



# Psychological strain and suicidal ideation in young university students during Covid-19 outbreak: the mediating roles of rumination and depression

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## Abstract

The link between psychological strain and suicidal ideation is well embedded in literature, however, the underlying mechanism is rarely explored. Therefore, this study aimed to examine the relationship between psychological strain, suicidal ideation, rumination, and depression among Pakistani young adults during the Covid-19 outbreak. In addition, it will also try to determine the mediating role of ruminative subtypes and depression in the relationship between psychological strain and suicidal ideation. The sample consists of 400 university students (83 males and 289 females) with the age range from 18 to 30 years ( $M = 22.25$ ,  $SD = 2.40$ ). Psychological strain scale, Suicidal Ideation Scale, Beck Depression Inventory, and Ruminative Response Scale were administered to the participants. Results indicated a significant and positive association between the study variables. Psychological strain positively influenced suicidal ideation both directly, and indirectly via brooding and depression. Both variables were found to be serially mediated by the brooding subtype of rumination and depression and not with the reflective subtype. Strain theory of suicide and response style theory also postulated important insights regarding the association of these variables in young adults, among which, strain is serially related to first brooding and then depression, which is eventually related to suicidal ideation. The present study makes a significant contribution to the literature by providing a unique conceptual and theoretical framework to identify suicide at the ideation level before it proceeds to behavior during this unprecedented time of the pandemic outbreak.

**Keyword** Suicidal ideation · Young adults · Psychological strain · Rumination · Depression · Brooding

## Introduction

Suicide is the second leading cause of death among 10 to 34 years old adults (Centre for Disease Control and Prevention, 2020, Lim et al., 2019), and claims more than 800,000 lives every year. With a global mortality rate of 16/100,000, it is an alarming rate of 1 death every 40 s (WHO, 2011). Suicidal behavior involves a three-step process, starting from the development of suicidal ideation (SI) to strong or moderate ideation, and advancing from ideation to suicidal

attempts (SA) (Klonsky, May, & Saffer, 2016). SI is defined as “having thoughts, ideas, and desire to claim one’s life” (Silva et al., 2014). Lim and colleagues (Lim et al., 2019) in their meta-analysis reported a higher lifetime prevalence of suicidal ideation (18%) as compared to SA (6%) and plan (9.9%). For every complete suicide, there were approximately twenty-five SAs and for every SA, there were at least two to three people suffering from SI (Goldsmith et al., 2002; Nock et al., 2008). Borges et al. (2008) reported similar findings in their study, estimating the figures for ideation far more alarming than complete suicides (NSDUH, 2019) however, extant literature is primarily focused on suicidal behavior (Angelakis, Gillespie, & Panagioti, 2019; Ayano et al., 2019; Bahraini et al., 2013; Brezo, Paris, & Turecki, 2006; Kawashima et al., 2019; Lawrence, Oquendo, & Stanley, 2016; Taylor, Hutton & Wood, 2015; Torok et al., 2019) while little attention is paid exclusively to SI despite its high prevalence.

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During the pandemic, the probabilities of SI were considered to be amplified by uncertainty and fear triggered by the outbreak of coronavirus disease 2019 (Covid-19) (Sher, 2020). The risk of SI is further escalated with an elevated risk of psychiatric disorders (Xiong et al., 2020), lockdown, and social isolation (Hashmi & Saleem, 2020; Le et al., 2020). Quarantined individuals under compulsions of social lockdown and later social distancing experienced a heightened level of psychological distress and strain (Hawryluck et al., 2004; Tran et al., 2020). Rates of SI were highest among young students (Lim et al., 2019) mainly because two aspects, young age, and students' status, acted as a risk factors for increased impact of Covid-19 as evident by a systematic review (Xiong et al., 2020). University students were also found to be experiencing increased stress, anxiety, and depression (Islam et al., 2020; Mazza et al., 2020; Wang et al., 2020a, 2020b) during Covid-19 due to academic workload (Yang et al., 2021) performance pressure (Son et al., 2020; Sundarasan et al., 2020), and uncertainty regarding future career prospects (Sundarasan et al., 2020). This warrants the increased significance of studying SI and its risk factors among university students, especially during Covid-19. The pre-existing literature has focused on risk and protective elements associated with suicide (Goodfellow, Kölves & de Leo, 2018; Hill et al., 2020; Miranda-Mendizábal et al., 2017; Shekhani et al., 2018), yet less attention is paid to the underlying mechanism behind SI which will be examined in the present study.

## Suicide in Pakistan

In Pakistan, according to National Human Development Report, 64% population is below the age of 30, while 29% are between 15–29 years of age (UNDP, 2018). The situation becomes alarming with the highest rate of suicide reported in Pakistan under the age of 30 (Khan and Reza, 1998). Although Pakistan is reported among the countries having the lowest suicide rates, between 0 and 4.9 (Bachmann, 2018), there is a significant possibility that the actual suicidal rates are much higher. There are various reasons for low reporting such as this is still an under-researched area in Pakistan (Khan and Reza, 2000) and official statistics on suicide in Pakistan are not reported to WHO but an increase in the suicide rate is highlighted (Valika & Jalbani, 2004). Another reason is the complex interface of legal and socio-cultural perspectives on suicide and stigma. A scoping review suggests the emphasis on exploring the risk and protective determinants of suicide but the underlying mechanism behind SI remains unaddressed (Shekhani et al., 2018). This reinforces the need to study the mechanism behind suicidal mindset among young adults. This study will explore

the path leading to SI via the strain theory of suicide and response style theory.

## Relationship between psychological strain and suicidal ideation

A psychological strain (PS) is the mental torment of an individual facing and deciding on two equally important yet contradictory social facts. The strain can be the discrepancies in an individual's reality and the ideal that he wants to achieve in terms of values, social or financial status, and coping abilities. (Zhang et al., 2011a, 2011b). Strain theory of suicide (STS; Zhang, 2019) postulates PS as the reason behind the suicidal mindset. When strain threatens the psychological equilibrium of the person by pulling in equally important but contradicting directions, it results in mental torment and frustration, which compels the individual to get rid of the psychological pain. To attain psychological or physical equilibrium, an individual pursues a solution, which sometimes in desperation is thinking to end one's life. In the current study, the PS is taken as a construct and potential predictor variable for SI. Therefore, we formulated the hypothesis.

**H1** There will be a significant relationship between PS and SI among university students.

## Role of Rumination and Depression as Mediators in the Relationship between Psychological Strain and Suicidal Ideation

Theoretically (Zhang, 2019) and empirically (Zhang et al., 2016; Zhang et al., 2017; Zhao and Zhang, 2014; Zhao & Zhang, 2018) the relationship between PS and SI has been justified. For instance, Zhao and Zhang (2018) examined PS, depression, and SI in a cross-national longitudinal study among Chinese and American undergraduates. Despite no statistically significant difference in the level of PS between the two samples and higher rates of depression among American students, the rates of SI were higher for Chinese students as compared to their counterparts. This indicated PS can be the predictor of SI, whereas other factors are impacting the relationship between PS and SI. Likewise, in another study, PS did not predict depression and SI beyond demographics, but a unique pattern of value and coping strain predicted SI (Zhang et al., 2016). STS postulates that the path between PS and SI can be intervened by certain psychological, social, and personal factors. The current study hypothesized ruminative subtypes and depression as potential mediators in this path.

Rumination is described as one's recurrent focus on the sources, meanings, and implications of one's low mood (Nolen-Hoeksema, 1991). It has been divided into two subtypes i.e. brooding and reflection. The brooding subtype is focused on the repetitive thinking of negative feelings, emotions, and adverse outcomes (Treyner, 2003). Whereas, reflection is purpose-driven inner contemplation of one's depressed state, categorized by assessment from a problem-solving perspective to reduce depression (Treyner, 2003). Depression is a psychological disorder characterized by low mood, lack of interest in activities, loss of energy, and other symptoms causing clinical impairment in social, occupational, and other areas of life (Diagnostic and Statistical Manual for Mental Disorders, 5<sup>th</sup> edition).

Response style theory (Nolen-Hoeksema, 1991) suggests that maladaptive response style heightens the intensity of negative events, making the person more prone to suicidal thoughts (Nolen-Hoeksema et al., 2008). The relationship between rumination, its subtypes and suicide has been studied in meta-analyses and systematic reviews (Morrison et al., 2008; Rogers & Joiner, 2017). The brooding subtype is related to suicidality in literature but there seems a contradiction regarding the reflective subtype. To the best of our knowledge, this study is preliminary in assessing the relationship between ruminative subtypes and SI among Pakistani university students.

**H2** There will be a significant relationship between brooding and SI among university students.

**H3** There will be a significant relationship between reflection and SI among university students.

Rumination and its subtypes were previously studied as mediators with other variables in association with suicide in both longitudinal and cross-sectional studies (Crane et al., 2007; Miranda & Nolen-Hoeksema, 2007). No study thus far has explored ruminative subtypes i.e., brooding and reflection as mediators between PS and SI which is important to examine as reflected by previous literature. Hence, the present study will assess the following hypotheses.

**H4** The influence of PS on SI will be mediated by brooding among university students.

**H5** The influence of PS on SI will be mediated by reflection among university students.

Rumination is considered as a determinant for depression (Miranda & Nolen-Hoeksema, 2007; Nolen-Hoeksema, 2000). The tendency to ruminate allows the low mood to negatively bias thinking and interfere with problem-solving (Nolen-Hoeksema, 1991; Robinson et al., 2003). Both longitudinal and cross-sectional studies established the relationship between rumination and depression

(Hilt et al., 2010; Nolen-Hoeksema et al., 1993, 2002; Soo & Sherman, 2015). Despite rich literature regarding the stated variables, no study thus far has addressed ruminative subtypes and depression as serial mediators in the relationship between PS and SI. Therefore, we hypothesized the following;

**H6** The influence of PS on SI will be serially mediated by brooding and depression among university students.

**H7** The influence of PS on SI will be serially mediated by reflection and depression among university students.

Depression was found to be the most significant predictor of SI (de Beurs et al., 2019; Ran et al., 2015) and the strongest risk factor for suicide in Pakistan (Ghazanfar et al., 2015; Khan et al., 2008; Naseem & Munaf, 2017; Osama et al., 2014). A systematic review and meta-analysis highlighted moderate association and contribution of depression towards SI (Wang et al., 2017). The strain theory of suicide (STS) is extended to explain psychopathologies. It is inferred that sequences of strain can involve mental disorders, mediating the relationship between PS and SI. A study reported that in the presence of PS, depressive symptoms will predict an increase in SI (Zhang, 2019). However, literature has shown mixed findings regarding these notions. In an autopsy study, half of the sample did not suffer from any psychological disorders, though they were suffering from PS (Zhang et al., 2011a, 2011b). In other studies, only a unique pattern of strains and depression predicted SI (Liu et al., 2019; Zhang et al., 2016), or the increase in depression level did not predict an increase in SI levels (Naseem & Munaf, 2017), even in the presence of PS (Zhao & Zhang, 2018). The increase in SI levels might be attributed to not only depression but a mechanism involving depression and PS.

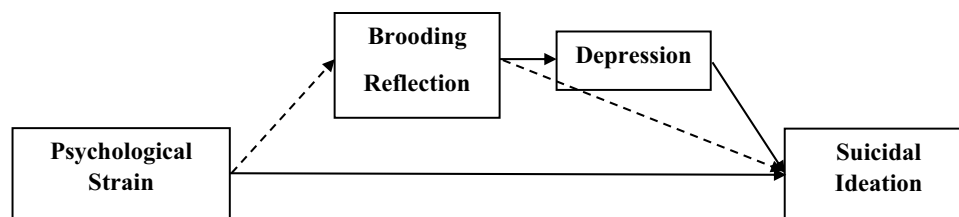
**H8** There will be a significant relationship between depression and SI among university students.

**H9** The influence of PS on SI will be mediated by depression among university students.

## The present study

In summary, the present study aims to analyze (1) The relationship between PS, SI, rumination (brooding, reflection), and depression among young adults; (2) The mediating role of brooding, reflection, and depression in the relationship between PS and SI; and (3) The serial mediation of ruminative subtypes and depression in the relationship between PS and SI as evident in Fig. 1

**Fig. 1** Conceptual Framework of the Study



## Methods

### Participants and procedure

A total of 400 young students participated in the entire study, out of which 18 did not meet the inclusion criteria of the age range (18–30 years old), university students enrolled in the universities of Rawalpindi or Islamabad, in programs for Bachelor's, Master's, or Ph.D. Convenient sampling was employed and the data collection process commenced after approval from the ethical committee of the institution was obtained. The data was collected only after obtaining informed consent from all the participants. The participants were debriefed about the purpose of the research. The anonymity of the participants was maintained and the participants were assured of confidentiality. The participants were given the right to withdraw at any point of research. Since the data is obtained from a large sample, the survey method was deemed appropriate. Due to the enforcement of strict lockdown in the country due to covid and pursuant closure of educational institutions, the data was collected online via Google forms employing a convenient sampling technique.

### Measures

The instruments were composed of a sociodemographic section, Suicide Ideation Scale, Psychological Strain Scale, Ruminative Responses Scale, and Beck's Depression Inventory.

### Demographic variables

In the sociodemographic section, the participants were enquired about their age, gender, educational level, and average family monthly income.

### Suicidal Ideation

The variable was operationalized using the Suicide Ideation Scale (Rudd, 1989). It is a self-report measure consisting of 10 items assessing the intensity and severity of suicidal thoughts over the past week. It is a 5-point Likert-type scale having responses ranging from 1 ("never or none of the time") to 5 ("always or a great many times"). The scale is a valid and reliable measure among Pakistani university

students (Ijaz and Ahmed, 2018). In the current study, Cronbach's value was found to be 0.93.

### Psychological Strain

PS was operationalized with the Psychological Strain Scale (PSS-40). It is composed of four dimensions having 10 items, each assessing a source of strain. It's a self-report 5-point Likert-type measure, having responses ranging from 1 (never, it's not me at all) to 5 (Yes, strongly agree and it's exactly me). In the current study, the Cronbach alpha coefficient was 0.94. The value of the alpha coefficient was 0.85 for the value and coping strain and 0.89 for deprivation and aspiration strain.

### Rumination

Rumination was assessed using the shorter revised version of the Ruminative Responses Scale, having comparative psychometric properties with the original version (Treyner et al., 2003). Each item is scored on a 4-point Likert scale, ranging from 1 ("almost never") to 4 (almost always"). It is found to be valid and reliable among the Pakistani population (Imtiaz & Kamal, 2016), where its Cronbach alpha coefficient in this study was 0.75 for rumination, and 0.67 for brooding and reflection subtype.

### Depression

Beck's depression inventory is a self-report inventory that assesses depressive symptoms (Beck et al., 1961). The short 13-item version was administered in this study, having comparative psychometric properties with the original version (Beck et al., 1988; Groth-Marnat, 1990). The scale is a 4-point Likert-type scale ranging from the responses 0 = did not experience at all to 4 = with experience of symptom most of the time. The instrument has been previously tested and validated among the Pakistani population (Aqeel et al., 2020; Khan et al., 2015). Its Cronbach's alpha value in the current study was 0.89.

### Statistical analysis

Statistical analyses of the responses were conducted using the Statistical Package for Social Sciences (SPSS, version

23) in conjunction with Process macro by Andrew Hayes (version 3.5.2). Pearson Product Moment Correlation was calculated to see the relationship between the study variables. The level of significance of the test was set at  $p < 0.05$ . For mediation and serial mediation analysis, model 6 was used with a bootstrap method with 5000 replications (Hayes, 2017).

## Results

### Descriptive statistics

Descriptive statistics and correlation analysis for the study variables are presented in Table 1. A total sample of 400 young students was recruited. Eighteen participants were removed as they did not meet the inclusion criteria. If any of the cases had a Mahalanobis distance value exceeding the chi-square critical value, in a multiple regression program, they were deemed as outliers and hence excluded. The final study sample consisted of 372 participants (77.7% females). The age range of the respondents varied from 18 to 30 years ( $M_{\text{age}} = 22.25$ ,  $SD = 2.40$ ). As per the degree of enrollment, 70.7% were in Bachelor's, 28% were in Master's, while a mere 1.3% were in Ph.D. In terms of average family monthly income, 27.68% lie in the average income range while 69.62% lie in the above-average range. 2.6% of data was missing regarding family monthly income. The missing data were treated using exclude cases pairwise method (Pallant, 2010).

PS, brooding, reflection, and depression were significantly related to SI. The correlation analysis indicated a high, positive, and statistically significant association between PS, depression, and SI, while a low, positive, and statistically significant association between brooding, reflection, and SI.

**Table 1** Means, Standard Deviations, and Correlations among Study Variables

	1	2	3	4	5
Suicidal ideation	-				
Psychological strain	.57**	-			
Brooding	.29**	.52**	-		
Reflection	.20**	.37**	.40**	-	
Depression	.58**	.64**	.42**	.21**	-
M	16.38	104.98	14.37	13.84	9.81
SD	8.57	30.4	3.19	3.35	7.44

\*\* :  $p < .01$

### Mediation analysis

Mediation analysis was conducted to explore the role of brooding, reflection, and depression as mediators in the relationship between PS and SI. The study also examined the serial mediation of ruminative subtypes and depression in the association of PS and SI. The results for the model are listed in Tables 2 and 3, and Fig. 2.

The results indicated that PS has a significant total effect on SI. The total effect of PS on SI, including brooding, is positive and statistically significant [ $B = 0.16$ ,  $SE = 0.01$ ,  $p < 0.001$ , 95% C.I. (0.13, 0.18)]. The direct effect of PS on brooding was positive and statistically significant [ $B = 0.51$ ,  $SE = 0.004$ ,  $p < 0.001$ , 95% C.I. (0.04, 0.06)] indicating that persons scoring higher on PS are more likely to brood and contemplate their low mood, its causes, and consequences. Whereas the direct effect of brooding on SI was negative and not significant ( $E = -0.02$ ,  $SE = 0.12$ ,  $p = 0.59$ ), as 0 falls between the lower and upper bounds of the 95% CI [ $B = -0.007$ ,  $SE = 0.02$ , 95% CI = (-0.05, 0.03)]. Hence, the relationship between PS and SI is not mediated by brooding.

Further, the study tested the reflection subtype as a mediator between PS and SI. The results indicated that PS has a positive and significant total effect on SI when reflection is included [ $B = 0.16$ ,  $SE = 0.01$ ,  $p < 0.001$ , 95% C.I. (0.13, 0.18)]. The direct effect of PS on reflection was positive and statistically significant [ $B = 0.37$ ,  $SE = 0.005$ ,  $p < 0.001$ , 95% C.I. (0.03, 0.05)] but the direct effect of reflection on SI was negative and non-significant [ $B = -0.04$ ,  $SE = 0.11$ ,  $p = 0.69$ , 95% C.I. (-0.27, 0.18)]. Similarly, the indirect effect of PS on SI via reflection is also statistically not significant [ $B = -0.006$ ,  $SE = 0.01$ , 95% CI = (-0.03, 0.02)] indicating that reflection did not mediate the relationship between PS and SI.

In addition, depression was tested as a mediator between PS and SI. The total effect of PS on SI was positive and statistically significant [ $B = 0.16$ ,  $SE = 0.01$ ,  $p < 0.001$ , 95% C.I. (0.14, 0.19)]. The direct effect of PS on depression was also positive and statistically significant [ $B = 0.67$ ,  $SE = 0.01$ ,  $p < 0.001$ , 95% C.I. (0.14, 0.18)] indicating that persons scoring higher on PS are more likely to suffer from depressive symptoms. Also, the direct effect of depression on SI was positive and statistically significant [ $B = 0.40$ ,  $SE = 0.06$ ,  $p < 0.001$ , 95% C.I. (0.06, 0.12)] indicating that people having depressive symptoms are more likely to contemplate ending their lives. The indirect effect was tested using non-parametric bootstrapping. The indirect effect of PS on SI via depression was positive and statistically significant as the null of zero does not lie between the lower and upper bounds of CI [ $B = 0.24$ ,  $SE = 0.05$ , 95% C.I. (0.14, 0.34)]. This indicated that the relationship between PS and SI is mediated by depression.

**Table 2** Brooding and Depression as Mediators between Psychological Strain and Suicidal Ideation

	B	SE	P	LLCI	ULCI
<b>Mediator variable model (Brooding)</b>					
Constant	5.72	1.43	.0001	2.90	8.54
Age	-.03	.17	.52	-.46	.23
Gender	.08	.37	.10	-.12	1.33
Average family income	.06	.33	.18	-.20	1.10
Psychological Strain	.51**	.004	.000	.04	.06
R <sup>2</sup> = .28**, F = 17.30					
<b>Mediator variable model (Depression)</b>					
Constant	-10.65	2.95	.0003	-16.45	-4.85
Age	-.07	.36	.06	-1.37	.037
Gender	.05	.75	.20	-.53	2.41
Average family income	-.075*	.67	.01	.42	3.07
Psychological Strain	.608**	.01	.000	.12	.17
Brooding	.102	.10	.02	.02	.44
R <sup>2</sup> = .45**, F = 32.13					
<b>Dependent Variable Model (Suicidal Ideation)</b>					
Constant	5.37	3.49	.12	-1.49	12.24
Age	.005	.42	.89	-.77	.88
Gender	-.009	.87	.82	-1.91	1.51
Average family income	-.018	.79	.67	-1.89	1.22
Psychological Strain	.34**	.01	.000	.06	.12
Brooding	-.02	.12	.59	-.31	.17
Depression	.40**	.06	.000	.33	.58
PS → SI (total)	.16**	.01	.000	.14	.19
PS → SI (direct)	.09**	.01	.000	.06	.12
PS → Brooding → SI	-.01	.02	.06	-.06	.03
PS → Depression → SI	.24	.05	.003	.14	.34
PS → Brooding → Depression → SI	.02	.009	.003	.003	.04
Total	.253	.058	.000	.14	.36
R <sup>2</sup> = .43**, F = 27.45					

PS: psychological strain; SI: suicidal ideation

Next, serial mediation of brooding and depression was tested in the relationship between PS and SI. The total effect of PS on SI was positive and statistically significant [B = 0.16, SE = 0.01,  $p < 0.001$ , 95% C.I. (0.14, 0.19)]. The direct effect of brooding on depression was positive and statistically significant [B = 0.10, SE = 0.10,  $p < 0.05$ , 95% C.I. (0.02, 0.44)]. The indirect effect of PS on SI via brooding and depression was positive and statistically significant as the null of zero did not lie between the lower and upper bounds of CI [B = 0.02, SE = 0.009, 95% C.I. (0.003, 0.04)]. This indicated that a young person is more likely to be depressed in the presence of PS when he recurrently thinks about his negative feelings. Brooding and depression serially mediate the relationship between PS and SI.

Finally, the serial mediation of reflection and depression was tested in the relationship between PS and SI. The direct effect of reflection on depression was negative and not significant [B = -0.037, SE = 0.09,  $p = 0.39$ , 95% C.I. (-0.27,

0.10)]. The indirect effect of PS on SI via reflection and depression was also negative and statistically non-significant [B = -0.005, SE = 0.007, 95% C.I. (-0.02, 0.007)].

## Discussion

As indicated by literature, there is growing evidence indicating that PS is related to SI (Zhang et al., 2016; Zhang et al., 2017; Zhao and Zhang, 2014; Zhao & Zhang, 2018) but the underlying mechanism between the variables is rarely addressed. The present study aimed to study the relationship between PS and SI through ruminative subtypes and depression.

The results indicated that high levels of PS are associated with higher levels of SI. As the PS increases among young adults, they are more likely to contemplate ending their lives. The discrepancy in one's real and ideal life, relative

**Table 3** Reflection and Depression as Mediators between Psychological Strain and Suicidal Ideation

	B	SE	P	LLCI	ULCI
<b>Mediator variable model (Reflection)</b>					
Constant	9.82	1.59	.000	6.68	12.97
Age	.008	.19	.87	-.35	.42
Gender	.11*	.41	.02	.10	1.73
Average family income	-.01	.37	.77	-.84	.62
Psychological Strain	.38**	.005	.000	.03	.05
R <sup>2</sup> = .18**, F = 9.88					
<b>Mediator variable model (Depression)</b>					
Constant	-8.50	3.05	.005	-14.50	-2.49
Age	-.07	.36	.05	-1.40	.017
Gender	.06	.75	.12	-.32	2.64
Average family income	.11**	.67	.006	.51	3.17
Psychological Strain	.67**	.01	.000	.14	.18
Reflection	-.037	.09	.39	-.27	.10
R <sup>2</sup> = .44**, F = 31.30					
<b>Dependent Variable Model (Suicidal Ideation)</b>					
Constant	5.37	3.57	.13	-1.65	12.39
Age	.005	.42	.88	-.76	.88
Gender	-.009	.87	.82	-1.91	1.52
Average family income	-.019	.79	.64	-1.91	1.19
Psychological Strain	.33**	.01	.000	.06	.12
Reflection	-.017	.11	.69	-.26	.17
Depression	.39**	.06	.000	.33	.57
PS → SI (total)	.16**	.01	.000	.141	.190
PS → SI (direct)	.09**	.01	.000	.002	.125
PS → Reflection → SI	-.006	.015		-.03	.02
PS → Depression → SI	.26	.05		.16	.38
PS → Reflec- tion → Depression → SI	-.005	.007		-.02	.007
R <sup>2</sup> = .44**, F = 27.43					

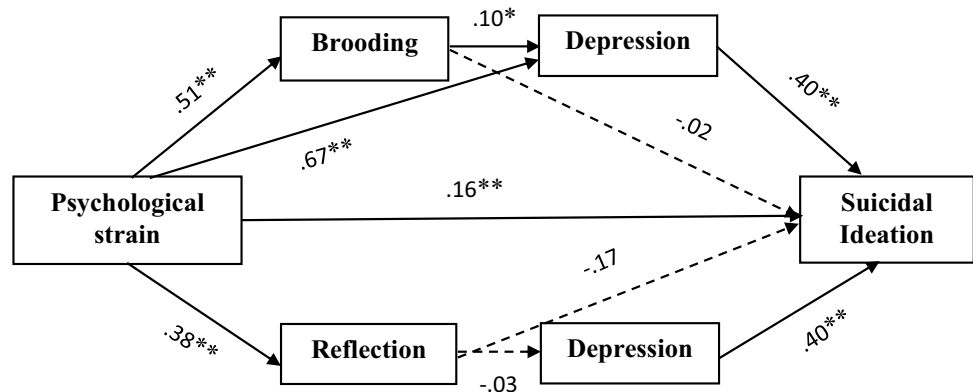
PS: psychological strain; SI: suicidal ideation

deprivation, differential values, lack of coping ability, or achievement can all motivate an individual to regard the cost of living as greater than the reward (Zhang, 2019). Similarly, with the increase in the level of brooding, there will be a significant increase in the level of suicidal thoughts. Young adults are more likely to think about suicide when they recurrently think about their low mood, its causes, and its consequences. In the current study, young adults who tend to ruminate and focus on the low mood with the problem-solving purpose (reflection) tend to think more about taking their own lives. In a meta-analytic review, both subtypes of rumination were found to predict SI (Rogers & Joiner, 2017). The brooding subtype is related to suicidality in literature but there seems a contradiction regarding the reflective subtype. Rumination and brooding were associated with SI in both cross-sectional and longitudinal studies, whereas reflection was merely related to SI in longitudinal studies. Although intended to get out of the situation, consistent focus on low mood and negative feelings make the person think more about suicide, whereas young adults might get rid of the low mood via distraction (Nolen-Hoeksema, 1991). A young adult is more likely to think about ending his life when he was suffering from depressive symptoms. Young adults are prone to SI when suffering from depression, it being the strongest predictor (Mackenzie et al., 2011; Mustafa et al., 2014; Ran et al., 2015). The findings are in line with the literature and support the hypotheses that PS, ruminative subtypes and depression are significantly and positively associated with SI.

**Influence of psychological strain on suicidal ideation, mediating effect of ruminative subtypes and depression**

The relationship between brooding and SI was found significant but brooding failed to mediate between PS and SI. These findings are contradictory to the existing literature in which brooding was found as a significant predictor of SI (Chan et al., 2009; Miranda et al., 2013a, 2013b;

**Fig. 2** Serial mediation of ruminative subtypes in the relationship between Psychological Strain and Suicidal Ideation. Note: The solid lines are significant paths and the dashed lines are nonsignificant paths. \**p* < 0.05; \*\**p* < 0.01; \*\*\**p* < .001



Polanco-Roman et al., 2016). However, in a study conducted among Black, Latino, and biracial undergraduate college students it was observed to be not significantly related to SI (Cheref et al., 2015). Also, PS significantly predicts SI in the presence of brooding but not via brooding among Pakistani young adults. The increase in the level of PS is significantly associated with the increase in the level of brooding. Considering circumstances as more taxing than coping abilities, relative deprivation, and the discrepancy in goals and values can motivate the person to brood consistently and recurrently (Michl et al., 2013; Watkins, 2008; Zhang et al., 2014). To get rid of psychological pain associated with strains, young adults may contemplate desperate solutions like taking their own life, but this desperation is not influenced by brooding. Brooding is related to suicidal thoughts but may not necessarily predict the suicidal thoughts, in the absence of PS. Therefore this hypothesis is not supported.

In addition, the results revealed that PS will significantly predict SI, even in the presence of reflection but not via reflection among Pakistani young adults. The results are in line with the literature, as reflection predicted SI in longitudinal but not cross-sectional studies (Morrison et al., 2008), and the hypothesis is not supported. Brooding and reflection did not mediate the path between PS and SI. Strain leads to SI among young adults even in the presence of rumination but not with the mechanism of rumination. A plausible explanation for the rumination not mediating between PS and SI might be the significant but weak association of brooding and reflection with SI. Brooding and reflection at low levels may be adaptive as it leads one to solve the situation rather than thinking to end one's life. Low levels of brooding may act as a reminder to get rid of the low mood, while SI is predicted by other factors (like PS) (Cheref et al., 2015; Sun et al., 2020). Reflection is a more adaptive form of rumination (Treynor, 2003) that helps to reflect and find ways to problem solve the situation. The focus on problem-solving reduces the strain, hence helping the person to end the problem rather than thinking to end his life. In cultural settings of Pakistan, where suicide is a criminal act, sufferers do not seek help because of fear of harassment, imprisonment, and financial penalty (Khan & Reza, 1998; Mahmood, 1989). Young students pondering over suicide as an option might try to overcome their negative thoughts due to fear of being stigmatized or humiliated while religion plays a significant role in hindsight. This distraction can act as an escape from negative thoughts making them less likely to suffer from SI (Hoeksema, 1991).

The relationship between PS and SI was found significant in the mechanism of depression, hence the hypothesis is supported. This indicated that young students suffering from PSs are more likely to contemplate ending their lives when suffering from depression. A study reported every fourth student suffers from depression and every tenth from

SI (Mckenze et al., 2012). Those with personal Covid-19 exposure were found to suffer more from depression and eventually SI (Zhou et al., 2021). The results are in line with the literature as depression significantly mediated the relationship between PS and SI among athletes (Sun et al., 2020). Polanco-Roman et al. (2016) reported similar findings in their study, where stress-related symptoms are associated with SI through depression but not rumination. Depression, having a high association with SI might not be adaptive, especially in the recruited sample (77.7% females) as females are more vulnerable to rumination and depression (Nolen-Hoeksema et al., 1999). Response style theory also suggests that men tend to distract their negative emotions as compared to women, as they brood more (Nolen-Hoeksema, 1991). The impact of rumination and depression varies by gender (Polanco-Roman et al., 2016).

Serial mediation indicated that the relationship between PS and SI was significant via brooding and depression, therefore the hypothesis is supported. A person who is exposed to PS is more likely to think about ending his life when he has the tendency to recurrently think about his negative symptoms and is suffering from depressive symptoms. Suffering from a low mood and the tendency to continuously brood upon the causes and consequences of the mood increases the possibility to think about suicide in the presence of PS. This is in line with literature as increased ruminative thoughts can lead to increased depression (Aldao et al., 2010; Nolen-Hoeksema, 1991; Nolen-Hoeksema et al., 1993; Robinson et al., 2003) even among a diverse community sample of young adults (Hilt et al., 2010). Findings indicated that recurrent negative thoughts about low mood will only predict SI, when in the presence of depressive symptoms and PS. Strain will not only lead to brood regarding the discrepancies but also regarding other areas of life (Nolen-Hoeksema, 1991). Ruminative response style in the presence of PS and depression will make an individual more vulnerable to SI. Focus on negative thoughts leads to unconstructive outcomes like damage to physical and psychological health (Nolen-Hoeksema, 1987; Watkins, 2008) and even results in internalizing disorders like depression and anxiety (Seegerstrom et al., 2000). People who ruminate tend to passively think about their low feelings, lack of motivation, and the impact of their low mood on social, occupational, or other areas of life.

Reflection subtype and depression did not mediate between PS and SI, therefore the hypothesis is not supported. If a young person tries to resolve the situation by reflecting upon it or distracting himself in other activities, he is more likely to get himself out of the vicious cycle of low mood and negative depressive thoughts as compared to the person who constantly broods over the negative thoughts (Hoeksema, 1991). The constant brooding interferes with problem-solving skills, making it hard for the individual to get himself



out of depression (Hoeksema, 1991). The purpose-driven inner contemplation of low mood to problem-solve brings constructive consequences (Watkins, 2008) and intends to reduce depression (Treyner et al., 2003). Active problem-solving (reflection) instead of passive thinking (brooding) can help fight low mood (Hoeksema, 1991) to curb depressive symptoms and suicidal thoughts. The results are in line with literature as the brooding, but not reflective subtype is found to mediate between negative life events, cognitive inflexibility, and SI (Chan et al., 2009; Miranda et al., 2013a, 2013b; Polanco-Roman et al., 2016). Maladaptive and not adaptive rumination is associated with depression, making it chronic, and worsening its consequences with a lack of perceived control of emotions (Lu et al., 2014).

### Conclusions, limitations, and suggestions

The present study addressed the need for an under-researched area of SI among Pakistani young adults, especially during the Covid-19 pandemic. Furthermore, the present study focused on the contextual gap and enhanced the understanding of SI. It expanded the conceptual understanding of SI in the Pakistani context by presenting a holistic picture and investigating the underlying mechanism in the relationship between PS and SI. The findings and theoretical foundations open a platform for upcoming studies to explore more in the area of SI. This study encouraged focusing on intermediate and distal factors leading to SI such as depression and adverse social circumstances etc. This study highlighted the importance of interventions or preventions that would be effective if pre-emptive rather than reactive. The earlier the process is detected the more effective is the intervention (Khokher & Khan, 2005), either at the ideation level or before that (Khan et al., 2008). These findings can be helpful for both research scholars to consider while studying SI among students and for professionals to consider those aspects while devising therapy or offering counseling.

For Pakistani students, in an academically challenging environment with additional fear of COVID-19 and pursuant social lockdowns, it would be significantly damaging if they succumb to strain, depression, and eventually SI. There is a need to pay special attention to the mental health of young students to eradicate any risks of suicide. Low-cost community-based mental health awareness programs must be introduced to fight the stigma attached to mental disorders and encourage students to seek services offered by institutional counseling centers. Social support should be offered through online interactive activities during the lockdown in educational institutions. Interventions are inevitable during these unprecedented times, to buffer the strains and reduce ideation levels. With advancements in technology and fear of the Covid-19 pandemic, internet Cognitive Behavioral

Therapy (i-CBT) can help to combat mental health issues (Ruwaard et al., 2009; Sijbrandij, Kunovski, & Cuijpers, 2016; Soh et al., 2020) preventing suicide at the ideation level before it proceeds to the behavior level.

Despite the significant results and well-tested hypotheses, the study is not without its limitations. Although aimed to address ideation separately, other aspects like SAs and behavior remained unaddressed. The impact of measures of affective temperaments should be assessed with SI as they were independently and more strongly associated with SA than with the diagnosis of Major Depressive Disorder (Baldessarini et al., 2017). Also, the study focused on a few risk elements, but the protective factors regarding SI needs to be addressed. Future studies can address the risk and protective factors regarding SAs or behavior as well. Factors like social desirability and biases can hinder honest responses in self-report measures administered in this study. Future studies can employ more reliable methods to establish clinical diagnoses like structured clinical interviewing (Ventura et al., 1998) and functional neuroimaging (Ho et al., 2020). The causal relationship between the variables cannot be established due to the cross-sectional nature of the study. Longitudinal studies will enlighten the effect of Covid-19 and other risk factors (Wang et al., 2020a, 2020b). Solano et al. (2016) reported Google search volumes for the term “suicide” are associated with the national suicide time series. The results vary in different countries, and actual suicidal rates are unknown in Pakistan, future studies employing this method can help in the prevention of SI.

The findings must be interpreted with caution as a convenient sampling technique was employed and the study is conducted during unusual times of pandemic. The study may be replicated in the future for comparative evidence and an enhanced outlook on the impact of the risk factors on SI. Likewise, random sampling would help to ensure better generalizability of the findings. Furthermore, the results should be interpreted with caution while generalizing it to all young adults, as only university students were recruited. Unique stressors faced by university students (Abdollahi et al., 2015; Ohayon et al., 2014; Potter et al., 2004) would distinguish them from other young adults. Future studies may assess SI among youth other than university students and the employed population. Although one underlying path in the association between PS and SI is explained, it does not rule out other mechanisms in the association. Future studies can focus on other underlying mechanisms explaining this relationship and expanding the area of knowledge regarding SI.

In conclusion, the present study is an important step in understanding SI among young adults, especially university students during Covid-19. It highlighted the importance of various risk determinants and their individual and holistic role in predicting SI. Policymakers, professionals,

counselors, and university administration may benefit from the findings pragmatically for the prevention of suicide by targeting it at the ideation level before its progression to behavior.

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**Data availability** Data and materials for the present study have not been made publicly available due to privacy concerns. Data analyzed in the current study are available on request from the corresponding author via email at Dr.sumara@s3h.nust.edu.pk.

## Declarations

**Ethical approval** This study was conducted following the ethical guidelines provided by the American Psychological Association and the ethical committee of the National University of Sciences and Technology.

**Conflict of interest** The authors have no conflicts to declare.

**Informed consent** Informed consent was obtained from all individual participants included in the study.

**Consent for publication** The authors have agreed upon the publication of this manuscript.

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