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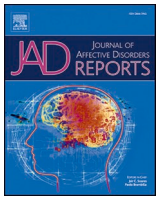

Research Paper

Suicidal ideation, non-suicidal self-injury and psychopathology in university students: Examining the moderating role of experiential avoidance

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ABSTRACT

Background: Suicidal ideation (SI) is prevalent and associated with negative mental health outcomes in young people, including psychiatric symptoms and non-suicidal self-injury (NSSI). These associations are not well understood, as is the role of experiential avoidance (EA) in the maintenance of SI in university students.
Method: The association between recent (last 30-days) and future (next 12-months) SI with NSSI, depression, anxiety, perceived life stress, and EA was explored in university students who completed an online survey (N = 1,355; 69 % women). Logistic regression analyses were used to predict recent and future SI. Interaction effects were explored to assess the moderating role of EA between NSSI, psychiatric symptoms, and SI.
Results: Past-NSSI plus past-SI were strongly associated with recent SI (OR = 6.08) and future SI (OR = 25.36), even over and above current psychiatric symptoms. Additionally, EA moderated the relationship between psychiatric symptoms and recent SI. Specifically, anxiety and perceived life stress were associated with an increased risk of recent SI in students with low EA, compared to those with high EA.
Limitations: The cross-sectional design does not allow us to infer causal relationships between variables. We only evaluated past NSSI and past SI with a single dichotomous item. Then, we did not capture the full heterogeneity of methods related to both phenomena. Only first-year university students were included and a convenience sampling method was used.
Conclusions: Past-NSSI and past-SI are risk factors in the maintenance of recent and future SI, whereas EA operates as a specific moderating mechanism for SI.

1. Introduction

Suicidal ideation (SI) is prevalent among young people and a public concern worldwide (Glenn et al., 2020). SI has been associated with adverse mental health outcomes (Kleiman and Nock., 2018), such as depressive and anxiety symptoms (Grant et al., 2023; Martínez-Nicolás et al., 2022), life-perceived stress (Yu & He, 2023) and non-suicidal self-injury (NSSI). There is a lack of consensus on the role of psychiatric symptoms as factors predicting SI (Franklin et al., 2017; Pollak et al., 2021), and other associated processes beyond symptoms are currently being examined to better understand these two phenomena and their associations (Schechter & Goldblatt, 2020). One of these processes is experiential avoidance (EA). Prior research has shown associations among EA, SI and NSSI (Anderson and Crowther, 2012; Bentley et al., 2015; Brereton and McGlinchey, 2020), but further research examining interactive factors between EA and suicide experiences is needed to provide new insights into potential clinical implications (Angelakis and Gooding, 2021).

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University students represent a vulnerable risk-group for mental health problems, and show relevant prevalence of psychological difficulties (Granieri et al., 2022; Kiekens et al., 2018), including symptoms of depression (34 %), symptoms of anxiety (32 %), SI (22,3 %) and NSSI (38,9 %) (Cipriano et al., 2017; Deng et al., 2021; Mortier et al., 2018; Wester et al., 2018). Particularly, first year university students present a higher incidence of NSSI (10.3 %) than students in the second year (6 %) (Kiekens et al., 2019). SI involves thoughts about ending one's own life while non-suicidal self-injury (NSSI) is used to reduce or alleviate an unpleasant emotional state or negative thoughts without intentions to die (Klonsky et al., 2014; Muehlenkamp, 2014). SI and NSSI are two strongly associated phenomena (Hamza et al., 2012; Kiekens et al., 2018) and linked with higher suicidal behaviors, particularly in young people and university students (Akram et al., 2020; Pillay, 2021). SI and NSSI may co-occur and share common risk factors (Griep & MacKinnon, 2022; Kiekens et al., 2018). For example, both appear in early adolescence and evidence suggests that NSSI precedes SI (Kiekens et al., 2018). Specifically, among people with a history of self-injury, 70% have attempted suicide at least once (Vega et al., 2018). The co-occurrence of NSSI and SI could involve greater psychopathological comorbidity (i.e., depressive and anxiety symptoms), increasing the risk for suicidal behavior (Hamza & Willoughby, 2013). To further our understanding of the associations between SI and NSSI, some studies have suggested that assessing underlying psychological transdiagnostic processes in conjunction with psychiatric symptoms may be fruitful (e.g. Shah et al., 2020).

One of these mechanisms is emotion regulation (Brausch et al., 2022), such as EA (Angelakis and Gooding, 2021; Nielsen et al., 2016), which represents the person's attempts or desires to suppress unwanted internal experiences, even when this leads to actions that are inconsistent with personal values and goals (Hayes et al., 1996, 2004). EA has been associated with the development and maintenance of a wide range of psychopathological disorders (Malicki & Ostaszewski, 2014; Spinhoven et al., 2014), SI (Ellis et al., 2016; Brausch & Woods, 2019) and NSSI (Haywood et al., 2023). The link between EA and psychological distress has been demonstrated in different populations (Andrew & Dulin 2007; Cheng et al., 2022; Pierson et al., 2019; Tan et al., 2023), including college students (Borgogna et al., 2020).

A recent meta-analysis showed moderate to strong associations between EA and SI and weak but significant associations between EA and NSSI (Angelakis and Gooding, 2021). Prior research examining this in university students is scant and supports that EA predicted an increased risk of SI one-year follow-up (Chou et al., 2018). As reported by Krafft et al. (2019) EA and SI were both cross-sectionally and longitudinally associated and EA interacted with distress, cognitive fusion, and values progress in a sample of college students. The meta-analysis by Angelakis and Gooding (2021) conducted in samples mostly composed by university students, showed moderate to strong associations between EA and SI and weak but significant associations between EA and NSSI. Additionally, the recent meta-analysis by Haywood et al. (2023) suggests a robust association between history of NSSI and EA, highlighting the need for further research to clarify which aspects of avoidance differentiate individuals with and without a history of NSSI. On the other hand, the evidence on the potential moderators between EA and other negative mental health outcomes is not clear. Angelakis and Gooding (2021) did not find any variable to moderate the association between EA and NSSI. On the other hand, there is scant research examining the potential moderating role of EA. Kashdan and Kane (2011) found that EA moderated the association between posttraumatic distress and the presence of posttraumatic growth and meaning in life. It has also been found that EA moderates the relationship between anxiety sensitivity and perceived stress (Baarden et al., 2013), the associations between cognitive fusion and psychological distress (anxiety, depression, stress and posttraumatic stress) (Bardeen et al., 2016) and the relation of cognitive fusion and depression, but not anxiety (Hekmati et al., 2021). To our knowledge, the only study systematically examining the associations between the history of NSSI and EA reported that measure of EA (AAQ – II) moderated this association (Haywood et al., 2023).

In summary, the literature suggests that NSSI is an early behavioral manifestation of psychopathology (e.g., Ghinea et al., 2020) and a risk factor for suicidal-related behaviors, including later SI in young people (Kiekens et al., 2018). Moreover, longitudinal studies suggest that the engagement in NSSI and suicidal behaviors during adolescence increases the risk of developing later psychopathology in adulthood related with depression and anxiety disorders (Daukantaitė et al., 2021; Mars et al., 2014; Wångby-Lundh et al., 2023). In turn, symptoms of depression, anxiety and stress are highly associated with suicidal behaviors in college students and may favor the occurrence of SI (see: Akram et al., 2020; Grant et al., 2023; Martínez-Nicolás et al., 2022). Some psychological mechanisms such as EA may contribute to maintaining (or reactivating when there is a history of past NSSI and SI) current suicidal behaviors in young people, such as maladaptive coping strategies to avoid academic and social stressors (Bentley et al., 2015; Brereton & McGlinchey, 2020). However, little is known about the moderating effect of EA on the association between past-NSSI, past-SI, current symptoms, and recent SI in young college students (e.g., Angelakis and Gooding, 2021).

Due to this evidence, we aimed to examine the associations between EA and recent (last 30-days) and future (next 12-months) SI in a sample of first-year university students. Likewise, we examined the associations between a history of past NSSI and past SI in conjunction with current symptoms of depression, anxiety and perceived life stress in predicting recent and future SI. Finally, we explored the moderating role of EA between the association of past SI, past NSSI, current symptoms of depression, anxiety, perceived life stress and recent SI. Specifically, we expected that: (i) students with a history of NSSI plus SI in the past, greater presence of current symptoms (i.e., depression, anxiety, perceived life stress) and higher level of EA would have a higher likelihood of recent suicide ideation (hypothesis 1); (ii) similarly, students with a history of NSSI plus SI in the past, greater symptoms of depression and also higher level of EA would have a higher likelihood of suicide ideation in the next 12-months (hypothesis 2); (iii) EA would moderate the association between past NSSI, past SI and recent SI (hypothesis 3); (iv) and, EA also would moderate the association between symptoms (i.e., depression, anxiety, perceived life stress) and recent SI (hypothesis 4).

2. Methods

2.1. Participants

Participants were first-year undergraduate students from two universities in the south of Chile. In total, 1,771 students agreed to participate in the study and signed the informed consent before completing the questionnaires. Overall, 416 participants did not complete the online survey. Finally, 1,355 participants (76.5 %) were included in the analyses.

2.2. Instruments

2.2.1. Suicidal ideation (SI)

SI was assessed on the basis of the Self-Injurious Thoughts and Behaviors Interview (SITBI) self-report version (Nock et al., 2007). We asked about SI at three different points in time: SI ever (past), SI in the last 30-days (recent), and SI in the next 12-months (future). SI ever was assessed by the question: *Did you ever in your life had thoughts of killing yourself?* Participants had a dichotomous response option (0 = "no"; 1 = "yes"). Those who answered "yes" were also asked: *How old were you the very first time you wished you were dead or had thoughts of killing yourself?* Recent SI was assessed by the question: *In the last 30 days, how often have you wished you were dead, wanted to go to sleep and never wake up, or had*

thoughts of suicide? Participants responded on a five-point scale (0 = "never"; 1 = "rarely"; 2 = "sometimes"; 3= "most of the time"; 4 = "always or almost always"). For logistic regression analyses, this scale was dichotomized (0 = "no" vs 1-4 = "yes"). Future SI was assessed by the question: *In the next 12 months, how likely are you to attempt suicide?* Participants responded on a four-point scale (1 = "not at all likely"; 2 = "not very likely"; 3 = "somewhat likely"; 4 = "very likely"). For logistic regression analyses, this scale was dichotomized (1-2 = " no" vs 3-4 = "yes").

2.2.2. Non-suicidal self-injury (NSSI)

Items from the SITBI were used to evaluate NSSI (Nock et al., 2007). NSSI was assessed by the question: *Have you ever in your life done something on purpose to harm yourself without intending to die (e.g., cut, hit, or burn yourself)?* Participants had a dichotomous response option (0 = "no"; 1 = "yes"). Those who answered "yes" were also asked: *Approximately how old were you the first time you did something on purpose to harm yourself, with no intention of dying?*

2.2.3. Experiential avoidance (EA)

The Acceptance and Action Questionnaire - II (AAQ-II: Bond et al., 2011) was used to measure the degree to which students have a tendency to suppress or avoid negative emotions, thoughts, feelings, or memories. EA is considered a transdiagnostic measure observed in different psychological disorders (Ruiz et al., 2013). It consists of 7 items that are measured using a 7-point Likert scale (from 1 = "Never true" to 7 = "always true"). The scale has shown good internal consistency (Cronbach's α = .88) in samples of university students (Ruiz et al., 2013) and demonstrated excellent internal consistency in the current sample (Cronbach's α = .91).

2.2.4. Depressive and anxiety symptoms

These symptoms were assessed in the past 30-days using the World Health Organization Composite International Diagnostic Interview (WMH-CIDI: Kessler & Üstün, 2004). This is a fully structured diagnostic interview based on the criteria of the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5: American Psychiatric Association, 2013). For each symptom, a 5-point scale was used (from 0 = "none of the time" to 5 = "always or most of the time") to obtain a severity score in a range of 0-16 points for each symptom. For depression symptoms, the items used were: (i) you felt sad or depressed; (ii) you felt discouraged about how things were going in your life; (iii) you felt little or no interest or pleasure in things; and (iv) you felt bad about yourself or that you were not good enough or worthless. For anxiety symptoms, the items used were: (i) you felt anxious or nervous; (ii) you felt worried about several different things such as work, family, health or money; (iii) you felt more anxious, nervous or worried than other people in the same situation; (iv) you worried too much. These scales have been used in a wide range of countries to assess the mental health of university students (e.g., Auerbach et al., 2018) and showed good internal consistency in the current sample (Cronbach's α = .88 and .89 for depression and anxiety, respectively).

2.2.5. Perceived life stress

A self-report scale of stress perception was used to measure perceived life stress (Kessler et al., 2004). Participants were asked about the stress they currently experienced in 9 different areas of their lives: financial situation, own health, academic achievements, love life, family relationships, problems with people at work or university, the health of loved ones, other problems of loved ones and life in general. For each item, a 5-point Likert scale was used (from 1 = "none" to 5 = "very severe"). The overall mean of the nine items was used to measure perceived life stress. The scale has demonstrated good internal consistency (Cronbach's α = .89) and a one-factor structure in a sample of university students (Rentería et al., 2021). The current sample showed good internal reliability (Cronbach's α = .82).

2.2.6. Socio-demographic variables

Gender at birth was assessed by asking respondents what sex was listed on their birth certificate, with response options of male or female. Age was treated as a continuous variable, with respondents asked to select their age from categories ranging from 18 years old to 36 years or older. Additionally, participants were asked about the highest level of education of their parents or caregivers across six options. Since the option "None" had few responses, it was merged with Elementary School into one category. The final responses were categorized into five levels: None/elementary school, secondary school, any post-secondary education, college graduate, and postgraduate degree (including Master's and PhD).

2.3. Procedure

Web surveys based on the World Mental Health International College Student Initiative (WMH-ICS; Cuijpers et al., 2019) were applied remotely from June to July 2021 to assess first-year university students. The surveys were accessed through Qualtrics software via e-mails and social media links that required students' identification number and surname. In addition, the Spanish version of the AAQ-II (Ruiz et al., 2013) was administered. A suicide risk protocol was previously developed. All students who presented suicidal ideation in the last month and who expressed a possible suicidal intention in the following 12 months were contacted by telephone for a brief assessment of suicidality based on the Columbia-Suicide Severity Rating Scale (CSSR-S; Posner et al., 2011). Students showing imminent risk were referred to emergency services, and those at moderate or mild risk were referred to university support services.

The study was approved by the scientific ethical committee of the National Health Service in Valdivia (n° 075) and the Universidad de Talca (03-2021). The study procedures were carried out in accordance with the Helsinki Declaration.

2.4. Data Analysis

First, the chi-square test was used to compare categorical variables. Then, Student's t-test or Mann-Whitney U were used to compare continuous variables when the normality assumption was met or violated respectively. Second, uni- and multivariate logistic regression analyses were performed to predict recent SI (last 30-days) and future SI (next 12-month). Predictors were EA, depression, anxiety, perceived life stress, suicide ideation and past-non-suicidal self-injury. Age and sex of participants were included in the analyses as covariates. Logistic regression analyses produced odds ratios (ORs) with 95 % confidence intervals. Past NSSI/SI variable was created from the non-suicidal self-injury ever and suicide ideation ever items, and contained four categories: (i) no history of NSSI and suicidal thought; (ii) only past-non-suicidal self-injury; (iii) only past suicidal thought; and (iv) past-non-suicidal self-injury plus past suicidal thought. In this way, we collapsed the overlap between past NSSI and past SI, and thus avoided confounding effects between these factors in predicting recent and future SI. Additionally, to avoid overlap between past NSSI/SI and recent SI, the new variable (i.e., past NSSI/SI) was coded as 0 (absence) in cases where participants reported past NSSI and/or past suicidal thought and recent SI in the same year.

Third, interaction effects were explored between EA and past NSSI/SI in predicting recent SI. Interaction effects also were explored using EA as a possible moderator of the association between depression, anxiety, perceived life stress and recent SI. For this purpose, we mean-centered the predictors (Aiken and West, 1991). Interaction models were not performed to predict future SI because the models did not converge adequately. That is, the sample with the future SI condition was relatively small (N = 64) for the interaction parameters used and the number of sample estimates were >3 in some of the categories of both predictors and outcome. All analyses were performed in RStudio (R Core

Team, 2020) and SPSS-21.

3. Results

Descriptive results are shown in Table 1. The total sample was composed of first-year university students (M_{age} = 19.11, SD = 1.71). Most of the participants were female (69.3 %). There were differences in the perception of physical and mental health. The group with recent SI (i.e., SI in the last 30-days) endorsed regular to poor physical and mental health, compared with the non-recent SI group. It also presented more symptoms of depression, anxiety and perceived life stress, and a greater tendency to EA, compared to the non-recent SI group. In addition, in the recent SI group, 59.9 % stated that they had also had SI in the past and 57 % stated that they had practiced NSSI in the past (see also Table 1). Of total sample, 40 % (N = 542) reported SI in the last 30-days (i.e., recent SI), whereas 4.6 % (N = 64) considered it likely that they would attempt suicide in the next 12-months (i.e., future SI). All participants who reported future SI had also reported recent SI. According to sex differences, the rates of recent SI (42 % vs 31.3 %; $\chi^2 = 34.87$; $p < .001$) and future SI (4.8 % vs 3.5%; $\chi^2 = 9.52$; $p < 0.01$) were higher in women compared with men. Lastly, the mean age of onset of NSSI and SI was 13.92 (2.69) and 14.21 (3.19) years, respectively.

When both behaviors (i.e., NSSI and SI) were collapsed, 38 % (N = 515) of participants did not have a history of NSSI or SI, 11.2 % (N = 152) reported only past NSSI, 14.6 % (N = 198) reported only past SI, and 36.2 % (N = 490) reported both (i.e., NSSI plus SI).

Furthermore, when we compared the characteristics of the subsample with SI, those who reported future SI (N = 64) were characterized as a more severe group compared to those who reported only recent SI (N = 478). Specifically, students with future SI started to self-injury earlier and presented more EA and greater symptoms of depression, anxiety and perceived life stress (see Table 3).

Finally, Supplementary Table S1 shows the correlations between the predictors used in the logistic regression analyses. Significant correlations were found. The most robust correlations were observed between EA with depression (r = .604) and anxiety with depression (r = .651).

3.1. Logistic regression analyses Suicidal ideation in the last 30-days

Univariate logistic regression analyses showed that the categories 'only past NSSI', 'only past SI', and 'past NSSI plus past SI' predicted significantly higher odds of recent SI (i.e., last 30-days), compared with students 'without a history of NSSI and SI'. In addition, female sex, EA, depression, anxiety and perceived life stress predicted higher odds of recent SI (see Table 2). However, multivariate logistic regression analysis yielded that past NSSI/SI (i.e., categories 'only past NSSI', 'only past SI' and 'past NSSI plus SI') continued to predict higher odds of SI in the last 30-days, compared with students 'without a history of NSSI and SI'. EA, depression and perceived life stress, but not anxiety, also predicted higher odds of recent SI (see also Table 2).

Receiver operating characteristic (ROC) analysis of the multivariate model showed that the area under the curve (AUC) was 0.85 (sensitivity = 0.81, specificity = 0.74) and the OR of the model was 13.11 (95 % CI 10.02–17.15, $p < .001$), indicating a very good capacity to discriminate between students with and without recent SI (Supplementary Figure 1a).

Table 1
Sociodemographic and clinical symptomatology of the sample.

	Total Sample (N = 1355)	Non-recent SI (N = 813)	Recent SI (N= 542)	Analysis Z / χ^2
Age (Mean, SD)	19.11 (1.71)	19.10 (1.76)	19.13 (1.65)	-1.41 n.s
Gender Birth (n, %)				
Female	939 (69.3)	530 (65.2)	409 (75.5)	16.12***
Parenting education (n, %)				.70 n.s
None/Elementary School	127 (9.4)	78 (9.6)	49 (9.0)	
Secondary School	503 (37.1)	304 (37.4)	199 (36.7)	
Any post-secondary School	347 (25.6)	203 (25)	144 (25.6)	
College degree	316 (23.3)	192 (23.6)	124 (22.9)	
Postgraduate degree	62 (4.6)	36 (4.4)	26 (4.8)	
Physical health (n, %)				44.82***
Very good	178 (13.1)	134 (16.5)	44 (8.1)	
Good	463 (34.2)	305 (37.5)	158 (29.2)	
Regular	575 (42.4)	311 (38.3)	264 (48.7)	
Poor	139 (10.3)	63 (7.7)	76 (14)	
Mental health (n, %)				259.82***
Very good	80 (5.9)	73 (9)	7 (1.3)	
Good	367 (27.1)	310 (38.1)	57 (10.5)	
Regular	656 (48.4)	368 (45.3)	288 (53.1)	
Poor	252 (18.6)	62 (7.6)	190 (35.1)	
Experiential Avoidance	25.75 (10.27)	22.01 (9.14)	31.35 (9.29)	-16.35***
Depression	8.72 (4.01)	7.09 (3.65)	11.15 (3.22)	-18.53***
Anxiety	9.60 (3.95)	8.44 (3.94)	11.35 (3.29)	-13.06***
Perceived Life Stress	2.77 (0.76)	2.54 (0.73)	3.12 (0.66)	-13.48***
Past SI (n, %)	688 (50.8)	277 (40.3)	411 (59.7)	226.88***
Past NSSI (n, %)	642 (47.4)	276 (43)	366 (57)	147.07***

Note. Non-recent SI = No suicidal ideation in the last 30-days; Recent SI = Suicidal ideation in the last 30-days; Past NSSI = non-suicidal self-injury in the past; Past SI = suicidal ideation in the past; Z = U Mann-Whitney test. n.s = non-significant,
*** $p < .001$.

Table 2
Uni- and Multivariate Logistic Regression Analyses Examining Predictors of recent and future Suicidal Ideation.

	Recent Suicidal ideation (last 30-days) (No = 813; Yes = 542)		Future Suicidal ideation (next 12-month) (No = 1291; Yes = 64)	
	Univariate Analyses	Multivariate Analysis	Univariate Analyses	Multivariate Analysis
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Age	1.00 (.94-1.07) n.s		1.07 (.95-1.22) n.s	
Gender Birth (male)				
Female	1.64 (1.29-2.09)***		1.61 (.88-2.99) n.s	
Past NSSI and SI (w/o)				
Only past NSSI	2.63 (1.74-3.97)***	1.99 (1.25-3.17)**	6.85 (.62-76.03) n.s	
Only past SI	4.64 (3.43-7.13)***	3.80 (2.49-5.80)***	16.06 (1.92-134.14)**	
Past NSSI plus past SI	9.73 (7.2-13.15)***	6.08 (4.33-8.55)***	64.99 (8.97-470.98)***	25.36 (3.44-186.98)**
Experiential Avoidance	1.11 (1.09-1.13)***	1.03 (1.02-1.05)***	1.14 (1.11-1.18)***	1.08 (1.04-1.12)***
Depression	1.38 (1.33-1.44)***	1.27 (1.21-1.34)***	1.38 (1.27-1.51)***	1.16 (1.04-1.13)**
Anxiety	1.24 (1.19-1.28)***		1.27 (1.17-1.37)***	
Perceived Life Stress	3.03 (2.55-3.59)***	1.36 (1.08-1.71)**	2.95 (2.06-4.22)***	
		AIC = 1273.19		AIC = 387.18

Note. Recent Suicidal ideation = Suicidal ideation in the last 30-days; Future Suicidal ideation = Suicidal ideation in the next 12-month; OR = Odds ratio; Past NSSI and SI (w/o) = No history of non-suicidal self-injury and past Suicidal ideation; Only NSSI = Non-suicidal self-injury in the past; Only SI = Suicide ideation in the past; Past NSSI and SI = Non-suicidal self-injury plus Suicidal ideation in the past. n.s = non-significant,
** $p < .01$,
*** $p < .001$.

Table 3
Comparison of the subsample with recent SI and future SI.

	Only recent SI (N = 478) Mean (SD)	Future SI (N= 64) Mean (SD)	Analysis Z / χ^2
NSSI onset	14.48 (2.54)	12.50 (3.19)	-2.78**
SI onset	14.16 (3.23)	13.19 (3.63)	-1.19 n.s
Experiential Avoidance	30.51 (9.01)	37.62 (8.98)	-5.98***
Depression	10.96 (3.25)	12.64 (2.57)	-4.05***
Anxiety	11.18 (3.32)	12.56 (2.78)	-3.22**
Perceived Life Stress	3.08 (0.66)	3.34 (0.62)	-2.77**

Note. Only recent SI = only report suicidal ideation in the last 30-days; Future SI = Suicidal ideation in the next 12-month; Z = U Mann-Whitney test; NSSI onset = age of onset Non-suicidal self-injury. n.s = non-significant.
** $p < .001$,
*** $p < .001$

3.2. Logistic regression analyses: Suicidal ideation in the next 12-months

Univariate logistic regression analyses showed that the categories 'only SI' and 'past NSSI plus past SI' (but not 'only past NSSI') predicted higher odds of future SI (i.e., next 12-months). EA, depression, anxiety and perceived life stress also predicted higher odds of future SI. However, in multivariate logistic regression analysis, only the category 'past NSSI plus past SI', EA and depression predicted higher odds of SI in the next 12-months (see Table 2).

In the multivariate model, receiver operating characteristic (ROC) analysis showed that the area under the curve (AUC) was 0.88 (sensitivity = 0.92; specificity = 0.71) and the OR was 29.94 (95 % CI: 11.92–75.19, $p < .001$), indicating a very good capacity to discriminate between students with and without future SI (Supplementary Figure 1b).

3.3. Moderating role of EA on the association between past NSSI/past SI and recent SI

We found no interaction effects between EA and past NSSI (β = -.006, SE = .02, $p = .80$), past SI (β = -.000, SE = .02, $p = .99$) or past NSSI plus past SI (β = .010, SE = .01, $p = .56$) in predicting recent SI. Supplementary Figure 2 shows that EA predicts recent SI in students with a history of past NSSI (OR = 1.98, 95 % CI: 1.28–3.07), past SI (OR = 3.61, 95 % CI: 2.44–5.33) and past NSSI plus past SI (OR = 5.89, 95 % CI: 4.28–8.12), compared to young people with no history of past NSSI and SI.

Subsequently, we evaluated the moderating role of EA on the association symptoms and recent SI. First, we did not find a moderating effect of EA on the relationship between depressive symptoms and recent SI (β = -.0002, SE = .002, p = .91). Supplementary Figure 3 shows that increased depressive symptoms are associated with higher odds of recent SI, independent of the level of EA.

Second, when the interaction effect between anxiety and EA was examined, we found a moderating effect of EA on the association between anxiety symptoms and recent SI (β = -.004, SE = .001, $p < .05$). In order to decompose the interaction, we performed a simple slope analysis. First, we centered the mean of the two predictors of the interaction and then estimated individuals with high and low EA (±1 SD). Simple slope analysis showed that anxiety symptoms were associated with higher odds of recent SI in students with low EA (OR = 1.17 [CI 95 %: 1.02–1.35], β = .15, SE = .07, $p < .05$), compared to those students with high EA. A visual inspection of Fig. 1 shows that the risk of higher SI increases only in those with low EA, while the odds of SI in students with high EA remain nearly constant. That is, students with high EA present a high risk of SI, independent of the level of anxiety.

Finally, we also found a moderating effect of EA on the association between perceived life stress and recent SI (β = -.03, SE = .009, $p < .01$). Simple slope analysis with high and low EA (±1 SD) showed that life stress symptoms were associated with higher odds of recent SI in students with low EA (OR = 2.27 [95 % CI: 1.12–4.61], β = .82, SE = .36, $p < .05$), compared with those students with high EA. Again, it is seen in Fig. 2 that the odds of higher SI increase only in those students with low EA. In contrast, the risk of SI in students with high EA remains nearly constant, irrespective of perceived life stress.

4. Discussion

We examined for the first time the associations among EA, recent and future SI, NSSI, depressive and anxiety symptoms and perceived life stress in a sample of first-year university students in Chile. Results from multivariate logistic regression models showed that the most robust predictors of recent and future SI were past history of NSSI plus past

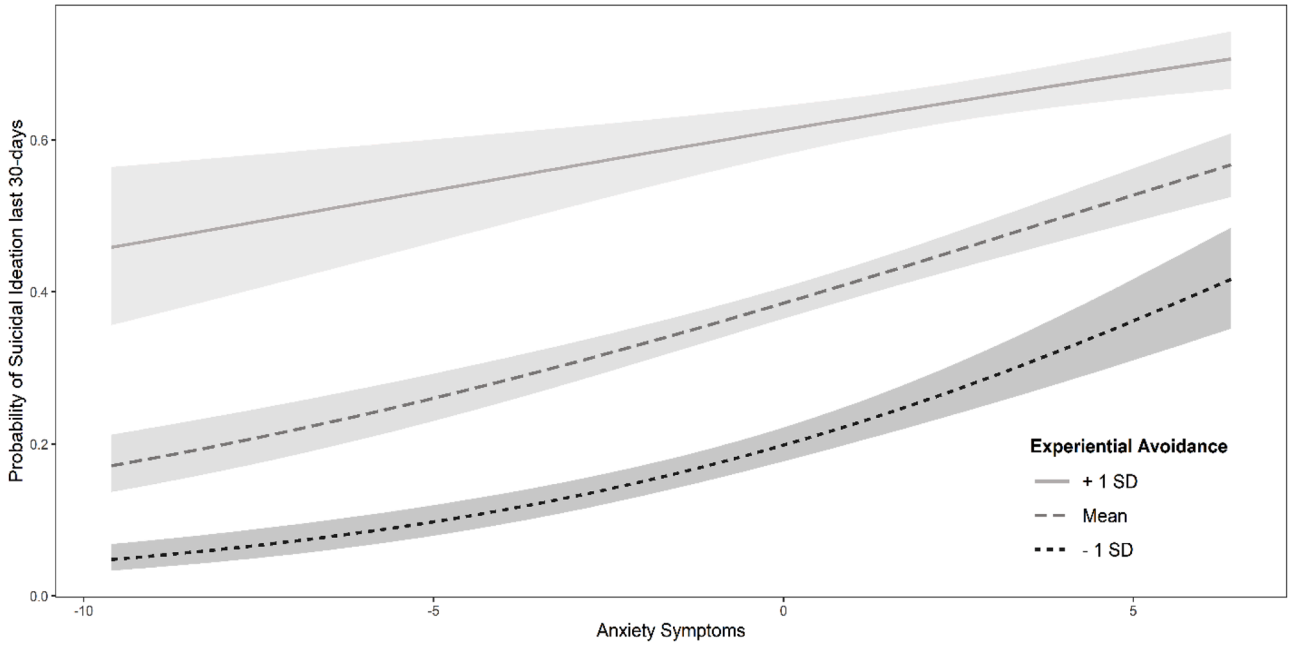

Fig. 1. Interaction effects between Experiential Avoidance and Anxiety symptoms in predicting recent Suicidal ideation (last 30-days).

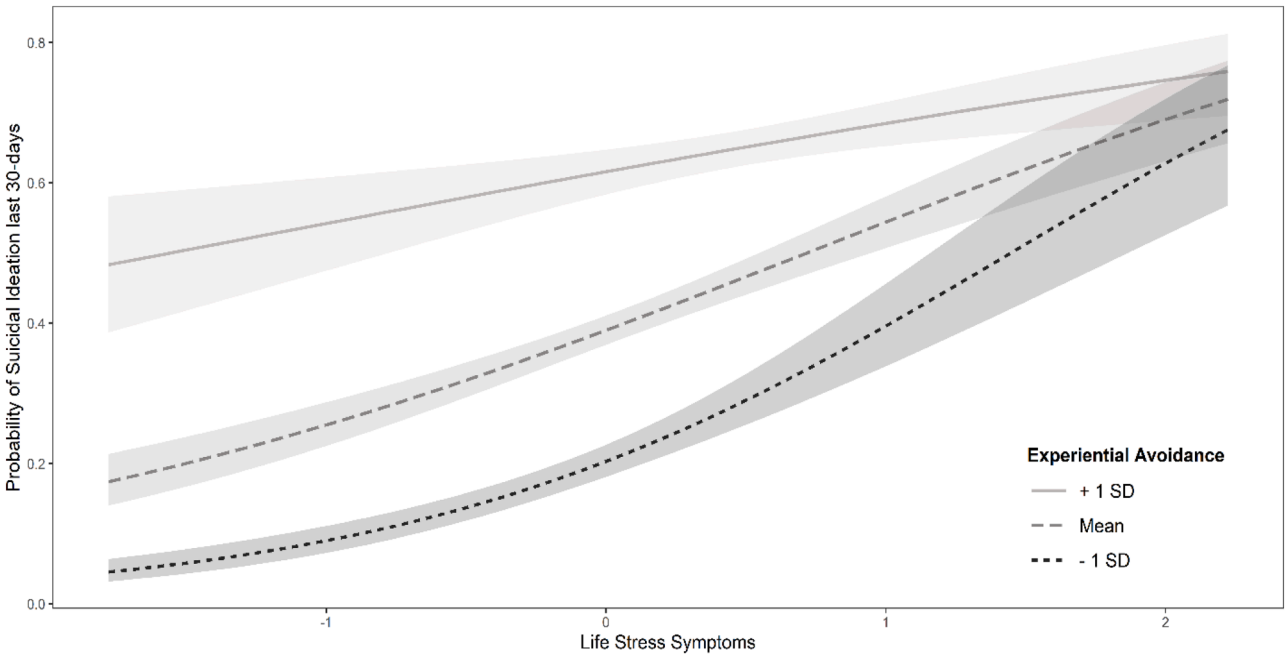

Fig. 2. Interaction effects between Experiential Avoidance and Perceived life stress in predicting recent Suicidal ideation (last 30-days).

suicidal thoughts, followed by depressive symptoms and EA. This is in accordance with prior research showing associations between EA, SI and NSSI (Angelakis and Gooding, 2021), highlighting depression as a relevant risk factor for suicidality in university students (Jones et al., 2022). In addition, we performed interaction analyses, which yielded no interactions between EA and past NSSI or past SI, as well as with depressive symptoms, in predicting recent SI. Contrary, we found that EA only moderates the association between anxiety symptoms and perceived life stress and recent SI.

As we hypothesized, we found that recent SI was associated with EA, past SI, depression and perceived life stress supporting previous cross-sectional and longitudinal research conducted on university students. Krafft et al. (2019) found that EA predicted recent SI (two last weeks) when controlled for distress and baseline SI. Moreover, Chou et al. (2018) observed that EA predicted SI and depression in the preceding year. As we expected, our results showed that past NSSI and past SI were associated with recent SI, which mirror previous findings in university students (Kiekens et al., 2018). Interestingly, our results showed an incremental risk of the mentioned variables (from past NSSI to NSSI plus past SI). This adds further evidence suggesting that the co-occurrence of these phenomena increases the suicide risk (e.g., Griep & MacKinnon, 2022; Mars et al., 2019). Contrary to our expectations, we did not find evidence for associations between anxiety and SI as previously reported in university students (Bantjes et al., 2016). However, the evidence on the predictive role of anxiety in this population is not conclusive. For example, Akram et al. (2020) reported no associations when anxiety was measured with depression, insomnia, mania, psychosis, and perceived stress. Similarly, Martínez-Nicolas et al. (2022) reported unclear associations between anxiety and suicidal behaviors among adolescents and young adult students. This suggests the need for further research to better understand the associations between anxiety and suicidality, which has been reported as a significant but weak association (Bentley et al., 2016). Furthermore, concerning future SI, we found that the most significant variable associated with it was past NSSI plus SI, increasing the potential of future SI risk by 25 times. Additionally, EA and depression were associated with future SI, as shown by previous literature on university students (Chou et al., 2018; Kraft et al., 2019).

Concerning the hypotheses about the potential interaction effects, we found that EA moderates the association between anxiety, perceived life stress and recent SI. This suggests that the role of anxiety symptoms in predicting recent SI by itself is not robust enough and that this association increases when EA was included as moderator, but only in participants with lower EA levels. This might indicate that high levels of EA present higher odds of SI, regardless of anxiety symptoms. This provides additional support for the role of EA as a risk factor of SI (Angelakis & Gooding, 2021) and the uncertainty about anxiety's predictive role (Martínez-Nicolas et al., 2022; Bentley et al., 2016). A similar pattern was observed in the association between perceived life stress and SI. Thus, life stress symptoms were associated with increased odds of recent SI in students with low EA, whereas in those with high EA, recent SI was independent of perceived stress levels. A potential explanation for this finding is that participants with higher EA are less sensitive to stressful events because they effectively avoid situations and inner experiences. For example, perceived stress has been found to require longer information processing time to evaluate the demands of the stressful situation (Zvolensky et al., 2002). Therefore, participants with high EA might benefit, in the short term, by avoiding this cognitive processing of situations perceived as stressful. Conversely, students with lower EA may be more reactive to stressful events, which may translate into an overwhelming or uncontrollable perception of the perceived event, which consequently, could lead them to suicidal thoughts.

Although these results seem contradictory, previous studies have found similar findings (e.g., Bardeen et al., 2013). As noted, in our case the outcome pointed to recent SI (i.e, last 30-days), therefore, participants with high EA may have effectively buffered the immediate effect of anxious symptoms and perceived stress on current SI, while participants with low EA were more sensitive to the effect of anxiety and stress. In fact, EA may have a positive effect in the short term by avoiding unwanted experiences, while it has a paradoxical effect in the long term by increasing distress (Hayes et al., 1996) and suicidal experiences (Angelakis and Gooding, 2021). A similar interpretation was provided by Bardeen et al. (2013) when examining EA as a moderator of the association between anxiety sensitivity and perceived stress. Interestingly, these authors found that a low level of EA moderated the association between anxiety and perceived stress, compared to a high level of EA.

By contrast, EA did not moderate the association between depressive symptoms and recent SI. This indicates that the strength of this association is independent of EA levels, which is in line with prior research

showing that SI is a psychopathological manifestation strongly related to depressive symptoms in university students (Zhou et al., 2022). Overall, our findings mirror prior research suggesting that the role of EA as a moderator could be disorder-specific (Bardeen et al., 2013; Hekmati et al., 2021). However, given the lack of studies examining the role of EA as a moderator between prevalent symptoms and suicide-related factors (Angelakis and Gooding, 2021), direct comparisons should be cautionary made and further research is needed.

Our results do have some clinical implications. Identifying risk factors for recent SI related to modifiable psychosocial processes, such as EA, may be relevant to improve the efficacy of prevention and treatment of suicidal behaviors especially in individuals with a history of NSSI and SI and who may present with difficulties disengaging from suicidal thoughts (e.g., psychological inflexibility: Krafft et al., 2019). Both depressive symptoms and EA were relevant risk factors for recent and future SI in our sample. These psychopathological domains and the co-occurrence of past SI, NSSI and their combination must be simultaneously assessed in clinical university settings. Especially, when the students have a projection of future SI, the presence of past SI plus NSSI suggest being a key indicator of risk for suicidal behaviors. Thus, an informed assessment of suicidal risk should include the perception of future SI.

Our study has some limitations. First, the cross-sectional design does not allow for inferring causal relationships among variables. Second, we only included first-year university students and used a convenience sampling method. Therefore, it is not possible to ensure the generalization of the results. Third, because of the small sample size of the group endorsing future SI, we could not accurately examine which variables were associated with this outcome in our sample. Fourth, we did not include other psychopathological variables potentially associated with future SI Fifth, we only evaluated past NSSI and past SI with a dichotomous question (yes or no). Therefore, we did not capture the full heterogeneity of both phenomena. Sixth, we did not assess other common suicide related-related among university students like psychotic experiences (Sun et al., 2023), insomnia (Rusell et al., 2019) stressful life events (Howarth et al., 2020), isolation and loneliness (Calati et al., 2019). Finally, we only addressed EA through the AAQ-II (Bond et al., 2011), which has been suggested as a measure of psychological inflexibility rather than experiential avoidance (Wolgast et al., 2014). As stated by Haywood et al. (2023), future studies using more nuanced measures of EA could enhance our comprehension of which specific aspects of avoidance differentiate individuals with and without a history of NSSI.

In conclusion, our results show that EA is a suicide-related factor potentially acting as an underlying mechanism that increases the risk for recent and future SI in university students, particularly in those with both past SI and past NSSI. Further research is needed to better understand specific interactions with psychopathological domains from different spectrum disorders.

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CRediT authorship contribution statement

Álvaro I. Langer: . **Carlos Schmidt:** Conceptualization, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. **Vania Martínez:** Writing – review & editing. **Scarlett MacGinty:** Writing – review & editing. **Reiner Fuentes:** Visualization, Writing – review & editing. **Daniel Núñez:** Conceptualization, Funding acquisition, Investigation, Writing – original draft, Writing – review & editing.

Declaration of competing interest

None.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jadr.2024.100734.

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