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A comparison between American and Chinese college students on suicide-related behavior parameters

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Abstract
Background/Objective: The United States (US) and China are the two largest economies, but recent and directly comparable studies on suicide-related behaviors in the two countries are lacking. By using the Suicidal Behaviors Questionnaire-Revised (SBQ-R), item-level comparison was performed in assessing self-reported suicide-related behaviors between the US and Chinese undergraduates.
Method: This study involved a total of 3,185 college students aged between 18 to 24 years (1,185 US college students, and 2,000 Chinese students who were randomly selected from a large sample of 11,806 Chinese college students). Participants filled out the 4-item SBQ-R.
Results: Participants' responses were compared by country and sex. There was a higher overall risk of suicide-related behaviors among US students (24.3%) compared to Chinese students (17.0%). US students also reported higher lifetime attempt, past-year ideation, and lifetime threat. US female college students reported the highest suicide-related behaviors compared to other sub-groups.
Conclusions: There is a need to tailor specific interventions to alleviate college students' suicide-related behaviors in the US and China, with a particular focus on US females.
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Comparación entre estudiantes universitarios estadounidenses y chinos en parámetros de comportamiento relacionados con el suicidio

Resumen

Antecedentes/Objetivo: Estados Unidos y China son las dos economías mundiales más grandes, pero faltan estudios recientes y comparables sobre comportamientos relacionados con el suicidio entre ambos países. Mediante el *Suicidal Behavior Questionnaire-Revised* (SBQ-R) se realizó una comparación a nivel de ítems para evaluar los comportamientos autoinformados relacionados con el suicidio entre estudiantes universitarios de Estados Unidos y China.
Método: Este estudio involucró a 3.185 estudiantes universitarios con edades comprendidas entre 18 y 24 años (1.185 estadounidenses y 2.000 chinos que fueron seleccionados al azar de una gran muestra de 11.806). Los participantes completaron el SBQ-R de cuatro ítems.
Resultados: Las respuestas de los participantes se compararon por país y sexo. Hubo un mayor riesgo general de conductas relacionadas con el suicidio entre estudiantes estadounidenses (24,3%) en comparación con los chinos (17,0%). Los estadounidenses también informaron mayor intento vital, ideación el año anterior y amenaza vital. Las estudiantes universitarias estadounidenses informaron las tasas más altas relacionadas con el suicidio en comparación con otros subgrupos.
Conclusiones: Existe la necesidad de adaptar intervenciones específicas para aliviar los comportamientos relacionados con el suicidio en estudiantes universitarios en ambos países, con una atención particular en las mujeres estadounidenses.

The term suicide encompasses an array of thoughts, feelings, and behaviors that relate to the desire to die in varying degrees of severity, ranging from the thoughts of suicide to death by suicide (Maris, Berman, & Silverman, 2000). Suicide is the second leading cause of death in the 15- to 29-year-old age group (World Health Organization WHO, 2014). To identify effective strategies in preventing suicide, understanding the multi-faceted factors that contribute to suicide is important (Turecki & Brent, 2016).

Past studies indicated that the differing suicidality prevalence between nations need to be further delineated (Eskin et al., 2016). Naghavi (2019) investigated global, national and regional suicide patterns between 1990 to 2016 across 195 countries from the 2016 Global Burden of Disease Study. Death by suicide increased 6.7% globally over the 27 years, and has become the leading cause and the top ten causes of death in high-income Asia Pacific countries and in North America, respectively. In over 100,000 subjects from 21 countries in the WHO World Mental Health Survey, Nock et al. (2012) found that the highest risk for transition from ideation to plan or attempt occurred within the first year of ideation onset. Despite having a suicidal plan generally increased odds for attempts, the odds of attempts were much lower in China (e.g., Beijing, Shanghai and Shenzhen) than the United States (US). Additionally, large-scale comparative studies of young adults' suicide-related behaviors in the US and China are scarce. Particularly, cross-cultural comparison studies on the suicide-related behavior parameters were not undertaken until recently (Zhang, Liu, & Sun, 2017). Therefore, the objective of this paper is to compare suicide-related behaviors among college students from the two largest economies in the world, the US and China.

Operationalizing suicide-related behavior is a major challenge in conducting cross-cultural studies due to different definitions in the literature (Silverman, Berman, Sanddal, O'Carroll, & Joiner, 2010). While some studies measured suicide-related thoughts and behaviors and their association with socioeconomic, environmental, and individual factors (Carter & Spittal, 2018; Jobes & Joiner, 2019), others investigated risk factors of suicide. Nonetheless, four robust risk factors were identified: previous episodes of self-harm, physical health problems, being a male, and suicidal intent (Carter & Spittal, 2018). Jobes and Joiner (2019) emphasized prior suicidal ideation as the predominant risk factor for future episodes of suicidal ideation and the third most potent predictor of future deaths by suicide. Nevertheless, a comprehensive reporting system capturing vital statistics is lacking, which may lead to over- or under-reported statistics (Bakst, Braun, Zucker, Amitai, & Shohat, 2016; Hu et al., 2015). Additionally, medical systems that detail suicide deaths, such as WHO's public repository, do not include different aspects of the suicidality continuum, notably suicidal ideation or attempts. To enable a cross-cultural comparison of the suicide-related behavior parameters between the US and China, this study administered a widely used self-report instrument, the Suicidal Behaviors Questionnaire-Revised (SBQ-R; Osman et al., 2001) to both college student populations.

In the US, a meta-analysis of 600,000 samples showed that one in four college students reported having suicidal ideation (Mortier et al., 2018). In a survey of 43,375 US undergraduate and graduate students across 60 institutions, 7.8% of students indicated having thoughts about suicide in the past year (Lipson, Kern, Eisenberg, & Breland-Noble,

Country	Sex	2016	2015	2010	2000
US	Overall	13.7	13.3	11.8	10.1
	Male	21.1	20.5	18.6	16.5
	Female	6.4	6.3	5.2	4.1
China	Overall	8.0	8.1	10.0	14.1
	Male	7.9	7.9	9.0	12.7
	Female	8.3	8.5	11.0	15.6

Note. Source: World Health Organization (WHO; 2016). http://apps.who.int/gho/data/view.main.MHSUICIDEv.

2018). Another survey with over 67,000 American college students showed that about 9.8% of respondents had seriously considered suicide in the past year, whilst 1.5% had attempted suicide (Chen, Stevens, Wong, & Liu, 2019). Across studies, the prevalence rate of suicidal behaviors among US students ranged between 6% and 25%.

In China, a meta-analysis study found that 17.7% of adolescents reported having suicide ideation, 7.3% planned to commit suicide, and 2.7% attempted suicide (Dong, Liu, & Liu, 2014). More females reported suicidal ideation (7%) than males (5%; Dong et al., 2014). In a survey of 1,168 first-year college students randomly sampled from 10 Chinese colleges, the prevalence rate of lifetime suicidal ideation was 45.1%, 6.8% for suicide planning, and 1.9% for suicide attempts, with females having an elevated risk of suicidality (Zhao et al., 2012). Hu and colleagues (2015) reported in their meta-analysis of 43 studies with 200,124 participants a pooled prevalence of 2.94% suicide attempts, ranging from 0.94% to 9.01%. Together, the prevalence rate of suicidal behaviors among Chinese students ranged between 2.7% and 45.1%.

For completed suicide, the World Health Organization WHO (2019) estimated an increase in suicide cases at 793,000 suicide deaths worldwide in 2016 with an annual global age-standardized suicide rate of 10.5 per 100,000 population. Per 100,000 population, the age-standardized suicide rate in the US between 2000 to 2016 increased from 10.1 to 13.7, while the same rate in China declined from 14.1 to 8.1 (World Health Organization WHO, 2016; Table 1).

This pattern is supported by other studies. In the US, the suicide rate between 1999 and 2017 rose 33% (Hedegaard, Curtin, & Warner, 2018), while in China, the high suicide rate in the 1990s (Qin & Mortensen, 2001) steadily declined since then (Hvistendahl, 2012; Zhang, Sun, Liu, & Zhang, 2014). In the US, the male-to-female suicide ratio remained consistent between 2000 to 2016, from 16.5:4.1 to 21.1:6.4, or a ratio of about three to four males to one female. However, during this same period in China, the suicide ratio shrunk from 12.7:15.6 in 2000 to 7.9:8.3 in 2016, resulting in an approximately even male-to-female ratio.

With the recent social and economic development in China, Zhang and colleagues (2014) suggested that the patterns of suicide rates between US and China are becoming more similar. It is therefore timely to use the SBQ-R to compare patterns in suicide-related behaviors between the two largest economies today. By using an identical measure in both countries, suicide-related behaviors are clearly operationalized. The SBQ-R was developed as a brief measure of

a range of suicide-related behaviors for use in both clinical and nonclinical settings (Osman et al., 2001), and is one of the most commonly used brief instruments in cross-cultural investigations (Batterham et al., 2015; Cassidy, Bradley, Bowen, Wingham, & Rodgers, 2018). The results may shed light on protective factors for promoting mental health and preventing suicide.

Method

The US participants and procedure

A total of 452 male (38.1%) and 733 female students (61.9%), aged between 18 and 24 years (*M* = 18.98, *SD* = 1.21), were recruited from a large public university in the Southwest of the US. Males (*M* age = 19.12, *SD* = 1.27 years) and females (*M* age = 18.89, *SD* = 1.17 years) differed significantly in age, *t* (1,185) = 3.16, *p* = .002, Cohen's *d* = 0.19. Informed consent were obtained, and participants completed a battery of questionnaires, including a short set of demographic information and the SBQ-R. Participation was voluntary and confidentiality was maintained by not including any identifiers in the survey form. Participants were awarded partial course credit for participation in the study. The university's Institutional Review Board approved all the study procedures. Criteria for excluding participants in the study were the same as the Chinese sample (described below). No participant was excluded as none of the questionnaires were incomplete.

Chinese participants and procedure

To lessen the potential impacts of unbalanced sample sizes between the Chinese and US samples, the SPSS random sampling extraction procedures extracted 2,000 students aged between 18 to 24 years (*M* = 20.70, *SD* = 1.35) from a dataset consisted of 11,806 participants from seven provinces in China (Ningxia, Shandong, Shanghai, Jilin, Qinghai, Shaanxi, and Xinjiang). The original dataset was part of a three-phase study on suicidality among college students in China, with a particular focus on examining the risk and protective factors associated with students' suicidality. Participants were excluded if: (1) the responses were out-of-range, which may be due to data entry error; (2) over 30% percent of the items were incomplete on the SBQ-R; or (3) key demographic information, such as gender and age, was missing. Participation was voluntary, with written consent obtained from participants. Confidentiality was maintained by not including any identifiers in the survey form. Each relevant universities' Institutional Research Board approved all study procedures. Males (*M* age = 20.75, *SD* = 1.36 years) and females (*M* age = 20.67, *SD* = 1.35 years) did not differ significantly in terms of age, *t* (2000) = 1.29, *p* = .195 (see Table 2).

Measures

Suicidal Behaviors Questionnaire-Revised (SBQ-R). The SBQ-R (Osman et al., 2001) is a scale designed to measure the suicide-related behavior construct with four different suicide-related behavior parameters: past suicide attempt,

Table 2 Age and gender breakdown of participants (N = 3,185).

	US			China		
	Male	Female	Total	Male	Female	Total
Sample Size	452	733	1185	787	1213	2000
Age (M ± SD)	19.12 ± 1.27	18.89 ± 1.17	18.98 ± 1.21	20.75 ± 1.36	20.67 ± 1.35	20.70 ± 1.35
t-test (Gender)	3.16** (p = .002)			1.29 (p = .195)		

*p < .05; **p <.01; ***p < .001.

suicidal ideation, suicide threat, and likelihood of suicide attempt. It allows researchers and healthcare professionals to assess the level of severity of suicidality and specific risk factors. The scale is unidimensional and made up of four items: assessing suicidal ideation and attempts in a lifetime (Item 1); the frequency of suicidal ideation over the past 12 months (Item 2); the threat of suicide attempt (Item 3); and future likelihood of suicidal behavior (Item 4). A sample item is, ''How likely is it that you will attempt suicide in the future?'' Summing each item score gives the total score for the SBQ-R which ranges between 3 to 18. Higher scores indicate higher levels of suicidality. A score of 7 or above was classified as suicidal, whereas scores below 7 was classified as non-suicidal. The reliability estimate of the SBQ-R for the undergraduate sample was reasonable (Cronbach's alpha = .76; Osman et al., 2001). In this study, the Cronbach alpha value was .73 (95% CI [.71, .75]) for the Chinese sample and .83 (95% CI [.81, .85]) for the US sample.

In the US sample, the original scale in English (Osman et al., 2001) was used. For the China sample, the Chinese version of the SBQ-R was translated by the Shandong University Centre for Suicide Prevention Research in 2016 by Chinese and US collaborative research teams. Two independent bilingual experts with extensive experience in the area of mental health forward-translated the individual items and the instructions into Chinese. Next, an expert, a native Chinese speaker with fluency in English, back-translated the Chinese version into English. The Chinese version of the SBQ-R was reviewed and discussed to enhance clarity and legibility prior to administration. It was first evaluated systematically in 2017 with approximately 2,074 college samples from two universities in Jinan, Shandong, with an acceptable Cronbach's alpha coefficient of .67 (Lew et al., 2019). The translated version was accepted with no further changes made.

Data analytic strategy

Statistical analysis was conducted using the SPSS V20 (IBM Corp., 2011). Data analytic strategy differed for continuous variables and categorical variables.

Continuous variables. Each question of the SBQ-R is examined in terms of its raw score. Specifically, Item 1 has a four-point response option, ranging from 1 (*never*) to 4b (*attempted to kill, ...hoped to die*). Item 2 has a five-point response option with scores ranging from 1 (*never*) to 5 (*very often*). Item 3 has a three-point response option with scores ranging from 1 (*no*) to 3b (*yes, ...really wanted to die*). Item 4 has a seven-point response option with scores ranging from 0 (*never*) to 6 (*very likely*). Each item represents a specific

suicide-related behavior parameter: (1) Life-time ideation / plans / attempts; (2) Past year ideation frequency; (3) Life-time threat (inform someone); and (4) Future attempt likelihood.

Categorical variables. Categorical variables were formed from the SBQ-R items based on the following criteria:

Item 1. Participants who selected option 2 were included in the Lifetime ideation category. Those who selected either 3a or 3b were included in the Lifetime plan category. Those who selected either 4a or 4b were assigned to the Lifetime attempt category.

Item 2. Participants who selected options of 2 to 5 were included in the Past-year ideation category.

Item 3. Participants who endorsed response options 2a, 2b, 3a or 3b were categorized into Life-time threat (inform someone).

Item 4. Participants who chose response options 4, 5, or 6 were categorized into the Future attempt likelihood category. In addition to assessing responses to the individual SBQ-R items, the overall severity of suicide risk score was computed by summing scores of the individual items. Following the cutoff score proposed by Osman and colleagues (2001), total scores at or above 7 in the current study indicated a risk for suicide-related behaviors.

For all continuous variables, the following analyses were undertaken:

1 US participants were compared with Chinese participants by gender and also by total sample.
2 Independent samples *t*-test was used to evaluate the level of significance.

For all categorical variables, the following analyses were undertaken:

1 US participants were compared with Chinese participants by gender and also by total sample.
2 Pearson Chi-Square was calculated to show the level of significance.
3 Odds Ratio (OR) was calculated for each comparison.

Results

Results are presented from Tables 3 to 5. Item-level comparison results are summarized as follows.

Table 3A Descriptive statistics of itemized SBQ-R for male students (comparison between US students and Chinese students; Continuous variables).

	Chinese		US		t	Cohen's d
	M	SD	M	SD		
Life-Time Ideation/ Plans/ Attempts	1.42	0.72	1.57	0.80	±3.39***	0.20
Past-Year Ideation Frequency	1.28	0.69	1.50	0.94	±4.72***	0.27
Life-Time Threat (Inform Someone)	1.14	0.40	1.22	0.50	±3.09**	0.18
Likelihood of Future Attempt	0.68	1.19	0.50	1.00	±2.71**	0.16
Total SBQ-R Score	4.51	2.42	4.79	2.68	±1.88	0.11
N	787		452			

*p < .05; **p < .01; ***p < .001.

Table 3B Descriptive statistics of itemized SBQ-R for male students (comparison between US students and Chinese students; Categorical variables).

	Chinese		US		χ^2	OR	95% CI
	N	(%)	N	(%)			
Life-Time Ideation	190	24.1	114	25.2	0.19	0.94	0.72, 1.23
Life-Time Plan	36	4.6	53	11.7	21.67***	0.36***	0.23, 0.56
Life-Time Attempt	23	2.9	12	2.7	0.04	1.10	0.54, 2.24
Past Year Ideation	145	18.4	127	28.1	15.76***	0.58***	0.44, 0.76
Life-Time Threat (Inform Someone)	89	11.3	82	18.1	11.16***	0.58***	0.42, 0.80
Likelihood of Future Attempt	48	6.1	9	2.0	10.98***	3.20**	1.55, 6.58
Risk of Suicide-Related Behaviors (Total SBQ-R Score ≥ 7)	123	15.6	96	21.2	6.19*	0.69*	0.64, 1.15
N	787		452				

*p < .05; **p < .01; ***p < .001.

Table 4A Descriptive statistics of itemized SBQ-R for female students (comparison between US students and Chinese students; Continuous variables).

	Chinese		US		t	Cohen's d
	M	SD	M	SD		
Life-Time Ideation/ Plans/ Attempts	1.45	0.67	1.79	0.91	±9.45***	0.43
Past-Year Ideation Frequency	1.28	0.65	1.67	1.08	±9.95***	0.44
Life-Time Threat (Inform Someone)	1.16	0.41	1.26	0.52	±4.70***	0.21
Likelihood of Future Attempt	0.71	1.23	0.60	1.05	±2.02*	0.10
Total SBQ-R Score	4.60	2.36	5.33	3.01	±5.95***	0.27
N	1213		733			

*p < .05; **p < .01; ***p < .001.

Table 4B Descriptive statistics of itemized SBQ-R for female students (comparison between US students and Chinese students; Categorical variables).

	Chinese		US		χ^2	OR	95% CI
	N	(%)	N	(%)			
Life-Time Ideation	339	27.9	218	29.7	0.73	0.92	0.75, 1.12
Life-Time Plan	82	6.8	120	16.4	45.10***	0.37***	0.28, 0.50
Life-Time Attempt	14	1.2	41	5.6	31.85***	0.20***	0.11, 0.36
Past Year Ideation	239	19.7	263	35.9	62.60***	0.44***	0.37, 0.54
Life-Time Threat (Inform Someone)	174	14.3	164	22.4	20.89***	0.58***	0.46, 0.74
Likelihood of Future Attempt	69	5.7	20	2.7	9.42**	2.15***	1.30, 3.57
Risk of Suicide-Related Behaviors (Total SBQ-R Score ≥ 7)	217	17.9	192	26.2	18.95***	0.61***	0.49, 0.77
N	1,213		733				

*p < .05; **p < .01; ***p < .001.

Table 5A Descriptive statistics of itemized SBQ-R for all students (comparison between US students and Chinese students; Continuous variables).

	Chinese		US		t	Cohen's d
	M	SD	M	SD		
Life-Time Ideation/ Plans/ Attempts	1.44	0.69	1.71	.88	±9.61***	0.34
Past-Year Ideation Frequency	1.28	0.67	1.61	1.03	±10.94***	0.38
Life-Time Threat (Inform Someone)	1.15	0.41	1.24	0.51	±5.46***	0.19
Likelihood of Future Attempt	0.70	1.21	0.56	1.03	±3.33***	0.12
Total SBQ-R Score	4.56	2.38	5.12	2.90	±5.91***	0.21
N		2000		1185		

*$p < .05$; **$p < .01$; ***$p < .001$.

Table 5B Descriptive statistics of itemized SBQ-R for all students (comparison between US students and Chinese students; Categorial variables).

	Chinese		US		χ^2	OR	95% CI
	N	(%)	N	(%)			
Life-Time Ideation	529	26.5	332	28.0	0.85	0.92	0.79, 1.08
Life-Time Plan	118	5.9	173	14.6	67.82***	0.37***	0.29, 0.47
Life-Time Attempt	37	1.9	53	4.5	18.06***	0.40***	0.26, 0.62
Past Year Ideation	384	19.2	390	32.9	75.91***	0.48***	0.41, 0.57
Life-Time Threat (Inform Someone)	263	13.2	20.8	246	31.92***	0.58***	0.48, 0.70
Likelihood of Future Attempt	117	5.9	29	2.4	20.77***	2.48***	1.64, 3.74
Risk of Suicide-Related Behaviors (Total SBQ-R Score $\geq$ 7)	340	17.0	288	24.3	25.04***	0.64***	0.53, 0.76
N	2000		1185				

*$p < .05$; **$p < .01$; ***$p < .001$.

Item 1 of SBQ-R

Continuous variables-lifetime ideation, plans, and attempts. Both the US male (1.57 ± 0.80) and female (1.79 ± 0.91) students (overall- US: 1.71 ± 0.88, Chinese: 1.44 ± 0.69, t (3185) = ±9.61, $p < .001$; Cohen's $d = 0.34$) had significantly higher total suicidal ideation than Chinese male students (1.42 ± 0.72), t (1239) = ±3.38, $p < .001$; Cohen's $d = 0.20$, and Chinese female students (1.45 ± 0.67), t (1946) = ±9.45, $p < .001$; Cohen's $d = 0.43$.

Categorical variables-lifetime ideation. Both the US and Chinese male students (25.2% and 24.1%, respectively), χ^2(1239) = 0.18 (*n.s.*) and the US and Chinese female students (29.7% and 27.9% respectively, χ^2(1946) = 0.72 (*n.s.*) reported similar lifetime ideation (overall- the US: 28.0%, Chinese: 26.5%, χ^2(3185) = 0.84 (*n.s.*). The odds of having lifetime ideation were all significantly higher for the US than Chinese students (overall and breakdown by sex).

Categorical variables-lifetime plans of suicide. The US male students reported higher lifetime plans of suicide than the Chinese male students (11.7% vs 4.6%, respectively), χ^2(1239) = 21.67, $p < .001$, with a significant OR of 0.36 (95% CI = 0.23-0.56). Similarly, more US female students reported lifetime plans than the Chinese students (16.4% vs. 6.8%, respectively), χ^2(1946) = 45.10, $p < .001$, and with a significant OR of 0.37 (95% CI = 0.28-0.50). Overall, US students reported more lifetime plans compared to the Chinese students (14.6% vs. 5.9%, respectively), χ^2(3185) = 67.82, $p < .001$, with a significant OR of 0.37 (95% CI = 0.29-0.47).

Categorical variables-lifetime attempts. US male students did not differ significantly than Chinese male students in lifetime attempts of suicide (2.7% vs 2.9%), χ^2(1239) = 0.04 (*n.s.*), and with a non-significant OR of 1.10 (95% CI = 0.54-2.24). However, more US female students reported lifetime suicide attempts than Chinese female students (5.6% vs. 1.2%, respectively), χ^2(1946) = 31.85, $p < .001$, with a significant OR of 0.20 (95% CI = 0.11-0.36). Overall, more US students reported lifetime suicide attempts than Chinese students (4.5% vs. 1.9%, respectively), χ^2(3185) = 18.05, $p < .001$, with a significant OR at 0.40 (95% CI = 0.26-0.62).

Item 2 of SBQ-R

Continuous variables-past-year suicidal ideation
Both the US male (1.50 ± 0.94), female (1.67 ± 1.08), and overall US students (1.61 ± 1.03) had significantly higher suicidal ideation than Chinese male (1.28 ± 0.69), t(1239) = ±4.72, $p < .001$, Cohen's $d = 0.27$, female (1.28 ± 0.65), t (1946) = ±9.94, $p < .001$, Cohen's $d = 0.44$, and overall Chinese students (1.28 ± 0.67), t (3185) = ±10.94, $p < .01$, Cohen's $d = 0.38$.

Categorical variables-past-year suicidal ideation
Both the US male (28.1%), female (35.9%), and overall (32.9%) US students reported higher past-year suicidal ideation than Chinese male (18.4%, χ^2(1239) = 15.76, $p < .001$; OR = 0.58, 95% CI = 0.44-0.76), female (19.7%,

$\chi^2(1946) = 62.60$, $p < .001$; OR = 0.58, 95% CI = 0.44-0.76, and overall Chinese students (19.2%, $\chi^2(3185) = 75.90$ ($p < .001$), OR = 0.48 (95% CI = 0.41-0.57).

Item 3 of SBQ-R

Continuous variables-suicide threat (informed someone)
Both the US male (1.22 ± 0.50), female (1.26 ± 0.52), and overall US students (1.24 ± 0.51) had significantly higher suicidal ideation than Chinese male (1.14 ± 0.4), $t(1239) = \pm 3.08$, $p < .01$, Cohen's $d = 0.18$, female (1.16 ± 0.41), $t(1946) = \pm 4.70$, $p < .001$, Cohen's $d = 0.21$, and overall Chinese students (1.15 ± 0.41), $t(3185) = \pm 5.45$, $p < .001$, Cohen's $d = 0.19$.

Categorical variables-suicide threat (informed someone)
More US male (18.1%), female (22.4%) and overall US students (20.8%) reported significantly higher suicide threat or having informed someone about going to kill themselves than Chinese male (11.3%), $\chi^2(1239) = 11.16$, $p < .001$, OR = 0.57 (95% CI = 0.42-0.80), female (14.3%), $\chi^2(1946) = 20.89$, $p < .001$, with a OR of 0.58 (95% CI 0.46-0.74), and overall Chinese students (13.2%), $\chi^2(3185) = 31.92$, $p < .001$, OR = 0.58 (95% CI = 0.46-0.74).

Item 4 of SBQ-R

Continuous variables-Likelihood of future suicide attempt
This is the only item whereby both US male (0.50 ± 1.00), female (0.60 ± 1.05) and overall US students (0.56 ± 1.03) reported a significantly lower likelihood of future suicide attempt than Chinese male (0.68 ± 1.19), $t(1239) = \pm 2.71$, $p < .01$, Cohen's $d = 0.16$, female (0.71 ± 1.23), $t(1946) = \pm 2.01$, $p < .05$, Cohen's $d = 0.10$, and overall Chinese students (0.70 ± 1.21), $t(3185) = \pm 3.33$, $p < .001$, Cohen's $d = 0.12$.

Categorical variables-Likelihood of future suicide attempt
Similarly, a significantly lower proportion of US male (2.0%), female (2.7%), and overall US students (2.4%) reported a likelihood of future suicide attempt than Chinese male (6.1%), $\chi^2(1239) = 10.97$, $p < .001$, with a OR of 3.20 (95% CI = 1.55-6.58), female (5.7%), $\chi^2(1946) = 9.42$, $p < .01$, with a OR of 2.15 (95% CI = 1.30-3.59) and overall Chinese students (5.9%), $\chi^2(3185) = 20.77$, $p < .001$, with a OR of 2.48 (95% CI = 1.64-3.74).

Total SBQ-R scores

Continuous variables- Total SBQ-R scores
The total SBQ-R scores did not differ significantly between male students in the US and China (4.79 ± 2.68 vs 4.51 ± 2.42, respectively), $t(1239) = 1.88$ (*n.s.*), Cohen's $d = 0.16$. The US female students had significantly higher mean total SBQ-R scores than Chinese female students (5.33 ± 3.01 vs 4.60 ± 2.36, respectively), $t(1946) = 5.94$, $p < .001$, Cohen's $d = 0.27$. Overall, US students also reported a significantly higher mean total SBQ-R score compared to

Chinese students (5.12 ± 2.90 vs 4.56 ± 2.38, respectively), $t(3185) = 5.90$, $p < .001$, Cohen's $d = 0.21$.

Categorical variables–Total SBQ-R scores
A higher proportion of US male (21.2%) and female (26.2%) students (and overall, 24.3%) were at risk of suicide-related behaviors compared to Chinese male (15.6%), $\chi^2(1239) = 6.19$, $p < .05$, with a OR of 0.69 (95% CI = 0.64-1.15), female (17.9%), $\chi^2(1946) = 18.95$, $p < .001$, with a OR of 0.61 (95% CI = 0.49-0.77) and overall students (17.0%), $\chi^2(3185) = 25.04$, $p < .001$, with a OR of 0.64 (95% CI = 0.53-0.76).

Discussion

Overall, American students were at higher risk of suicide-related behaviors compared to Chinese students, at 24.3% compared to 17.0%, respectively. American students scored higher than Chinese students on: (1) life-time ideation, plan, and attempt; (2) past-year suicidal ideation; (3) life-time threat; and (4) total SBQ-R score. Despite no substantive differences on life-time ideation, Chinese students scored higher on the likelihood of future attempt item, and were 2.5 times more likely to be at risk of future attempts.

The mean SBQ-R total score of 5.12 for the US sample and findings indicating that 24.3% of American students are at risk of suicide-related behaviors in this study were similar to findings by Becker, Holdaway, and Luebbe (2017), who reported a mean SBQ-R total score of 5.17, constituting 26.1% of high-risk individuals among US college students.

Chinese students reported significantly fewer suicide-related behaviors such as lifetime ideation/plan/attempt, past-year ideation frequency and lifetime threat, reflected by significantly lower total SBQ-R scores than their US counterparts. Despite this, the likelihood of future attempt was significantly higher among the Chinese students compared to the American students.

Many factors could account for this discrepancy, such as cultural attitudes toward suicide. Much like Japan, there is substantial cultural tolerance in China for and permissive attitudes toward suicide and suicidal behavior/intent (Otsuka et al., 2020), with suicide historically even condoned as a morally responsible action (Kawashima, Kawamoto, Shiraga, & Kawano, 2019). The Chinese are much less predisposed toward help-seeking for emotional and mental distress compared to Americans. Mental issues remain a taboo issue in China, with less than 5% of Chinese respondents reporting lifetime mental health help-seeking (Liu et al., 2018). Hence, when young Chinese individuals suffer from mental health issues, they may have much less recourse to the traditional sources of support that are prevalent in Western society. For example, in spite of the cultural value emphasizing strong family cohesion, having a frank conversation with family and friends on mental health struggles remains far from the norm.

Another cultural reason may be due to Confucian ethics. Especially among Chinese females, they have been carefully groomed and moulded to subordinate to certain societal norms and are obliged to fulfil the expectations of their elders, family, and society (Zhang & Liu, 2012). This added pressure may exacerbate the typical stress-diathesis of

already overwhelming pressure to cope with young adulthood and college life. Radical economic development may explain decreased suicide-related behaviors in China (Hu et al., 2015). Follett (2018) noted that the drop in suicide rate coincided with the large-scale migration of rural workers to cities since 2001, and Wang, Chan, and Yip (2014) suggested that the changes in individuals' circumstances such as improved income, standards of living and education might have lowered the overall suicide rates. Filial piety (Chinese: *Xiao*), a central Confucian concept (Chao, 1994), which socialized Chinese people to consider how one's action would affect their parents, may discourage suicide. Limited access to lethal means, such as firearms in China, may further discourage suicide. The lower rate of suicide-related behaviors in the Chinese college sample may also be mediated by higher socio-economic status, unlike the more disadvantaged general population (Vijayakumar, 2015).

Lastly, the prevalence of firearms in the US may elevate suicide risk and increase the rate of suicide. Firearms are a highly lethal method of suicide (Goldstein, Prater, & Wickizer, 2019), and experiences with firing a gun are associated with lifetime suicide attempts (Anestis & Capron, 2017). Over 60% of completed suicides in the US are by firearms (Ajdacic-Gross et al., 2008), and a meta-analysis study suggested that access to firearms increases the risk for completed suicide (Anglemyer, Horvath, & Rutherford, 2014).

Interventions to reduce suicide should not only focus on addressing items on the SBQ-R. Studies of adults and adolescents in Germany highlighted the importance of positive mental health in protecting against suicidal ideation (Teismann et al., 2018; Teismann, Brailovskaia, & Margraf, 2019). Depressed patients with and without pre-treatment for suicidal ideation were found to have similar psychotherapy outcomes, indicating that suicidal ideation may not be a detriment to depression recovery (Von Brachel, Teismann, Feider, & Margraf, 2019). Factoring in cultural differences, more research is needed to unravel the complex issues in suicide.

Several limitations should be considered when interpreting the results of the current findings. First, findings may not be generalizable to clinical groups. Second, the study did not include parameters such as suicide intent and correlates of suicide. Third, the study did not address the issue of measurement invariance, but this is fully addressed in another study by the authors. Indeed, it was the results of the presence of the differential item functioning of the SBQ-R items which had led to the focus of this paper to undertake the analyses at the item level. Suicide-related behavior construct could hold different meanings to the US and China groups such that it cannot be meaningfully compared (Putnick & Bornstein, 2016). Fourth, there were more Chinese students and they were slightly older than their US counterparts. Fifth, students in the US sample were awarded a partial course credit for their participation while students in China were not awarded, which could lead to biases in participant responses. Sixth, since data from the US involved one large public university while data from China was from seven provinces, generalizability of the findings may be affected by sampling bias. Despite these limitations, results point to the importance of traditional classical test theory for undertaking analyses at the item-level in order to evaluate the performances of individual items empirically (Bichi, 2016).

In conclusion, the study provided empirical evidence on the cross-cultural differences in suicide-related behavior parameters by making careful item-level comparisons on the well-validated SBQ-R across the two countries. Further investigations on why Chinese students reported a higher likelihood of future attempts compared to their US counterparts are needed. Factors such as psychological distress, suicide stigma, help-seeking behavior, and hope and hopelessness about the future (Han, Batterham, Calear, & Ma, 2018; Huen, Ip, Ho, & Yip, 2015; Tang, Byrne, & Qin, 2018) can be explored in future studies. Reasons behind higher suicide-related behaviors among female US students also warrants further investigation. Specific interventions designed to alleviate college student suicide-related behavior in the US and China and studies on particular protective and risk factors in different sub-groups across the countries should also be conducted.

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