Published by Oxford University Press on behalf of the International Epidemiological Association
International Journal of Epidemiology 2009;38:459–469
doi:10.1093/ije/dyn166

Violence, psychological distress and the risk of suicidal behaviour in young people in India

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Accepted 21 July 2008

Background Suicide among young people has emerged as a major public health issue in many low- and middle-income (LAMI) countries. Suicidal behaviour including ideation and attempt are the most important predictors of completed suicide and offer critical points for intervention. The aim of this study is to estimate the prevalence and risk factors for suicidal behaviour in young people in India.

Method and findings Cross-sectional study of 3662 youth (16–24 years) from rural and urban communities in Goa, India. Suicidal behaviour during the recent 3 months and associated factors were assessed using a structured interview. Overall 144; 3.9% [95% confidence interval (CI) 3.3–4.6] youth reported any suicidal behaviour in the previous 3 months. Suicidal behaviour was found to be associated with female gender Odds ratio (OR) 6.5 (95% CI 3.9–10.8), not attending school or college OR 1.6 (95% CI, 1.01–2.6), independent decision making OR 2.5 (95% CI 1.5–4.3), premarital sex OR 3.2 (95% CI 1.6–6.3), physical abuse at home OR 3.3 (95% CI 1.8–6.1), life time experience of sexual abuse OR 3.3 (95% CI 1.8-6.0) and probable common mental disorders (CMD) OR 9.5 (95% CI 6.3–14.5). Gender segregated analysis found independent decision making ($P = 0.68$ for interaction), rural residence ($P = 0.01$ for interaction) and premarital sex ($P = 0.41$ for interaction) retained association with suicidal behaviour only among females ($P < 0.05$). The population attributable fraction estimates were largest for CMD (42.8% for females; 35.9% for males); physical abuse in one's home (12.5% for females; 12.4% for males); sexual abuse (12.1% in females; 22.3% in males); and making independent decisions (22.9% for females). Analyses of the risk factors for the relatively less common outcome of suicide attempts found a similar set of factors as for suicidal behaviour; in addition, alcohol use was also an independent risk factor.

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Conclusion Violence and psychological distress are independently associated with suicidal behaviour; factors associated with gender disadvantage—in particular for rural women, may increase their vulnerabilities. Prevention programs for youth suicide in India need to address both the structural determinants of gender disadvantage, and the individual experiences of violence and poor mental health.

Keywords Mental health, suicide, India, violence, gender, youth

Introduction

Global mortality data indicates suicide as the fourth leading cause of death among young males and the third for young females.[1] Reliable statistics on completed suicides are uncommon in many low- and middle-income (LAMI) countries including India. Official data from India demonstrates a 27.7% increase in recorded number of suicides between 1995 and 2005 with a current suicide rate of 10.5/1 000 000.[2] About 35% of suicides occur amongst youth (15–29 years).[3] Two recent studies from south India[4,5] using a verbal autopsy method show that official rates are likely to be gross underestimates of the true rates. One study, for example, reported a rate of 152/100 000 for girls and 69/100 000 for boys aged 15–19 years between 1992 and 2001.[5] Compared with the rates from high-income countries, these rates are about 50–70 times higher for girls and about four times higher for boys.[6,7] Thus, suicide among young people has emerged as a major public health issue in India.

Suicidal behaviours, including ideation and attempt are a harbinger of completed suicide.[8] Suicidal ideation refers to thoughts of harming or killing oneself and attempted suicide is a non-fatal, self-inflicted destructive act with explicit or inferred intent to die.[9] A cross-national study comparing suicidal behaviour among adults found life-time prevalence of suicidal ideation ranging from 2.1 to 18.5/100 while suicidal attempts ranged from 0.7 to 5.9/100 with lowest rates reported from Asian countries.[10] However, the completion rates of suicide attempts may be higher in India, and other Asian countries, due to the use of relatively lethal methods of self-harm, such as pesticides.[11] A recent study of completed suicide among youth in China that found 24% had attempted suicide previously.[12] Escalation of suicidal behaviour from ideation to first suicidal attempt occurs within 1 year of the onset of ideation in 60% of cases.[13] Thus, about one in every 50–200 suicide attempts among youth ultimately has a fatal outcome[14] and the most important correlate for youth suicide is prior suicidal behaviour.[15] Suicidal behaviour in adolescence is also a predictor of compromised functioning, indicating the need for early identification and intervention.[16–18]

Suicidal behaviours are influenced by a number of factors; identifying these factors and understanding their roles are essential for preventing suicides.[19] Studies employing community samples, mostly from high-income countries, have found mental illness as a major factor associated with suicide, though anecdotal reports suggest that they may be a less common cause of suicide in developing countries.[20] Family conflicts, social maladjustments, breakdown of intimate relationships and exam failure are some of the social factors associated with suicide in developing countries.[21] Indeed, the National Crime Record Bureau reports suggest that family problems is the major reason (22.6%) for suicide among 15–29 age groups in India, while mental illness is attributed to 5% of cases; reasons are recorded as unknown in 16% of completed suicides.[2] Adversities including physical violence, emotional and sexual abuse can lead to substantially higher risk for suicide.[21] Nevertheless, our knowledge of critical risk and protective factors associated with suicidal behaviour among young people in developing countries remain limited and this lack of information has hindered the development of evidence-based prevention programs. In this article, we report the findings on suicidal behaviour and associated factors from the largest community-based survey of young people from India.

Methods

Study design

This study was a cross-sectional survey of youth aged 16–24 years in rural and urban Goa, India.

Setting

The setting included two rural and urban communities in the southern district of the state of Goa, India. Goa is one of the smaller states in India with a population of about 1.4 million.[22] The two rural study communities lie in the catchment area of a primary health centre (PHC) and these communities consist mostly of population from the lower socioeconomic background engaged in farming. The two urban communities were located in the main commercial

city and comprise a cluster of wards. We selected four villages (total population 14 794) and 10 urban wards (total population 34 565) for the study. These four communities were chosen as the setting of an exploratory randomized controlled trial of community interventions to promote the health of young people; the trial began after the survey reported in this article, in which one of each pair of communities was randomly assigned to the intervention arm.

Participants

Our sample comprised all young persons aged 16–24 years residing in the selected clusters enumerated through a door-to-door survey. Recruitment took place between March and July 2006 by trained researchers through face-to-face structured interviews. Youth who had significant visual impairment, hearing disability, intellectual disability, those who did not consent, or who could not communicate in one of the three study languages (English, Konkani or Hindi) were excluded from the study. Five participants were excluded as they could not communicate in any of the three study languages. Awareness programs on the study were conducted in both rural and urban areas before recruitment.

Measurements

A structured interview schedule was developed based on previous research studies, notably a study on health needs of adolescents in schools;[23] a population-based study of mental health in young adolescents;[24] and a population-based cohort study of women's reproductive and mental health.[25,26] The interview schedule was piloted among 87 young persons from a comparable but different community to assess acceptability and clarity. The final interview was translated to Konkani and Hindi via a standard translation and back translation protocol and piloted. The interview schedule was structured in the following domains.

Socio-demographic and educational factors (Table 1)

Information on gender, age, area of residence (urban/rural), marital status, age at marriage and housing arrangements. We also included questions on factors associated with schooling, namely whether currently in school; performance in last major exam, number of days absent from school in the past 3 months.

Interpersonal relationships (Table 2)

Information on living arrangement (past 3 months); present relationship with parents including ease of communicating personal problems; problems related to studies, sexual issues; and independent decision making on important issues. We also asked questions on sexual relations before marriage, physical abuse by parents and physical abuse from teachers or peers in school during the past 3 months.

Sexual violence (Table 2)

Life-time experience of any form of sexual violence which includes the experience of another person talking inappropriately about sex, inappropriate touching or fondling one's sex organs, showing their sex organ and forcing sexual intercourse.

Substance abuse and psychological distress

Life-time and past 3 months' use of alcohol, tobacco and other illegal drugs was elicited. We screened for psychological distress using the GHQ12.[27] The GHQ is a well-established screening questionnaire for non-psychotic psychological distress[28]—and can be used to elicit a probable diagnosis of common mental disorder (CMD). The validity of the Konkani version of the GHQ has been demonstrated in earlier studies conducted in Goa.[29] A cut-off score of 5/6 on the GHQ has been shown to be having optimal sensitivity and specificity for detecting CMD in the primary care population in Goa.[30]

Suicidal behaviour

We asked three questions to elicit suicidal behaviour—whether seriously considered ending one's life; made a plan about ending one's life; or attempting suicide. The reference period for all three questions was the 3 months before the interview, and a positive response to at least one of the questions was considered as suicidal behaviour. We have used the term suicidal behaviour to include suicidal thoughts, plans and attempts.

Analysis

The primary outcome was a report of suicidal behaviours (suicidal ideation, plan or attempt) during the previous 3 months. The outcome was coded as a binary variable. Two composite variables were computed from independent variables included in the survey: *sexual abuse* was a variable derived for exposure to one or more life-time experience of sexual abuse, by combining these variables: the experience of another person talking inappropriately about sex, inappropriate touching or fondling one's sex organ, showing their sex organ, or forcing sexual intercourse. *Physical abuse in school* was computed by combining physical abuse in peers and teachers in school. The resultant variable was categorized into a binary variable—any experience of physical abuse in school in previous 3 months. Missing values were present for variables which were not applicable for some participants (for example, physical abuse in school for participants not in school)—these were treated as missing in analyses and the valid number of observations available for the analyses for each variable is presented in the tables. We also removed variables with less than 1% responses from the final analysis (e.g. any drug abuse in recent 3 months); all analysis were *a priori* adjusted for age, gender and area of residence. Multiple logistic regression was used to estimate odds ratio (OR) and 95%

Table 1 Socio-demographic and educational factors associated with suicidal behaviour during past 3 months in young adults (16–24 years) in Goa ($n = 3662$ unless otherwise specified)

Variable	Proportion of suicidal behaviour in the sample (%)	adj OR and 95% CI	adj OR and 95% CI (Males)	adj OR 95% (Females)
Gender				
Male	28/1780 (1.6)	1		
Female	116/1882 (6.2)	4.1 (2.7–6.3)*		
Area of Residence				
Urban	71/1859 (3.3)	1	1	1
Rural	73/1803 (4)	1.1 (0.7–1.5)	0.4 (0.2–0.9)*	1.3 (0.9–1.9)
Age (years)				
16–18	47/1490 (3.2)	1	1	1
19–21	48/1256 (3.8)	1.2 (0.8–1.8)	1.1 (0.5–2.8)	1.2 (0.8–2.0)
22–24	49/916 (5.4)	1.8 (1.2–2.7)*	1.8 (0.7–4.5)	1.7 (1.1–2.8)*
Married				
No	126/3419 (3.7)	1		1
Yes	18/243 (7.4)	1.2 (0.7–2.0)	–	1.2 (0.7–2.2)
Kind of house				
Own house	122/3192 (3.2)	1	1	1
Other	22/469 (4.7)	1.3 (0.8–2.2)	1.4 (0.5–3.7)	1.3 (0.7–2.2)
Currently studying				
Yes	43/1594 (2.7)	1	1	1
No	101/2068 (4.9)	1.6 (1.1–2.5)*	1.9 (0.8–4.6)	1.5 (0.9–2.4)
Performance in last major exam ($n = 1594$)				
Passed in all subjects	31/1254 (2.5)	1	1	1
Failed in 1 or more	11/334 (3.3)	1.4 (0.7–3.0)	0.4 (0.1–3.4)	1.9 (0.8–4.2)
Days of absence from school in past 3 months ($n = 1594$)				
0 day	8/563 (1.2)	1	1	1
1–3 days	7/364 (1.9)	1.4 (0.5–4.0)	0.7 (0.1–7.6)	1.8 (0.6–5.5)
4–6 days	10/254 (3.9)	3.0 (1.1–7.7)*	1.0 (0.1–10.8)	3.6 (1.2–10.6)*
7 days or more	18/349 (4.6)	5.1 (2.1–12)*	2.8 (0.5–15.0)	5.9 (2.2–16.1)*

*$P < 0.05$.

confidence intervals (CI). All models were adjusted for clustering of participants within households using generalized estimating equations (GEE). Analyses were performed with Stata version 9.0 for windows. We repeated the risk factor analyses as described above for the narrower outcome of suicidal attempts. *A priori* gender segregated analyses were carried out to explore whether different risk factors would be associated with suicidal behaviour among males and females. We carried out tests for interaction with factors which demonstrated gender-specific variation in our final multivariable model.

Our analyses were guided by a conceptual framework (Figure 1) postulating a hierarchical relationship between factors associated with suicidal behaviours in young persons. The conceptual model formed the basis for assessing the effect of various factors as direct or mediated or confounded by other factors. The model was developed on the basis of available literature from developing countries on the aetiology of suicidal behaviours and our clinical experience with youth in Goa. All factors associated with outcome at $P < 0.05$ or OR>2 or <0.5 from the socio-demographic and relationship domains were retained for further multivariable analyses. The factors were introduced one by one depending on the hierarchical relationship between risk factors postulated in our conceptual model (Figure 1). Thus we introduced variables from the socio-demographic domain which retained an association with the outcome, followed by interpersonal relationship in the previous 3 months and life-time experience of sexual violence. In the final step we added psychological distress and substance abuse. All variables

Table 2 Relationship factors associated with suicidal behaviour during past 3 months in young adults (16–24 years) in Goa

Variable	Proportion in the sample (%)	adj OR and 95% CI	adj OR and 95% CI (Males)	adj OR 95% (Females)
Live with whom in the last 3 months (*n* = 3651)				
With parents	119/3331 (3.6)	1	1	1
In marital home	14/176 (8.0)	1.2 (0.6–2.1)	–	1.1 (0.6–2.2)
Others	11/144 (7.6)	2.3 (1.2–4.4)*	1.6 (0.4–6.9)	2.5 (1.2–5.3)*
Easy to talk to parents about studies *(n* = 1570*)*				
Yes a lot	22/1011 (2.2)	1	1	1
Yes a little	12/353 (3.4)	1.4 (0.7–3.0)	0.7 (0.1–6.1)	1.6 (0.7–3.6)
No not at all	06/206 (2.9)	1.5 (0.6–3.7)	1.6 (0.3–8.5)	1.3 (0.4–4.1)
Easy to talk to parents about personal problems *(n* = 3559*)*				
Yes a lot	42/1624 (3.0)	1	1	1
Yes a little	40/1067 (3.8)	1.4 (0.9–2.2)	0.6 (0.2–2.1)	1.6 (1.0–2.7)*
No not at all	51/868 (5.9)	2.6 (1.7–4.0)*	1.5 (0.7–3.4)	3.0 (1.9–5.0)*
Easy to talk to parents about sex related issues *(n* = 3560*)*				
Yes a lot	19/535 (3.6)	1	1	1
Yes a little	18/486 (3.7)	0.9 (0.5–1.8)	–	1.1 (0.5–2.1)
No not at all	96/2539 (3.5)	1.7 (1.0–2.9)*	0.6 (0.2–2.1)	1.9 (1.1–3.3)*
Been able to make own decisions *(n* = 3661*)*				
Almost Never	30/1082 (2.8)	1	1	1
Almost Always	144/2579 (4.4)	1.9 (1.2–2.8)*	2.2 (0.7–7.5)	1.8 (1.1–2.8)*
Sexual relations-unmarried *(n* = 3419*)*				
No	107/3223 (3.3)	1	1	1
Yes	19/186 (10.2)	7.6 (4.1–13.8)*	4.9 (2.1–11.3)*	13.9 (5.7–33.9)*

*$P < 0.05$. ($n = 3662$ unless otherwise specified).

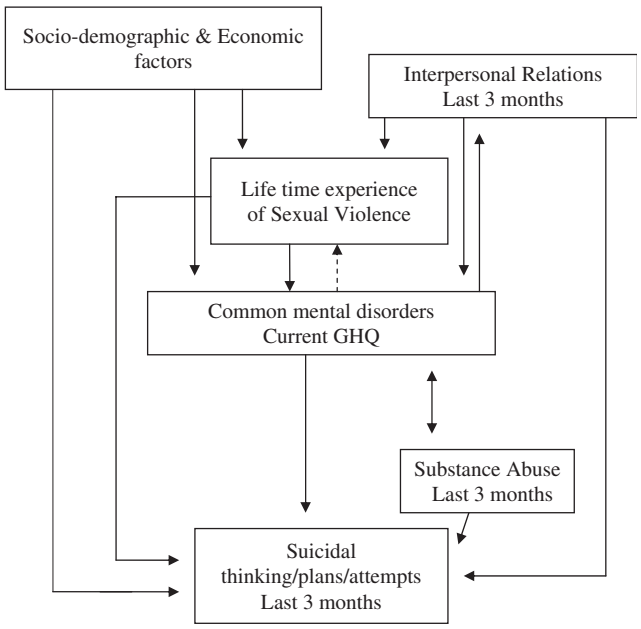

Figure 1 Conceptual framework for analyses of risk factors for suicidal behaviours

which retained an association with suicidal behaviour after adjustment for each other comprised the final multivariable model. We estimated the population attributable fraction (PAF) from the final multivariable model; we used the excess fraction model formula for estimating PAF.[31,32] Since we calculated PAF separately for different risk factors their sum is not constrained to 1 (100%).[33]

Ethical considerations

The project was approved by the Institutional Review Board of Sangath in Goa. All the participants received an introduction to the study, were given an information sheet with details and were then requested to join the study voluntarily. Consent declared voluntary participation and informed that the participants were free to withdraw from the interview at any point or not to answer questions that they do not feel comfortable with. Young people with suicidal behaviour were offered free consultations at Sangath's mental health clinic.

Results

We enumerated 1089 males and 955 females in the rural communities and 1208 males and 1223 females in the urban communities. Ten months later, when the survey began, we identified further 74 males and 114 females who had moved into the rural community, and 222 males and 127 females who had moved into the urban community. During the survey, 375 persons (149 males and 226 females) from the rural enumeration list and 774 (522 males and 252 females) from the urban enumeration list were not available for the interview. This was largely due to migrant communities which shifted residence after enumeration, young women who got married and moved out and those who left the area for work or study in the period between the enumeration and the survey. Of those who were available, refusal rate was 2.4% ($n = 53$) in rural and 5.2% ($n = 145$) in urban areas. More females (5.8%) refused than males (2.2%). Complete data was available for 1859 youth in urban and 1803 youth in rural area.

Sample characteristics

Participants ($n = 3662$) were evenly distributed between rural (49.2%) and urban settings with slightly more females ($n = 1882$; 51.4%) in the sample. The mean age of the participants was 19.4 years (SD 2.5 years), and less than half (male 44.7% and females 42.5%) were currently attending school or college. About 11% of females ($n = 205$) and 2% of males ($n = 38$) were married at the time of interview. Majority of the youngsters were living with parents or at the marital home; <1% of participants were living alone.

Prevalence of suicidal behaviour

Overall 144, that's 3.9% (95% CI 3.3–4.6) of young persons reported suicidal behaviour during the recent 3 months. Females were four times more likely ($n = 116$; 6.2%) to report suicidal behaviours compared with males ($n = 28$; 1.6%; OR 4.1, 95% CI 2.7–6.3). Eleven males (0.6%, 95% CI 0.3–1.1) and 48 females (2%, 95% CI 1.4–2.7) had made suicide plans while seven males (0.4%, 95% CI 0.16–0.8) and 19 females (1%, 95% CI 0.6–1.6) had made an attempt.

Association with socio-demographic factors

Univariate analysis of socio-demographic and educational factors (Table 1) found suicidal behaviours were associated with female gender, older age group, those who are not attending regular school or college and those who were absent from school for more than 4 days in the past 3 months. Gender-segregated analysis of these factors found older age group and absence from school were associated with suicidal behaviour only for females while males from rural area were less likely to report suicidal behaviours. Multivariable analysis of socio-demographic variables found female gender (OR 4.1, $P < 0.001$) and not attending school (OR 1.6, $P = 0.02$) were independently associated with suicidal behaviours.

Association with relationship factors

The following factors were associated with suicidal behaviours (Table 2): not living with parents, difficulty in talking to parents about personal problems and sexual issues, independent decision making, physical abuse at home and premarital sex. These factors were also found to have an association for females in gender segregated analysis; for males, only those who reported premarital sex were at increased risk. Multivariable analysis of relationship factors found difficulty in talking to parents about personal problems (OR 2.0, $P = 0.003$), independent decision making (OR 2.2, $P = 0.002$), physical abuse from parents (OR 5.3, $P < 0.001$) and premarital sex (OR 6.3, $P < 0.001$) were independent risk factors for suicidal behaviours.

Association with violence, substance abuse and mental illness

About 4.2% of the young persons and 5.2% of school/college goers faced physical abuse at home and school/college respectively during the past 3 months (Table 3). At least one life-time experience of sexual abuse was reported by 13% ($n = 481$) of young persons, while about 5% ($n = 180$) reported more than one episode. About of 7.8% young persons used tobacco at least once a week and 5.4% had used alcohol during the past 3 months. The GHQ cutoff criteria for probable diagnosis of a CMD was met by 7.9% ($n = 287$) of young persons. These factors were also found to have association with both males and females in gender segregated analsyis. Physical abuse at home (OR 5.3, $P < 0.001$), sexual abuse (OR 8.3, $P < 0.001$), use of alcohol (OR 2.6, $P < 0.001$) and a probable diagnosis of CMD (OR 13.8, $P < 0.001$) were independently associated with suicidal behaviour.

Final multivariable model

The final multivariable model (Table 4) identified a subset of factors which remained associated with suicidal behaviour after adjustment for all other factors. Female gender, independent decision making, not attending regular school or college, experience of premarital sex, life-time experience of sexual abuse, physical abuse from parents in the past 3 months, and probable CMD were found to be independent factors associated with suicidal behaviour in the recent 3 months. A gender-segregated multivariable model demonstrated higher risk for suicidal behaviour among both males and females who experienced sexual abuse, physical abuse in their homes or suffering from a probable CMD. In addition, the following factors showed an independent association only in females: living in rural areas (P-value for interaction 0.01);

Table 3 Violence and mental health factors associated with suicidal thinking/planning/attempts during past 3 months in young adults (16–24 years) in Goa

Variable	Proportion in the sample (%)	adj OR and 95% CI	adj OR and 95% CI (Males)	adj OR 95% (Females)
Physical abuse at home (3 months) ($n = 3661$)				
No	117/3501 (3.3)	1	1	1
Yes	27/155 (17.4)	7.0 (4.3–11.3)*	5.1 (1.8–14.4)*	7.1 (4.1–12.3)*
Physical abuse at school (3 months) ($n = 1559$)				
No	39/1476 (2.6)	1	1	1
Yes	04/84 (4.8)	2.8 (1.0–8.5)	3.5 (0.7–17.7)	2.4 (0.5–10.6)
Inappropriate talk about sex ($n = 3660$)				
No	105/3246 (3.2)	1	1	1
Yes	39/414 (8.4)	3.8 (2.5–5.8)*	4.1 (1.8–9.0)*	3.8 (2.3–6.1)*
Unwanted touching/fondling of sex organ ($n = 3659$)				
No	113/3421 (3.3)	1	1	1
Yes	31/238 (13)	5.2 (3.3–8.0)*	3.6 (1.4–9.1)*	5.9 (3.5–9.8)*
Showing sex organs ($n = 3660$)				
No	127/3486 (3.6)	1	1	1
Yes	17/174 (9.8)	3.3 (1.9–5.7)*	3.7 (1.4–10.2)*	3.4 (1.7–6.7)*
Forced to have sexual intercourse ($n = 3660$)				
No	124/3583 (3.5)	1	1	1
Yes	20/77 (26)	13.1 (7.3–23.5)*	7.8 (2.8–21.9)*	17.8 (8.4–37.7)*
Any experience of sexual abuse ($n = 3659$)				
Never	85/2998 (2.8)	1	1	1
Once	31/481 (6.4)	2.9 (1.9–4.5)*	2.1 (0.8–5.6)	3.2 (2.0–5.4)*
Two or more	28/180 (15.6)	8.3 (5.1–13.5)*	7.6 (3.1–18.7)*	9.0 (4.9–16.2)*
Alcohol use (3 month)				
No	118/3181 (3.7)	1	1	1
Yes	26/481 (5.4)	2.7 (1.7–4.4)*	1.8 (0.8–4.0)	3.7 (2.0–6.6)
Tobacco use (3 months)				
Never	129/3193 (4.0)	1	1	1
Less than once a week	2/128 (1.6)	0.5 (0.1–2.2)	1.1 (0.3–4.9)	0.3 (.01–6.4)
At least once a week	13/287 (4.5)	2.3 (1.2–4.2)*	2.8 (1.2–6.5)	1.6 (0.5–5.1)
CMD ($n = 3649$)				
GHQ-5 or less	77/3362 (2.3)	1	1	1
GHQ-Above 5	67/287 (23.3)	13.8 (9.5–19.9)*	9.4 (4.3–20.6)*	15.9 (10.3–24.4)*

*$P < 0.05$. ($n = 3662$ unless otherwise specified).

exposed to premarital sex (P-value for interaction 0.41); and taking independent decisions (P-value for interaction 0.68). The PAF estimates were computed on the basis of the final models. Gender-segregated estimates of PAF from the final model for females were as follows: CMD 42.8 (95% CI 40.1–44.5), physical abuse 12.5 (95% CI 6.8–15.4), sexual abuse 12.1 (95% CI 7.6–14.8), premarital sex 7.2 (95% CI 3.7–8.4) and making independent decisions 22.9 (95% CI 7.0–31.2). For males PAF estimates were CMD 35.9 (95% CI 28–39.3), physical abuse 12.4 (95% CI 1.6–16) and sexual abuse 22.3 (95% CI 13.3–25.8).

Analysis of factors associated with the specific outcome of attempted suicide during the past 3 months found the following variables as independent risk factors in the final multivariable model: female gender (OR 4.3; 95% CI 1.5–12.5); not staying in a house owned by the family (OR 4.8; 95% CI 1.7–14.1); physical abuse

Table 4 Final multivariable model-factors associated with suicidal behaviour among young people in Goa

Variable	Final model combined OR (95% CI), *P*	Final model males OR (95% CI), *P*	Final model females OR (95% CI), *P*
Area (Rural)	1.4 (1.0–2.3), 0.07	0.5 (0.2-1.2), 0.11	2.5 (1.5-4.1), 0.001
Age (years)			
16–18	1	1	1
18–21	0.9 (0.6–1.5), 0.67	1.4 (0.5–3.5), 0.52	1.0 (0.6–1.7)
22–24	1.0 (0.6–1.8), 0.87	1.6 (0.6–4.4), 0.33	1.4 (0.8–2.5), 0.82
Gender (female)	6.5 (3.9–10.8), 0.001	–	–
Taking independent decisions	2.5 (1.5–4.3), 0.001	–	2.2 (1.2–3.9), 0.01
Not currently studying	1.6 (1.01–2.6), 0.047		
Premarital sex	3.2 (1.6–6.3), 0.001	–	5.0 (1.7–14.7), 0.003
Experience of sexual abuse (life)			
Once	2.1 (1.3–3.5), 0.004	1.7 (0.6–4.6), 0.29	2.4 (1.3–4.4)
More than once	3.3 (1.8–6.0), <0.001	4.9 (1.9–12.7), 0.001	3.5 (1.8–7.7), <0.001
Physical abuse at home (3 months)	3.3 (1.8–6.1), <0.001	3.3 (1.1–9.8), 0.03	3.3 (1.6–6.9), 0.002
CMD			
GHQ>5	9.5 (6.3–14.5), <0.001	6.9 (3.0–15.4), <0.001	11.2 (6.8–18.5), <0.001

in one's home (OR 3.2, 95% CI 1.02–10.2); engaging in premarital sex (OR 6.2, 95% CI 1.8–20.7); psychological distress indicating a probable CMD (OR 10.0 95% CI 4.0–25.0); and alcohol use at least once a week (OR 4.7 95% CI 1.2–18.9).

Discussion

This is the largest population-based study of suicidal behaviour in young people in India. The even distribution of rural and urban participants reflects the population distribution of the Indian state in which this study was carried out.[34] We found that 3.9% of young persons reported suicidal behaviour in the past 3 months; about one in 100 young women attempted suicide in the previous 3 months. Apart from the higher risk for young women, violence-both physical and sexual, and psychological distress which suggests a probable diagnosis of CMD were independently associated with suicidal behaviour.

While there is paucity of comparable community-based studies on suicidal ideation and attempt from India, a study from Delhi has reported an annual prevalence of 11.9% suicidal ideation and 3.5% suicidal attempt among 12- to19-year-old school going adolescents.[35] Studies from other developing countries shows varying prevalence of suicidal ideation (18.4% Guyana;[36]17% Brazil;[37] 19.3% 6 months China[38]) among adolescents and rates of annual suicidal attempt ranging from 1% to 9% are reported from varying settings.[35,39–41] Although our findings from Goa are based on a shorter observation period, they are broadly comparable to these findings, and also similar to annual prevalence of suicidal ideation (16.9%) reported from the latest US Youth Risk Behavior surveillance[40] which surveys a slightly younger age group (12–21). A recent cross national survey comparing prevalence rates for suicidal ideation, plans and attempts among adults has reported that estimates in low- and middle-income countries are similar to those in high-income countries.[13]

Research on factors associated with suicidal behaviour provides the basis for developing preventive strategies. Trends for increased suicidal ideation and suicide attempts by females described in other studies[7,42] was replicated in our population; we found females six times more likely to have suicidal ideation or attempt compared with males. The higher rates of suicidal behaviour reported in our study from rural areas is consistent with previous findings from southeast Asian countries.[20] However, we found an interaction between gender and rural residence indicating that the higher risk was restricted to rural women. We also found suicidal behaviour in females was associated with independent decision making and premarital sex, but not for males. The vulnerability of young women may be heightened in rural communities and amongst those who pursue independent decisions and engage in premarital sex, as a consequence of the heightened risk of conflict within a traditionally patriarchal society. Thus, gender disadvantage experienced by women, and illustrated through these multiple indicators, is possibly a major social determinant of suicidal behaviour in young women. Social change has been shown to be a critical factor in explaining suicidal behaviours, for example in rural China.[20] It is plausible that, as Indian society witnesses rapid social and economic change,

gender-related factors may enhance stressful life experiences for young women and increase their risk for suicidal behaviours. Other research in Goa has shown that young girls who face discrimination by their parents, in comparison to their male siblings, were at greater risk to suffer a mental disorder.[24]

The association between physical violence, sexual abuse and suicidal behaviour in adolescents has been well established by a large body of research particularly in western studies.[8,43,44] We also found these associations to be strong for both males and females; the association with life-time experience of sexual abuse followed a dose–response pattern for episodes of sexual abuse as well as the severity (showing sex organs OR 3.3 95% CI 1.9–5.7; talking inappropriately about sex OR 3.8 95% CI 2.5–5.8; inappropriately touching/fondling private parts OR 5.2 95% CI 3.3–8.0; forceful sexual intercourse OR 13.1 95% CI 7.3–23.5). It is possible that the association between physical violence, sexual abuse and suicide behaviour is confounded or mediated by CMD. Moreover, findings from prior research[44–46] on whether sexual violence is an independent risk for suicidal behaviour have been mixed. In our stepwise logistic regression, the addition of CMD led to a decline in the strength of the association between physical and sexual violence with suicidal behaviours, but these factors retained an association with the outcome in the final model. This demonstrates a pathway mediated both through symptoms of CMD in addition to an independent pathway between violence and sexual abuse leading to suicidal behaviour.

Studies have suggested mental disorders as less important in suicidal behaviours in low- and middle-income countries compared with high-income countries.[20,47] However, we found psychological distress indicative of a probable CMD had the largest independent contribution to the risk of suicidal behaviour in young adults. A recent international study, employing similar assessment methods cross-nationally, has also found mental disorders are as important and predictive of suicidal behaviours in low- and middle-income countries as they are in high-income countries.[13] That study also reported that impulse-control disorders were stronger predictors than mood disorders in most low- and middle-income countries, in contrast to high-income countries. Secondary analyses of factors associated with the relatively less common outcome of attempted suicide showed that, in addition to the risk factors identified for suicidal behaviours, alcohol use was also an independent risk factor. Alcohol use, which has been found associated with suicidal behaviour in several studies from other countries,[48,49] dropped out as a risk factor from our final multivariable model for suicidal behaviours, but retained an independent association with suicide attempts. We found a low prevalence of alcohol use in our sample; this is similar to the findings of the only other recent survey from India,[50] which reported low prevalence of alcohol use among young people. Thus, the association of alcohol use with suicidal behaviour in our sample is largely attributable to its specific association with suicide attempts.

We acknowledge limitations of our study. Being a cross-sectional survey we are unable to assess the temporal nature of the factors leading to suicidal behaviour; however, our outcome was suicidal behaviour over the previous 3 months and we do not think reverse causality may be a significant source of explanation for most of the associations we report. On the other hand, our finding of a strong association of current psychological distress with suicidal behaviour; which suggests that they are at least co-morbid, does not necessarily imply that the former is a risk factor for suicidal behaviour. Suicidal behaviour is a sensitive issue prone to under-reporting; though we are unable to quantify the degree of under-reporting, our study design had anticipated this bias and taken several steps to minimize it. We followed a community-based participatory approach and the participants were well aware of the steps taken to ensure confidentiality and the options to skip questions or sections which they were not comfortable with and to discontinue from the interview at any point during the interview. The study provided information about a youth counselling centre, and encouraged help seeking for emotional problems at no cost to the participant. The organization which conducted the study, Sangath (www.sangath.com) is a community-based NGO with a long history of community engagement in mental health and is widely recognized in the study communities. The characteristics of the state of Goa (e.g. levels of literacy and urbanization) are reflective of the more developed states of India and our findings may not be representative of less developed states.

In conclusion, we report moderately high prevalence of suicidal behaviour in young people in our population in Goa, India. Our findings demonstrate the need for public health interventions for the prevention of suicidal behaviour in young people to address the structural determinants of gender disadvantage for women, violence and sexual abuse for both sexes, and the early recognition and treatment of CMDs and alcohol use in young people.

Acknowledgements

This study was part of the Yuva Mitr project aiming to promote the health of young people, supported by the John T and Catherine D MacArthur Foundation. V.P. is supported by the Wellcome Trust Senior Clinical Research Fellowship in Tropical Medicine. The authors express thanks to the Yuva Mitr project team for the data collection.

Conflict of interest: None declared.

References

[1] Wasserman D, Cheng Q, Jiang GX. Global suicide rates among young people aged 15-19. *World Psychiatry* 2005;**4:**114–20.

[2] National Crime Record Bureau. *Accidental Deaths and Suicides in India*. New Delhi: Ministry of Home Affairs, 2005.

[3] De Leo D. *The Interface of Schizophrenia, Culture and Suicide, Suicide Prevention – Meeting the Challenge Together*. Hyderabad, India: Orient Longman, 2003.

[4] Gajalakshmi V, Peto R. Suicide rates in rural Tamil Nadu, South India: verbal autopsy of 39 000 deaths in 1997-98. *Int J Epidemiol* 2007;**36:**203–7.

[5] Aaron R, Joseph A, Abraham S *et al*. Suicides in young people in rural southern India. *Lancet* 2004;**363:**1117–18.

[6] McClure GM. Suicide in children and adolescents in England and Wales 1970-1998. *Br J Psychiatry* 2001;**178:**469–74.

[7] Gould MS, Greenberg T, Velting DM, Shaffer D. Youth suicide risk and preventive interventions: a review of the past 10 years. *J Am Acad Child Adolesc Psychiatry* 2003;**42:**386–405.

[8] Bridge JA, Goldstein TR, Brent DA. Adolescent suicide and suicidal behavior. *J Child Psychol Psychiatry* 2006;**47:**372–94.

[9] Goldsmith SK, Pellmar TC, Kleinman AM, Bunney WE. *Reducing Suicide: A National Imperative*. Washington DC: National Academy Press, 2002.

[10] Weissman M, Bland RC, Canino GJ *et al*. Prevalence of suicide ideation and suicide attempts in nine countries. *Psychol Med* 1999;**29:**9–17.

[11] Eddleston M, Karalliedde L, Buckley N *et al*. Pesticide poisoning in the developing world-a minimum pesticides list. *Lancet* 2002;**360:**1163–67.

[12] Li XY, Phillips MR, Zhang YP, Xu D, Yang GH. Risk factors for suicide in China's youth: a case-control study. *Psychol Med* 2008;**38:**397–406.

[13] Nock MK, Borges G, Bromet EJ *et al*. Cross-national prevalence and risk factors for suicidal ideation, plans and attempts. *Br J Psychiatry* 2008;**192:**98–105.

[14] American Academy of Pediatrics. Committee on Adolescence. Teenage suicide. *Pediatrics* 1980;**66**:144–46.

[15] Grossman DC. Risk and prevention of youth suicide. *Pediatr Ann* 1992;**21:**448–9, 452–4.

[16] Kessler RC, Borges G, Walters EE. Prevalence of and risk factors for lifetime suicide attempts in the National Comorbidity Survey. *Arch Gen Psychiatry* 1999;**56:**617–26.

[17] Pfeffer CR, Klerman GL, Hurt SW, Kakuma T, Peskin JR, Siefker CA. Suicidal children grow up: rates and psychosocial risk factors for suicide attempts during follow-up. *J Am Acad Child Adolesc Psychiatry* 1993;**32:** 106–13.

[18] Reinherz HZ, Tanner JL, Berger SR, Beardslee WR, Fitzmaurice GM. Adolescent suicidal ideation as predictive of psychopathology, suicidal behavior, and compromised functioning at age 30. *Am J Psychiatry* 2006; **163:**1226–32.

[19] Krug EG, Mercy JA, Dahlberg LL, Zwi AB. The world report on violence and health. *Lancet* 2002;**360:**1083–88.

[20] Phillips MR, Liu H, Zhang Y. Suicide and social change in China. *Culture Med Psychiatry* 1999;**23:**25–50.

[21] Vijayakumar L, Nagaraj K, John S. *Suicide and Suicide Prevention in Developing Countries*, 2004;27, Working Paper 27. Disease Control Priorities Project, Fogerty International Center, National Institute of Health, Bethesda, MD.

[22] Government of India. *Census of India 2001*. New Delhi: Government of India, 2001.

[23] Patel V, Andrew G. Gender, sexual abuse & risk behaviours: a cross-sectional survey in schools in Goa. *Natl Med J India* 2001;**14:**263–67.

[24] Pillai A, Patel V, Cardozo P, Goodman R, Weiss H, Andrew G. Non-traditional life styles and the prevalence of mental disorders in young adolescents in a community in India. *Br J Psychiatry* 2008;**192:**45–51.

[25] Patel V, Pednekar S, Weiss H *et al*. Why do women complain of vaginal discharge? A population survey of infectious and pyschosocial risk factors in a South Asian community. *Int J Epidemiol* 2005;**34:**853–62.

[26] International Institute for Population Sciences & ORC Macro. *National Family Health Survey (NFHS-2), 1998–99. India*. Mumbai, India, Calverton, MD, USA: IIPS, 2000.

[27] Goldberg D, Oldehinkel T, Ormel J. Why GHQ threshold varies from one place to another. *Psychol Med* 1998; **28:**915–21.

[28] Goldberg DP, Gater R, Sartorius N *et al*. The validity of two versions of the GHQ in the WHO study of mental illness in general health care. *Psychol Med* 1997;**27:**191–97.

[29] Patel V, Pereira J, Mann A. Somatic and psychological models of common mental disorders in India. *Psychol Med* 1998;**28:**135–43.

[30] Patel V, Araya R, Chowdhary N *et al*. Detecting common mental disorders in primary care in India: a comparison of five screening questionnaires. *Psychol Med* 2008;**38:** 221–28.

[31] Miettinen OS. Proportion of disease caused or prevented by a given exposure, trait or intervention. *Am J Epidemiol* 1974;**99:**325–32.

[32] Rothman KJ, Greenland S. *Modern Epidemiology*. 2nd edn. Philadelphia, PA: Lippincott-Raven Publishers, 1998.

[33] Rockhill B, Newman B, Weinberg C. Use and misuse of population attributable fractions. *Am J Public Health* 1998;**88:**15–19.

[34] International Institute for Population Sciences; Macro International. *National Family Health Survey (NFHS-3) 2005-06: India*. Mumbai, India: International Institute for Population Sciences, 2007.

[35] Sidhartha T, Jena S. Suicidal behaviors in adolescents. *Indian J Pediatr* 2006;**73:**783–88.

[36] Rudatsikira E, Muula AS, Siziya S. Prevalence and associated factors of suicidal ideation among school-going adolescents in Guyana: results from a cross sectional study. *Clin Pract Epidemol Ment Health* 2007;**3:**13.

[37] Botega NJ, Barros MB, Oliveira HB, Dalgalarrondo P, Marin-Leon L. Suicidal behavior in the community: prevalence and factors associated with suicidal ideation. *Rev Bras Psiquiatr* Mar 2005;**27:**45–53.

[38] Liu X. Sleep and adolescent suicidal behavior. *Sleep* 2004;**27:**1351–58.

[39] Borowsky IW, Ireland M, Resnick MD. Adolescent suicide attempts: risks and protectors. *Pediatrics* 2001;**107:**485–93.

[40] Eaton DK, Kann L, Kinchen S *et al*. Youth risk behavior surveillance–United States, 2005. *MMWR Surveill Summ* 2006;**55:**1–108.

[41] Liu X, Tein JY, Zhao Z, Sandler IN. Suicidality and correlates among rural adolescents of China. *J Adolesc Health* 2005;**37:**443–51.

[42] Grunbaum JA, Kann L, Kinchen SA *et al*. Youth risk behavior surveillance–United States, 2001. *MMWR Surveill Summ* 2002;**51:**1–62.

[43] Zametkin AJ, Alter MR, Yemini T. Suicide in teenagers: assessment, management, and prevention. *JAMA* 2001; **286:**3120–25.

[44] Davidson JR, Hughes DC, George LK, Blazer DG. The association of sexual assault and attempted suicide within the community. *Arch Gen Psychiatry* 1996;**53:** 550–55.

[45] Bonomi AE, Kelleher K. Dating violence, sexual assault, and suicide attempts among minority adolescents: ending the silence. *Arch Pediatr Adolesc Med* 2007;**161:**609–10.

[46] Olshen E, McVeigh KH, Wunsch-Hitzig RA, Rickert VI. Dating violence, sexual assault, and suicide attempts among urban teenagers. *Arch Pediatr Adolesc Med* 2007;**161:**539–45.

[47] Vijayakumar L. Suicide prevention: the urgent need in developing countries. *World Psychiatry* 2004;**3:**158–59.

[48] Swahn MH, Bossarte RM. Gender, early alcohol use, and suicide ideation and attempts: findings from the 2005 youth risk behavior survey. *J Adolesc Health* 2007;**41:** 175–81.

[49] Donald M, Dower J, Correa-Velez I, Jones M. Risk and protective factors for medically serious suicide attempts: a comparison of hospital-based with population-based samples of young adults. *Aust N Z J Psychiatry* 2006;**40:**87–96.

[50] World Health Organization. *Burden and Socioeconomic impact of alcohol – The Bangalore Study*. New Delhi: WHO SEARO, 2006.