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Suicidality Among High School Students in Hong Kong, SAR

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Suicide is the leading cause of death in Hong Kong SAR for the youth aged 15–24. This study examined the prevalence of suicidality among secondary school students in Hong Kong using a representative, territory-wide sample of 2,586 students. Suicidal behaviors can be conceptualized as a spectrum of self-destructive behaviors. Cumulative logit model analysis indicated that a range of factors, such as unhappy family life, were associated with increasing levels of suicidality. Use of illicit drugs, inhalants, and tobacco differentiated attempters from ideators. The implications of the research findings are discussed.

Studies in the West have examined the prevalence and the associated risk factors of suicidal ideation and behavior among adolescents, using clinical samples (Beautrais, Joyce, & Molder, 1997, 1999; Kelly, Lynch, Donovan, & Clark, 2001; Yoder, 1999) and community samples (CDC, 1998; Fergusson & Lynskey, 1995; Gould et al., 1998; Gould et al., 2001; Lewinsohn, Rohde, & Seeley, 1996). It has been found that suicidal ideation and nonfatal behavior are relatively common among adolescents. A range of risk factors are associated with suicidal behavior, including sociodemographic measures such as age and gender, personality characteristics, psychopathology, substance abuse, psychosocial disorders, family dysfunction, parental pathology, and social isolation.

There are fewer studies on suicidal ideation and nonfatal behavior in non-Western populations (Stewart, Lam, Betson, & Chung, 1999). Hong Kong has a different pattern of youth suicide—the usual peak in the suicide rate during the adolescent years in Western countries was not found in Hong Kong. There is also a much lower gender ratio among the teenagers—around 1.3 (Yip, 1996, 1997). Youth suicides in Hong Kong have less depressive disturbance, less antisocial disturbance, less substance abuse disor-

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der, and more psychotic disturbance (Ho, Lee, Tang, & Hung, 1998). Research on adolescent suicidal ideation and behavior in this population can help to understand the different patterns of suicidal behavior among different cultures which are of relevance for suicide prevention (Tsung, Tseng, & Yeh, 1995).

In studying suicidal behavior, King (1997) suggested that, based on evidence from retrospective and prospective studies, the traditional categories of suicidal behavior (i.e., suicide ideation, suicide attempts, and completed suicide) should be conceptualized as distinct yet overlapping aspects of a severity continuum of adolescent suicidal behavior. He argued that there is a need for research which is conceptually based on this continuum to be done on the more homogeneous subgroups of ideators and attempters. Some researchers, however, argue that the profiles of ideators and attempters are quite distinct: The risk factors associated with suicidal attempts may not be the same as those associated with ideation. For instance, Gould et al. (1998) found that substance abuse/dependency was associated with suicide attempts but not ideation. It has also been argued that because suicide ideation is quite frequent in adolescence, it cannot be regarded as a predictive factor for suicide risk (Tomori & Zalar, 2000). Despite some discontinuities, the difference between types of suicidal behavior may well be one of degree rather than one of kind (Groholt, Ekeberg, Wichstrom, & Haldorsen, 2000). Prior suicidal behavior poses a significantly high risk for completed suicide. The psychiatric problems of suicide attempters are quite similar to those who complete the act. There is also significant overlap between suicidal attempts and ideation, as well as significant prediction of future attempts from ideation (Gould & Kramer, 2001). Given the high prevalence rate of prior suicidal ideation and behaviors among youths that complete suicide, and the common risk factors among youths with different degrees of suicidality, it is important to recognize the overlapping and progressive nature of suicidal behavior in forming effective intervention policy. As Crosby, Cheltenham, and Sacks (1999) argued, the problem of suicide among populations can be represented not only by the prevalence of cases, but also by the prevalence of suicide ideation and behaviors among the populations. Preventing less serious events may preclude more lethal health problems.

The present paper reports the first study on the prevalence of suicide behavior in a territory-wide sample of secondary school students. Suicidal ideation and behavior were conceptualized as four progressive levels—suicidal ideation, made plans for a suicide attempt, had attempted suicide, and made an injurious attempt that required medical attention.

METHOD

Data

In November 2001 the Family Planning Association of Hong Kong conducted the Youth Sexuality Survey (YSS), which included four questions on suicidal behaviors. A random stratified sample of all Form 3 to Form 7 students enrolled in day school (equivalent to grades 9 to 13 in the U.S. education system) was used. School class was used as the sampling unit, and the sample was stratified by school type and education level. The sample was representative to the Form 3 to Form 7 student population in Hong Kong. Prior consent of the schools was obtained and staff from the Family Planning Association were sent to the school to assist the operation. Students were informed about the goals of the survey and that participation was voluntary. The students were reassured of the anonymity and confidentiality of the survey.

A vast majority (90.3%) of the participants answered the questions about suicidal behavior. It yielded 2,586 valid observations (1,058 boys and 1,528 girls), with a mean age of 15.8 years (ranging from 13 to 21 years).

Measures

The respondents were asked to complete a questionnaire in Chinese, with minimal interference from the teacher, at a single setting.

Suicidality. As mentioned above, suicidality was measured by four progressive levels—suicidal ideation, made plans for a suicide attempt, had attempted suicide, and made an injurious attempt that required medical attention. The four questions used were:

1. During the past 12 months, did you seriously consider suicide?
2. During the past 12 months, did you make a plan about how you would attempt suicide?
3. During the past 12 months, how many times did you actually attempt suicide?
4. If you attempted suicide during the past 12 months, did any attempt result in an injury that had to be treated by medical personnel (doctor or nurse)?

Risk Factors. Basic individual correlates. Information on gender, age, school grade, self-rated health, and self-rated academic performance was obtained. Self-rated health was measured by the following question: "Generally speaking, you would describe your health condition as very good, good, poor, and very poor." Responses were recoded into two categories: good and poor self-rated health. Self-rated academic performance was measured by the following question: "When you were studying in school, your academic result was. . .". There were five response categories, and were recoded into three levels: good, average, and poor.

Family Factors. Information on the living arrangement with parents and parents' marital status was collected. Single-item measures were used to measure the respondent's perception of his/her family relationship. They were asked to rate their relationships with father, mother, and siblings as well as between their parents. Parental monitoring was measured by the questions of whether the student accepts his/her father/mother's guardianship. To measure attachment to parents, students were asked about whether they think their fathers/mothers love them. All these single-item measures were used in the univariate analysis; however, as these factors were highly correlated, only parents' marital status and the student's rating of their family life were used in the multivariate models.

Depressive Symptoms. Depression symptoms were measured by the Center for Epidemiological Studies—Depression Scales (CES-D, Radloff, 1977). It is a short self-report scale designed to measure depressive symptomatology, and its severity, in the general population. A factor analysis was performed to calculate a score for the CES-D questions. Upon analysis, among the 20 questions in the CES-D, the four positively worded questions loaded on a separate factor, probably due to the questions' wording. The remaining 16 items all had a factor loading of 0.57 or greater on one factor. Therefore, the factor scores of these 16 questions were used in the analysis. The 16-item CES-D had excellent internal consistency (Cronbach's alpha = 0.90).

Social Support. Students were asked about whether they found themselves important to their friends; whether they had friends to help and support important decisions; and whether there were any friends who could cheer them up when they were upset or annoyed. These questions were treated as single-item measures as well as used in creating a composite score for social support. The social support composite score had fair internal consistency (Cronbach's alpha = 0.73). Social network was measured by the question on how many good friends the respondent thought they had.

Substance Abuse. Students were asked about whether they had ever used inhalants and other illicit drugs. Use of tobacco was measured by whether the student smoked more than six cigarettes a week, smoked one to six cigarettes a week, or did not smoke. Alcohol use was measured by whether the

student used alcohol three times to everyday a week, less than three times, or did not use alcohol.

Body Experiences, Sexual Activity, Pregnancy, and Abortion. Students were asked whether they were satisfied with their physical appearance and how often they got upset because of their appearance. Onset of sexual activity was measured by the question of whether the student had had their first sexual intercourse before the age of 14, after the age of 14, or had no sexual experience. Students were also asked whether they had ever been pregnant or had an abortion. As pregnancy and abortion were highly correlated in our sample, only measure of pregnancy was used in the multivariate analysis.

Statistical Methods

To address the issue about the distinctiveness in the associated risk factors for ideators and attempters, a series of multivariate, binary logistic regressions were first employed to explore the similarities and differences in the profiles of ideators and attempters. Those who reported having considered suicide and/or those who had planned suicide were classified as ideators. Regardless of whether they reported ideation, those who attempted or those received medical attention were classified as attempters. By collapsing the four groups into two categories, the statistical power in performing binary logistic regression analysis was increased. Additional binary logistic regression analysis (not reported here) showed that the two groups of ideators and the two groups of attempters had similar profiles. Therefore it was justifiable to combine the groups into these two categories. The method of backward elimination was employed. The effects of the significant risk factors were reported as odds ratios.

Cumulative logit modeling was then used to identify the set of factors that lead to increasing risk of suicidality. Compared to a series of binary logistic regressions, the cumulative logit model utilizes the ordinality of the variable, which improves model parsimony and power (Agresti & Finlay, 2002). In other words, the cumulative logit modeling utilized all the information yielded from the four questions on suicide and there was no need to collapse the different responses. Furthermore, the four questions represent a description on the severity continuum of adolescent suicidal behavior.

Let Y denote an ordinal response variable, having c categories. Let $Pr\ (Y \leq j)$ denote the probability that the response falls in category j or below. The cumulative logit model has the form $\text{logit}[Pr(Y \leq j)] = \alpha_j + \beta X$, $j = 1, 2 \ldots . c - 1$ where $\alpha_1, \ldots \alpha_{c-1}$ are $(c - 1)$ intercept parameters, X is a vector of covariates, and β is the vector of slope parameters. As Y is a variable with c categories, there are $P(Y \leq 1), P(Y \leq 2) \ldots P(Y \leq c)$ cumulative probabilities. Note that β takes the same value for the logit for each cumulative probability. In other words, this model assumes that X has a common effect for each cumulative probability. Therefore, rather than providing three separate estimates from fitting binary logit model for each collapsing of the response, the cumulative logit model provides a single estimate β for the effect of X (Agresti & Finlay, 2002). This model has the advantage of yielding simpler, easier to interpret parameter estimates (Agresti, 1990, 262).

RESULTS

Prevalence Rate of Suicidality Among High School Students in Hong Kong

The prevalence rates of suicidal ideation and behavior among high school students in this study were 17.8% (considered), 5.4% (planning), 8.4% (attempt once or above), and 1.2% (required medical care) in 2001. Among female students, the prevalence rates were 21.1%, 6.2%, 8.3%, and 1.2%, respectively. Among male students, the prevalence rates were 13.1%, 4.2%, 8.5%, and 1.3%, respectively.

Table 1 reports the prevalence rate of suicidality with mutually exclusive categories. Twenty-one percent (95% CI = 0.19, 0.22) had some levels of suicidal ideation or behav-

TABLE 1
Prevalence Rate of Suicidality (%) Among F3–F7 Students by Gender–Mutually Exclusive

	Male $n = 1,058$	Female $n = 1,528$	Total $N = 2,586$
1. No suicide tendency	82.3	76.8	79.1
2. Considered suicide	7.7	13.0	10.8
3. Made a plan about how to attempt suicide	1.4	1.8	1.7
4. Attempted suicide once or above	7.3	7.2	7.2
5. Made at least one injurious attempt that required medical attention	1.3	1.2	1.2
6. Had any suicidal ideation or behavior (categories 2–6 above)	17.7	23.2	20.9

Note: The categories are mutually exclusive. Cases are assigned according to the highest level of suicidal behavior reported.

ior. More female students reported suicidal ideation, but male and female students seemed to be equally likely to have made suicide attempt(s) or have made injurious attempt(s).

Multivariate Binary Logistic Regression

As mentioned above, *ideator* was defined as one who had considered and/or made a plan about how to attempt suicide in the last 12 months (categories 2 and 3 in Table 2), and *attempter* was defined as those who had ever made an attempt in the last 12 months (categories 4 and 5 in Table 1). Using the method of backward elimination, we identified four sets of significant risk factors: attempters versus ideators; ideators versus the nonsuicidal group; attempters versus the nonsuicidal group; and suicidal ideators or attempters (i.e., those who displayed some degree of suicidal tendency) versus the nonsuicidal group.

Table 2 shows that there were more significant associations between individual factors and suicidal ideation (Column 2), and fewer risk factors associated with suicidal attempts (Column 3). The results in Table 2 suggest that there were some overlaps in the profiles of ideators and attempters. Compared to the nonsuicidal group, both groups were likely to have depression symptoms, an unhappy family/average family life, and occasionally alcohol. Nonetheless, there were also some differences in the profiles of ideators and attempters. Attempters were more likely to be of younger age, have poor self-rated health, to have used inhalants, and had an early onset of sexual activity. These factors, however, did not predict ideation. Being female, having divorced/separated parents, never had friends to cheer up, and being upset with appearance were predictors of ideation but not attempts. Surprisingly, compared to students with no suicidal tendency, ideators were less likely to have used drugs other than inhalants.

This issue of the similarities and differences in the profiles of ideators and attempters was further investigated by looking at risk factors that differentiated attempters from ideators. As shown in Column 1 in Table 2, the adjusted odds ratios (OR) showed that, compared to ideators, attempters were more likely to have used inhalants (OR = 2.79, CI = 1.12, 6.97), smoked more than six cigarettes a week (OR = 3.03, CI = 1.26, 7.26), smoked one to six cigarettes a week (OR = 2.44, CI = 0.87, 6.85), and to have used illicit drugs (OR = 3.05, CI = 1.99, 9.36).

Cumulative Logit Modeling

Cumulative logit modeling was employed to examine the risk factors associated with increasing levels of suicidality.

Univariate Analysis

Univariate cumulative logit model was first employed to look at the factors' respec-

TABLE 2
Significant Risk Factors Among Hong Kong Students with Suicidal Ideation, Suicide Attempts, and Suicidal Ideation and/or Attempts

	Attempts vs. ideation	Ideation vs. None	Attempts vs. None	Attempts or ideation vs. None
Depression symptoms score		1.73 (1.49, 2.00)	1.70 (1.45, 1.99)	1.92 (1.69, 2.19)
Age per year			0.88 (0.79, 0.99)	0.90 (0.84, 0.97)
Male		0.59 (0.44, 0.79)		0.68 (0.54, 0.86)
Poor self-rated health[a]			1.51 (1.05, 2.16)	1.40 (1.08, 1.82)
Unhappy family life[b]		2.91 (1.96, 4.33)	1.76 (1.09, 2.96)	2.92 (2.05, 4.17)
Average family life[b]		1.62 (1.22, 2.16)	1.41 (1.00, 1.98)	1.60 (1.27, 2.03)
Father/mother/both deceased[c]				
Parents divorced/separated[c]		1.59 (1.06, 2.34)		
Used inhalants	2.79 (1.12, 6.97)		3.49 (1.82, 6.69)	2.10 (1.12, 3.92)
Used drugs	3.05 (1.99, 9.36)	0.29 (0.11, 0.78)		
Smoke more than 6 cig a week[d]	3.03 (1.26, 7.26)			
Smoke less than 6 cig a week[d]	2.44 (1.87, 6.85)			
Drink more than 3 times a week[e]				2.88 (1.13, 7.92)
Drink less than 3 times a week[e]		1.62 (1.24, 2.10)	1.82 (1.31, 2.51)	1.86 (1.48, 2.33)
Never have friends to cheer up[g]		2.28 (1.12, 4.64)		
Seldom have friends to cheer up[g]				
Occasionally have friends to cheer up[g]				
Had sexual experience before age 14[h]			3.64 (2.05, 6.43)	2.32 (1.36, 3.96)
Had sexual experience after age 14[h]				
Had ever been pregnant				
Always upset with appearance[i]		2.32 (1.13, 4.74)		2.34 (1.23, 4.46)
Often upset with appearance[i]		1.73 (1.10, 2.71)		1.58 (1.09, 2.89)
Occasionally upset with appearance[i]				

Note. All odd ratios have a p-value < 0.05. Odd Ratios (95% C.I.) estimated from multivariate binary logistic models using the method of backward elimination.

[a]Good self-rated health; [b]Happy family life; [c]Parents still married; [d]Did not smoke; [e]Did not drink; [f]Always have friends' support and help to make important decision; [g]Always have friends to cheer up when angry or annoyed; [h]Did not have sexual experience; [i]Never upset with appearance.

tive impact on adolescent suicidality. As mentioned above, suicidality is defined by five progressive levels. During the last 12 months, the respondent had: (1) no suicidal tendency; (2) considered suicide; (3) made plan(s) about how to attempt suicide; (4) attempted suicide; or (5) made an injurious attempt that required medical attention.

Table 3 reports the unadjusted odds ratios estimated from the univariate analysis. Factors found to be insignificant in relation with suicidality included age, school grade, place of birth, social support (both composite score and individual items), and number of good friends. All the measures related to family dynamics, substance abuse, physical

TABLE 3
Unadjusted Odds Ratios Estimated from Cumulative Logit Modeling, Individual Risk Factors with Suiciality

	OR	95% C.I.		*p*-value
Depression symptom score	2.15	1.93	2.40	.000
Male	0.74	0.61	0.90	.003
Self-rated Academic performance[a]				
Bad	1.74	1.26	2.41	.001
Average	1.01	0.79	1.40	.745
Poor self-rated health[b]	2.06	1.65	2.57	.000
Not living with both parents	1.58	1.23	2.03	.000
Relationship between parents[c]				
Bad/very bad	2.76	2.05	3.72	.000
NA/Do not know	1.57	0.99	2.71	.108
Average	1.61	1.30	1.99	.000
Parents' marital status[d]				
Seperated/divorced	1.75	1.28	2.39	.000
Father/mother/both deceased	1.42	0.89	2.25	.139
Family life[e]				
Unhappy	4.86	3.64	6.50	.000
Average	2.03	1.65	2.51	.000
Relationship with father[f]				
Bad/very bad	2.75	2.13	3.54	.000
Do not know/NA	1.64	1.28	2.11	.000
Relationship with mother[f]				
Bad/very bad	3.60	2.55	5.07	.000
Do not know/NA	1.83	1.32	2.53	.000
Relationship with siblings[f]				
Bad	3.44	2.44	4.85	.000
NA	1.20	0.87	1.67	.261
Average	1.66	1.33	2.06	.000
Whether accept father's guardianship[g]				
No	2.30	1.84	2.89	.000
Do not know/NA	1.51	1.16	1.97	.002
Whether accept mother's guardianship[g]				
No	2.63	2.01	3.43	.000
Do not know/NA	1.90	1.40	2.59	.000
Thinks father loves him/her[g]				
No	3.12	2.30	4.24	.000
Do not know/NA	1.56	1.20	2.03	.001
Thinks mother loves him/her[g]				
No	4.71	3.23	6.88	.000
Do not know/NA	1.46	1.00	2.04	.028
Used inhalants	4.03	2.47	6.55	.000
Used drugs	2.96	1.93	4.55	.000
Smoking[h]				
Over 6 cigarettes a week	2.49	1.71	3.62	.000
1 to 6 cigarettes a week	1.77	1.01	2.92	.025
Drinking[i]				
3 times to every day a week	3.76	1.90	7.45	.000
Less than 3 times a week	1.99	1.64	2.42	.000

(*continued*)

TABLE 3
Continued

	OR	95% C.I.		*p*-value
Friends' cheering up[j]				
Never	1.59	1.01	2.41	.028
Seldom	1.01	0.81	1.39	.674
Occasionally	1.00	0.79	1.26	.997
Friends to share time[j]				
Never	1.90	0.99	3.87	.079
Seldom	1.69	1.20	2.37	.002
Occasionally	1.26	1.00	1.54	.023
Number of good friends[k]				
None	1.86	1.19	2.90	.006
1–4	1.00	0.85	1.26	.745
Composite score of social support	–0.049	–0.089	–0.009	.017
Satisfaction with appearance[l]				
Satisfied	2.04	1.60	2.59	.000
Do not know	0.99	0.74	1.15	.450
Upset with appearance[j]				
Never	6.23	3.76	10.33	.000
Seldom	2.51	1.86	3.41	.000
Occasionally	1.46	1.01	1.94	.010
Sexual experience[m]				
Had sexual experience at/before age 14	2.78	1.54	5.03	.001
Had sexual experience after age 14	2.47	1.80	3.39	.000
Had ever been pregnant	6.26	3.17	12.37	.000

[a]Good self-rated academic performance; [b]Good self-rated health; [c]Good/very good relationship between parents; [d]Parents still married; [e]Happy family life; [f]Good relationship; [g]Yes; [h]Did not smoke; [i]Did not drink; [j]Seldom; [k]5 or over; [l]Dissatiisfied; [m]Did not have sexual experience.

appearance, sexual activity, and pregnancy were significantly associated with increasing levels of suicidality.

Multivariate Cumulative Logit Modeling

Using multivariate cumulative logit modeling, the effects of the various risk factors on levels of suicidality are examined simultaneously—the effect of each specific factor was examined while controlling for the effects of other factors included in the model. Owing to the possible colinearity between the family relationship variables, as well as between pregnancy and abortion, only the overall rating of family life, parental marital status, and pregnancy were entered into the model.

Table 4 reports the significant risk factors associated with adolescent suicidality in the multivariate model: being female, having poor self-rated health, unhappy/average family life, use of inhalants and alcohol, being upset with appearance, and early onset of sexual activity.

DISCUSSION

Basing on a large, territory-wide, and representative sample of school students, this study provided unique information on adolescent suicidality in Hong Kong Chinese. It showed that around 20% of students displayed some form of suicidal ideation and/or behavior. The prevalence rate found in the

present study was relatively low compared to other Hong Kong studies which found that 39–42% of surveyed adolescents reported ideation (Chan, 1995; Fong, 1993; Stewart et al., 1999). However, this may be due to the differences in the wording of questions. The four questions used in the present study were also used in the U.S. Youth Risk Behavior Survey. Goldston (2000) suggests that these four questions are likely to yield conservative estimates of suicidal ideation and attempts. The Youth Risk Behavior Survey (1997) yielded prevalence rates among U.S. high school students as 20.5% (considered), 15.7% (planning), 7.7% (attempted), and 2.6% (medical care) (Brener, Krug, & Simon, 2000). The prevalence rates among high school students in Hong Kong were 17.8% (considered), 5.4% (planning), 8.4% (attempted), and 1.2% (medical care). Suicidal ideation and behavior among Hong Kong students appear to be less prevalent than in the U.S., but the differences were slight. It was intriguing to find that there were fewer students reported having a plan on how they would suicide than those who reported having attempted suicide, which might mean that impulsivity is a key area that we should study further. We were uncertain, however, about whether the low prevalence rate of planners was a genuine feature of the Hong Kong student population, or whether it was due to the Chinese translation of the YRBS. For some of the respondents, that question might be interpreted as whether their prior attempts were planned. This may explain the exceptionally low prevalence rate of those who reported having a suicide plan.

The binary logistic regression analyses shed some light on the similarities and differences in the risk factors associated with suicide ideation and attempts. Our analyses showed that ideators and attempters were similar in some respects: depression, unhappy family life, and alcohol use. On the other hand, tobacco and illicit drug and inhalant use differentiated attempters from ideators. This finding is consistent with other studies

TABLE 4
Adjusted Odd Ratios Estimated from Multivariate Cumulative Logit Model, Risk Factors with Suicidality

	OR	95%C.I.		*p*-value
Depression symptom score	1.85	1.64	2.08	.000
Age per year	0.90	0.84	0.97	.007
Male	0.73	0.58	0.91	.006
Poor self-rated health[a]	1.42	1.10	1.82	.006
Family life[b]				
Unhappy	2.53	1.82	3.52	.000
Average	1.57	1.25	1.97	.000
Used inhalants	2.19	1.26	3.81	.006
Drinking[c]				
3 times to every day a week	2.15	0.93	4.99	.075
Less than 3 times a week	1.83	1.47	2.27	.000
Upset with appearance[d]				
Always	1.84	1.03	3.29	.040
Occasionally	1.41	0.99	2.01	.056
Seldom	1.23	0.89	1.71	.212
Onset of sexual activity[e]				
Had sexual intercourse at/before age 14	3.08	1.93	4.92	.000
Had sexual intercourse after age 14	1.55	0.95	2.53	.083

[a]Good self-rated health; [b]Happy family life; [c]Did not drink; [d]Never; [e]Did not have sexual experience.

which found a stronger association of substance abuse with suicide attempts than with ideation (Garrison, McKeown, Valois, & Vincent, 1993; Gould et al., 1998). Nonetheless, in our study, drug use other than inhalants did not differentiate attempters from students with no suicidal behaviors. It may be due to the fact that drug use is not as prevalent as the use of inhalants among students in Hong Kong.

More factors were found to be associated with suicidal ideation than with suicidal attempts. Given the relatively high prevalence of suicidal ideation among adolescents, one of the possibilities is that a wider range of factors may be associated with negative feelings during adolescence, which in turn leads to suicidal ideation. Suicide attempts, which are on the higher end of suicidal behavior, may be more affected by a subset of risk factors. This subset of risk factors might be so prevalent among the attempters that it overshadows the effects of other risk factors in the statistical model. As Gould et al. (1998) argued, some factors (e.g., substance abuse) may lead to the escalation of suicidal ideation to attempt. They argued that such findings are compatible with the conceptualization of ideation and attempts as a continuum, or two distinct but overlapping groups. In other words, even if we conceptualize different suicidal behaviors as a continuum, it does not necessary follow that all risk factors would have a linear effect across the whole spectrum of suicidality. Cumulative logit modeling assumes (1) ordinality among the dependent variable's levels and (2) a uniform effect of the explanatory variables across the levels of the dependent variable. It is possible, however, that different risk factors' effects can be linear, nonlinear, or distinctive to specific levels. With the imposed extra constraints in the cumulative logit modeling, our model showed that a range of significant risk factors were associated with increasing levels of suicidality. This finding is highly relevant to early intervention strategies.

A wide range of factors were found to be associated with adolescent suicidality: basic individual correlates such as gender, health, and academic performance; family factors including happiness, guardianship, parental love, and family stability; different forms of substance abuse; social support; behavioral factors such as sexual activity; and perception such as satisfaction with appearance. Special attention should be paid to adolescents suffering from depression, having family problems, using inhalants/alcohol, and having an early onset of sexual activity, as these factors have a strong and independent association with increasing levels of suicidality.

Some of our findings require special attention. First, this study found that although female students were at a higher risk for nonfatal suicidal ideation and behavior, the gender difference was not very pronounced (OR = 1.43). It is well-known that suicide is more common among boys, but suicide ideation and attempts are more common among girls (Gould & Kramer, 2001).

In studies on completed suicide, older age represents a five-fold increased risk of suicide (Brent, Baugher, Bridge, Chen, & Chiappetta, 1999). Some researchers have argued that the marked increase in adolescent suicide in the last two decades could be explained by the parallel increase in depression, conduct disorder, and substance abuse with age (Gould & Kramer, 2001). In this study, however, older age represents a *lower* risk. How it relates to the absence of the adolescent peak in suicide rate in Hong Kong requires further research.

Psychopathology is considered the most important risk factor for adolescent suicide, and our review of the literature shows that depressive disorders consistently constitute the most prevalent disorders (Gould & Kramer, 2001; Leung, Ho, & Hung, 1998). This study shows that depression has a strong and independent association with suicidality. Nonetheless, the levels of depression symptoms were similar between ideators and attempters in our study.

Durkheim's model on suicide suggests a relationship between family integration and youth suicide. From a developmental psychology or life course perspective, it is not surprising that family dynamics play a special

role in adolescent suicidal behavior. In this study, family factors are shown to have a significant association with adolescent suicidality. It is in line with Gould et al.'s (2001) finding in the United States: After adjusting for sociodemographic measures and psychiatric disorders, a significant association persists between suicidal ideation or attempts and poor family environment and low parental monitoring.

In our study, although parents' marital status had a significant association with suicidality, its effect became insignificant under the multivariate model. Studies in the West also have mixed findings. For instance, even if the overall impact is quite small, non-intact family of origin is a risk factor for suicide attempts and completed suicide (Gould & Kramer, 2001). In Gould et al.'s study (2001), suicidal ideation and attempts are not associated with non-intact family of origin.

As Hong Kong is a society influenced by both Chinese and Western culture, the impact of family dysfunction on suicidality among the youth in Hong Kong deserves special attention. On the one hand, it has been argued that Chinese culture puts special emphasis on family values. On the other hand, like other Western societies, we have witnessed a rise in the level of family disintegration in Hong Kong in the past few decades (Yip & Lee, 2002). Whether the combination of these factors would pose a specific risk for adolescents requires further research, but our study does point out the importance of family factors on suicidality among adolescents in Hong Kong.

Research in the West has found that suicidality is strongly associated with substance abuse, especially with alcohol abuse (McClure, 2001). This study suggests that, although drug use was not a significant factor in the multivariate analysis, the use of inhalants/alcohol did have an impact on adolescent suicidality. The insignificant effect of drug use might be due to the low prevalence of drug use (i.e., relative to use of inhalants and alcohol). It should be noted also that drug use might be associated with inhalant and alcohol use; therefore, there could be a collinearity problem. In recent years there has been a raising concern over adolescent substance abuse in Hong Kong. Careful monitoring is needed to ascertain whether there will be a parallel increase of suicidal behavior.

Suicide attempters in Hong Kong adolescents have been found to be lonely and socially withdrawn (Stewart, Lam, Betson, & Chung, 1999). Other studies, nonetheless, have found that perceived social support and past suicide attempts are not correlated, or the negative relationship became insignificant after controlling for depression (Lewinsohn, Rohde, & Seeley, 1993; Yuen et al., 1996). In our univariate analysis, both the composite score of social support and the individual question items had a significant relationship with suicidality. In the multivariate cumulative logit model, however, measures of social support did not have significant effects on suicidality.

Orbach, Stein, Shani-Sela, and Har-Even (2001) have pointed out that body experience has become a growing interest as a new possible risk factor on suicidality among adolescents. It is hypothesized that negative attitude toward one's body, in the form of body rejection, body hate, and bodily detachment, may facilitate self-destructive behavior when under stress. This study found that dissatisfaction with one's own appearance increased the level of suicidality. Given the fact that teenagers in Hong Kong have shown greater concern about their body in recent years, this finding has high relevance to the social context.

On the other hand, sexual activity, pregnancy, and abortion belonged to another dimension of bodily experience that might be highly relevant to adolescent suicidality. Our findings were consistent with Gould et al.'s (2001) study, which found that onset of sexual intercourse is associated with suicidal ideation and attempts. Concerning the effect of pregnancy, Connolly (2002) points out the danger in assuming that pregnancy is protective against suicide. Gissler, Hemminki, and Lonnqvist's study (1996) in Finland found that although suicidal risk after giving birth

is half of that among women in reproductive age in general, teenage mothers have a suicide rate three times the general rate in the same age group. Univariate analysis of our data also suggests that pregnancy is a risk factor for suicidal behavior. Nonetheless, this result is not definitive given the small number of pregnancies and the fact that the teenage pregnancies among our sample usually resulted in an abortion; it is uncertain that whether the negative effect was due to the pregnancy itself, postnatal depression, abortion, or other common risk factors.

Limitations

There were several limitations in our study. First, the number of risk factors measured was limited. For example, personality variables, stressors, coping mechanism, and history of family psychopathology were not measured in the study. There might also be underreporting and recalling errors. A finer measure of suicidality, preferably with information from caretakers/interviews, is more desirable. Moreover, the in-school sample was not representative of school dropouts and absentees, who might be those with highest risk of suicidality.

The main limitation is the cross-sectional design, such that the temporal sequence of suicidality and risk factors is uncertain, and causal inference is limited.

CONCLUSION

This study reported the prevalence rate of suicidal ideation and behavior of adolescents in Hong Kong, using the first territory-wide sample. Our results suggest that there might be some dissimilarity of risk factors associated with suicidality in Hong Kong and in the West. For instance, female students in Hong Kong did not have a drastically higher risk for suicidal ideation and attempts than male students as compared to the West. In Hong Kong, illicit drug use was not as important a risk factor as in the West.

As King (1997) has pointed out, adolescence is in many ways a distinct phase. From a developmental perspective, adolescents are faced with various developmental tasks such as establishing autonomy and role identity. Socioenvironmental factors interact with psychological and cognitive factors throughout adolescence in a constant flux. This study suggests that a wide range of different factors are related to suicidality among this student population. In preventing adolescent suicidal ideation/behavior, a multidimensional approach is urgently needed. Programs on family, substance abuse, risky behavior, and social support are needed to help adolescents to face their specific problems; they are also urgently needed as a united effort in preventing adolescent suicide.

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