

# Prevalence and Associated Factors of Suicidality in Japanese Adolescents: Results from a Population-based Questionnaire Survey

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## Research article

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# Abstract

**Background** Suicide is the first leading cause of death among Japanese adolescents. There are knowledge gaps regarding contemporary demographics and factors associated with suicidality in Japanese adolescents. This study examined the prevalence of suicidality and its associated factors among Japanese adolescents.

**Methods** A population-based questionnaire survey was administered to 22,419 adolescents aged 13–18 years to investigate general health problems in adolescents. The questionnaire included 29 items regarding emotional status, family function, cyberbullying, suicidality, and stressors (focused on relationships with parents or friends, school performance, and sexual identity). We conducted multiple logistic regression analysis to identify the factors associated with suicidality in adolescents. We hypothesized that the prevalence of suicidality would be similar to that found internationally and bullying would be associated with suicide attempts. **Results** The prevalence of suicidal ideation and attempted suicide was 21.6% and 3.5% in males and 28.5% and 6.6% in females, respectively. Bullying and family relationship stressors had the highest association with suicide attempts. Exposure to cyberbullying showed the highest odd ratios for both junior high and high school children (3.1, 95% confidence interval [CI] 2.1–4.4; 3.6, 95% CI, 2.5–5.3, respectively). Adolescents accessed a variety of resources for stressors but chose the internet more frequently.

**Conclusions** Our results indicate that suicidality is a common experience among Japanese adolescents. Although there are many associated risk factors, cyberbullying may be particularly concerning. Recognition of factors associated with adolescent suicidality will help inform future research and suicide prevention efforts for healthcare providers and families.

## Background

The Promotion Council for Healthy Parents and Children 21 database (operated by Japan's Ministry of Health, Labour and Welfare) has recently identified a number of positive trends in adolescent behaviors and health [1]. For example, rates of smoking, alcohol consumption, sexually transmitted disorders, induced abortions, and obesity have decreased in recent decades. However, the suicide rate among young people aged 10–14 and 15–19 years rose from 0.8 and 7.5 per 100,000, respectively, in 2002 to 1.3 and 8.5 per 100,000 in 2012 [2].

Prior research has examined factors associated with suicidal ideation or attempts in adolescents [3–11]. The majority of youth with suicidality have preexisting psychiatric disorders. Saffer et al. [9] reported that lower parental bonding, may be an important risk factor for youth suicidal behavior. Other work suggests that adolescents who are either victims of bullying and bully perpetrators have an increased risk for suicide [3,6]. Academic stressors and conflicted feelings about sexual identity are other putative risk factors for suicide in adolescents [10]. Recently, several cross-sectional studies showing associations between personal/social risk factors and suicidality have also reported among Japanese adolescents. Hikikomori, preference for solitude, low body mass index, appetite loss, violence, and psychotic-like experiences are proposed as significant risk factors in Japanese adolescents [12–18]. As suicide is the first-leading cause of death among Japanese adolescents, effective strategies are required to prevent adolescent's suicide. Although the Japanese government's official announcement reported that poor school academic records and stressors about the academic course were the most significant causes of school children [19], multiple logistic regression analysis is necessary to identify the individual and environmental factors associated with suicidality in adolescents.

The present study aimed to examine the prevalence of suicidal ideation and attempts among Japanese junior high-school and high school students. Further, we examined the correlates between suicidal ideation or attempts and potential associated factors, including sex, age, grade, family structure, family function, emotional status, cyberbullying, number of friends, stressors (relationship with friend, relationship with parents, school records, academic course, sexual identity, and others), and geographic region. Broadly, findings could inform public health initiatives focused on

adolescent health. We hypothesized that the prevalence of suicidality would be similar to that found internationally and bullying would be associated with suicide attempts.

## Methods

### *Participants*

Data for this study came from a Promotion Council for Healthy Parents and Children survey in November–December 2016. Six education committees approved representative schools to participate in the present study. In total, 22,419 children from 36 public junior high, 5 private junior high, 10 public high and 6 private high schools participated. The adolescents were aged 13–15 years (grades 7–9) in junior high school and 16–18 years (grades 10–12) in high school. The participating schools were located in four urban cities (population over 1 million), four suburban cities (population around 300,000), and two rural area (population around 50,000); they covered much of Japan and included Tokyo, Kyoto, Fukuoka, Tochigi, Aichi, and Nagasaki prefectures.

### *Questionnaire content and survey procedure*

The Promotion Council for Healthy Parents and Children 21 (Second Phase) reviewed and approved the questionnaire and survey process. The questionnaire consisted of 29 items, which requested general information: (age, sex, school grade, number of siblings, sleep habits, and Internet use); general feelings (emotional status and suicidality); family function; bullying (school or cyber); general stressors (regarding family, friends, sexual identity, pregnancy, school bullying, substance use, and other), and stress about future events (such as marriage and raising children). The participants were also asked about consulting resources for any stressors. They selected the most useful single resource from among four (parents, friends, school teacher, and the Internet) for each stressor. Table 1 provides an example of survey questions. The participants' parents were informed about this questionnaire survey by letter and the participating schools obtained passive informed consent from the participants. The questionnaire was distributed directly to adolescent participants. Teachers explained the purpose of the study. The anonymous self-administered questionnaire was completed during class time. After respondents answered the questionnaire, they placed it into a sealed envelope. The teacher collected the envelopes and sent them to Kurume University.

### *Statistical procedure and analysis*

The survey data were used to determine the prevalence of suicidal ideation, suicide attempts, and potential associated factors among Japanese adolescents. Regarding ideas of suicidality, participants were asked, "In the past year, have you seriously considered killing yourself?" (question number, Q15); participants were requested to select one of five choices (never, sometimes, always, have attempted suicide, and no idea). We defined participants who selected "never" as having no suicidality, either "sometimes" or "always" as having suicidal ideation and those who selected "have attempted suicide" as suicide attempts. To minimize the invasive effects on participants, the participant's responses for suicidal ideation and suicidal behaviors (suicide attempts) were listed in one answer column. We examined potential associated factors with suicidality: grade (Q1); sex (Q3); number of siblings (Q4); number of friends (Q8); happiness (Q10); wellness (Q11); loneliness (Q12); amount of family conversation (Q13); experience of cyberbullying (Q14); and stressors (Q17). Participants were asked whether they had the following stressors (Q17): relationships with friends; school bullying; relationship with parents; school records; relationship with the opposite sex; sexual identity; academic course; and tobacco or substance use. Geographic region was also examined.

We first presented the number for each answer to each question (single-tabulation analysis). Second, we conducted cross-tabulation analysis between suicidality and the potential associated factors. Finally, the calculated ratio of consultation resources for each stressor was examined.

Univariate logistic regression analysis, examined potential associated factors with suicidality adolescents in adolescents both with respect to ideation and attempts. Separate analyses were conducted for junior and high school participants. We conducted multiple logistic regression analysis to estimate odds ratios. Potential confounders (including grade, sex, number of siblings, number of friends, stressors, and others listed in Table1) were included in the model as covariates.

## Results

### *Participants*

In all, there were 22,419 respondents (48% female) adolescents aged 13–18 years. There were 13,285 junior high and 9,134 high school students. Notably, adolescents absent from school were unable to participate in the survey. The participant numbers in each grade were as follows: 4,371 (7th grade); 4,486 (8th grade); 4,396 (9th grade); 3,683 (10th grade); 3,024 (11th grade); 2,396 (12th grade); and 63 (undetermined grade). The distribution of participants' locations and school types appear in Table 2. There were no participants from private schools in rural areas.

### *Prevalence of idea of suicidality*

The prevalence of suicidal ideation was 25.7%. The prevalence of attempted suicide was 5.4%. Almost twice as many female adolescents as males had made suicide attempts (6.6% versus 3.5%). Notably, in the 7th grade, we observed little difference in the prevalence of suicide attempts (Table 3).

### *Single-tabulation analysis*

The results of single tabulation for each question under logistic analysis for the covariates appear in Table 3. Among the participants, 14.0% (n = 3,118) had no siblings and 13.3% (n = 2,970) had “not so many” or “very few” friends. The proportion of participants who responded “never” with respect to being happy and well was, 2.3% (n = 513) and 2.6% (n = 569), respectively. The proportion of participants who responded “always” to loneliness was 1.8% (n = 406). Among the participants, 8.2% (n = 1,830) rarely or never had chance to talk daily with their families; 1.8% (n = 402) had experience of cyberbullying. Most participants had stress regarding their school records and academic course: 59.7% (n = 13,391) and 60.1% (n = 13,477), respectively. The proportion of participants who had stress about relationships with friends, parents, and people of the opposite sex were, respectively, as follows: 24.0% (n = 5,381); 9.2% (n = 2,062); and 10.6% (n = 2,383). However, those who had stress related to school bullying, sexual identity, and tobacco or substance use ranged from 0.7% to 2.6%.

### *Consultation resources for stressors*

Figure 1 shows the proportions of the preferred resources that the participants selected for their various stressors. They used different resources according to the type of stressors. Many participants selected the Internet as a resource for consultation—even for matters dealing with parent relationships. Notably, a small minority of adolescents described teachers as resource for addressing stressors.

### *Cross-tabulation analysis*

We performed cross-tabulation analysis between suicidality and potential associate factors (Table 3). Participants who related having very few friends showed a four times greater prevalence of suicide attempts (18.2%) than those who had very many or many friends (4.2%–4.7%). Respondents who endorsed feelings of unhappiness, poor wellness, and loneliness showed a three- or four-fold higher prevalence of suicide attempts (16.2%, 14.6%, and 15.0%, respectively) than those who had positive feelings in those areas (4.1%, 4.0%, and 3.7%, respectively). Similarly, many adolescents who attempted suicide (14.1%) had perceptions of suboptimal family communication. Participants who had experienced

cyberbullying showed a four-fold higher prevalence of suicide attempts (19.9%) than those without such experience (5.1%). Respondents who had stressors about relationships with parents and friends, school bullying, sexual identity, and substance use showed more than two times more suicide attempts than those without such stressors.

### *Logistic analysis*

Table 4 shows the results of univariate and multivariate logistic regression analysis. In the univariate logistic regression analysis, all the covariates except school grade and number of siblings (junior high school children) were significantly associated with suicide attempts. The following associated factors showed odds ratios (OR) of greater than 4; experience of cyberbullying (OR 6.5, 95% confidence interval [CI] 4.7-8.8 in junior high school children, OR 5.6 95% CI 4.0-7.7 in high school children), stressors about school bullying (OR 5.3, 95% CI 4.3-6.4 in junior high school children, OR 8.9 95% CI 5.2-15.4 in high school children), and stressors about the relationship with parents (OR 5.0, 95% CI 4.4-5.6 in junior high school children, OR 4.2 95% CI 3.6-4.9 in high school children). In the multivariate logistic regression analysis after adjustment for confounding variables, many covariates—except grade, number of siblings (junior high school children), stressors about tobacco or substance use, and geographic region (junior high school children)—were significantly associated with suicidality. The following factors showed OR of greater than 2; experience of cyberbullying (OR 3.1, 95% CI 2.1-4.4 in junior high school children, OR 3.6 95% CI 2.5-5.3 in high school children) and stressors about the relationship with parents (OR 2.1, 95% CI 1.8-2.4 in junior high school children, OR 2.1 95% CI 1.8-2.5 in high school children).

## **Discussion**

The present study examined the prevalence of suicidality and associated factors among Japanese adolescents. The study was characterized by nationally representative large-scale data, covering urban, suburban, and rural areas in Japan; it analyzed associated factors in terms of general information about the respondents, their feelings, family function, bullying, and various stressors. The overall prevalence of suicidal ideation and suicide attempts among Japanese adolescents was 25.7% and 5.4%, respectively; those rates are similar to ones observed in Western countries [4,7]. School grade level and geographic regions did not appear to be associated factors. However, a number of characteristics and perceptions appeared to have an association with suicidality in this sample. Prior perceived cyberbullying and stressors about the relationship with parents were particularly important factors.

The strength of this cross-sectional survey was that we simultaneously analyzed various possible associated factors of adolescents' suicidality, including environmental factors and their stressors; experience of cyberbullying was identified as the most significant associated factor. According to the Japanese government's official announcement about the causes of adolescent suicides, poor school academic records and stressors about the academic course were the most significant causes (9.9% of suicide cases were considered as having those conditions as a possible cause) [19]. Although 8.8% of completed suicides were related to a stressful relationship with parents; the overall bullying rate as a possible cause was only 1.8%. It is imperative that school health providers observe this discrepancy between the government's official announcement and our results to develop and optimize preventive interventions.

Associations between bullying (cyber or school) victimization and suicidal behavior have been reported over the past decade; the growing number of reports could reflect great concern [20-24]. Psychological distress by cyberbullying is more severe than that with school traditional bullying: it is more anonymous and pervasive, and it can happen anytime and anywhere [23,24]. Based on the intensity of threats and individual vulnerability of the victims, cyberbullying may directly result in increased depression and suicidal behavior [21]. In the present study, the definition of cyberbullying was not determined, thus it seemed to self-reported perception of cyberbullying. However, 1.8% of adolescents related the experience of cyberbullying: among them, 19.9% and 52.0%, respectively, had attempted suicide and had suicidal

ideation. The association between level of Internet use and suicidal ideation or attempts was investigated in over 200,000 adolescents using a Web-based survey; participants with a higher Internet addiction risk reported significantly higher suicidal ideation or suicide attempts [22]. Use of the Internet is increasing as a communication vehicle among children; thus, guidance about cyberbullying should be provided in school health programs to prevent possible suicidal behavior.

Another striking factor for suicidality identified in the present study was stress related to parental relationships. This factor showed the second- and fourth-highest odds ratio as an associated factor among junior high and high school students, respectively. When participants were asked whether they had stress related to their relationship with parents, the meaning of that relationship with parents could be widely interpreted, including family support, family function, conflict with family, conversation, and other factors. Negative perceptions of family function or support have been reported as being a significant associated factor of suicidality in both community and clinical samples [7,9,11,25-29]. Samm et al. [29] observed that self-reported satisfaction with relationships in the family and good communication with parents reduced the likelihood of suicidal thoughts in a non-clinical sample of adolescents. Susukida et al. [11] reported that individuals who perceived love from caregivers during childhood had a significantly lower prevalence of lifetime suicidal ideation than individuals without such perceptions; this finding was independent of whether or not the individuals lived with both biological parents during childhood. Susukida et al. [11] suggested that regardless of family structure, perceived support from caregivers during childhood is an important correlate of lifetime suicidal ideation. Similarly, in clinical samples, family discord and negative relationships with parents have been found to be associated with increased suicide risk in depressed adolescents [25-27,29]. Furthermore, suicidal ideation of children is associated with suicidal depression of caregivers [28]. The evidence indicates that good relationships with parents lead to lower lifetime suicidal ideation. Thus, it is important for health providers to assess individual family function, which may be a key preventing factor for suicidal ideation or attempted suicide in adolescents.

A growing body of evidence suggests that help-seeking behavior may influence the prevention of suicidal ideation or attempted suicide in adolescents [30-32]. Help seeking is defined as the use of social networks or professionals to gain support in coping with suicidal ideation and attempted suicide [31]. Though friends and family members are likely to be the greatest support resources for adolescents with suicidality, the majority of young people and adolescents with suicidality do not seek help for their difficulties [33]. In the present study, reports of a low number of friends and limited conversation with families, were associated with a greater prevalence of suicidality. This may indicate the importance of friends and family as help-seeking resources. Furthermore, the adolescents consulted different resources about their stressors according to the type of stress. Our participants chose the Internet as a consulting resource for worries or stress about sexual identity, substance use, and relationships with parents. However, participants tended not to confide in their teachers as a consulting resource, indicating reluctance to undertake help-seeking behavior. Our respondents may have been concerned about confidentiality and stigma, which can prevent young people from seeking help. Two studies have used a school-based education program, including Internet-based cognitive behavioral therapy, to improve suicidality in young people: one study found a significant effect, but the other found no effect [34,35]. Such trials may be an effective way of helping young people access help-seeking behavior.

The present study has some limitations. Study results must be considered in the context of potential response bias inherent in our survey process. First, ideally suicidal ideation and attempts would be reviewed with two discrete questions. In our study, the participant's responses for suicidal ideation and suicide attempts were listed in one answer column to minimize the invasive effects on participants. In Japan, some educational committees still have the perception that talking about suicide and its prevention in the classroom as an educational program might increase the possibility of suicide in a vulnerable child. For this reason, we were obligated to minimize questions pertaining directly to suicidality. However, the questionnaire for suicidality is not validated. Second, we did not perform structured diagnostic and cognitive interviews with the participants, and we did not ask about depressive symptoms in the questionnaire.

Thus, we did not assess for depressive disorders, which may be associated with the development of suicide plans. Third, we did not evaluate socioeconomic status, such as income and education level, or the family structure of the parents and their children.

In conclusion, we found the prevalence of suicidal ideation and attempted suicide in Japanese adolescents to be 25.7% and 5.4%, respectively; those rates are similar to ones observed in Western countries [4,7]. We simultaneously investigated various possible associated factors of the children's suicidality; we identified the experience of cyberbullying as the most significant associated factors. The relationship between children and their parents was also important in prevention efforts of suicidal behavior. Further research is needed about school- and home-based mental health education by health providers and families toward facilitating help-seeking behavior among adolescents.

## **Declarations**

### **Ethics approval and consent to participate**

The design of this study and procedures for obtaining informed consent were approved by the Medical Ethics Committee of Kurume University School of Medicine (#16159). The participants' parents were informed about this questionnaire survey by letter and the participating schools obtained passive informed consent from the participants.

### **Consent for publication**

Not applicable.

### **Availability of data and materials**

The datasets of this study are available from the corresponding author on reasonable request.

### **Competing interests**

All other authors declare that they have no conflicts of interest.

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### **Authors' contributions**

SN, MM, YY and TI participated in the design of this study and SN compiled the manuscript. KK, NT, YK, RH, RI, and MM informed the design of study to education committees and collected patient's data. ZY conducted the statistical analyses. PC supervised the preparation of the manuscript. All authors have read and approved the manuscript.

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### **Abbreviations**

Not applicable.

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## Figures

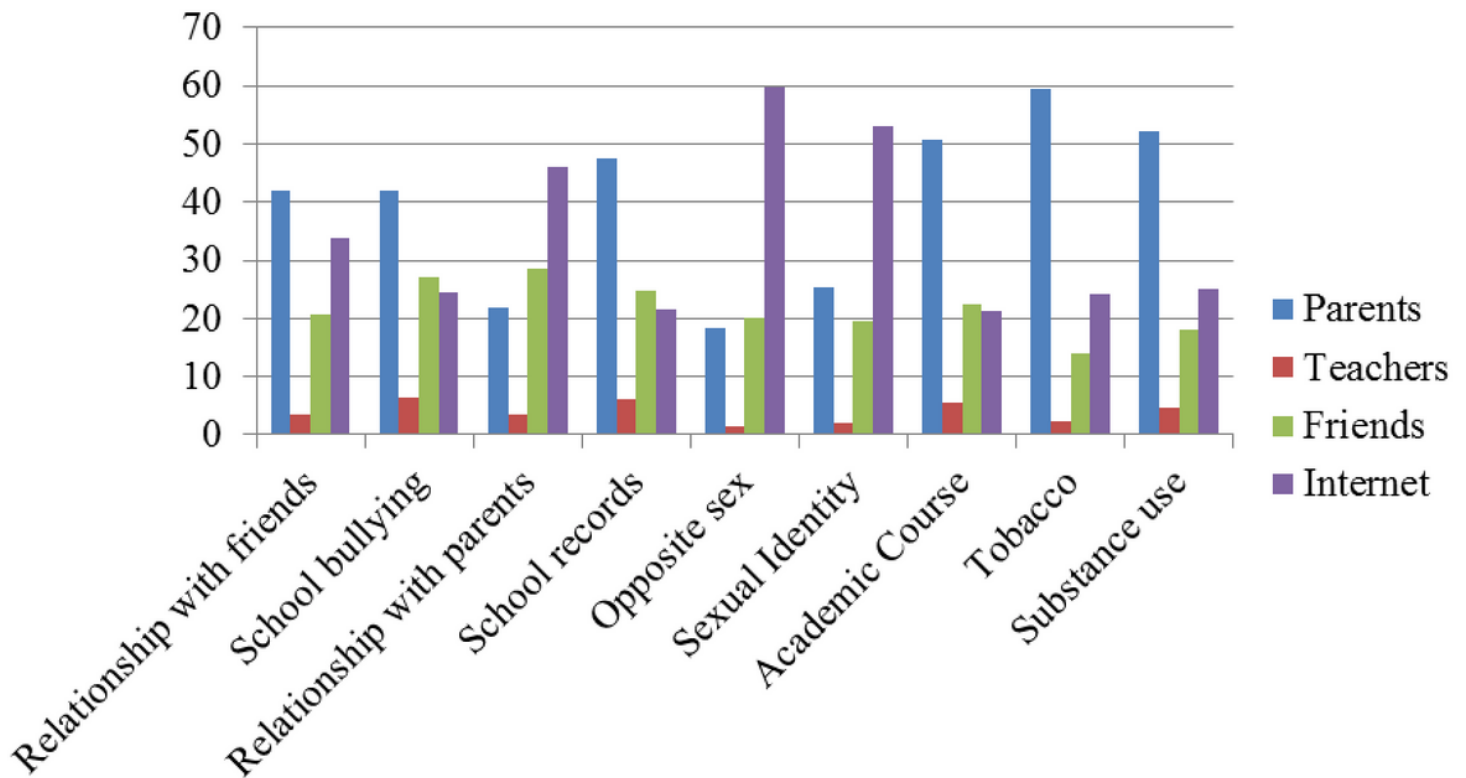


Figure 1

Percentages of adolescent respondents' preferred resources for stressors

## Supplementary Files

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