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Socio-economic and psychological correlates of suicidality among Hong Kong working-age adults: results from a population-based survey

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ABSTRACT

Background. The global toll of suicide is estimated to be one million lives per year, which exceeded the number of deaths by homicide and war combined. A key step to suicide prevention is to prevent less serious suicidal behaviour to preclude more lethal outcomes. Although 61% of the world's suicides take place in Asia and the suicide rates among middle age groups have been increasing since the economic crisis in many Asian countries, population-based studies of suicidal behaviour among working-age adults in non-western communities are scarce.

Method. Data from a population-based survey with 2015 participants were used to estimate the prevalence of suicidal ideation and behaviour among the working-age population in Hong Kong, and to study the associated socio-economic and psychological correlates. We focused particularly on potential modulating factors between life-event-related factors and suicidal ideation.

Results. Six per cent of the Hong Kong population aged 20–59 years considered suicide in the past year, while 1·4% attempted suicide. Hopelessness, reasons for living, and reluctance to seek help from family and friends had direct association with past-year suicidal ideation. Reasons for living were found to moderate the effect of perceived stress on suicidal ideation.

Conclusions. Suicidality is a multi-faceted problem that calls for a multi-sectored, multi-layered approach to prevention. Prevention programmes can work on modulating factors such as reasons for living to reduce suicidal risk in working-age adults.

INTRODUCTION

The World Health Organization (WHO) estimated that suicide claimed one million lives in 2001, which exceeded the number of deaths by homicide and war combined (WHO, 2004). The problem of suicide is increasingly being recognized as a public health problem that calls for a multi-layered approach (Knox *et al.* 2004). Early detection is undeniably one of the core components in suicide prevention. Despite the substantial differences between casual suicidal ideation, serious ideation, planning, attempts and completed suicides, research findings indicate that they largely follow a continuum of risk (Beautrais, 2001; Burless & De Leo, 2001; Yip *et al.* 2004). While extensive research has been conducted on more lethal suicidal behaviours

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based on clinical samples, relatively little is known about suicidal ideation in the general population (Burless & De Leo, 2001). As suicide ideation is a common antecedent of suicide behaviour, an understanding of its epidemiology, as well as the associated risk and protective factors, is essential to suicide prevention. The individuals who considered suicide or made less injurious suicide attempts, however, are unlikely to be in contact with health-care professionals. The limitation of relying solely on clinical samples in suicide research is clear (Burless & De Leo, 2001). For instance, 50–80 % of all suicide attempters do not present to medical care services (Burless & De Leo, 2001), and the majority of individuals who died by suicide had not received any specialist psychiatric care in the year before death (Appleby *et al.* 1999).

Although suicide rates tend to be higher among adults than adolescents, few studies have been conducted on suicidal ideation and non-fatal behaviour among adult population samples. Moreover, prior research on suicidal behaviour has been mainly conducted in Europe and the USA, even though 61 % of the world's suicides take place in Asia (Vijayakumar, 2005). After the economic crisis in 1997, suicide rates among the middle age groups have been on the rise in many Asian populations (Yip *et al.* 2003). For these reasons, community studies of non-fatal suicidal behaviours among adults in Asian populations are urgently needed to inform our global suicide prevention effort.

Prior studies have identified a number of individual correlates of suicidal ideation and behaviour among adults. For example, socio-demographic factors such as gender, age, marital status and socio-economic status are some stable correlates of suicidal behaviour (Kjoller & Helweg-Larsen, 2000); psychiatric disorders are regarded as the most important risk factor (Jacobs *et al.* 1999); depression often precedes suicidal ideation and behaviour (Goldney *et al.* 2000); and a recent population-based study shows that an anxiety disorder independently predicts onset of suicidal ideation and attempt (Sareen *et al.* 2005).

Among the risk factors, life-event-related factors are also found to be important triggers of suicidal behaviours (Heikkinen *et al.* 1994). Nonetheless, not all those who experience negative life events contemplate suicide. Under the diathesis–stress paradigm (Schotte & Clum, 1982, 1987), other factors mitigate the effect of stress in leading to suicidal behaviour. For instance, Yang and Clum (1994) hypothesize that social support can moderate the impact of life stress on suicidal behaviour. Extending the work of Schotte and Clum, Dixon *et al.* (1994) proposed hopelessness as a mediator between failures in coping with life stress and suicidality. Having reasons for living is also considered an important protective factor (Linehan *et al.* 1983). Goal-directed traits, conceptualized by Synder *et al.* (1991) as Hope, may make one more able to deal with life's difficulties (Range & Penton, 1994). By contrast, negative coping styles and unwillingness to seek help can increase one's suicidal risk in time of stress (Horesh *et al.* 1996). Nonetheless, compared with the large number of studies on risk factors of suicidality, few studies have looked into its protective factors. Given the implications for clinical practice and population-based suicide prevention strategies, it is important to study these potential modulating cognitive and behaviour factors.

This study aimed to explore the relationships between socio-economic and psychological factors and suicidal ideation, with particular focus on the above-mentioned moderating factors. It also provides an accurate estimation of the prevalence of suicidal ideation and behaviour among the adult population aged 20–59 years in Hong Kong.

METHOD

Participants

The sampling frame used in this study was the Frame of Quarters maintained by the Census and Statistics Department of Hong Kong. It is the most complete and up-to-date registry of residential addresses in the territory. Random sampling stratified by geographic area and type of living quarters (e.g. public or private housing estates) was performed. One household member in a contacted household was selected randomly by the last-birthday method. This sampling procedure yielded successful interviews with 2016 respondents aged between 20 and 59 years between December 2003 and July 2004, and the response rate was 62 %. The age and gender distribution of the sample was similar to that

of the population aged 20–59 years in Hong Kong. Excluding the one case with missing data on past-year suicidal ideation, there were 2015 cases available for analysis. Written informed consent was obtained from all participants. This study was approved by the ethic committee of the Social Science Faculty, the University of Hong Kong.

Measures

The interviews were conducted in Chinese. A typical interview lasted for one hour. A self-report booklet was used for the sensitive questions such as history of psychiatric consultation and negative life-events.

Suicidality

Suicidal ideation and behaviour were measured as follows: (1) Lifetime ideation: 'In your lifetime, have you ever considered suicide?' (yes/no); (2) Past-year ideation: 'During the past 12 months, have you ever considered suicide?' (yes/no); (3) Past-year suicide plan: 'During the past 12 months, have you made a plan about how you would attempt suicide?' (yes/no); (4) Past-year attempt: 'During the past 12 months, how many times did you actually attempt suicide?' (0, 1, 2–3, 4 or more); and (5) Injurious past-year attempt: '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)?'(yes/no).

Predicting variables

Selection of the predicting variables in this study was guided by prior research. As clinical diagnosis of psychiatric disorders could not be made in the interview, whether the respondent had ever received psychiatric consultation served as a proxy measure of a history of psychiatric disorder. The summary scores of the psychological instruments were standardized before being entered into the multivariate regression models. Further details of the variables can be found in Table 1(*a*, *b*).

Statistical methods

Weighting

Because only one member of a sampled household was selected randomly, we weighted the data with the inverse of the number of eligible respondents in the household to adjust for the differences in the selection probability. Although there was no significant difference in the proportions of men and women between our sample and the population aged 20–59 years in mid-2004 ($\chi^2 = 0.06$, df = 1, $p = 0.807$), there was a slight but significant difference in the age profiles ($\chi^2 = 21.26$, df = 7, $p = 0.003$); there were slightly more men and women in the 35–39 years (+2.2 total %) and 40–44 years (+2.0 total %) age groups in our sample than in the population. We adjusted for these slight discrepancies by weighting our data according to the population distribution of the population aged 20–59 years in mid-2004.

Statistical analysis

Point estimates and the 95% confidence intervals (CIs) of the prevalence of the different levels of suicidality were provided. χ^2 and *t* test statistics were used to test the differences in the proportions or means of the independent variables between those had and had not considered suicide in the past year. Nested multivariate regression analysis was performed to identify important life-event-related variables and potential modulating variables, while controlling for the effects of significant socio-economic and psychological variables. Interactions between the proposed modulating variables and the life-event-related variables were tested. Regression models were not performed to past-year planning, attempt and attempts that required medical care because of the limited number of cases.

RESULTS

Explanatory variables

Table 1(*a*, *b*) gives the proportions or means and standard deviations of the explanatory variables according to the presence of past-year suicidal ideation. The χ^2 and *t* test statistics show that there were substantial differences between the two groups with regard to most of the explanatory variables.

Prevalence of suicidal ideation and behaviour

Table 2 reports the estimated proportions and their 95% CIs of the different levels of

Table 1(*a*). *Descriptive statistics of the categorical independent variables, unweighted data*

Variable	Definition	Past-year ideation	No past-year ideation	All	χ^{2a}
Gender	1 = male	33·6	48·3	47·3	10·4**
	0 = female	66·4	51·7	52·7	
Education level	1 = matriculation or above	29·1	30·0	30·0	0·4
	2 = Form 4 or Form 5[b]	31·5	33·6	33·5	
	3 = Form 3 or below[b]	39·4	36·4	36·6	
Marital status	1 = single, never married	35·2	29·4	29·8	45·5**
	2 = divorced, separated or widowed	19·5	5·5	6·4	
	3 = married or cohabiting	45·3	65·1	63·8	
Low household income	1 = under HKD3999 per month	11·7	3·8	4·3	18·5***
	0 = HKD4000 or above per month	88·3	96·2	95·7	
Psychiatric consultation	1 = had ever received psychiatric consultation	16·9	3·3	4·2	53·8***
	0 = had never received psychiatric consultation	83·1	96·7	95·8	
Interpersonal conflicts	Presence of the following types of serious interpersonal conflicts experienced in the past 12 months: (i) serious conflicts with family; (ii) serious conflicts with neighbour or friends; (iii) breaking off from a stable relationship				
	0 = none of these incidents	59·4	91·7	89·6	173·1***
	1 = any one type of conflict	25·8	7·1	8·3	
	2 = any two types of conflicts	11·7	1·2	1·9	
	3 = all three types of conflicts	3·1	0·1	0·3	
Unemployment	1 = unemployed at time of interview	89·1	96·2	4·2	15·3***
	0 = employed/self-employed at time of interview	10·9	3·8	95·8	
Chronic illness or long-term pain	1 = had chronic illness or long-term pain	58·6	23·6	24·7	20·5***
	0 = did not have chronic illness or long-term pain	41·4	76·4	75·3	
Debts	1 = had large amount of debts	18·4	9·0	9·6	11·8**
	0 = did not have large amount of debts	81·6	91·0	90·4	
Abuse	1 = had been physically, sexually or emotionally abused	32·8	8·7	10·2	76·3***
	0 = had not been physically, sexually or emotionally abused	67·2	91·3	89·8	
Recent bereavement	1 = had a first-degree relative who died in the past 12 months	13·3	11·2	11·3	0·5
	0 = did not have a first-degree relative who died in the past 12 months	86·7	88·8	88·7	
Help-seeking behaviour	1 = had any obstacles in seeking help from people you know	64·1	35·8	37·6	40·9***
	0 = did not have obstacles in seeking help from people you know	35·9	64·2	62·4	

[a] Comparison of the two groups with and without past-year ideation.
[b] Form 3 is equivalent to Grade 9 and Form 4 and 5 to Grade 10 or 11 in the US system.
** $p < 0.01$, *** $p < 0.0001$.

suicidality, and shows that 28·1% of the population aged 20–59 years had lifetime suicidal ideation; 6·0% had past-year suicidal ideation; and 1·9% made a suicide plan in the past year. While it is estimated that 1·4% attempted suicide in the past year, only 0·1% had made at least one suicide attempt in the past year that required medical attention. In addition, suicidal ideation and behaviours decreased with age and were more prevalent among women than men.

Nested multivariate regression analysis

Past-year suicidal ideation was regressed on the explanatory variables in four steps.

Table 3 shows the adjusted odds ratios (ORs) of the final model. In the first step, the socio-economic variables, history of psychiatric consultation, standardized Center for Epidemiological Studies Depression Scale (CES-D) and Depression Anxiety Stress Scales (DASS)-anxiety scores were entered in the model (Model 1). Backward stepwise elimination identified age, marital status, ever had psychiatric consultation, CES-D and DASS-anxiety scores as the significant correlates of past-year ideation. Gender, educational level and low household income were insignificant. The five significant variables in Model 1 were

Table 1(*b*). *Descriptive statistics of the continuous independent variables, unweighted data*

Variable	Definition	Cronbach's alpha	Range	Past-year suicidal ideation		No past-year suicidal ideation		t test[a]
				Mean	S.D.	Mean	S.D.	
Age (yr)	Age at time of interview	—	20–59	36·7	10·1	39·0	10·3	−2·4*
Average life distress rating	Average rating of the levels of distress concerning 16 aspects of life[b]	—	0–3	0·8	0·5	0·3	0·4	12·9***
Depressive symptoms	Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977; Cheung & Bagley, 1998)	0·94	0–60	22·0	15·0	7·1	8·4	18·2***
Anxiety symptoms	Seven-item anxiety subscale of the Chinese Depression Anxiety Stress Scales (DASS-anxiety; Taouk *et al.* 2001)	0·82	7–28	12·7	4·5	9·2	2·7	13·5***
Social support	Twelve-item Chinese Multi-dimensional Scale of Perceived Social Support Scale (MSPSS; Zimet *et al.* 1988; Chou, 2000)	0·92	12–84	54·5	16·9	63·1	14·3	−6·4***
Negative coping styles	Eight items on substance use, self-blame, behavioural disengagement, and denial in the Chinese Brief COPE (Wei & Tang, 1996)	0·75	8–32	18·2	4·8	15·2	3·9	8·4 ***
Hopelessness	Twenty-item Chinese Beck Hopelessness Scale (BHS; Beck *et al.* 1974; Shek, 1993)	0·85	0–20	8·7	4·6	5·0	3·6	11·0***
Hope	Eight-item Hope Scale (HOPE; Snyder *et al.* 1991)	0·89	8–32	21·6	4·9	25·0	4·2	−8·9***
Reasons for living	12-item Brief Reasons for Living Scale (BRFL; Ivanoff *et al.* 1994)	0·77	12–72	43·2	11·4	48·8	11·3	−5·4***

[a] Comparison of the two groups with and without past-year ideation.
[b] The 16 aspects were marriage, household duty, financial circumstances, employment, education, leisure time, social life, physical health, and relationships with parents, parents-in-law, spouse/partner, children, schoolmates, colleagues, other relatives and friends.
* $p<0.05$, *** $p<0.0001$.

Table 2. *Prevalence of suicidal ideation and behaviours among the population aged 20–59 years by gender and age group, weighted data*

Age (yr)	Gender	N in sample	Lifetime suicidal ideation	Past-year suicidal ideation	Past-year suicide planning	Past-year suicide attempts	Received medical care
20–24	M	99	28·8 (20·0–38·5)	5·8 (2·2–12·1)	1·0 (0·0–5·2)	1·0 (0·0–5·2)	0·0 (0·0–2·8)
	F	114	38·7 (29·4–48·6)	9·3 (4·6–16·5)	2·8 (0·6–8·1)	2·8 (0·5–8·0)	0·0 (0·0–2·8)
	All	213	33·8 (27·4–40·6)	7·6 (4·4–12·0)	1·9 (0·5–4·8)	1·9 (0·5–4·8)	0·0 (0·0–1·4)
25–34	M	212	34·8 (28·6–41·5)	8·6 (5·3–13·1)	1·4 (0·3–3·9)	0·5 (0·0–2·5)	0·0 (0·0–1·4)
	F	267	31·9 (26·4–37·8)	7·7 (4·8–11·5)	3·6 (1·8–6·6)	2·6 (1·0–5·2)	0·0 (0·0–1·1)
	All	479	33·2 (29·1–37·5)	8·1 (5·9–11·0)	2·6 (1·4–4·5)	1·6 (0·7–3·2)	0·0 (0·0–0·6)
35–44	M	335	25·6 (20·6–31·2)	3·9 (2·0–6·9)	1·1 (0·2–3·1)	1·1 (0·2–3·1)	0·0 (0·0–1·1)
	F	371	36·7 (31·6–42·1)	7·6 (5·0–10·9)	2·0 (0·8–4·2)	1·5 (0·5–3·4)	0·3 (0·0–1·6)
	All	706	31·7 (28·1–35·5)	5·9 (4·2–8·1)	1·6 (0·8–2·9)	1·3 (0·6–2·5)	0·0 (0·0–0·9)
45–54	M	215	18·2 (13·7–23·5)	3·1 (1·4–6·0)	1·9 (0·6–4·5)	1·6 (0·4–3·9)	0·0 (0·0–1·2)
	F	240	26·8 (21·6–32·6)	6·4 (3·8–10·1)	2·3 (0·8–4·9)	1·1 (0·2–3·3)	0·4 (0·0–2·1)
	All	455	22·6 (19·1–26·4)	4·8 (3·1–7·0)	2·1 (1·1–3·7)	1·3 (0·5–2·7)	0·0 (0·0–1·1)
55–59	M	94	9·6 (4·3–18·1)	2·4 (0·3–8·4)	1·2 (0·0–6·5)	0·0 (0·0–3·5)	0·0 (0·0–3·5)
	F	69	7·5 (2·8–15·6)	1·3 (0·0–6·9)	0·0 (0·0–3·7)	0·0 (0·0–3·7)	0·0 (0·0–3·7)
	All	163	8·6 (4·8–14·0)	1·9 (0·4–5·3)	0·6 (0·0–3·4)	0·0 (0·0–1·8)	0·0 (0·0–1·8)
All	M	955	24·6 (21·9–27·5)	5·0 (3·7–6·6)	1·4 (0·7–2·3)	1·0 (0·4–1·8)	0·0 (0·0–0·3)
	F	1061	31·0 (28·3–34·0)	7·0 (5·6–8·7)	2·4 (1·6–3·6)	1·7 (1·0–2·7)	0·2 (0·0–0·7)
	All	2016	28·1 (26·1–30·1)	6·0 (5·1–7·2)	1·9 (1·2–2·6)	1·4 (0·9–2·0)	0·1 (0·0–0·4)

Values are % (95% confidence interval).

retained in the subsequent models as the controlling variables (Nagelkerke $R^2=31.0\%$, Model $\chi^2=224.19$, df $=6$).

In Step 2, the life-event-related variables were entered into the model. Breaking up of a stable relationship in the past 12 months and the mean

Table 3. *Adjusted odds ratios from multivariate regression model on past-year suicidal ideation*

	OR	Sig.	95% CI
Age	0·977	0·124	0·949–1·006
Marital status[a]		0·002	
Single	0·894	0·742	0·459–1·741
Separated, divorced or widowed	**3·854**	**0·001**	**1·773–8·378**
Had psychiatric consultation	**3·774**	**0·000**	**1·835–7·763**
CES-D	**1·578**	**0·000**	**1·226–2·030**
DASS anxiety subscore	**1·315**	**0·011**	**1·066–1·622**
Broke up from a steady relationship last year	**3·821**	**0·001**	**1·782–8·192**
Average life distress rating	1·383	0·295	0·753–2·541
BHS[b]	**1·358**	**0·027**	**1·035–1·783**
Negative coping strategies[b]	1·198	0·159	0·932–1·540
Hope[b]	0·909	0·473	0·701–1·179
BRFL[b]	0·937	0·737	0·639–1·374
MSPSS[b]	1·193	0·195	0·914–1·557
Had difficulties in seeking help	**1·862**	**0·015**	**1·131–3·065**
Average life distress rating × BRFL[b]	**0·582**	**0·021**	**0·367–0·923**
Constant	0·036	0·000	

CES-D, Center for Epidemiological Studies Depression Scale; DASS, Depression Anxiety Stress Scales; BHS, Beck Hopelessness Scale; BRFL, Brief Reason for Living Scale; MSPSS, Multi-dimensional Scale of Perceived Social Support Scale; OR, odds ratio; CI, confidence interval.

Values with $p < 0.05$ shown in bold.

[a] Reference category = married.

[b] Standardized scores.

FIG. 1. Interaction between mean life distress rating and brief reasons for living (BRFL).

life distress rating were found to be the two significant correlates (Model 2). Serious conflicts with family and with friends and neighbours, being currently unemployed, chronic illness or long-term pain, having a large amount of debt, having been physically, psychologically or sexually abused, and recent bereavement were insignificant. The inclusion of the two significant life-event-related variables significantly increased the model's goodness-of-fit (Δ Nagelkerke $R^2 = 3\cdot7\%$; $\Delta\chi^2 = 28\cdot42$, $\Delta df = 2$, $p < 0\cdot01$). The inclusion of the life-event-related variables attenuated the estimated effects of the variables identified in Model 1. For example, age became insignificant, and the ORs of the other four Model 1 predicting variables all decreased. This suggests that the life-event-related variables mediated part of their effects on past-year ideation.

The potential modulating variables were entered in Step 3. Hopelessness (measured on the Beck Hopelessness Scale, BHS), reasons for living (measured on the Brief Reason for Living Scale, BRFL) and having difficulty in seeking help from others had direct effects on past-year suicidal ideation, controlling for the effects of
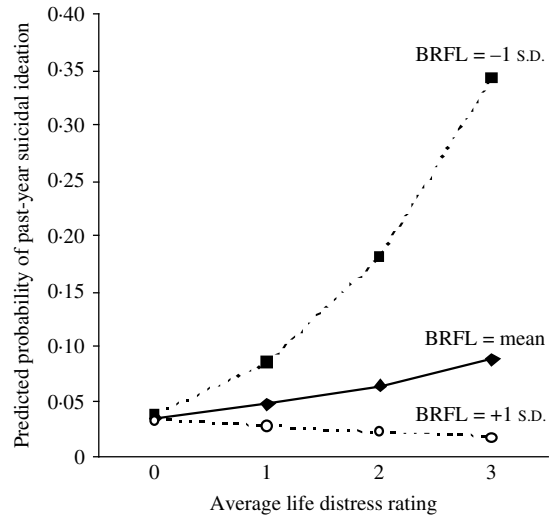
the significant variables identified at Steps 1 and 2. Negative coping styles, Hope and social support (measured on the Multi-dimensional Scale of Perceived Social Support Scale, MSPSS) were insignificant. The inclusion of the potential modifying factors made a unique contribution to the model's goodness-of-fit (Δ Nagelkerke $R^2 = 3\cdot7\%$; $\Delta\chi^2 = 28\cdot39$, $\Delta df = 6$, $p < 0\cdot01$). The ORs of the other variables in the model further decreased.

In the final step, the interaction terms between the two significant life-event-related variables and the significant variables in the last step were entered into the model. Backward stepwise elimination found that the interaction between the BRFL score and mean life-distress rating was significant. Figure 1 depicts the estimated probability of reporting past-year suicidal ideation by the mean life distress rating. It shows that when a respondent's BRFL score was 1 standard deviation (S.D.) below the mean, the probability of having considered suicide in the past year increased substantially with the mean life distress score; when a respondent had a high BRFL score (e.g. +1 S.D.), their mean life distress score was *not* associated with the probability of past-year suicidal ideation.

DISCUSSION

This is the first territory-wide study on the prevalence of suicidal ideation and behaviour

among the working-age population in Hong Kong, revealing that 6·0% of the population aged 20–59 years had past-year suicidal ideation, while 1·4% had made an attempt in the past-year. The prevalence of past-year suicidal ideation and past-year attempt among adults ranged from 2·4% to 6·9% and from 0·4% to 1·0% respectively in the UK, the USA, Australia, Denmark and Finland (Hintikka *et al.* 1998; Crosby *et al.* 1999; Kjoller & Helweg-Larsen, 2000; Pirkis *et al.* 2000; Meltzer *et al.* 2002). Excluding the findings from Finland, a country of high suicide rates, the 1-year attempt rates in the other four countries range from 0·4% to 0·7%. Hence, while the prevalence of past-year ideation among working-age adults in Hong Kong was comparable to other developed countries, the prevalence of past-year attempts appeared to be high. More importantly, although 1·4% of this population reported attempting suicide in the past year, only 0·1% had received medical care for their suicide attempt(s). Although this may suggest that many of these attempts may not be 'serious', it also confirms that suicide-related behaviour is much more prevalent than what is presented to the medical care system. This calls for population-based strategies (e.g. gatekeeper training and public awareness campaign) to tackle this important public health problem.

This study also provided a comprehensive overview of the socio-economic and psychological correlates of suicidal ideation among the Hong Kong Chinese working-age population, with particular focus on the potential modulating factors (i.e. hopelessness, hope, negative coping styles, reasons for living, having difficulties in seeking help, and social support). Among the demographic factors, we found that gender was not significantly associated with suicidal ideation, controlling for the effects of other factors. However, one well-known epidemiological fact of suicide is that men tend to have a higher suicide rate than women (Schmidtke *et al.* 1999), although Asian countries have reported much lower male to female ratios of suicide (Yip *et al.* 2000). The same lack of substantial gender difference in suicidal ideation has been reported by studies conducted on populations with high male to female ratios of suicide (Hintikka *et al.* 1998; Crosby *et al.* 1999; Kjoller & Helweg-Larsen, 2000; Pirkis *et al.* 2000;

Meltzer *et al.* 2002). This indicates that there may be gender-specific factors that lead to more lethal outcomes among male ideators (Hawton, 2000; Beautrais, 2002; Moller-Leimkuhler, 2003). Nevertheless, the lack of gender difference in the prevalence of suicidal ideation suggests that suicide is a public health problem in both genders, and caution is needed to monitor any shifts in the potential lethality of suicidality among women.

Among the life-event-related variables, breaking up from a stable relationship in the past year and the mean life distress rating were found to be associated with past-year suicidal ideation. We also found that hopelessness, reasons for living, and reluctance to seek help from family and friends were independently associated with past-year ideation. These findings confirm existing findings that suggest that cognitive and behavioural factors have important roles in suicidality (e.g. Beck *et al.* 1989; Yang & Clum, 1994; Kuo *et al.* 2004). Moreover, reasons for living were shown to moderate the effect of perceived stress on suicidal ideation; among people with important reasons for living, the probability of reporting past-year ideation was low even when perceived stress was high. Such results should have important implications to suicide prevention strategies.

It is well known that there are complex interdependencies among the risk and protective factors of suicidal behaviour. Indeed, our nested multivariate regression analysis showed that there were complex relationships among the predicting variables, because including additional factors in the model attenuated the statistical relationships between suicidal ideation and other factors; putting all our measures in a single multivariate model will essentially ignore this complexity and omit important information. To make better sense of this complexity, on the one hand we need theories of suicidal behaviour, and on the other hand we need empirical research that is aimed towards exploring this complexity. However, as Maris (1981) points out, the large number of factors associated with suicidality and the complex relationship among them make the development of a theory of suicide 'a complicated and in some ways ungratifying venture' (p. 290). Yet there is no substitute for theory in suicide research (Leenaars *et al.* 1997). Similarly, empirical

studies should continue to try to elucidate this complexity. That also was our aim in this study. Certainly, our categorization of the variables, as well as our sequence of entering them into the nested regression model, is not unique and can be debated. Different sequences of model fitting can be formulated that might give somewhat different interpretations of the results.

This study has many advantages, including the large, representative sample and the large number of variables measured in one survey specifically designed to study suicidal behaviour. Yet there are several limitations that should be acknowledged. First, with a cross-sectional design, our analysis can only describe the statistical relationships among the predicting variables and suicidal ideation that existed in our data. It does not permit us to make any causal inferences, which require a longitudinal design. Second, the difficulty in inferring causal relationships lies in the fact that our outcome measure (i.e. suicidal ideation) was measured for the past year, but some of our predictors (e.g. depressive symptoms) were specific to the 2 weeks before the interview.

Third, suicidal ideation and behaviour were self-reported and thus subject to the problem of under-reporting. Moreover, compared with behavioural measures, suicidal ideation is a somewhat vague construct and the degree of 'seriousness' in such ideation should have varied among our respondents. Hence caution is needed in generalizing our results on this more common form of suicidal ideation to high levels of suicidality. However, relying solely on behavioural measures such as suicide attempts has its own disadvantage, as a substantial proportion of suicide decedents did not have a history of prior attempt (Sakinofsky, 2000). Ideally, we could perform separate analyses on suicide plans and attempts, but even in our rather large sample there were not enough respondents with a suicide plan or attempts to allow detailed statistical analysis.

The response rate of 62 % may be considered by some as insufficient and has limited the generalizability of our results. However, the age and gender distribution of our sample deviated very little from that of the general population, and our response rate is just slightly lower than the response rates reported in other prevalence studies on suicidality (e.g. Kjoller & Helweg-Larsen, 2000; Hintikka *et al.* 2001). Given the global trend of decreasing response rate, we see this response rate as acceptable. Finally, the time limit of an interview at the respondent's home did not allow a proper psychiatric diagnosis; hence we can only use a history of psychiatric consultation as a proxy measure and cannot directly assess the contribution of psychiatric disorders.

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DECLARATION OF INTEREST

None.

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