Psychiatry Research 321 (2023) 115059

Contents lists available at ScienceDirect

Psychiatry Research

journal homepage: www.elsevier.com/locate/psychres

Risk and protective factors in suicidal behaviour among young people in Hong Kong: A comparison study between children and adolescents☆☆

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ARTICLE INFO

Keywords:
Suicidal behaviour
Growth mindset
Self-compassion
Protective factor
Risk factor

ABSTRACT

Suicide is the leading cause of death among young people worldwide. Few studies examined the factors of childhood suicidality and compared them with adolescent suicidality to meet their age-specific needs. We examined the similarities and differences in risk and protective factors of children and adolescent suicidality in Hong Kong. A school-based survey with 541 students in grades 4–6 and 3,061 students in grades 7–11 from 15 schools was conducted. We measured the demographic, familial, school, mental health, and psychological factors of suicidality. Hierarchical binary logistic regressions were performed to examine the association between correlates and child and youth suicidality, and the interaction effects of these factors and school-age groups. Approximately 17.51% and 7.84% of secondary school respondents and 15.76% and 8.17% of primary school respondents reported suicidal ideation and attempt, respectively. Common correlates for suicidal ideation were depression, bullying, loneliness, self-compassion, and growth mindset, while those for suicide attempt were depression and bullying. Secondary school respondents with higher life satisfaction reported less suicidal ideation, while primary school respondents with higher self-control reported fewer suicide attempts. In conclusion, we recommended recognizing the factors of suicidal ideation and attempt in children and adolescents to tailor preventive strategies in a culturally sensitive manner.

1. Introduction

Suicide is one of the leading causes of death among young people aged 10–24 years (Bachmann, 2018). Suicide rates worldwide were estimated respectively to be 15.3 and 11.2 per 100,000 males and females aged 15–29 years, and 0.9 and 1.0 per 100,000 males and females aged 5–14 years (Bilsen, 2018). Suicidal ideation is a robust risk factor and mediator of many psychosocial-developmental risk factors in more severe suicidal behaviour (Lawrence et al., 2021). One study estimated that approximately one-third of adolescents with suicidal ideation will develop a suicide plan and that approximately 60% of those with a plan will attempt suicide (Nock et al., 2013). The Global School-Based Health Survey, which was conducted in 90 countries, revealed that young people aged 12–15 years had thought about suicide (16.5%), created a suicide plan (16.5%), or attempted suicide (16.4%) in the past 12 months (Campisi et al., 2020). Specifically among young people in Asia, and particularly junior and senior high-school adolescents in Taiwan, mainland China, Hong Kong, and South Korea, the highest prevalence was observed for suicidal ideation in Taiwan (27.6%), for suicide planning in mainland China (7.0%), and for suicide attempt in South Korea (4.9%) (Chen and Kuo, 2020).

Although suicidal behaviour is less reported among children than among adolescents (DeVille et al., 2020), childhood suicidality is a growing concern. A study documented that over the last decade, self-harm presentations by children in emergency departments have increased globally, and that the COVID-19 pandemic may have worsened the situation (Sara et al., 2022). Additionally, childhood suicidality predicts adult psychiatric morbidity and mortality and has been suggested as an indicator of lifelong vulnerability to poor mental health (Copeland et al., 2017). Hence, both the early identification of childhood suicidality and proactive actions to minimize childhood suicidal risk are necessary.

Among the limited research into the suicidality of children aged under 12 years, several review studies have found that childhood

☆ We obtained ethical approvals from the Human Subjects Ethics Sub-Committee of the Hong Kong Polytechnic University (No. HSEARS20210414004-01).

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https://doi.org/10.1016/j.psychres.2023.115059
Received 3 July 2022; Received in revised form 5 January 2023; Accepted 14 January 2023
Available online 27 January 2023

suicidality is related to presence of psychopathology, such as attention deficit hyperactivity disorder, antisocial personality disorder, depression, or poor coping strategies; poor parent–child relationships; physical and sexual violence; and school problems, such as bullying and poor school performance (Desmarais and Montreuil, 2021; Sousa et al., 2017; Tishler et al., 2007; Wasserman et al., 2020). A recent study that examined suicidality among children aged 6–12 years from seven European countries found that the average prevalence of suicidal ideation and death-related thoughts was 16.9% and 21.9%, respectively; and children living in a single-parent environment or with some psychiatric syndromes were found to be at higher risk of death-related thoughts and suicidal ideation (Kovess-Masfety et al., 2015). While there has been less of a focus on identifying protective factors in suicidality in young people, scholars have suggested that the presence of one or more protective factors, such as positive self-esteem (Kleiman and Riskind, 2013), social and school connectedness (Whitlock et al., 2014), or good problem-solving skills (Burke et al., 2016), may reduce suicide risk by as much as 70–85% (Borowsky et al., 2001).

Noteworthily, contextual and cultural factors play significant roles in the understanding and prevention of youth suicidality and help-seeking patterns of young people in different parts of the world. For instance, racism and discrimination were reported to be prevalent stressors linked to youth suicidality among African Americans (Clark et al., 1999). Many East Asian societies are heavily influenced by the Confucian belief that education is the most crucial process of constant self-improvement, and that it leads one to become successful; therefore, across this region, academic success and school distress are significant stress factors that contribute to student suicidal behaviour (Snowdon, 2018). Specifically, academic stress was reported as a factor in 59.1% of suicides by children aged 10–14 years in Singapore and in 38.0% of suicides among those aged under 18 years in the United Kingdom; however, it was only reported as a factor in 18.7–22.7% of suicides in children aged under 15 years in Turkey (Wong et al., 2022). Moreover, in many Asian countries, people exhibit a low intention to seek help due to strong social stigma, which leads to increased rates of suicidal ideation and attempt among young people (Kwak and Ickovics, 2019). Hence, examining suicidality in different ethnicities is critical, as is exploring the implications of culture for the development of suicide prevention.

In 2020, the overall suicide rate in Hong Kong was 12.1 per 100,000, and the suicide rate of children under the age of 15 years was 0.9, increasing to 7.9 among those aged 15–24 years (The Center for Suicide Research and Prevention, CSRP, 2022). Using cluster analysis, Wong et al. (2022) found that among 35 suicide cases of school-aged students in Hong Kong, the largest subgroup ($n = 14$, valid percent = 40%) was characterised by high academic stress. This finding indicated that academic stress is a major risk factor for suicidality among Hong Kong youths. Most studies on suicidality among young people in Hong Kong have mainly examined adolescents and the estimated prevalence of suicidality, including suicidal ideation, non-suicidal self-injury, and self-harm, ranges from 15.0 to 32.7% (Zhu and Wong, 2022; Zhu et al., 2019). A review paper of youth suicidality in Hong Kong found that psychopathologies, especially depression, family relationship issues, and impulsivity, were identified as the most common risk factors for youth suicidal behaviour in Hong Kong; however, less is known about the factors that prevent its development (Siu, 2019). Since relevant studies have found that parental relations (DeVille et al., 2020), peer relations (Pfeffer, 1997), school climate (Young et al., 2011), school bonding (Shahram et al., 2021), self-compassion (Zhang et al., 2019), self-control, and a growth mindset (Zhu and Wong, 2022) are potential factors that could protect against youth suicidality, examining whether these factors are applicable to the local context would have important research and practice implications.

In addition, the identification of commonalities and differences between children and young people in terms of the risks and protective factors associated with suicidality might enable policy makers, educators, and clinicians to intervene on behalf of at-risk individuals more effectively and as early as possible (Sheftall et al., 2021). Locally and internationally, concerns are high regarding the recent increases in suicidal behaviour among young children (Sara et al., 2022) as well as the deterioration of their psychological well-being during the COVID-19 pandemic (Racine et al., 2021). Therefore, this study aimed to fill the research gaps by examining and comparing risks and protective factors in child and adolescent suicidality in Hong Kong in the hope that more age-specific initiatives can be developed and implemented effectively in differentiated ways.

Based on prior research into the associations between suicidality and young people, this study specifically examined the role of psychosocial factors in relation to suicidal ideation and suicide attempt among children and compared them with those of adolescents in Hong Kong. We hypothesised that, besides the sociodemographic characteristics (Vinas et al., 2002), differences exist in the influences and magnitudes of the factors between children and youth suicidality, which include family, school, and mental health factors. Specifically, we hypothesised that the parent–child relationship, perceived home living environment, school bonding, self-compassion, self-control, a growth mindset, and life satisfaction are negatively associated with suicidality, while mental health symptoms are positively associated with suicidality.

2. Methods

2.1. Participants and process

This study adopted a cross-sectional survey design and was conducted from May to June 2021. Since January 2020, Hong Kong had experienced four waves of COVID-19. During each outbreak, all schools, libraries, playgrounds, beaches, and sport facilities were closed as mandatory measures. Schools reopened and resumed half-day schooling once the pandemic situation had been relieved slightly. This study was conducted during a period when schools had reopened. Invitations were sent to 23 primary and secondary schools on Hong Kong Island as well as in Kowloon and the New Territories. We ceased sending invitations when four primary schools and nine secondary schools had agreed to participate. Seven schools declined due to the difficulties of arranging a school-based survey during half school days, while two refused to use the suicide-screening questions in the questionnaire. The higher grades in primary schools (i.e., Grades 4–6) and all grades in secondary schools (i.e., Grades 7–11, as Grade 12 had left school after sitting their university admission exams) were invited to join the study. The lower grades were not invited because we deemed the students to possibly not yet be able to understand all of the survey questions. Schools were sent a digital or hard-copy research information sheet with a parental consent form that detailed the research objectives, possible risks, and the benefits of participation.

The parental consent forms were collected by the schools before the survey. Students gave assent and they were reassured that their participation was voluntary and they could withdraw at any time. To reduce the concerns associated with being labelled, participants were assured that their teachers would not be able to view their responses. The pen-and-paper survey was conducted in classrooms under the administration of one or two trained research assistants. Participants could select either Chinese or English versions of the questionnaire. The research assistants introduced the surveys to the participants with a standard script; then, they provided guidance on how to complete the questionnaire and answered queries when appropriate. When the surveys were finished, the research assistants packed and sealed the questionnaires and returned them to the first author's university. All participants of this study received souvenirs worth US$5. We obtained ethical approval from the Human Subjects Ethics Subcommittee of the first author's university.

2.2. Measures

The questionnaire consisted of validated measures of suicidal ideation and attempt as well as measures of familial, school-related, mental health–related, psychological, and demographic factors.

The *demographic factors* were age, gender, and socioeconomic status.

Suicidal ideation and attempt were measured with two items of the Suicidality Scale (Cheung et al., 2013). The question regarding suicidal ideation was as follows: "In the past 12 months, have you ever seriously considered suicide?" The question regarding suicide attempt was as follows: "In the past 12 months, have you ever attempted suicide?" Respondents answered the questions with dichotomous yes/no responses.

The *family factors* were family structure, time spent chatting with parents, family relationship, family environment, and parental conflict. The respondents were asked whether they were living with both parents, a single parent, or not with either parent, and also how many days a week they chatted with their parents for more than 15 min. Family relationship was measured with a three-item parent–child relation scale with a four-point Likert scale (1 = strongly disagree, 4 = strongly agree; Shek, 2006). Sample items are as follows: "I am very satisfied with the relationship between me and my parents" and "I actively share with my parents what happens to me." Higher mean scores of the three items indicated a better relationship with parents. The scale's Cronbach's α was 0.84. Family environment was assessed using five items that measured participants' perceived home-living environment (Liau et al., 2015) on a four-point Likert scale (1 = strongly disagree, 4 = strongly agree). Sample items are as follows: "It is pleasant living with my parents and family" and "I feel uncomfortable at home (reversed item)." Reversed items were recoded, and higher mean scores indicated a better perceived home-living environment. The Cronbach's α was 0.82. Lastly, parental conflict was measured with a single item – "My parents often have a quarrel" – using a four-point Likert scale (1 = strongly disagree, 4 = strongly agree).

School bonding was measured with the three-item School Positive Affect Scale (Roeser et al., 1996), which assessed students' emotional experience in school. The items were as follows: "I like being at school"; "Most of the time, being in school puts me in a good mood"; and "I am happier at school than when I am not at school." Higher mean scores indicated more positive affect towards school. The scale's Cronbach's α was 0.83. We also measured the time spent on homework per school day, which was in the range of 0–5 h.

The *mental health factors* were depression, anxiety, gaming disorder, loneliness, experience of bullying, and social anxiety.

Depression was measured with the Patient Health Questionnaire-9 (Kroenke et al., 2001; Wang et al., 2014). Respondents were asked how often they had experienced depressive symptoms in the past 2 weeks (e.g., feeling tired or having little energy), with response options ranging from 0 (not at all) to 3 (nearly every day). Higher total scores represented more depressive symptoms. The Cronbach's α of the scale was 0.87.

Anxiety was measured using the Generalized Anxiety Disorder-7 scale (GAD-7; Spitzer et al., 2006). Respondents were asked how often they had experienced general anxiety symptoms in the past 2 weeks (e.g., worrying excessively about various things). Response options, with respect to frequency, ranged from 0 (not at all) to 3 (nearly every day). Higher total scores represented a higher level of generalised anxiety symptoms. The scale's Cronbach's α was 0.92.

Gaming disorder was measured using the 7-item Game Addiction Scale (GAS; Hsiao, 2016; Khazaal et al., 2016). We used the Chinese version adapted for young adolescents; for example "I played a game to forget my real life" was changed to "I have played games and missed planned work" (Hsiao, 2016). Respondents answered with their endorsement of the described addiction symptoms on a 6-point Likert scale ranging from 1 = strongly disagree to 6 = strongly agree. Higher mean scores indicated more endorsement of gaming disorder symptoms. The scale's Cronbach's α was 0.76.

Loneliness was measured using the following single question: "How often do you feel lonely?" (Zhu et al., 2021a). Respondents rated the frequency from 0 (not at all) to 3 (nearly every day). Such a single-item self-report format for measuring loneliness is commonly used and was direct and easy for our respondents (Goodman et al., 2015; Pinquart and Sorensen, 2001). Higher scores indicated greater loneliness.

Experience of bullying was measured using eight items that we adapted from the peer bullying subscale of the Juvenile Victimization Questionnaire (Chen et al., 2018). The respondents were asked whether they had experienced being bullied, such as spreading rumours about the victim, preventing the victim from being in a group, manipulating friends to stop liking the victim, ignoring or threatening the victim, or perpetrating cyberbullying. The questions were answered with dichotomous yes/no responses. A score of 1 was received for each item if endorsed, and the total number represented the level of the bullying experienced. The scale's Cronbach's α was 0.77.

Social anxiety was measured using the 10-item Social Anxiety Scale (SAS; La Greca et al., 1988). Example items were "I worry about doing something new in front of other classmates" and "I worry about being teased." Respondents answered how often each item was a true description of themselves, ranging from 0 (never true) to 5 (always true). A higher mean score indicated more serious social anxiety. The scale's Cronbach's α was 0.90.

The *positive psychological factors* were self-compassion, self-control, a growth mindset, and life satisfaction.

Self-compassion was measured using the 12-item Self-Compassion Scale Short Form (SCS-SF; Gong et al., 2014; Raes et al., 2011). Example items included the following: "When something painful happens, I try to take a balanced view of the situation" and "When I'm feeling down, I tend to feel like most other people are probably happier than I am (reversed)." Respondents assessed how often they behaved in the stated manner with a 5-point Likert scale (1 = almost never, 5 = almost always). We recoded the reversed items. A higher mean score on the scale indicated higher self-compassion. The scale's Cronbach's α was 0.87.

Self-control was measured using the Brief Self-Control Scale (SCS; Tangney et al., 2004; Unger et al., 2016), which measured individual differences in self-control traits. The brief scale that we used comprised nine items, which were measured with a 6-point Likert scale ranging from 1 = strongly disagree to 6 = strongly agree. An example item was "I am good at resisting temptation." A higher mean score for all nine items indicated a higher level of self-control. The scale's Cronbach's α was 0.81.

Growth mindset was measured using the 12-item Mindsets of Depression, Anxiety, and Stress Scale (MDASS; Zhu et al., 2021b). An example item was "When you have a certain level of depression, you really cannot do much to change it." We used a 6-point Likert scale, ranging from 1 = strongly disagree to 6 = strongly agree. The score of each item was reversed, with a high mean score indicating stronger belief-in-change about depression, anxiety, and stress. The scale's Cronbach's α was 0.92.

Life satisfaction was measured using the five-item Satisfaction with Life Scale (SWLS; Diener et al., 1985; Sachs, 2003). A 7-point Likert scale was used to measure the items, which ranged from 1 = strongly disagree to 7 = strongly agree. A higher mean score for all five items represented a higher level of life satisfaction. An example item was "In most ways, my life is close to my ideal." The scale's Cronbach's α was 0.88.

2.3. Data analysis

Given that the rate of missing values was very low, prorated mean scale scores were computed by averaging the available items (Mazza et al., 2015; Schafer and Graham, 2002). We defined a complete case as having scale scores of at least 60% (Mazza et al., 2015; Schafer and Graham, 2002). The ratio of complete cases was calculated as the ratio of

Table 1
Characteristics of participants.

	Total (N = 3575)	Primary (n = 514)	Middle (n = 3061)
Variable	*M(SD)or%*	*M(SD)or%*	*M(SD)or%*
Suicidal ideation	17.26%	15.76%	17.51%
Suicide attempt	7.89%	8.17%	7.84%
Age	14.22(1.92)	11.14(1.02)	14.80(1.45)
Female	47.67%	52.45%	46.77%
SES	4.58(0.85)	4.44(0.89)	4.60(0.84)
Chat with parents	5.49(2.74)	5.17(2.77)	5.55(2.73)
Family structure:			
Dual parents	79.00%	79.83%	78.84%
Single parent	17.21%	16.71%	17.31%
With neither parent	3.79%	3.46%	3.85%
Family relationship	2.78(0.71)	2.96(0.72)	2.75(0.70)
Family environment	3.08(0.58)	3.19(0.58)	3.06(0.58)
Parental conflict	1.79(0.80)	1.73(0.83)	1.79(0.80)
School positive affect	3.30(0.76)	3.42(0.83)	3.28(0.75)
Homework time (hour)	2.78(0.89)	2.82(0.80)	2.77(0.91)
Depression	16.26 (5.65)	15.12(5.59)	16.45(5.64)
Anxiety	12.87(5.33)	11.64(5.19)	13.07(5.33)
Gaming disorder	1.87(2.06)	2.04(1.97)	1.84(2.07)
Bully	9.03(1.65)	9.40(1.89)	8.97(1.60)
Loneliness	1.70(0.94)	1.60(0.94)	1.72(0.94)
Social anxiety	2.94(0.84)	2.59(0.93)	2.99(0.81)
Self-compassion	3.06(0.48)	3.17(0.49)	3.04(0.47)
Self-control	3.45(0.82)	3.87(0.91)	3.38(0.78)
Growth mindset	4.00(1.14)	4.31(1.30)	3.95(1.11)
Life satisfaction	4.22(1.28)	4.60(1.32)	4.15(1.26)

Note. *M* and *SD* represent the mean and standard deviation, respectively. SES = socioeconomic status ranged from 2 to 6; chat with parents ranged from 1 to 7, meaning the number of days the respondents talk with their parents in 1 week; family structure included living with dual parents, a single parent, or neither parent; family relationship ranged from 1 to 4, meaning the perceived closeness with parents; family environment ranged from 1 to 4, meaning the perceived pleasantness of one's home living environment; homework time indicated the hours spent on homework per school day, ranging from 0 to 5 h; depression is the total score measured with the PHQ-9 and anxiety is the total score measured with the GAD-7; gaming disorder ranged from 1 to 6; bullying ranged from 0 to 8, where a higher score represented a higher level of experienced bullying; loneliness ranged from 0 to 3, with a higher score meaning higher perceived loneliness; social anxiety ranged from 1 to 5, with a higher score meaning higher social anxiety; self-compassion ranged from 1 to 5; self-control ranged from 1 to 6; growth mindset ranged from 1 to 6; and life-satisfaction ranged from 1 to 7.

the number of complete cases to the number of total cases. The ratio of complete cases was 99.8%. Thus, the ratio of incomplete cases was 0.2%, which is less than 5%. All analyses were performed in R Core Team (2020).

Descriptive statistical analyses were conducted for each outcome and predictor variable (see Table 1). Moreover, hierarchical binary logistic regressions were conducted to assess the relationship between the independent variables and the two dependent variables (i.e., suicidal ideation and suicide attempt) among primary and secondary school students separately. In each regression, we included five steps for demographic, familial, school-related, mental health–related, and psychological factors. In Step 1, we examined the associations of the demographic factors, namely age, gender, and socioeconomic status, with the dependent variables, namely suicidal ideation or suicide attempt in the total sample or subgroup samples. In Step 2, we examined the associations of familial factors, namely family structure, communication time, parent–child relationship, and family environment and conflict, with the dependent variables. In Step 3, we added school-related factors to the model, namely school engagement and time used for studying. In Step 4, we examined the association of mental health factors, namely depressive symptoms, anxiety symptoms, gaming behaviours, bullying, loneliness, and social anxiety. Lastly, in Step 5, psychological factors were added to the model, namely self-compassion, self-control, a growth mindset, and life satisfaction. Furthermore, we estimated Nagelkerke's R^2 values to assess the proportion of variation in suicidal ideation or attempt that was explained by the predictive factors. Due to space considerations, we present the results for Model 5 in Table 2 with the odds ratios (ORs), 95% confidence intervals (CIs) of the ORs, and p value of the results of the logistic regression on the predictors of suicidal ideation and attempt among primary and secondary school students. The results for Models 1–5 with Nagelkerke's R^2 estimates are displayed in Appendix Tables 1–4.

Finally, to test whether the associations based on the predictors of suicidal ideation and attempt differed between primary school and secondary school students, the interactive effects between each predictor and the school-age groups were examined (see Appendix Table 5 for all interactive effects). Effects were considered statistically significant when the p values were < 0.05 and when the 95% CIs of the ORs did not contain 1. Figures for the simple slope probes of the statistically significant interaction effects are presented in Figs. 1 and 2.

3. Results

3.1. Demographics and suicidal behaviour

In total, 3575 students from four primary schools ($n = 514$) and nine secondary schools ($n = 3061$) participated in the survey on suicidality. Their mean age was 14.2 years (standard deviation = 1.92), and 47.67% were female. Among them, 17.21% were living with only one parent, and 3.79% were living with neither parent (see Table 1).

Among the overall sample, 617 out of 3575 (17.26%) reported having had suicidal ideation, and 282 (7.89%) reported attempting suicide during the past 12 months. The χ^2 analyses suggested no differences between the primary and secondary school students in terms of suicidal ideation (primary: $n = 81$, 15.76% vs. secondary: $n = 536$, 17.51%, $\chi^2 = 1.56$, $p > .05$) or suicide attempt (primary: $n = 42$, 8.17% vs. secondary: $n = 240$, 7.84%, $\chi^2 < 0.001$, $p > .05$).

3.2. Risk and protective factors in suicidal ideation and attempt among primary students

Table 2 presents the findings of the final model of the regression analyses. The statistically significant protective factors for suicidal ideation among the primary students were self-compassion (OR = 0.33, 95% CI = 0.14–0.78, $p = .014$) and a growth mindset (OR = 0.61, 95% CI = 0.44–0.85, $p = .004$); the statistically significant risk factors were depression symptoms (OR = 1.12, 95% CI = 1.02–1.24, $p = .022$), bullying (OR = 1.17, 95% CI = 1.00–1.38, $p = .049$), and loneliness (OR = 1.43, 95% CI = 1.01–2.03, $p = .041$).

Moreover, the statistically significant protective factors in suicide attempt among the primary school students were self-control (OR = 0.43, 95% CI = 0.22–0.79, $p = .008$), and the risk factors were depressive symptoms (OR = 1.14, 95% CI = 1.01–1.28, $p = .036$) and bullying (OR = 1.24, 95% CI = 1.02–1.49, $p = .027$).

3.3. Risk and protective factors in suicidal ideation and attempt among secondary students

The significant protective factors in suicidal ideation among the secondary school students were age (OR = 0.87, 95% CI = 0.80–0.94, $p < .001$), social anxiety (OR = 0.77, 95% CI = 0.65–0.91, $p = .002$), self-compassion (OR = 0.52, 95% CI = 0.38–0.70, $p < .001$), a growth mindset (OR = 0.64, 95% CI = 0.56–0.75, $p < .001$), and life satisfaction (OR = 0.84, 95% CI = 0.74–0.94, $p = .003$); the risk factors were gender (OR = 1.35, 95% CI = 1.04–1.77, $p = .026$), depressive symptoms (OR = 1.09, 95% CI = 1.06–1.13, $p < .001$), bullying (OR = 1.17, 95% CI = 1.09–1.25, $p < .001$), and loneliness (OR = 1.29, 95% CI = 1.14–1.46, $p < .001$).

Furthermore, the statistically significant protective factors in suicidal attempt among the secondary school students were age (OR = 0.90, 95%

Table 2
Logistic regression analysis on the predictors of suicidal ideation and suicide attempt.

	Suicidal ideation						Suicide attempt					
	Primary			Secondary			Primary			Secondary		
	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*
Age	1.09	0.78, 1.50	.601	**0.87**	**0.80, 0.94**	**< 0.001**	0.88	0.56, 1.37	.590	**0.90**	**0.81, 1.00**	**.045**
Female	1.52	0.78, 3.01	.218	**1.35**	**1.04, 1.77**	**.026**	2.05	0.87, 5.02	.105	1.12	0.79, 1.60	.518
Higher SES	1.09	0.75, 1.58	.660	1.14	0.99, 1.31	.069	1.10	0.67, 1.82	.697	**1.26**	**1.05, 1.51**	**.015**
Parent-child chat time	1.09	0.96, 1.24	.174	1.02	0.98, 1.07	.339	0.97	0.83, 1.14	.733	0.97	0.91, 1.03	.270
Single-parent family	1.49	0.65, 3.29	.330	1.16	0.86, 1.55	.320	0.33	0.08, 1.09	.093	1.20	0.81, 1.74	.361
With neither parent	0.25	0.02, 1.71	.209	0.89	0.49, 1.56	.704	1.49	0.16, 8.54	.682	0.99	0.45, 1.98	.969
Parent-child relation	1.04	0.56, 1.95	.900	0.84	0.67, 1.07	.157	1.30	0.61, 2.81	.504	0.86	0.63, 1.18	.352
Family environment	0.66	0.28, 1.51	.328	0.79	0.58, 1.07	.122	0.50	0.19, 1.32	.165	0.70	0.48, 1.02	.065
Parental conflict	1.17	0.76, 1.79	.486	1.05	0.90, 1.23	.522	0.59	0.34, 0.99	.050	0.84	0.69, 1.03	.100
School positive affect	1.23	0.80, 1.90	.352	0.93	0.80, 1.09	.361	0.99	0.59, 1.66	.958	1.05	0.87, 1.27	.602
homework time	0.98	0.64, 1.46	.920	1.02	0.89, 1.15	.797	0.76	0.43, 1.28	.320	0.92	0.77, 1.09	.343
Depression	**1.12**	**1.02, 1.24**	**.022**	**1.09**	**1.06, 1.13**	**< 0.001**	**1.14**	**1.01, 1.28**	**.036**	**1.09**	**1.05, 1.14**	**< 0.001**
Anxiety	0.96	0.87, 1.06	.454	0.97	0.94, 1.00	.098	0.95	0.84, 1.06	.360	0.97	0.93, 1.01	.137
Gaming disorder	1.08	0.91, 1.28	.380	0.97	0.92, 1.03	.350	0.95	0.77, 1.18	.664	1.01	0.93, 1.09	.825
Bully	**1.17**	**1.00, 1.38**	**.049**	**1.17**	**1.09, 1.25**	**< 0.001**	**1.24**	**1.02, 1.49**	**.027**	**1.23**	**1.14, 1.33**	**< 0.001**
Loneliness	**1.43**	**1.01, 2.03**	**.041**	**1.29**	**1.14, 1.46**	**< 0.001**	1.19	0.77, 1.83	.418	**1.23**	**1.04, 1.44**	**.014**
Social anxiety	0.82	0.56, 1.21	.321	**0.77**	**0.65, 0.91**	**.002**	0.92	0.57, 1.48	.726	0.88	0.71, 1.10	.256
Self-compassion	**0.33**	**0.14, 0.78**	**.014**	**0.52**	**0.38, 0.70**	**< 0.001**	0.81	0.30, 2.13	.668	0.72	0.49, 1.06	.096
Self-control	1.01	0.62, 1.64	.972	0.89	0.74, 1.07	.223	**0.43**	**0.22, 0.79**	**.008**	1.15	0.90, 1.46	.261
Growth mindset	**0.61**	**0.44, 0.85**	**.004**	**0.64**	**0.56, 0.75**	**< 0.001**	0.80	0.52, 1.21	.293	**0.69**	**0.57, 0.84**	**< 0.001**
Life satisfaction	1.27	0.93, 1.75	.134	**0.84**	**0.74, 0.94**	**.003**	1.12	0.76, 1.66	.574	**0.84**	**0.72, 0.97**	**.022**

Note. OR: odds ratio*; 95% CI:* 95% confidence interval for each *OR*.

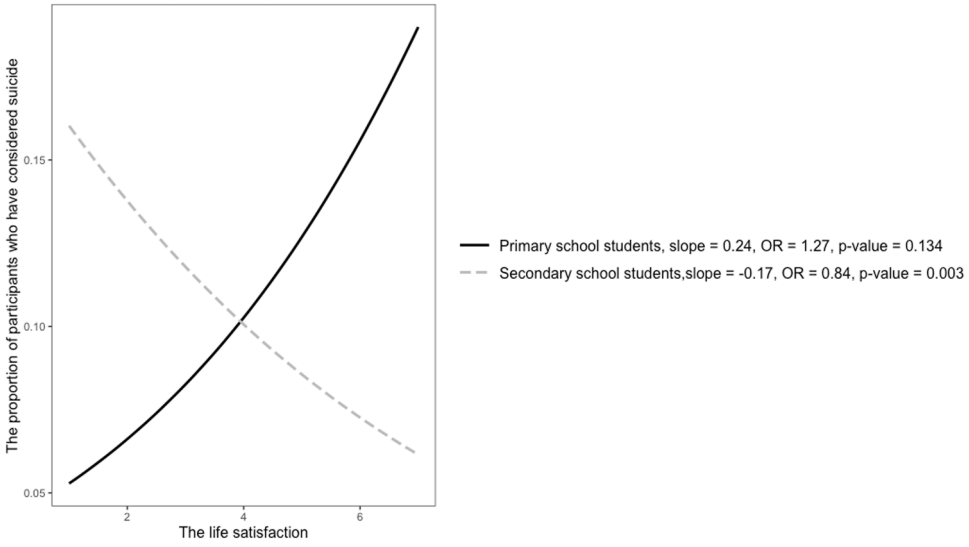

Fig. 1. Interaction between suicidal ideation and life satisfaction.

CI = 0.81–1.00, p = .045), a growth mindset (OR = 0.69, 95% CI = 0.57–0.84, p < .001), and life satisfaction (OR = 0.84, 95% CI = 0.72–0.97, p = .022). The risk factors were socioeconomic status (OR = 1.26, 95% CI = 1.05–1.51, p = .015), depressive symptoms (OR = 1.09, 95% CI = 1.05–1.14, p < .001), bullying (OR = 1.23, 95% CI = 1.14–1.33, p < .001), and loneliness (OR = 1.23, 95% CI = 1.04–1.44, p = .014).

3.4. Interactive effects

Age groups significantly interacted with the effect of life satisfaction on suicidal ideation (OR = 0.66, 95% CI = 0.47–0.92, p = .014) as well as that of self-control on suicidal attempt (OR = 2.68, 95% CI = 1.39–5.34, p = .004). Fig. 1 indicates that higher life satisfaction was associated with a lower likelihood of suicidal ideation only among the secondary school students. This association was nonsignificant among the primary school students. Fig. 2 indicates that self-control was negatively associated with suicidal attempt among the primary school students but not among the secondary school students.

4. Discussion

Suicide is a leading cause of death among children and adolescents, yet only a limited number of large-scale studies have focused on children, both locally and internationally. Given the growing recognition that factors associated with the development of suicidal ideation can be distinct from those associated with a suicide attempt (Mars et al., 2019), we conducted this study of approximately 3500 primary and secondary school students to examine and compare the general phenomenon and prevalence rates of suicidal behaviour among the two age groups. The findings could enable age-specific suicide prevention initiatives in Hong Kong to be proposed. Additionally, one of the main strengths of the study is that since students of both age groups completed the same survey, we were able to compare the similarities and differences among the risk and protective factors in youth suicidality between them.

Three main findings are worthy of further discussion. First,

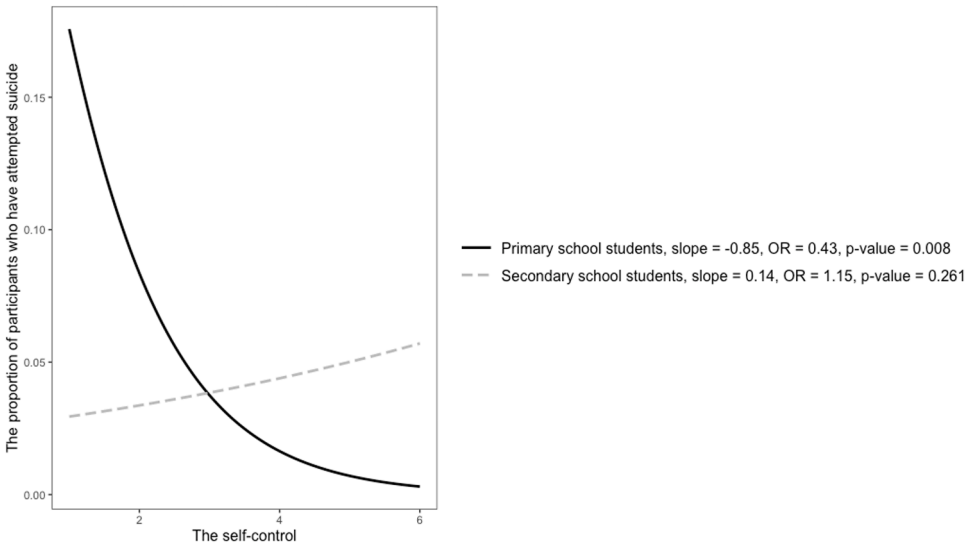

Fig. 2. Interaction between suicidal attempt and self-control.

Appendix Table 1
Logistic regression analysis on the predictors of suicidal ideation among primary school students ($n = 514$).

	Step1		Step2		Step3		Step4		Step5	
IV	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Age	1.04	0.82, 1.30	0.93	0.71, 1.19	0.92	0.71, 1.19	1.01	0.73, 1.38	1.09	0.78, 1.50
Gender (female)	1.58	0.97, 2.59	1.62	0.96, 2.77	1.59	0.93, 2.73	1.35	0.72, 2.56	1.52	0.78, 3.01
SES	0.95	0.72, 1.25	1.10	0.82, 1.49	1.10	0.82, 1.50	1.13	0.80, 1.63	1.09	0.75, 1.58
Parent-child chat time			1.05	0.95, 1.17	1.05	0.95, 1.17	1.09	0.97, 1.23	1.09	0.96, 1.24
Single-parent family			1.56	0.81, 2.89	1.57	0.81, 2.92	1.25	0.55, 2.71	1.49	0.65, 3.29
With neither parent			0.75	0.11, 2.90	0.82	0.12, 3.19	0.52	0.06, 2.76	0.25	0.02, 1.71
Parent-child relation			0.86	0.53, 1.41	0.86	0.52, 1.41	1.12	0.64, 1.98	1.04	0.56, 1.95
Family environment			**0.39**	**0.20, 0.75**	**0.39**	**0.20, 0.75**	0.65	0.30, 1.36	0.66	0.28, 1.51
Family conflict			1.27	0.90, 1.78	1.28	0.90, 1.80	1.13	0.75, 1.70	1.17	0.76, 1.79
School positive affect					1.05	0.75, 1.47	1.25	0.84, 1.88	1.23	0.80, 1.90
Homework time					0.96	0.69, 1.32	0.89	0.59, 1.30	0.98	0.64, 1.46
Depression							**1.17**	**1.07, 1.28**	**1.12**	**1.02, 1.24**
Anxiety							1.00	0.92, 1.10	0.96	0.87, 1.06
Gaming disorder							1.14	0.98, 1.33	1.08	0.91, 1.28
Bully							1.15	0.99, 1.34	**1.17**	**1.00, 1.38**
Loneliness							**1.51**	**1.08, 2.10**	**1.43**	**1.01, 2.03**
Social anxiety							0.92	0.63, 1.32	0.82	0.56, 1.21
Self-compassion									**0.33**	**0.14, 0.78**
Self-control									1.01	0.62, 1.64
Growth mindset									**0.61**	**0.44, 0.85**
Life satisfaction									1.27	0.93, 1.75
Nagelkerke's R square	0.01		0.13		0.13		0.38		0.44	

Note. OR: odds ratio*; 95% CI:* 95% confidence interval for each *OR*.

depression, bullying, and loneliness were indicated to be common risk factors for suicidal ideation and attempted suicide among the two age groups. Second, self-compassion and a growth mindset were protective factors in suicidal ideation for both age groups, but a growth mindset was associated with fewer suicide attempts among secondary school students only. Third, self-control was protective against suicide attempt among the primary school students, and life satisfaction was protective against both suicidal ideation and suicide attempt among the secondary school students.

4.1. Suicidal behaviour among children and adolescents in Hong Kong

The results of this study provide numerical information that will be useful for providing additional support for addressing societal concerns regarding suicidality in young people in Hong Kong. An interesting observation of our data was that no statistically significant difference existed regarding the suicidality patterns among the primary and secondary school students in our sample; moreover, when we combined the overall rates, the prevalence rates of past-year suicidal ideation and suicide attempt among our participants was double that of the U.S. population, and they were closer to the prevalence rates among European populations (Kovess-Masfety et al., 2015). This warrants heightened concern for childhood suicidality in Hong Kong, as the prevalence is as high as that among the older adolescent population. We believe that the reliability and validity of measuring self-reported suicidality among children are not significant issues, although some scholars have raised concerns about the accuracy of measuring age-appropriate concepts about death and suicide among young people (Mishara, 1999). A recent study provided some promising finding that indicated that children as young as 5 years in Hong Kong already possess an initial understanding of the biological, psychological, and metaphysical concepts of death (Wong et al., 2022); therefore, it seems that the accuracy of measuring childhood suicidality in the present study may not be a significant methodological concern, although predicting suicidal behaviour has always been a clinical issue in the treatment of suicidal behaviour.

Appendix Table 2
Logistic regression analysis on the predictors of suicidal ideation among secondary school students ($n = 3061$).

IV	Step1 OR	95% CI	Step2 OR	95% CI	Step3 OR	95% CI	Step4 OR	95% CI	Step5 OR	95% CI
Age	**0.92**	**0.86, 0.98**	**0.92**	**0.86, 0.99**	**0.92**	**0.86, 0.99**	**0.89**	**0.83, 0.96**	**0.87**	**0.80, 0.94**
Gender (female)	**1.81**	**1.47, 2.23**	**1.86**	**1.49, 2.32**	**1.88**	**1.50, 2.35**	**1.40**	**1.08, 1.81**	**1.35**	**1.04, 1.77**
SES	0.91	0.81, 1.02	1.08	0.96, 1.23	1.08	0.96, 1.23	1.10	0.96, 1.26	1.14	0.99, 1.31
Parent-child chat time			1.04	1.00, 1.08	1.04	1.00, 1.08	1.03	0.98, 1.07	1.02	0.98, 1.07
Single-parent family			1.17	0.89, 1.51	1.15	0.88, 1.49	1.11	0.83, 1.48	1.16	0.86, 1.55
With neither parent			0.95	0.56, 1.55	0.98	0.58, 1.59	0.84	0.47, 1.47	0.89	0.49, 1.56
Parent-child relation			**0.58**	**0.47, 0.71**	**0.61**	**0.49, 0.74**	**0.75**	**0.60, 0.95**	0.84	0.67, 1.07
Family environment			**0.43**	**0.33, 0.56**	**0.42**	**0.32, 0.55**	**0.65**	**0.49, 0.87**	0.79	0.58, 1.07
Parental conflict			1.10	0.96, 1.27	1.09	0.95, 1.25	1.05	0.90, 1.23	1.05	0.90, 1.23
School positive affect					**0.78**	**0.68, 0.90**	0.89	0.77, 1.03	0.93	0.80, 1.09
Homework time					1.09	0.97, 1.21	1.00	0.88, 1.13	1.02	0.89, 1.15
Depression							**1.12**	**1.08, 1.15**	**1.09**	**1.06, 1.13**
Anxiety							1.02	0.99, 1.05	0.97	0.94, 1.00
Gaming disorder							0.99	0.93, 1.04	0.97	0.92, 1.03
Bully							**1.16**	**1.09, 1.23**	**1.17**	**1.09, 1.25**
Loneliness							**1.34**	**1.19, 1.52**	**1.29**	**1.14, 1.46**
Social anxiety							0.91	0.78, 1.07	**0.77**	**0.65, 0.91**
Self-compassion									**0.52**	**0.38, 0.70**
Self-control									0.89	0.74, 1.07
Growth mindset									**0.64**	**0.56, 0.75**
Life satisfaction									**0.84**	**0.74, 0.94**
Nagelkerke's R square	0.02		0.16		0.17		0.31		0.35	

Note. OR: odds ratio*; 95% CI:* 95% confidence interval for each *OR*.

Appendix Table 3
. Logistic regression analysis on the predictors of suicide attempt among primary school students ($n = 514$).

IV	Step1 OR	95% CI	Step2 OR	95% CI	Step3 OR	95% CI	Step4 OR	95% CI	Step5 OR	95% CI
Age	0.93	0.67, 1.27	0.83	0.57, 1.17	0.82	0.56, 1.16	0.87	0.55, 1.32	0.88	0.56, 1.37
Gender (female)	**2.06**	**1.06, 4.15**	2.05	1.01, 4.30	**2.11**	**1.03, 4.50**	1.98	0.87, 4.68	2.05	0.87, 5.02
SES	0.93	0.65, 1.35	1.03	0.70, 1.53	1.03	0.69, 1.53	1.13	0.72, 1.80	1.10	0.67, 1.82
Parent-child chat time			0.96	0.84, 1.09	0.97	0.84, 1.11	0.99	0.84, 1.15	0.97	0.83, 1.14
Single-parent family			0.67	0.21, 1.70	0.64	0.20, 1.65	0.34	0.09, 1.08	0.33	0.08, 1.09
With neither parent			1.80	0.27, 7.21	1.85	0.27, 7.46	1.53	0.18, 8.39	1.49	0.16, 8.54
Parent-child relation			0.89	0.47, 1.72	0.94	0.49, 1.82	1.23	0.62, 2.49	1.30	0.61, 2.81
Family environment			**0.31**	**0.14, 0.72**	**0.32**	**0.14, 0.76**	0.50	0.21, 1.19	0.50	0.19, 1.32
Parental conflict			0.81	0.51, 1.27	0.81	0.51, 1.27	0.63	0.37, 1.04	0.59	0.34, 0.99
School positive affect					0.88	0.56, 1.37	0.97	0.60, 1.59	0.99	0.59, 1.66
Homework time					0.82	0.51, 1.25	0.66	0.39, 1.11	0.76	0.43, 1.28
Depression							**1.21**	**1.09, 1.36**	**1.14**	**1.01, 1.28**
Anxiety							0.94	0.84, 1.06	0.95	0.84, 1.06
Gaming disorder							1.09	0.90, 1.32	0.95	0.77, 1.18
Bully							**1.20**	**1.00, 1.43**	**1.24**	**1.02, 1.49**
Loneliness							1.25	0.82, 1.90	1.19	0.77, 1.83
Social anxiety							1.10	0.70, 1.72	0.92	0.57, 1.48
Self-compassion									0.81	0.30, 2.13
Self-control									**0.43**	**0.22, 0.79**
Growth mindset									0.80	0.52, 1.21
Life satisfaction									1.12	0.76, 1.66
Nagelkerke's R square	0.02		0.11		0.11		0.32		0.36	

Note. OR: odds ratio*; 95% CI:* 95% confidence interval for each *OR*.

4.2. Depression, loneliness, and bullying as significant risk factors in young people's suicidal behaviour

Numerous studies have already identified that depression and loneliness are crucial risk factors for suicidality among all age groups, and it seems that depression acts as a mediator between academic stress, loneliness, and later suicidal behaviour (Chen and Kuo, 2020; McClelland et al., 2020). Additionally, because many people experienced a long duration of loneliness during the COVID-19 pandemic, a worry exists that this lonely feeling may linger and have long-term effects on people's psychological well-being and suicidality (Antonelli-Salgado et al., 2021). The early detection of loneliness in young people by their caregivers and teachers as an initiative against the development of depression and/or suicidality seems to be the most logical initial step for youth suicide prevention programmes. Bullying has also been found to be a significant risk factor in youth suicidality, suggesting that victims of bullying are at higher risk of anxiety, low self-esteem, loneliness, and hopelessness, which increase the risk of suicidality (Hong et al., 2015).

Programmes for the prevention of depression, loneliness, and bullying have their own unique values. However, future youth programmes for preventing risk behaviours are suggested to borrow from the integrative approach to the structure of the psychopathology concepts of network analysis (Borsboom and Cramer, 2013). Focusing on the interrelationships between risk and protective factors and the problematic behaviours in young people's suicidal behaviour before the development of youth suicide prevention may lead to more effective outcomes.

Appendix Table 4
Logistic regression analysis on the predictors of suicide attempt among secondary school students ($n = 3061$).

IV	Step1 OR	95% CI	Step2 OR	95% CI	Step3 OR	95% CI	Step4 OR	95% CI	Step5 OR	95% CI
Age	**0.90**	**0.82, 0.98**	**0.90**	**0.82, 0.99**	**0.91**	**0.82, 1.00**	0.91	0.82, 1.01	**0.90**	**0.81, 1.00**
Gender (female)	**1.47**	**1.11, 1.96**	**1.49**	**1.11, 2.02**	**1.52**	**1.12, 2.07**	1.14	0.81, 1.61	1.12	0.79, 1.60
SES	0.97	0.83, 1.14	**1.21**	**1.02, 1.43**	**1.21**	**1.02, 1.44**	**1.23**	**1.03, 1.48**	**1.26**	**1.05, 1.51**
Parent-child chat time			0.99	0.94, 1.05	0.99	0.94, 1.05	0.97	0.92, 1.03	0.97	0.91, 1.03
Single-parent family			1.26	0.88, 1.78	1.21	0.84, 1.72	1.14	0.77, 1.65	1.20	0.81, 1.74
With neither parent			1.11	0.56, 2.04	1.14	0.58, 2.10	0.91	0.42, 1.83	0.99	0.45, 1.98
Parent-child relation			**0.59**	**0.44, 0.78**	**0.60**	**0.45, 0.80**	0.76	0.56, 1.02	0.86	0.63, 1.18
Family environment			**0.38**	**0.27, 0.54**	**0.39**	**0.27, 0.54**	**0.61**	**0.42, 0.87**	0.70	0.48, 1.02
Parental conflict			0.92	0.77, 1.11	0.91	0.76, 1.10	0.83	0.68, 1.01	0.84	0.69, 1.03
School positive affect					0.86	0.72, 1.03	1.00	0.83, 1.20	1.05	0.87, 1.27
Homework time					0.98	0.84, 1.15	0.91	0.77, 1.08	0.92	0.77, 1.09
Depression							**1.11**	**1.07, 1.16**	**1.09**	**1.05, 1.14**
Anxiety							1.00	0.96, 1.04	0.97	0.93, 1.01
Gaming disorder							1.00	0.93, 1.07	1.01	0.93, 1.09
Bully							**1.23**	**1.14, 1.33**	**1.23**	**1.14, 1.33**
Loneliness							**1.28**	**1.09, 1.50**	**1.23**	**1.04, 1.44**
Social anxiety							0.95	0.78, 1.17	0.88	0.71, 1.10
Self-compassion									0.72	0.49, 1.06
Self-control									1.15	0.90, 1.46
Growth mindset									**0.69**	**0.57, 0.84**
Life satisfaction									**0.84**	**0.72, 0.97**
Nagelkerke's R square	0.01		0.13		0.14		0.25		0.27	

Note. OR: odds ratio*; 95% CI:* 95% confidence interval for each *OR*.

Appendix Table 5
Interactive effect between each predictive factors and age groups on suicidal ideation and suicide attempt.

IV	Suicidal ideation OR	95% CI	*p*	Suicidal attempt OR	95% CI	*p*
Gender (female) x age group	0.89	0.43, 1.82	.748	0.55	0.21, 1.38	.208
SES x age group	1.05	0.7, 1.55	.818	1.14	0.67, 1.93	.627
Parent-child chat time x age group	0.94	0.82, 1.07	.344	0.99	0.84, 1.18	.949
Single-parent family x age group	0.78	0.33, 1.88	.567	3.68	1.03, 16.21	.061
With neither parent x age group	3.65	0.48, 50.34	.263	0.66	0.1, 6.69	.692
Parent-child relation x age group	0.81	0.42, 1.56	.534	0.67	0.29, 1.51	.332
Family environment x age group	1.19	0.49, 2.91	.697	1.39	0.49, 3.98	.537
Parental conflict x age group	0.90	0.57, 1.43	.664	1.44	0.82, 2.58	.210
School affect x age group	0.76	0.48, 1.19	.237	1.07	0.61, 1.83	.818
Homework time x age group	1.04	0.68, 1.61	.863	1.21	0.7, 2.18	.507
Depression x age group	0.97	0.88, 1.08	.586	0.96	0.85, 1.09	.553
Anxiety x age group	1.01	0.91, 1.12	.858	1.02	0.9, 1.17	.725
Gaming disorder x age group	0.90	0.75, 1.08	.257	1.06	0.85, 1.33	.629
Bully x age group	1.00	0.84, 1.18	.957	1.00	0.81, 1.23	.990
Loneliness x age group	0.90	0.62, 1.3	.560	1.03	0.65, 1.63	.913
Social anxiety x age group	0.93	0.61, 1.43	.747	0.96	0.57, 1.63	.881
Self-compassion x age group	1.55	0.63, 4	.353	0.90	0.32, 2.60	.839
Self-control x age group	0.88	0.53, 1.5	.645	**2.69**	**1.39, 5.34**	**.004**
Growth mindset x age group	1.05	0.73, 1.51	.785	0.87	0.55, 1.38	.547
Life satisfaction x age group	**0.66**	**0.47, 0.92**	**.014**	0.75	0.49, 1.13	.173

Note. OR: odds ratio*; 95% CI:* 95% confidence interval for each *OR*.

4.3. Protective factors for youth suicidality

Another strength of this study was that we examined the relationships of several positive factors as well as their relationships with youth suicidality, rather than focusing solely on risk factors. This helped us to identify protective factors that can be included in psychosocial interventions for suicide prevention. It was remarkable to find that self-compassion was a protective factor in suicidal ideation among both age groups. Several studies have identified the protective relationship between self-compassion, depression, and psychological distress (Borsboom and Cramer, 2013; Pullmer et al., 2019), such a relationship has been less studied among younger children (Stolow et al., 2016). Self-compassion is defined as an unconditional acceptance and understanding of an imperfect self (Leary et al., 2007). A study suggested that people with self-compassion believe that they are acceptable and worthy, even when they experience intense psychological pain and think about harming themselves (Sun et al., 2020). Future suicide prevention strategies may incorporate compassion and empathy as key components of any school-based social-emotional learning activities that aim to enhance children and adolescents' emotional regulation, coping behaviour, and problem-solving competences (Ngai et al., 2021).

In the current study, a growth mindset, which refers to the belief that one's negative emotions are changeable, was also found to be a consistent protective factor against youth suicidality. The belief in changing negative emotions was associated with an approximately 30% lower likelihood of suicidal ideation in both age groups and of suicidal attempt among secondary school students. Having a growth mindset may not only reduce worry about the symptoms caused by risk factors but also increase positive coping strategies and the sense of control over one's emotions (Kneeland et al., 2016); therefore, it may also reduce the risk of suicidality among those who suffer from depressive symptoms (Zhu and Wong, 2022). More crucially, a growth mindset could be a modifiable factor for helping children better cope with the strong and intense emotions of puberty, which may reduce suicidal ideation and attempt (Zimmermann, 2021). As belief in changing negative emotions is a protective factor for children and youth's suicidality, it could be incorporated into a psychoeducational course for primary and secondary school students to enhance their understanding about emotions and their ability to change them.

In addition, self-control was found to be a protective factor against suicidal attempt among children. Self-control refers to an individual's

capacity to resist, modify, or override impulses, emotions, external temptations, and inner desires that hinder the pursuit of long-term goals (Zhu et al., 2021c). Low self-control develops in the primary stages of life and may result in insufficient or ineffective socialization in later stages, which also enhances the probability of future delinquent and suicidal behaviour (Fergusson et al., 2013; Moffitt et al., 2013). High self-control can help in delaying gratifications or preventing destructive desires, thus reducing the probability of self-harm (Arneklev et al., 1993). In addition, self-control was found to indirectly contribute to later decreases in loneliness via a pathway through peer preference; on the other hand, low self-control was demonstrated to lead to Internet addiction and aggression in Chinese male students (Teng et al., 2014). Hence, it seems that more educational programmes that address self-compassion, self-control, and a growth mindset for Chinese children may positively affect youth suicide prevention. Furthermore, life satisfaction has been found to be a protective factor against adolescent suicidality but not for younger children. A negative relationship between life satisfaction and suicidality has been documented among adolescents (Valois et al., 2004), undergraduates in China (You et al., 2014), and adults (Koivumaa-Honkanen et al., 2001). Moreover, a study postulated that improved life satisfaction can improve one's ability to cope with stress and dissatisfaction over time (Koivumaa-Honkanen et al., 2001).

Noteworthily, although family-related factors did not remain as statistically significant in the final model when the abovementioned protective factors were included, a previous study found that perceived responsibilities for family was a highly significant protective factor against youth suicidality in Hong Kong (Chan et al., 2009). In addition, as Chinese culture values interdependency more than independence, it would be useful for mental health service providers to have plans for involving family members in mental health and suicide prevention programs, if young people consent to it, to promote more mutual understanding within families (Lin and Cheung, 1999, 1999).

5. Conclusion

The findings of this study contribute to extending the existing literature on the suicidality of children and adolescents in Hong Kong; however, they are limited as they are cross-sectional. Furthermore, fewer children than adolescents participated in the study. To generate a more empirically driven and age-specific suicide prevention program, a key focus for future research should be to conduct more multiple-comparison studies (Beautrais, 2001). Such studies should examine the similarities and various risk factors between non-suicidal young people and those with suicidal ideation or suicide plans, those who have attempted suicide, and those who have completed suicide, thus determining whether these are different populations or one population. With regards to preventing youth suicide in Hong Kong and East Asia, it is extremely challenging to change the regions deeply ingrained social belief about academic success as the crucial factor that leads to future success and a fulfilled life within a short period of time as a stress reduction strtegy for both young people and their caregivers and teachers. To meet the urgent need to prevent youth suicides and to promote youth development, it will be useful to have programs that can equip our young people with the necessary skills and competencies to succeed in the global digital world. Interventions that have more immediate impacts on young people that target their individual resilience with positive self-control and compassion to oneself, openness to novelty with adaptive coping mechanisms, and good communication skills that can help them to expand social support with availability to resources. Also, since many East Asians value interdependence, involvement of parents and teachers in such programs may enhance the impacts on the young people (Goldston et al., 2008). As we will soon enter the second quarter of the 21st century, policy makers, educationalists, health practitioners, and parents, who have great influence on our young people must also adapt and understand how the digital contexts influence all people in the societies in a fast and ever-transforming digital era as one of the stakeholders' responsibilities.

Financial disclosure

This work was supported by the Hong Kong Research Grants Council (Ref: 25605418 and Ref: 15601621) .

CRediT authorship contribution statement

Shimin Zhu: Visualization, Data curation, Formal analysis, Conceptualization, Writing – original draft. **Xiaomin Li:** Formal analysis. **Paul W.C. Wong:** Conceptualization, Writing – original draft.

Declaration of Competing Interest

The authors declare that they have no conflicts of interest.

Acknowledgments

This work was supported by the Early Career Scheme Grant and the General Research Fund (Ref: 25605418 and Ref: 15601621) by the Hong Kong Research Grants Council awarded to Shimin Zhu. We would like to thank the participants of the study and the schools for their assistance with participant recruitment.

Multimedia Appendix

Ni(Appendix Tables 1, Appendix Tables 2, Appendix Tables 3, Appendix Tables 4, Appendix Tables 5).

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