCA) as well as the administrators, teachers and students at participating schools in La Paz. We also extend our appreciation to Daniel Watt and Emily Bennett who collected the majority of the data for this study. Funding for this project was provided by Brigham Young University.

References

Berenson, A.B., Wiemann, C.M., & McCombs, S. (2001). Exposure to violence and associated health risk-behaviors among adolescent girls. *Archives of Pediatrics and Adolescent Medicine*, 155, 1238-1242.

Blum, R.W., & Nelson-Mari, K. (2004). The health of young people in a global context. *Journal of Adolescent Health*, 35(5), 402-418.

Brener, N.D., Collins, J.L., Kann, L., Warren, C.W., & Williams, B.I. (1995). Reliability of the Youth Risk Behavior Survey. *American Journal of Epidemiology*, 141(6), 575-580.

Brener, N.D., Kann, L., Kinchen, S.A., et al. (2004). Methodology of the Youth Risk Behavior Surveillance System. *Morbidity and Mortality Weekly Report*, 53(RR12), 1-13.

Brener, N.D., Kann, L., McManus, T., Kinchen, S.A., Sundberg, E.C., & Ross, J.G. (2002). Reliability of the 1999 Youth Risk Behavior Survey questionnaire. *Journal of Adolescent Health*, 31, 336-342.

Brent, D.A. (1995). Risk factors for adolescent suicide and suicidal behavior: mental and substance abuse disorders, family environmental factors, and life stress. *Suicide and Life-Threatening Behavior*, 25(Suppl), 52-63.

Butler, J.W., Novy, D., Kagan, M., & Gates, G. (1994). An investigation of differences in attitudes between suicidal and nonsuicidal student ideators. *Adolescence*, 29(115), 623-638.

De Man, A.F., & Leduc, C.P. (1995). Suicidal ideation in high school students: depression and other correlates. *Journal of Clinical Psychology*, 51(2), 173-181.

Dube, S.R., Anda, R.F., Felitti, V.J., Chapman, D.P., Williamson, D.F., & Giles, W.H. (2001). Childhood abuse, household dysfunction, and the risk of attempted suicide throughout the life span: Findings from the Adverse Childhood Experiences Study. *Journal of the American Medical Association*, 286(24), 3089-3096.

Gast, J., Sarvela, P.D., Caravella, T., & McDermott, R.J. (1995). Validation of the CDC's YRBS alcohol questions. *Health Values*, 19(2), 38-43.

Gonzalez-Forteza, C., Berenzon-Gorn, S., Tello-Granados, A.M., Facio-Flores, D., & Medina-Mora Icaza, M.E. (1998). Suicidal ideation and associated characteristics in adolescent women. Salud Pública de México, 40(5), 430-437.

Gwede, C.K., McDermott, R.J., Westhoff, W.W., et al. (2001). Health risk behavior of rural secondary school students in Zimbabwe. *Health Education and Behavior*, 28(5), 608-623.

Hallfors, D.D., Waller, M.W., Ford, C.A., Halpern, C.T., Brodish, P.H., & Iritani, B. (2004). Adolescent depression and suicide risk: Association with sex and drug behavior. *American Journal of Preventive Medicine*, 27(3), 224-231.

King, R.A., Schwab-Stone, M., Flisher, A.J., Greenwald, S., Kramer, R.A., Goodman, S.H., et al. (2001). Psychosocial and risk behavior correlates of youth suicide attempts and suicidal ideation. *Journal of the American Academy of Child and Adolescent Psychiatry*, 40(7), 837-846.

Kolby, L.J., Kann, L., & Collins, J.L. (1993). Overview of the Youth Risk Behavior Surveillance System. *Public Health Reports*, 108(Supp 1), 2-10.

Lee, A., Tsang, C.K.K., Lee, S., & To, C. (2001). A YRBS survey of youth risk behaviors at alternative high schools and mainstream high schools in Hong Kong. *Journal of School Health*, 71(9), 443-447.

Lewinsohn, P.M., Rohde, P., & Seeley, J.R. (1996). Adolescent suicidal ideation and attempts: Prevalence, risk factors, and clinical implications. *Clinical Psychology: Science and Practice*, 3(1), 25-46.

Makikyro, T.H., Hakko, H.H., Timonen, M.J., Lappalainen, J.A., Ilomaki, R.S., Marttunen, M.J., Laksy, K., & Rasanen, P.K. (2004). Smoking and suicidality among adolescent psychiatric patients. *Journal of Adolescent Health*, 34(3), 250-253.

Martin, G., Bergen, H.A., Richardson, A.S., Roeger, L., & Allison S. (2004). Sexual abuse and suicidality: gender differences in a large

community sample of adolescents. *Child Abuse and Neglect*, 28(5), 491-503.

McDermott, R.J., Klein, K., Westhoff, W.W., et al. (1998). Tobacco use by Muscovite youth attending school. *American Journal of Health Studies*, 14, 128-136.

Midyear Population, by Age and Sex. Bolivia, 2004. (2004). [Online] Available: www.census.gov/ipc/www/idbagg.html. Washington DC: United States Census Bureau, International Data Base [Producer and Distributor].

Orbach, I., Lotem-Peleg, M., & Kedem, P. (1995). Attitudes toward the body in suicidal, depressed and normal adolescents. *Suicide and Life-Threatening Behavior*, 25(2), 211-221.

Paluzsny, M., Davenport, C., & Kim, W.J. (1991). Suicides attempts and ideation: Adolescents evaluated on a pediatric ward. *Adolescence*, 26(101), 209-215.

Pan American Health Organization. (2000). Health situation analysis in the Americas, 1999-2000. *Epidemiological Bulletin*, 21(4),

Pan American Health Organization. (2002). Health in the Americas volume II. Washington, D.C.: Author.

República de Bolivia Ministerio de Educación. (2002). La educación en Bolivia, anexo 1: Lista de distritos educativos. La Paz, Bolivia: Author.

Robbins, P.R. (1998). Adolescent suicide. Jefferson, North Carolina: McFarland & Company, Inc.

Sen, B. (2004). Adolescent propensity for depressed mood and help-seeking: race and gender differences. *Journal of Mental Health Policy and Economics*, 7(3), 133-145.

Sofront, K., Dalgliesh, L., & Kosky, R. (2005). Out of options: A cognitive model of adolescent suicide and risk-taking. Cambridge, U.K.: Cambridge University Press.

Weaver, K., & Maddaleno, M. (1999). Youth violence in Latin America: Current situation and violence prevention strategies. *Pan American Journal of Public Health*, 5(4/5), 338-343.

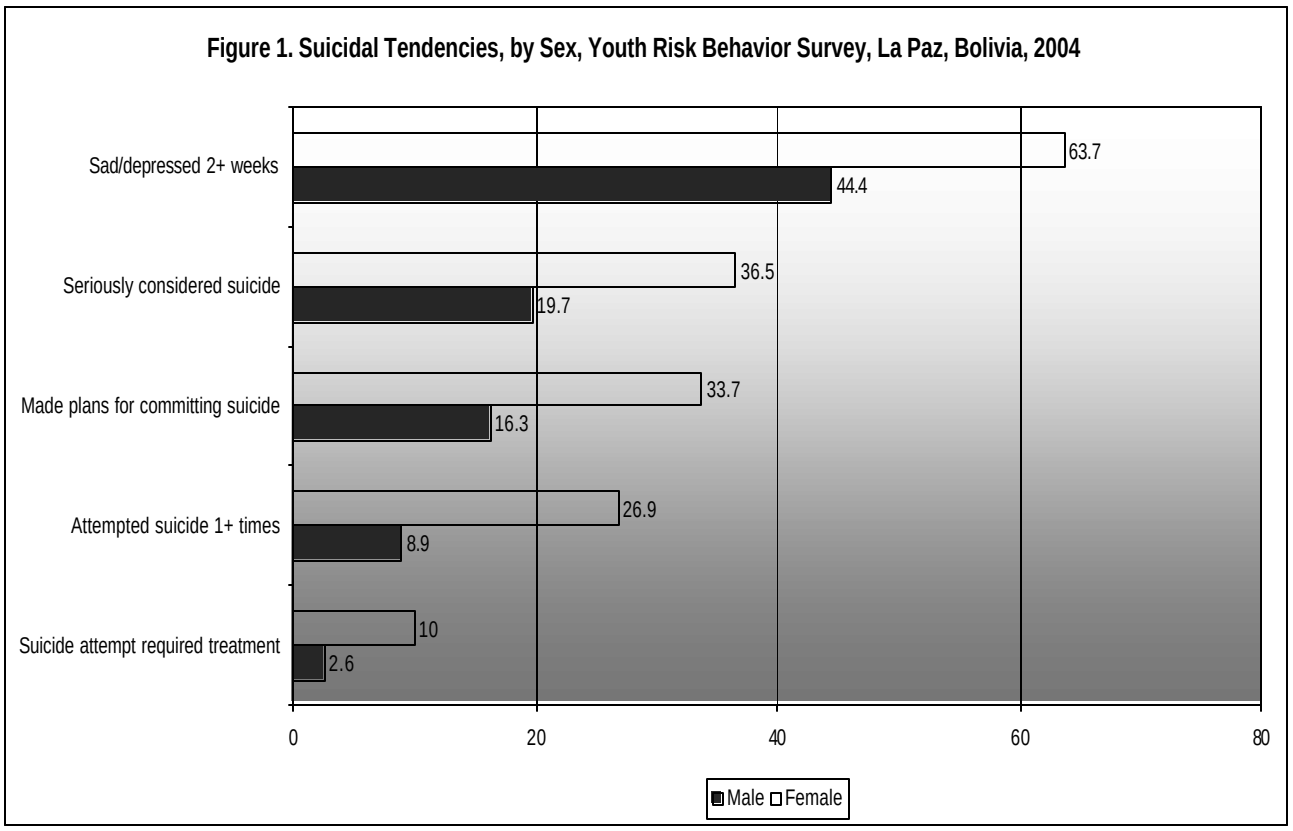
Westhoff, W.W., Klein, K., McDermott, R.J., Schmidt, W.D., & Holcomb, D.R. (1996). Sexual risk taking by Muscovite youth attending school. *Journal of School Health*, 66 (3), 102-105.

Westhoff, W.W., McDermott, R.J., & Holcomb, D.R. (1996). HIV risk behaviors: A comparison of U.S. Hispanic and Dominican Republic youth. *AIDS Education and Prevention*, 8(2), 106-114.

Wiederman, M.W., Sansone, R.A., & Sansone, L.A. (1998). History of trauma and attempted suicide among women in a primary care setting. *Violence and Victims*, 13(1), 3-9.

Wild, L.G., Flisher, J.A., & Lombard, C. (2004). Suicidal ideation and attempts in adolescents: associations with depression and six domains of self-esteem. *Journal of Adolescence*, 27(6), 611-624.

Ystgaard, M., Hestetun, I., Loeb, M., & Mehlum, L. (2004). Is there a specific relationship between childhood sexual and physical abuse and repeated suicidal behavior? *Child Abuse and Neglect*, 28(8), 863-875.



Note: All variables were self-reported for the past year. All comparisons between sexes are significant at $p<.0001$, by $?^2$.

Table 2. Risk Factors for Suicidal Tendencies, by Sex, Youth Risk Behavior Survey, La Paz, Bolivia, 2004

Characteristic	Female		Male	
	Attempted Suicide[a] (n=49) %	p value	Attempted Suicide[a] (n=35) %	p value
Sociodemographic Characteristics				
Age (years)		.6886		.0737
13-14	23.8		2.8	
15	20.7		11.8	
16	31.7		10.3	
17-18	26.5		11.7	
Ethnicity		.1174		.4389
Mestizo/Indigenous	32.8		12.0	
Dark complexion/Mulatto/Afro-Bolivian	27.9		8.1	
White	13.9		7.7	
Academic Performance		.0031		.0129
0-40 (low)	48.4		14.5	
41-50	28.2		11.4	
51-70 (high)	15.9		4.0	
Violence				
Days carried a weapon in the previous 30 days		.0002[b]		.4726[b]
0	22.4		8.0	
1	55.6		9.4	
2	72.3		13.6	
Days carried a weapon to school in the previous 30 days		.0009[c]		.2500[c]
0	23.5		8.3	
1 or more	66.7		14.0	
Days did not go to school in the previous 30 because he/she felt unsafe		<.0001		.3681[b]
0	17.4		8.2	
1	54.5		15.4	
2 or more	53.3		12.2	
Times threatened or injured with a weapon on school property		.0009[b]		<.0001[b]
0	23.2		5.2	
1	69.2		18.6	
2 or more	50.0		29.7	

Table 2. Risk Factors for Suicidal Tendencies, by Sex, Youth Risk Behavior Survey, La Paz, Bolivia, 2004 (continued)

Characteristic	Female		Male	
	Attempted Suicide[a] (n=49) %	p value	Attempted Suicide[a] (n=35) %	p value
Times in the past year, saw adults in family hurt others at home		.0005		.0024
0	19.4		6.7	
1	21.1		8.8	
2 or more	50.0		22.0	
Times in past year, saw adults hurt other adults in home		.7969		.0412[b]
0	26.6		7.3	
1	24.2		17.4	
2 or more	32.0		16.7	
Ever forced to have sex		.0008[c]		.0114[c]
Yes	69.2		26.1	
No	22.6		7.9	
Suicidal Tendencies				
In past year, sad/depressed 2+ weeks		<.0001		<.0001
Yes	40.5		15.5	
No	3.0		3.7	
In past year, seriously considered suicide		<.0001		<.0001
Yes	74.2		44.2	
No	0.0		0.0	
In past year, made plans for committing suicide		<.0001		<.0001
Yes	80.3		54.7	
No	0.0		0.0	
Substance Abuse				
Ever tried smoking		.0017		.0507
Yes	38.1		11.0	
No	17.4		5.1	
Days had at least one alcoholic drink		.0009		.0019
0 days	15.6		2.6	
1-2 days	29.4		11.1	
3-19 days	33.3		16.5	
20 or more days	57.1		13.3	

Table 2. Risk Factors for Suicidal Tendencies, by Sex, Youth Risk Behavior Survey, La Paz, Bolivia, 2004 (continued)

Characteristic	Female		Male	
	Attempted Suicide[a] (n=49) %	p value	Attempted Suicide[a] (n=35) %	p value
In the past 30 days, days had at least one alcoholic drink		.0003		.0387
0 days	18.4		6.7	
1-2 days	41.9		10.7	
3 or more days	52.0		17.0	
Ever used marijuana		.0045[c]		.2719[c]
Yes	60.0		13.0	
No	23.5		8.3	
Sexual Relations				
Ever had sex		.0031		.0008
Yes	48.4		16.0	
No	22.5		5.6	
Body Image				
Feels he/she weighs less/more than normal		.0933[b]		.8920[b]
Much less than normal	31.3		11.8	
Less than normal	38.9		6.7	
Normal	20.5		9.1	
More or much more than normal	39.4		9.4	

[a] One or more times in the previous year.
[b] Fisher's Exact Test not available.
[c] Cell value warning, used Fisher's Exact Test.
Note: p values compare categories of respondents of the same sex.

Table 3. Results of Logistic Regression, Factors Significantly Associated with Suicidal Tendencies, Youth Risk Behavior Survey, La Paz, Bolivia, 2004

	Female		Male		All	
Characteristic	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI
Sex						
Female	--	--	--	--	4.5	(2.2, 9.0)
Age	1.6	(1.0, 2.7)	1.0	(0.7, 1.4)	1.1	(0.9, 1.5)
Ethnicity						
White	1.0	--	1.0	--	1.0	--
Dark complexion/Mulatto/Afro-Bolivian	7.7	(1.3, 44.4)	1.5	(0.4, 5.5)	2.4	(0.9, 6.2)
Mestizo/Indigenous	11.3	(1.8, 73.3)	3.0	(0.9, 10.9)	4.1	(1.6, 10.7)
Academic Performance						
51-70 (high)	1.0	--	1.0	--	1.0	--
41-50	3.3	(0.7, 14.9)	3.2	(1.0, 10.0)	2.1	(0.9, 4.9)
0-40 (low)	6.0	(1.1, 34.1)	1.9	(0.6, 6.4)	2.0	(0.8, 4.9)
Violence						
Days did not go to school in the previous 30 because he/she felt unsafe						
0	1.0	--	1.0	--	1.0	--
1	14.7	(2.9, 74.9)	1.7	(0.4, 6.7)	3.5	(1.5, 8.4)
2 or more	3.0	(0.4, 20.4)	1.5	(0.4, 5.9)	1.6	(0.6, 4.3)
Times threatened or injured with a weapon on school property						
0	1.0	--	1.0	--	1.0	--
1	1.4	(0.1, 17.5)	7.8	(2.5, 24.7)	6.1	(2.2, 16.6)
2 or more	0.2	(0.0, 4.3)	6.3	(2.1, 18.5)	4.4	(1.6, 11.9)
Ever forced to have sex	20.1	(2.3, 178.7)	5.2	(1.4, 19.1)	5.6	(2.1, 15.4)
Suicidal Tendencies						
In past year, sad/depressed 2+ weeks	73.6	(5.5, 977.4)	4.6	(1.7, 12.2)	7.6	(3.2, 17.8)
Substance Abuse						
Days had at least one alcoholic drink						
0 days	1.0	--	1.0	--	1.0	--
1-2 days	2.4	(0.4, 12.6)	3.0	(0.8, 12.1)	2.8	(1.1, 7.0)
3-19 days	9.4	(1.4, 60.9)	4.2	(1.1, 16.6)	4.5	(1.7, 11.8)
20 or more days	37.3	(4.7, 297.2)	1.9	(0.4, 10.2)	4.2	(1.4, 12.4)