



<b>Title</b>	<b>The Impact of Habit of Eating Breakfast and Physical Activity on Children Suicidal Behaviour</b>
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## The Impact of Habit of Eating Breakfast and Physical Activity on Children Suicidal Behaviour

Research Article

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### Abstract

**Introduction:** Youth suicide is one of the top three causes of death among age group between 15 and 24 years old. The known risk factors include depression, hopelessness, dysfunctional families, substance abuse, school failure and harassment. However, research reports in relation to the protective factors to prevent adolescent from suicidal attempts are still lacking. The purpose of this study is to detect (if any) the protective effect of physical activity and the habit of eating breakfast on children suicidal attempts.

**Methods:** This study adopted a secondary data analysis approach, in which data was extracted from the 2013 Youth Risk Behaviour Surveillance System to detect the association effect between children's physical activity level and the habit of eating breakfast with suicidal attempts.

**Results:** The increase number of days of physical activity and the habit of eating breakfast were both significantly related to the declining trend in suicidal attempts ( $p < 0.0001$ ). Only the effect of habit of eating breakfast on suicidal behaviour remained a protective factor for suicidal attempts after the adjustment ( $p < 0.001$ ).

**Conclusions:** Our results illustrate that the physical activity has a marginal effect on suicidal attempts among males only. After adjusting other risk factors, the habit of eating breakfast shows a strong effect on preventing children from having suicidal attempt and also suggests a dose effect for the days of eating breakfast. For a child who skips breakfast for a week would have 1.7 higher risk of suicidal attempt compared with another child who eats breakfast every day in a week.

**Keywords:** Suicide; Breakfast; Physical Activity.

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### Introduction

Youth suicide is one of the top three causes of death among age group between 15 and 24 years old, which arouses concerns [1]. Yet, there is a lack of empirical attention worldwide for attempts in studying the suicidal behaviour [2], resulting from no records of suicidal rate to climb up [3] and only a very few research stud-

ies were conducted to establish relative hypothesis for this topic; nevertheless, this issue is now become considered as significant for investigation. Although exploring the risk factors associated with suicidal behaviour in youth has already been done by many researchers, a body of findings has not yet been well established. According to the studies conducted, the known risk factors include depression, hopelessness, dysfunctional families, substance abuse, school failure and harassment [1, 4] and the associated risk factors demonstrated by Hauser and colleagues (2013) are gender, physical/sexual abuse and parental depression [5]. However, research reports in relation to the protective factors to prevent adolescent from suicidal attempts are still lacking.

The effects of physical activities playing an essential role in health issues are confirmed. Over the past few decades, children and adolescent have been tending to stay inactive physically [6, 7], resulting in overweight and getting into sedentary behaviours; this phenomenon associates with the increasing risk of suicide ideation among Chinese adolescents whereas this is protective for Philippine adolescents [8]. Some research studies suggest that physical activity can improve the perceived physical quality of life among depressed women [9] and young people can enjoy positive outcomes in their academic performance, cardiorespiratory fitness, mood status and self-esteem [10]. However, the effect of physical activity on youth suicide behaviour has not yet been widely explored. One of the studies has reported the effect of

exercise does not lead to protective effect on Korean adolescents, where this finding contradicted to the general expectation that adolescent who frequently perform vigorous physical activities are more likely to have suicidal ideation and attempts [11]. Another study has showed that suicidal attempts do not associate with the frequency of doing exercises, indicating that the control and intensity, and the frequency as well as duration of activity would not affect the association [12].

A report has stated that ranging 10% to 30% of children and adolescents learnt from their parents to skip eating breakfast regularly though they may understand the importance of breakfast to their health [13, 14]. Even the effect of the habit of eating breakfast with suicidal attempts has not been well reported, its association on mental health is documented. Among those, one study conducted with American Indian/Alaska Native (AI/AN) and non-AI/AN youth, demonstrating eating breakfast every day has a protective effect on suicide attempts; [15] other studies in Japan demonstrated the skipping of breakfast is associated with shorter sleeping time [16] and in South Korea, it is associated with suicidal attempts among adolescents [17]. At present, no study shows a dose effect, frequency of eating breakfast per week on suicidal attempts and the relative effect on boys and/or girls.

The purpose of this study is to detect (if any) the protective effect of physical activity and the habit of eating breakfast on children suicidal attempts. It also aims to strengthen the protective effect on the day of engagement on eating breakfast and physical activity on children suicidal behaviour, and demonstrates in reality the effect relating to some other potential risk factors, such as, ethnicity, emotion (i.e. feeling sad or hopeless), history of e-bullied, gender, and age issues and these effects on girls and boys, respectively.

## Methodology

Our study adopted 2013 Youth Risk Behaviour Surveillance (YRBSS) data to detect the association effect between children's physical activity level and the habit of eating breakfast with suicidal attempts [18]. YRBSS was a cross-sectional survey, and the targeted subjects were students who studied across grades 9 to grade 12 in 50 States of the US and in the District of Columbia. Samples were taken from 193 schools. The outcome variable selected from the surveillance was asking the subjects to answer the question: "During the past 12 months, did you ever seriously consider attempting suicide?" The optional answer to this question was either "Yes" or "No". The two interesting exposure variables were physical activity and the habit of eating breakfast. The question about physical activity was: "During the past seven days, how many days were you physically active for a total of at least 60 minutes per day?" The question about the habit of eating breakfast was: "During the past seven days, how many days did you eat breakfast?" Options for answers to both questions were based on a scale of zero to seven days, during the past seven days. We used seven as a reference when comparing the association effect of suicidal behaviour from 0 to 6 days. Besides the exposure variables, others factors were also used to detect the confounding effect (if any) of physical activity and the habit of eating breakfast on suicidal attempts. Variables in age, race/ethnicity, gender, emotions (i.e. feeling sad or hopeless) and history of being electronically-bullied were also included in the analysis. A new variable labelled as race/ethnicity developed by YRBSS was used for the calculation; and the race/ethnicity was separated into eight groups.

This study was based on secondary data analysis with no primary data collected; therefore it was exempted for ethics by the Institutional Review Board of the University of Hong Kong/Hospital Authority Hong Kong West Cluster.

## Data analysis

Chi-square test was used to detect the relationship between binary variables and category variables with suicidal attempt, such as age group, gender, physical activity days, the habit of eating breakfast day, history of electronically bullied and emotion of feeling sad. Logistic regression was used to detect the independent effect of each variable on suicidal attempt. Odds ratio and adjusted odds ratio were used to measure the impact of the risk associated to suicidal attempt. Reference groups were set up according to "18-year-old in age group, seven days in physical activity and the habit of eating breakfast" for odds ratio calculation. Stratified analysis by gender was also performed to detect the association between different variables with suicidal attempts, in order to eliminate the effect between genders. Cochran-Armitage Trend Test was used to identify the trend between various levels of risks with suicidal attempts. All analyses were performed by SAS version 9.2. A p-value <0.05 with two sides was treated as significant.

## Results

The univariate analysis result showed that gender, race/ethnicity, age group, physical activity days, habit of eating breakfast days, history of electronically bullied and emotion of feeling sad were all associated with suicidal attempts. (Table 1) Females had more suicidal attempts when compared with males with the odd ratio (OR), and it has 95% confident intervals (95% C.I.) 1.35 (1.21 – 1.52). With reference to the increase in age, a decrease in the trend of suicidal attempt was shown. Furthermore, the increase number of days of physical activity and the habit of eating breakfast related to the declining trend in a suicidal attempts were observed ( $p < 0.0001$ ). However, the effect of physical activity became insignificant after the adjustment ( $p = 0.1312$ ). The effect of habit of eating breakfast on suicidal behaviour remained a protective factor for suicidal attempts after the adjustment ( $p < 0.001$ ). This might imply children who skipped their breakfast would have 1.7 higher risks of having suicidal attempts than those who had breakfast every day. A decrease of risk was seen if the days of having breakfast are increased. Gender, history of electronically bullied, and emotions of feeling sad were significantly associated with suicide attempts, while race/ethnicity was not significant.

Stratified analysis of gender showed that the physical activity and race/ethnicity were insignificantly associated with suicidal attempts among females. The logistic regression result demonstrated that age group, the days of eating breakfast, the history of electronically bullied and the emotion of feeling sad remained very much significantly associated with suicidal attempts. (Table 2) A different significant result was observed among males ( $p = 0.4827$ ); the univariate analysis result showed that all the variables were significantly associated with suicidal attempts. For the adjusted outcomes, age group becomes insignificant ( $p = 0.4827$ ). (Table 2) The effect of physical activity still remained significant with suicidal attempt ( $p = 0.0385$ ). (Table 3) The habit of eating breakfast, race/ethnicity, history of electronically bullied and emotion of feeling sad were also significant with suicidal attempts after the adjustment.

**Table 1. Univariate analysis (All subjects).**

	Considered suicide attempt				Logistic regression	
	Yes	No			Adjusted p-value	Adjusted OR (95% C.I.)
	N=2259	n=11232	p-value	OR (95% C.I.)		
Sex			<0.0001		<0.0001	
Female	1469 (22.3%)	5117 (77.7%)		2.2 (2.0-2.4)		1.35 (1.21-1.52)
Male	789 (11.4%)	6105 (88.6%)				
Age			<0.0001		0.0002	
<=12	11 (44.0%)	14 (56.0%)		4.86 (2.19-10.81)		5.63 (2.10-15.13)
13 years old	4 (25.0%)	12 (75.0%)		2.06 (0.66-6.44)		1.80 (0.39-8.30)
14 years old	248 (18.2%)	1113 (81.8%)		1.38 (1.15-1.65)		1.24 (1.00-1.55)
15 years old	528 (172.2%)	2540 (82.4%)		1.29 (1.11-1.50)		1.30 (1.09-1.55)
16 years old	591 (18.6%)	2594 (81.4%)		1.41 (1.22-1.64)		1.37 (1.16-1.63)
17 years old	542 (15.7%)	2913 (84.3%)		1.15 (0.99-1.34)		1.08 (0.91-1.29)
18 years old	321 (13.9%)	1987 (86.1%)		Reference		Reference
Race/ethnicity			<0.0001		0.131	
American Indian/Alaskan Native	34 (28.3%)	86 (71.7%)		1.35 (0.88-2.09)		
Asian	73 (14.9%)	416 (85.1%)		0.60 (0.44-0.82)		
Black or African American	413 (13.9%)	2558 (86.1%)		0.55 (0.45-0.68)		
Native Hawaiian or other Pacific Islander	19 (14.3%)	114 (85.7%)		0.57 (0.34-0.96)		
White	892 (16.5%)	4525 (83.5%)		0.67 (0.56-0.82)		
Hispanic/Latino	272 (15.8%)	1452 (84.2%)		0.64 (0.51-0.80)		
Multiple-Hispanic/Latino	344 (20.9%)	1303 (79.1%)		0.90 (0.73-1.12)		
Multiple-non-Hispanic/Latino	153 (22.6%)	524 (77.4%)		Reference		
Physical active >60mins.Daily			<0.0001		0.278	
0 days	426 (19.8%)	1728 (80.2%)		1.49 (1.29-1.72)		
1 days	180 (18.1%)	777 (81.2%)		1.40 (1.16-1.69)		
2 days	246 (19.5%)	1018 (80.5%)		1.46 (1.23-1.73)		
3 days	266 (18.5%)	1176 (81.6)		1.37 (1.16-1.61)		
4 days	212 (16.8%)	1047 (83.2%)		1.22 (1.03-1.46)		
5 days	254 (14.8%)	1464 (85.2%)		1.01 (0.89-1.23)		
6 days	125 (14.8%)	712 (85.1%)		1.06 (0.86-1.31)		
7 days	512 (14.2%)	3093 (85.8%)		Reference		
Ate Breakfast			<0.0001		<0.0001	
0 days	453 (23.5%)	1477 (76.5%)		2.19 (1.91-2.51)		1.70 (1.44-1.99)
1 days	205 (21.4%)	753 (78.6%)		1.95 (1.63-2.32)		1.41 (1.15-1.73)
2 days	287 (19.5%)	1185 (80.5%)		1.73 (1.48-2.02)		1.28 (1.07-1.54)
3 days	223 (17.0%)	1090 (83.0%)		1.46 (1.24-1.73)		1.16 (0.96-1.41)
4 days	172 (17.5%)	810 (82.5%)		1.52 (1.26-1.87)		1.18 (0.95-1.46)
5 days	193 (17.9%)	883 (82.1%)		1.56 (1.31-1.87)		1.29 (1.05-1.59)
6 days	91 (13.7%)	574 (86.3%)		1.13 (0.89-1.44)		0.91 (0.69-1.19)
7 days	596 (12.3%)	4257 (87.7%)		Reference		Reference
Electronical bullied			<0.0001	4.4 (3.9-4.9)	<0.0001	2.44 (2.15-2.77)
Yes	745 (39.8%)	1127 (60.2%)				
No	1509 (13.0%)	10075 (86.1%)				
Ever feel sad or hopeless			<0.0001	12.7 (11.3-14.1)	<0.0001	10.0 (8.92-11.21)
Yes	1733(42.6%)	2337(57.4%)				
No	520(5.5%)	8870(94.5%)				

**Table 2. Univariate analysis (Female only).**

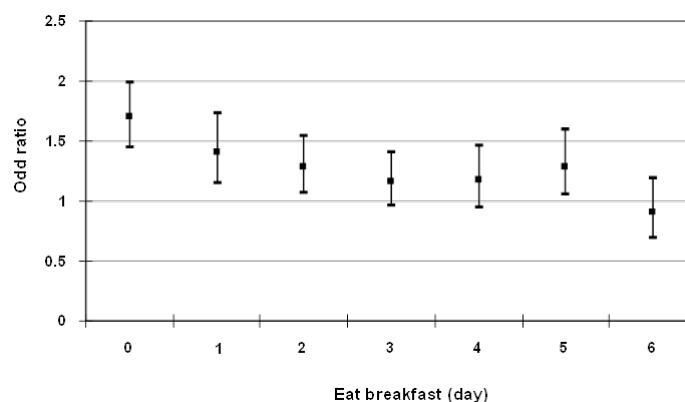
	Considered suicide attempt				Logistic regression	
	Yes	No			Adjusted p-value	Adjusted OR (95% C.I.)
	N=1469	n=5117	p-value	OR (95% C.I.)		
Age			<0.0001		<0.0001	
<=12	6 (66.7%)	3 (33.3%)		9.77 (2.42-39.41)		9.33 (1.84-47.26)
13 years old	2 (50.0%)	2 (50.0%)		4.89 (0.68-34.96)		2.16 (0.08-55.73)
14 years old	173 (24.1%)	545 (75.9%)		1.55 (1.23-1.97)		1.36 (1.03-1.78)
15 years old	383 (24.6%)	1175 (75.4%)		1.59 (1.31-1.95)		1.63 (1.29-2.05)
16 years old	377 (24.5%)	1163 (75.5%)		1.59 (1.30-1.94)		1.48 (1.18-1.86)
17 years old	348 (20.6%)	1345 (79.4%)		1.27 (1.04-1.55)		1.18 (0.94-1.48)
18 years old	176 (17.0%)	861 (83.0%)		Reference		Reference
Race/ethnicity			<0.0001		0.712	
American Indian/Alaskan Native	21 (35.0%)	39 (65.0%)				
Asian	47 (18.4%)	209 (81.6%)				
Black or African American	285 (19.2%)	1203 (80.9%)				
Native Hawaiian or other Pacific Islander	9 (15.0%)	51 (85.0%)				
White	571 (22.0%)	2020 (78.0%)				
Hispanic/Latino	190 (22.1%)	671 (77.9%)				
Multiple-Hispanic/Latino	214 (26.9%)	582 (73.1%)				
Multiple-non-Hispanic/Latino	102 (28.7%)	253 (71.3%)		Reference		
Physical active >60mins.Daily			0.115		0.697	
0 days	317 (23.1%)	1056 (76.9%)		0.96 (0.80-1.16)		
1 days	131 (21.2%)	488 (78.8%)		0.86 (0.68-1.09)		
2 days	178 (22.8%)	602 (77.2%)		0.95 (0.76-1.78)		
3 days	194 (24.7%)	592 (75.3%)		1.05 (0.85-130)		
4 days	134 (21.7%)	155 (18.7%)		0.89 (0.70-1.23)		
5 days	155 (18.7%)	676 (81.4%)		0.74 (0.59-0.92)		
6 days	78 (21.6%)	284 (78.5%)		0.88 (0.66-1.17)		
7 days	268 (23.8%)	860 (76.2%)		Reference		
Ate Breakfast			<0.0001			
0 days	301 (31.0%)	670 (69.0%)		2.40 (2.01-2.87)		1.87 (1.52-2.31)
1 days	138 (26.5%)	382 (73.5%)		1.93 (1.54-2.42)		1.46 (1.12-1.89)
2 days	209 (25.3%)	617 (74.7%)		1.81 (1.49-2.20)		1.46 (1.16-1.83)
3 days	159 (22.5%)	548 (77.5%)		1.55 (1.25-1.92)		1.33 (1.04-1.69)
4 days	113 (22.9%)	380 (77.1%)		1.59 (1.25-2.02)		1.28 (0.97-1.69)
5 days	135 (24.7%)	411 (75.3%)		1.76 (1.40-2.20)		1.50 (1.15-1.95)
6 days	63 (19.2%)	265 (81.8%)		1.27 (0.94-1.71)		1.12 (0.80-1.57)
7 days	333 (15.8%)	1779 (84.2%)		Reference		Reference
Electronical bullied			<0.0001	3.5 (3.1-4.0)	<0.0001	2.31 (1.98-2.68)
Yes	551 (42.5%)	745 (57.5%)				
No	915 (17.4%)	4360 (82.7%)				
Ever feel sad or hopeless			<0.0001	10.5 (9.1-12.1)	<0.0001	8.84 (7.63-10.24)
Yes	1174 (45.5%)	1408 (54.5%)				
No	293 (7.4%)	3696 (92.7%)				

**Table 3. Univariate analysis (Male only).**

	Considered suicide attempt				Logistic regression	
	Yes	No			Adjusted p-value	Adjusted OR (95% C.I.)
	N=789	n=6105	p-value	OR (95% C.I.)		
Age			0.014		0.483	
<=12	5 (31.3%)	11 (68.8%)		3.56 (1.22-10.38)		
13 years old	2 (16.7%)	10 (83.3%)		1.56 (0.34-7.21)		
14 years old	75 (11.7%)	568 (88.3%)		1.03 (0.77-1.39)		
15 years old	145 (9.6%)	1364 (90.4%)		0.83 (0.65-1.06)		
16 years old	214 (13.0%)	1430 (87.0%)		1.17 (0.93-147)		
17 years old	194 (11.0%)	1566 (89.0%)		0.97 (0.77-1.22)		
18 years old	144 (11.3%)	1126 (88.7%)		Reference		

Race/ethnicity			<0.0001		0.039	
American Indian/Alaskan Native	13(21.7%)	47(78.3%)				0.99(0.42-2.31)
Asian	26(11.2%)	207(88.8%)				0.58(0.32-0.84)
Black or African American	128(8.6%)	1355(91.4%)				0.56(0.37-0.84)
Native Hawaiian or other Pacific Islander	10(13.7%)	63(86.3%)				0.69(0.30-1.60)
White	321(11.4%)	2505(88.6%)				0.76(0.52-1.11)
Hispanic/Latino	82(9.5%)	781(90.5%)				0.50(0.32-0.78)
Multiple-Hispanic/Latino	130(15.3%)	721(84.7%)				0.82(0.54-1.24)
Multiple-non-Hispanic/Latino	51(15.8%)	271(84.2%)		Reference		Reference
Physical active >60mins.Daily			0.01		0.024	
0 days	109 (14.0%)	672 (86.0%)		1.48 (1.16-1.89)		1.33 (0.99-1.77)
1 days	48 (14.2%)	289 (85.8%)		1.52 (1.01-2.11)		1.33 (0.99-1.97)
2 days	68 (14.1%)	415 (85.9%)		1.49 (1.12-1.99)		1.43 (1.02-2.01)
3 days	72 (11.0%)	584 (89.0%)		1.13 (0.85-1.49)		1.09 (0.79-1.50)
4 days	78 (12.2%)	564 (87.9%)		1.26 (0.96-1.66)		1.25 (0.92-1.71)
5 days	99 (11.2%)	787 (88.8%)		1.15 (0.90-1.47)		1.30 (0.98-1.74)
6 days	47 (9.9%)	427 (90.1%)		1.01 (0.72-1.40)		0.97 (0.66-1.42)
7 days	244 (9.9%)	2227 (90.1%)		Reference		Reference
Ate Breakfast			<0.0001		0.005	
0 days	152 (15.9%)	805 (84.1%)		1.78 (1.43-2.20)		1.44 (1.11-1.86)
1 days	67 (15.3%)	370 (84.7%)		1.70 (1.28-2.28)		1.38 (0.98-1.95)
2 days	78 (12.1%)	567 (87.9%)		1.29 (0.99-1.69)		1.05 (0.76-1.43)
3 days	64 (10.6%)	542 (89.5%)		1.11 (0.83-1.48)		0.94 (0.68-1.31)
4 days	59 (12.1%)	430 (87.9%)		1.29 (0.96-1.74)		1.04 (0.73-1.48)
5 days	57 (10.8%)	471 (89.2%)		1.14 (0.84-1.54)		1.01 (0.71-1.43)
6 days	28 (8.3%)	309 (91.7%)		0.85 (0.57-1.28)		0.65 (0.41-1.03)
7 days	263 (9.6%)	2474 (90.4%)		Reference		Reference
Electronical bullied			<0.0001	4.9 (4.0-5.9)	<0.0001	2.73 (2.17-3.43)
Yes	194 (33.7%)	382 (66.3%)				
No	593 (9.4%)	5705 (90.6%)				
Ever feel sad or hopeless			<0.0001	13.8 (11.6-16.3)	<0.0001	12.0 (10.1-14.4)
Yes	559 (37.6%)	927 (62.4%)				
No	226 (4.2%)	5166 (95.8%)				

Figure 1. Adjusted odds ratio and 95% confident limit comparing among number of days of breakfast eating.



### Conclusion and Discussion

Our results illustrated that the physical activity had a marginal effect on suicidal attempts among males only, but not among females as shown in the univariate analysis. The effect of race/ethnicity also has the effect factor on males but not females. We understand that gender is a risk factor for suicidal behaviour, from which it indicates females have a higher chance of attempting suicide than males (22.3% vs. 11.4%).(Table 1) Our study demonstrated that a separate analysis for gender was needed to project more details about the association of suicidal behaviour upon gender difference. After adjusting other risk factors, the habit of eating breakfast showed a strong effect on preventing children from having

suicidal attempt and also suggested a dose effect for the days of eating breakfast. (Figure 1) For a child who skips breakfast for a week would have 1.7 higher risk of suicidal attempt compared with another child who eats breakfast every day in a week. Doing physical exercises regularly can help prevent males from suicidal attempt (p=0.045). Non-Hispanic/Latina males are the higher risk groups associated with suicidal attempt.

Due to the modern lifestyle and busy day life problems, a lot of people seldom do exercises and skip breakfast in the morning. The changes in lifestyles among adults will both positively affect their health and their family member, especially their children. A traditional Chinese proverb goes, "The plans of the day are

made in the morning!" Children are our future, and we should try our best to help them keep a healthy life. The obligations of the government and parents are to safeguard the health of our next generations. We should provide them with sufficient resources, education, better environment, support and necessities. Suicidal attempts can bring a serious injury on children; our study suggests that eating breakfast every day and doing physical activity can help decrease children's suicidal attempts. In view of our findings, we would promote physical activity and encourage children to do more exercises every day. According to our findings, physical activity may only have effect on males, but we would also encourage children to do more physical exercise. It is because the effect of physical activity not only for preventing suicide attempts, but also bringing a lot of other benefits to their health. Eating breakfast is a critical life schedule which can provide daily energy and contribute to the effects on children's behaviour. Therefore, this message "children should not skip the breakfast, but should enjoy it every day with their family" should be disseminated to the members of the general public so that they can be aware of the profound effect of breakfast on children.

Due to the limitation of the study and the topic of suicide, it is very difficult to perform an empirical research. This study cannot detect the effect of habits of eating breakfast on preventing suicidal behaviour in details, such as the location of eating breakfast, parents or others accompany children to breakfast, the food combinations of breakfast. With the indications of results obtained in this study concerning the association of eating breakfast and physical activity with suicidal attempts, we should urge the government to take actions to educate children to have breakfast and do exercises regularly. The government and stakeholders should support more research studies on the effect of breakfast to be carried out so as to bridge the research study gaps in this regard. Nevertheless, eating breakfast is simple to many families, but there are a lot of children, in particular among the vulnerable groups of citizens in Hong Kong still skipping their breakfast for many other reasons. The government and stakeholders should have the responsibility to look into this issue.

### Implications and Contribution of the Manuscript

This study showed that the habit of eating breakfast has a strong effect on preventing children from having suicidal attempt. Children's psychological well-being can be protected by developing and maintaining a simple daily habit of breakfast eating.

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