



# Integrated Motivational-Volitional Model: A Structural Equation Modeling with Interaction of Latent Variables

Reyhaneh Sardarzehi <sup>1</sup>, Reza Zadehparizi <sup>1</sup>, Amir Sam Kianimoghadam <sup>1,\*,</sup>, Mahdi Karvandi Renani <sup>2</sup>, Leila Ekhtiyari <sup>3</sup> and Jafar Sarani Yaztappeh <sup>1</sup>

<sup>1</sup>Taleghani Hospital Research Development Committee, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, IR Iran

<sup>2</sup>Faculty of Psychology, Allameh Tabataba'i University, Tehran, IR Iran

<sup>3</sup>School of Medicine, Tabriz University of Medical Sciences, Tabriz, IR Iran

\*Corresponding author: Taleghani Hospital Research Development Committee, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, IR Iran. Email: [kianimoghadam@sbm.ac.ir](mailto:kianimoghadam@sbm.ac.ir)

Received 2022 November 02; Revised 2023 January 29; Accepted 2023 February 01.

## Abstract

**Background:** The integrated motivational-volitional (IMV) model is the second theory based on the ideation-to-action framework.

**Objectives:** The current study aimed to investigate the motivational phase of this model in the Iranian population. In this study, threat-to-self moderators are included cognitive emotion regulation strategies. Also, thwarted belongingness and perceived burdensomeness are considered motivational moderators.

**Materials and Methods:** A total of 405 participants (68.6% female; mean age: 22.7 years) filled out several self-report questionnaires, including the Defeat Scale, Entrapment Scale, Beck Scale for Suicidal Ideation, Cognitive Emotion Regulation Questionnaire-short, Interpersonal Needs Questionnaire-15. To assess the IMV model, structural equation modeling with the interaction of latent variables was performed.

**Results:** The results indicated that the overall model's fit was poor. Although the model explained 70% and 61% of the variance in entrapment and suicidal ideation, respectively, the pathway between entrapment and suicidal ideation was not statistically significant. The findings demonstrated that the most effective predictors of suicidal ideation were perceived burdensomeness and thwarted belongingness.

**Conclusions:** The results add to our knowledge of what constructs are more critical in the emergence of suicidal ideation. It is hoped that the study findings will lead to a greater interest in this field of research in the future.

**Keywords:** Suicide, Suicidal Ideation, Structural Equation Modeling

## 1. Background

Recently, there has been a reduction in the worldwide rate of suicide (1); however, suicide trends continue to rise in several countries (2). The suicidal behaviors with increasing committed suicide imply serious mental health challenges (2). It is estimated that suicide is the fourth leading cause of death for those aged 15 - 29 years, according to the World Health Organization (3). Furthermore, in 2020, nearly 46,000 individuals died from suicide in the United States (4).

Suicidal theories have been developed to determine critical factors for suicidal behavior (5-15). The traditional approach to suicide is considered suicidal ideation and suicide attempts as unitary constructs. Social isolation, hopelessness, shame, psychache, and escape from frustrating self-awareness are characterized as predictors of

suicidal behaviors (5-12). In contrast to traditional theories, the ideation-to-action framework suggests that suicidal ideation and suicide attempts are separate phenomena with different explanations. Joiner's interpersonal theory of suicide, as the first theory based on the ideation-to-action framework (13), was a significant advance in suicide studies. According to interpersonal needs theory, a low level of belongingness and a high level of burdensomeness can lead to a tendency for suicidal ideation, and a high acquired capability facilitates suicidal attempts (13, 16).

Another critical theory based on this framework is the integrated motivational-volitional (IMV) model (17, 18). Pre-motivational phase, motivational phase, and volitional phase are the three phases of suicidal behavior formation based on the IMV model. The pre-motivational phase consists of background agents (e.g., diathesis and environment) and triggering events (e.g., relationship crisis) in a

biosocial background of suicide. The motivational phase suggests that an individual's intention to commit suicide is identified by feelings of entrapment, and feelings of defeat/humiliation are indicators of entrapment. Finally, suicide attempts occur in the volitional phase. Stage-specific moderators (i.e., factors that facilitate or impede movement between stages) determine progression from defeat/humiliation to entrapment (i.e., threat-to-self moderators), entrapment to suicidal ideation (i.e., motivational moderators), and suicidal intent to suicidal behavior (i.e., volitional moderators) (14, 19).

Threat-to-self moderators and motivational moderators have a significant role in the IMV model (19). Based on O'Connor and Kirtly, coping skills have been suggested as threat-to-self moderators (19). Although suicide risk is poorly studied in coping skills, there have been some promising findings (17). There is evidence that maladaptive cognitive emotion regulation strategies (e.g., self-blame, other-blame, focus on thought/rumination, and catastrophizing) are associated with suicidal ideation (20). Despite the aforementioned finding, no study has been conducted on how these strategies might lead to the development of suicide intentions according to the IMV model. Therefore, as part of the current study, we set out to clarify how maladaptive cognitive emotion regulation strategies contribute to suicidal ideation formation.

Furthermore, previous studies have demonstrated that thwarted belongingness and perceived burdensomeness are the main causes of suicidal ideation formation (13, 15). Consistent with this finding, these constructs are included as motivational moderators between entrapment and suicidal ideation in the present study.

Although the previous findings of structural tests according to the IMV model are promising (21), they have not included the interactions between latent variables. By using the interaction of latent variables, it was possible to estimate relationship values closer to their actual values (18).

## 2. Objectives

Therefore, the present study aimed to test the motivational phase of the IMV model using structural equation modeling (SEM) by exploring the interaction of latent variables. Motivational phase validation in Iran could contribute to improved assessment tools and therapeutic interventions for suicidal ideation among Iranian clinicians.

## 3. Materials and Methods

### 3.1. Participants

In order to test the study model, 405 individuals (68.6% female) with a mean age of 22.7 years (standard deviation:

3.97; range: 17 - 55) completed the study questionnaires. Regarding marital status, the sample was mainly single (84%). The remaining participants were in a relationship (8.1%), married (7.4%), and divorced (0.5%).

Furthermore, 35.1% of the participants reported some psychological problems in the past, and 28.4% stated a history of psychological problems in their family. Regarding the history of self-harm, 14.6% reported self-injurious behaviors. Finally, 5.7% of the participants reported a history of suicidal attempts, and 53% endorsed that they had suicidal ideation.

### 3.2. Measurements

The Gilbert and Allan Defeat Scale: Is a 16-item that assesses feelings of defeat within the past week. Participants' responses to each item are scored based on a 5-point Likert (0 = never to 4 = always/all the time). The high scores are correlated with a high level of depression. Gilbert and Allan have demonstrated that the defeat scale has good to excellent psychometric properties (22). The internal consistency of the Persian version was obtained at 0.91 (23).

The Entrapment Questionnaire: Is a 16-item scale created by Gilbert and Allan in 1998. This scale assesses the feeling of entrapment through external entrapment (the first 10 items) and internal entrapment (the last 6 items). Respondents are asked to reveal on a 5-point Likert scale (0 = not at all like me to 4 = extremely like me) how much they are experiencing each statement. According to Gilbert and Allan's study, Cronbach's alpha values in the student group for the internal entrapment subscale and external entrapment subscale were obtained at 0.93 and 0.88, respectively (22). The internal consistency of the Persian version was excellent ( $\alpha = .92$ ) (24).

The Beck Scale for Suicidal Ideation (BSSI): Was created by Beck et al. in 1979. The BSSI includes 19 items and three factors. This scale has five screening items; if the participant's score in these items is above 0, he/she must complete the entire scale. Each item is scored from 0 to 2. Therefore, the possible range of the total score is 0-38. Beck et al. showed that the BSSI has good psychometric properties (25). The present study used the Persian version of the BSSI, and Cronbach's alpha for this version was high ( $\alpha > 0.8$ ) (26).

Cognitive Emotion Regulation Questionnaire-short (CERQ-short): Is a self-report, 18-item questionnaire designed by Garnefski and Kraaij in 2006. The aim of CERQ-short is to assess the nine cognitive emotion regulation strategies (i.e., positive refocusing, planning, positive reappraisal, putting into perspective, acceptance, self-blame, other-blame, rumination, and catastrophizing). The CERQ-short measures these strategies on a 5-point

Likert scale from 1 = never to 5 = almost in the specific subscale. Each subscale includes two items of all 18 items. The highest score of each subscale indicates the more a strategy is used. The reliability and validity were supported (27). The current study utilized the Persian version of the CERQ-short, and the internal consistency of subscales was reported within the range of 0.73 - 0.90 (28).

Interpersonal Needs Questionnaire-15 (INQ-15): Is a part of Joiner's interpersonal needs theory (13), were assessed using a 15-item version of the Interpersonal Needs Questionnaire (INQ-15). The INQ-15 was created to measure the feeling of burden to others (i.e., burdensomeness) and the feeling of connectedness to others (i.e., belongingness). Respondents indicate the degree of these feelings on a 7-point Likert scale (29, 30). The INQ-15 demonstrated excellent psychometric properties, and confirmatory factor analyses showed that this version of the questionnaire has the maximum consistent model fit (30, 31). The present study used the Persian version of the INQ-15, and internal consistency for belongingness and burdensomeness was reported as 0.90 and 0.85, respectively (32).

### 3.3. Procedure

The study procedure was approved by the Research Ethics Committee of the Vice-Chancellor in Research Affairs, Shahid Beheshti University of Medical Sciences, Tehran, Iran. The study participants were recruited via social media posting on Telegram and Instagram. Additionally, Shahid Beheshti University of Medical Sciences advertised the study on its online platforms. The participants were informed that their participation in the study was voluntary and signed a written consent form. Afterward, the participants completed the study questionnaires online via a web link.

### 3.4. Data Analysis

First, we searched for missing data and figured out that there was no missing data. Then, the distribution of variables was checked for deviation from normality, and it was demonstrated that the variables deviated from normality. Therefore, the maximum likelihood with robust standard errors (MLR) estimator was used instead of the popular maximum likelihood to estimate model parameters. The MLR estimator is a good choice when data distributions are not normal, and the sample size is relatively small. Correlations between the variables were also scrutinized to be proper for SEM. Then, SEM was implemented to assess the hypothesized relationships as mentioned in the IMV model. Additionally, the present study explored the effects of treat-to-self moderators and defeat interaction on entrapment and motivational moderators and entrapment interaction on suicidal ideation (Figure 1) (18). All analyses

were performed in R environment version 4.1.3 and mainly using the lavaan package (33, 34).

The chi-square goodness of fit test, root mean square error of approximation (RMSEA), comparative fit index (CFI), Tucker-Lewis index (TLI), and standardized root mean square residual (SRMR) as recommended by Kline were used to assess model fit (35). A chi-square test significance value greater than 0.05 shows preliminary support for the hypothesized model. The RMSEA less than 0.06 and upper confidence interval not greater than 0.10 indicate adequate fit. The CFI and TLI greater than 0.95 indicate a good fit. An SRMR less than 0.08 is considered an acceptable fit (36).

## 4. Results

Table 1 shows the correlations between variables and other descriptive statistics, including mean and standard deviation. Cronbach's alpha was also reported for the variables that were used as manifests in the model, either as a scale or subscale.

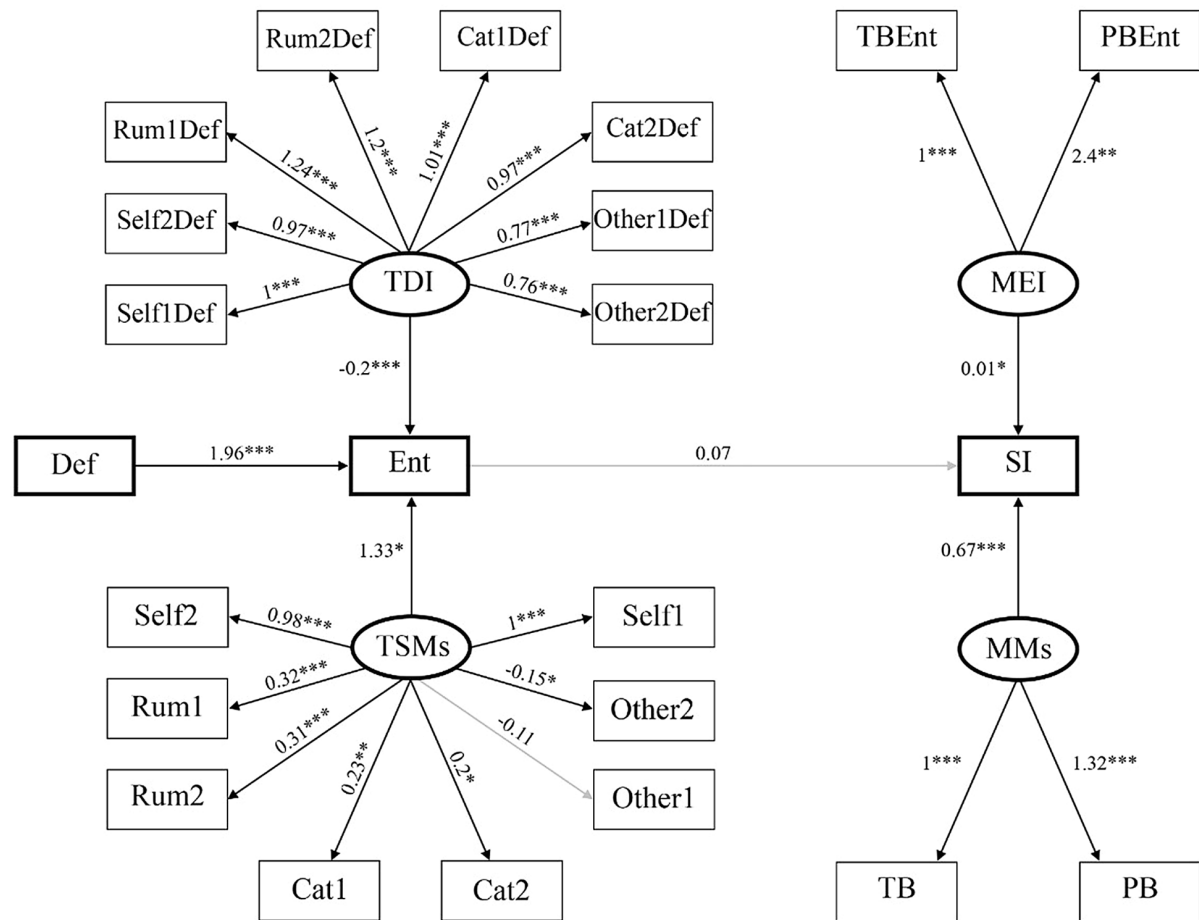
Using the statistics mentioned earlier, the overall model's fit was checked. The chi-square test showed a significant value ( $\chi^2(223) = 2916.26, P < 0.001$ ), which indicated that the overall fit of the model was poor. Consistent with this finding, the poorly fitted model was also confirmed by other fit indices (CFI = 0.610, TLI = 0.558, SRMR = 0.264, RMSEA = 0.173 (95% CI: 0.168 - 0.177)). According to the findings of this study, the model accounted for 61% and 70% of variances in suicidal ideation and entrapment, respectively.

Local fit indexes, including standard regression parameters and standard factor loadings, are shown in Tables 2 and 3, respectively.

The effects of all regressors of entrapment were significant ( $P < 0.05$ ). The primary effects of defeat and threat-to-self moderators were positively related to entrapment; nevertheless, the primary effect of threat-to-self moderators and defeat interaction was negatively related to entrapment. Furthermore, motivational moderators and motivational moderators and entrapment interaction were significant predictors of suicidal ideation ( $P < 0.05$ ). However, entrapment did not reach the conventional significance value ( $P < 0.05$ ). Two interaction terms showed relatively moderate effects. The most effective variable to predict suicidal ideation as the ultimate endogenous variable in the model (Figure 1) was the motivational moderator's factors, and their effect size was moderate-high.

## 5. Discussion

The current study aimed to investigate the motivational phase of the IMV model using SEM with the interac-



**Figure 1.** Structural path coefficients of integrated motivational-volitional model. Abbreviations: Def, defeat; Ent, entrapment; SI, suicidal ideation; TSMs, threat-to-self moderators; MMs, motivational moderators; TDI, threat-to-self moderators and defeat interaction; MEI, motivational moderators and entrapment interaction; Self1, item 1 of self-blame; Self2, item 2 of self-blame; Rum1, item 1 of rumination; Rum2, item 2 of rumination; Cat1, item 1 of catastrophizing; Cat2, item 2 of catastrophizing; Other1, item 1 of other-blame; Other2, item 2 of other-blame; TB, burdensomeness; PB, belongingness; Self1.Def, item 1 of self-blame and defeat interaction; Self2.Def, item 2 of self-blame and defeat interaction; Rum1.Def, item 1 of rumination and defeat interaction; Rum2.Def, item 2 of rumination and defeat interaction; Cat1.Def, item 1 of catastrophizing and defeat interaction; Cat2.Def, item 2 of catastrophizing and defeat interaction; Other1.Def, item 1 of other-blame and defeat interaction; Other2.Def, item 2 of other-blame and defeat interaction; TB.Ent, burdensomeness and entrapment interaction; PB.Ent, belongingness and entrapment interaction. Note: All coefficients are non-standard.

tion of latent variables. Overall, the obtained results indicated that the model was a poor fit for the data. However, the model explained the considerable amount of variance between entrapment and suicidal ideation; nevertheless, the findings demonstrated that the pathway between entrapment and suicidal ideation was not statistically significant.

Furthermore, the results of the interaction between the suicidal ideation predictors showed that the interaction between defeat and threat-to-self moderators had a negatively significant effect on the relationship between defeat and entrapment. Additionally, the interaction between entrapment and motivational moderators had a positively significant effect on the relationship between

entrapment and suicidal ideation. Previous studies have shown that exploring the interaction of latent variables results in more study power and less biased estimation (18, 37). The main result of the interaction between the suicidal ideation predictors was the predictive role of entrapment and motivational moderators in suicidal ideation. In the following, we discuss the probable explanation for this finding.

In line with previous studies, this study found a significant relationship between defeat and entrapment. It has been shown that defeat and entrapment are associated with several psychopathological symptoms (22, 38, 39). The appraisal of defeat and a sense of entrapment are the main components of the cry of pain theory. This theory con-

**Table 1.** Descriptive Statistics and Correlations of Variables<sup>a</sup>

	1	2	3	4	5	6	7	8	9	10	11	12	Mean ± SD	A
<b>1. Def</b>	-												41.92 ± 8.21	0.79
<b>2. Ent</b>	0.73 **	-											17.64 ± 16.46	0.96
<b>3. SI</b>	0.66 **	0.69 **	-										4.79 ± 6.30	0.86
<b>4. Self1</b>	0.05	0.13*	0.02	-									3.24 ± 1.11	-
<b>5. Self2</b>	0.1*	0.16 **	0.05	0.87 **	-								3.06 ± 1.11	-
<b>6. Rum1</b>	0.08	0.06	0.01	0.31 **	0.28 **	-							3.88 ± 0.99	-
<b>7. Rum2</b>	0.24 **	0.3 **	0.14 **	0.25 **	0.26 **	0.59 **	-						3.60 ± 1.09	-
<b>8. Cat1</b>	0.31 **	0.38 **	0.2 **	0.17 **	0.18 **	0.17 **	0.39 **	-					2.93 ± 1.13	-
<b>9. Cat2</b>	0.36 **	0.44 **	0.29 **	0.12 *	0.15 **	0.22 **	0.44 **	0.76 **	-				2.73 ± 1.19	-
<b>10. Other1</b>	0.24 **	0.29 **	0.18 **	-0.13 *	-0.09 *	-0.04	0.15 **	0.32 **	0.36 **	-			2.35 ± 1.01	-
<b>11. Other2</b>	0.21 **	0.27 **	0.17 **	-0.17 **	-0.14 **	-0.06	0.16 **	0.32 **	0.36 **	0.82 **	-		2.34 ± 1.02	-
<b>12. TB</b>	0.5 **	0.6 **	0.58 **	0.07	0.11*	-0.03	0.13 **	0.21 **	0.29 **	0.23 **	0.24 **	-	12.25 ± 8.63	0.94
<b>13. PB</b>	0.53 **	0.6 **	0.54 **	-0.01	0.05	-0.01	0.13 **	0.2 **	0.25 **	0.18 **	0.18 **	0.5 **	29.51 ± 11.78	0.88

Abbreviations: SD, standard deviation; Def, defeat; Ent, entrapment; SI, suicidal ideation; Self1, item 1 of self-blame; Self2, item 2 of self-blame; Rum1, item 1 of rumination; Rum2, item 2 of rumination; Cat1, item 1 of catastrophizing; Cat2, item 2 of catastrophizing; Other1, item 1 of other-blame; Other2, item 2 of other-blame; TB, burden-someness; PB, belongingness.

<sup>a</sup> Statistical significance: \*  $P < 0.05$ , \*\*  $P < 0.01$ .

**Table 2.** Standardized Regression Coefficients

		B	SE	Z	P	95% CI	
						LL	UL
<b>Ent</b>	~ Def	0.803	0.015	52.528	< 0.001	0.773	0.832
<b>Ent</b>	~ TSMs	0.069	0.033	2.073	0.038	0.004	0.134
<b>Ent</b>	~ TDI	-0.238	0.049	-4.867	< 0.001	-0.334	-0.142
<b>SI</b>	~ Ent	0.237	0.19	1.246	0.213	-0.136	0.61
<b>SI</b>	~ MMs	0.738	0.092	7.992	< 0.001	0.557	0.919
<b>SI</b>	~ MEI	0.255	0.087	2.917	0.004	0.084	0.426

Abbreviations: CI, confidence interval; Def, defeat; Ent, entrapment; SI, suicidal ideation; TSMs, threat-to-self moderators; MMs, motivational moderators; TDI, threat-to-self moderators and defeat interaction; MEI, motivational moderators and entrapment interaction.

ceptualizes suicide as a behavioral response to a frustrated and painful situation. Defeat, no escape, and no rescue are three elements of the behavioral response. Due to the appraisal of defeat, individuals might experience more entrapment and decrease the escape level (12). In the current study, the presence of maladaptive cognitive emotion regulation strategies contributes to a sense of entrapment. These strategies, for example, rumination, serve as tunnel cognition or cognitive deconstruction (40) in a way that the individual cannot see the way to escape from the defeated situation, and the feeling of entrapment emerges (19).

The current study's results unexpectedly demonstrated that there was no significant relationship between entrapment and suicidal ideation. In other words, en-

trapment cannot mediate between defeat and suicidal ideation. This finding is consistent with the findings of Ng et al. (41) and Taylor et al. (42). Nevertheless, according to the cry of pain theory (12) and the IMV model (19), the violation of entrapment's centrality in the formation of suicidal intent is a controversial finding. The small sample size and the low level of suicidal desire (53%) in the total sample could be two explanations for this finding.

In addition, O'Conner and Portzky have suggested that entrapment can be a cultural, gender-sensitive, and age-sensitive concept (43). In this regard, the present study also suggests that entrapment might be a situation-sensitive concept or temporary condition. Consequently, although the individuals report a feeling of entrapment, they remain optimistic and hopeful that a way out will appear and

**Table 3.** Standardized Factor Loadings

			B	SE	Z	P	95% CI	
							LL	UL
TSMs	≈	Self1	0.936	0.021	43.887	< 0.001	0.895	0.978
TSMs	≈	Self2	0.921	0.02	45.829	< 0.001	0.882	0.96
TSMs	≈	Rum1	0.334	0.054	6.168	< 0.001	0.228	0.441
TSMs	≈	Rum2	0.299	0.061	4.921	< 0.001	0.18	0.418
TSMs	≈	Cat1	0.208	0.068	3.039	0.002	0.074	0.342
TSMs	≈	Cat2	0.171	0.07	2.443	0.015	0.034	0.309
TSMs	≈	Other1	-0.109	0.073	-1.497	0.134	-0.252	0.034
TSMs	≈	Other2	-0.158	0.074	-2.141	0.032	-0.302	-0.013
MMs	≈	TB	0.715	0.042	17.232	< 0.001	0.634	0.797
MMs	≈	PB	0.692	0.033	21.006	< 0.001	0.627	0.756
TDI	≈	Self1.Def	0.937	0.017	55.481	< 0.001	0.904	0.97
TDI	≈	Self2.Def	0.939	0.016	57.793	< 0.001	0.907	0.971
TDI	≈	Rum1.Def	0.971	0.007	140.514	< 0.001	0.958	0.985
TDI	≈	Rum2.Def	0.978	0.004	231.676	< 0.001	0.97	0.987
TDI	≈	Cat1.Def	0.96	0.007	129.027	< 0.001	0.946	0.975
TDI	≈	Cat2.Def	0.949	0.008	112.155	< 0.001	0.932	0.965
TDI	≈	Other1.Def	0.922	0.012	77.685	< 0.001	0.898	0.945
TDI	≈	Other2.Def	0.916	0.012	75.756	< 0.001	0.892	0.94
MEI	≈	TB.Ent	0.84	0.04	20.988	< 0.001	0.761	0.918
MEI	≈	PB.Ent	0.97	0.041	23.909	< 0.001	0.89	1.049

Abbreviations: CI, confidence interval; TSMs, threat-to-self moderators; MMs, motivational moderators; TDI, threat-to-self moderators and defeat interaction; MEI, motivational moderators and entrapment interaction; Self1, item 1 of self-blame; Self2, item 2 of self-blame; Rum1, item 1 of rumination; Rum2, item 2 of rumination; Cat1, item 1 of catastrophizing; Cat2, item 2 of catastrophizing; Other1, item 1 of other-blame; Other2, item 2 of other-blame; TB, burdensomeness; PB, belongingness; Self1.Def, item 1 of self-blame and defeat interaction; Self2.Def, item 2 of self-blame and defeat interaction; Rum1.Def, item 1 of rumination and defeat interaction; Rum2.Def, item 2 of rumination and defeat interaction; Cat1.Def, item 1 of catastrophizing and defeat interaction; Cat2.Def, item 2 of catastrophizing and defeat interaction; Other1.Def, item 1 of other-blame and defeat interaction; Other2.Def, item 2 of other-blame and defeat interaction; TB.Ent, burdensomeness and entrapment interaction; PB.Ent, belongingness and entrapment interaction.

reject suicidal ideation as a solution (42). To this finding and based on the moderating effect of maladaptive cognitive emotion regulation strategies between defeat and entrapment, probably the severity and frequency of using these strategies could also be an important factor in the relationship between entrapment and suicidal ideation. Optimistic views about the future and hopefulness are associated with further adaptive strategies (26).

Another important result of the current study was the significant relationship between motivational moderators (i.e., thwarted belongingness and perceived burdensomeness) and suicidal ideation. This finding is consistent with the main idea of interpersonal needs theory. Based on Joiner's theory, a lack of social connectedness is remarkable in forming a desire for death (13, 16). According to this theory, other risk factors (e.g., hopelessness, shame, and psychache) might influence suicidal ideation by increas-

ing feelings of thwarted belongingness or perceived burdensomeness or a combination of the two (16). Furthermore, Durkheim has suggested that social isolation is a significant factor in the development of suicidal ideation (11).

Additionally, the interaction of entrapment and motivational moderators was a prominent predictor of suicidal ideation. Therefore, the interactive effect of entrapment and lack of social connectedness is the important proximal predictor of suicidal ideation. Probably, in such a situation, optimistic views about a solution will be ruined, and the interaction between a sense of entrapment and loneliness results in suicidal intent. In addition, as noted above, entrapment and social factors are significant elements in contemporary suicidal theories. Therefore, the predictive effect of the interaction of these elements is consistent with present knowledge about suicide.

The results of the current study should be considered

in light of some limitations. Firstly, all of the results are cross-sectional. Longitudinal data will be beneficial for searching the causality. Secondly, the assessment of suicidal ideation was conducted by self-reporting questionnaires. Future studies should employ methods other than self-reporting, such as interviews. Thirdly, the cry of pain theory (12) and the IMV model (19) include humiliation as a predictor of entrapment. In this study, only the role of defeat was explored. Therefore, investigating the role of humiliation besides defeat is an important direction for future studies. Fourthly, considering the prevalence of suicide attempts in the general population (44), investigating the pre-motivational factors and volitional moderators according to exploring the interaction of latent variables method is necessary. Fifthly, probably other theories based on the ideation-to-action framework, such as interpersonal needs theory (13) and three-step theory (15), can better explain suicidal ideation in the Iranian population. Therefore, our understanding of suicidality in this population can be improved by assessing suicidal ideation according to these theories. Finally, generalizability is limited since all the participants of the study were students. Consequently, it would be helpful to replicate the results in a different population.

### 5.1. Conclusions

In conclusion, the present study was designed to investigate the motivational phase of the IMV model using SEM by the interaction of latent variables. The findings suggest that thwarted belongingness and perceived burdensomeness are the most effective predictors of suicidal ideation in the Iranian population. To the best of our knowledge, the current study was the first study according to the ideation-to-action theories of suicidality by exploring the interaction of latent variables. Hopefully, this study will encourage further studies in this area.

### Footnotes

**Authors' Contribution:** R. S. designed the study, conducted data collection, drafted the introduction, method, and discussion sections, and revised the manuscript. R. Z. designed the study, conducted data collection, revised the manuscript, and designed the figure. A. K. designed the study and supervised the study. M. K. conducted all statistical analyses, interpreted the data, and drafted the results section. L. E. conducted data collection. J. S. revised the final manuscript and provided critical feedback.

**Conflict of Interests:** The authors have no actual or potential conflict of interest, including any financial, personal, or other relationships with other individuals or or-

ganizations in the work submitted that could inappropriately influence the outcomes.

**Data Reproducibility:** The dataset presented in the study is available on request from the corresponding author during submission or after publication. The data are not publicly available due to privacy and ethics.

**Ethical Approval:** The study procedures were approved by the Research Ethics Committee of the Vice-Chancellor in Research Affairs, Shahid Beheshti University of Medical Sciences (IR.SBMU.RETECH.REC.1400.462) (webpage of ethical approval code: ethics.research.ac.ir/IR.SBMU.RETECH.REC.1400.462).

**Funding/Support:** This study was supported by the Taleghani Hospital Research Development Committee, School of Medicine, Shahid Beheshti University of Medical Sciences (grant no.: 29685).

**Informed Consent:** Written informed consent was obtained from the participants.

### References

1. Stone DM, Jones CM, Mack KA. Changes in Suicide Rates - United States, 2018-2019. *MMWR Morb Mortal Wkly Rep.* 2021;**70**(8):261-8. [PubMed ID: 33630824]. [PubMed Central ID: PMC8344989]. <https://doi.org/10.15585/mmwr.mm7008a1>.
2. Martinez-Ales G, Jiang T, Keyes KM, Gradus JL. The Recent Rise of Suicide Mortality in the United States. *Annu Rev Public Health.* 2022;**43**:99-116. [PubMed ID: 34705474]. <https://doi.org/10.1146/annurev-publhealth-051920-123206>.
3. World Health Organization. *Suicide in the world: global health estimates.* 2019. Available from: <https://apps.who.int/iris/handle/10665/326948>.
4. Kunce M. The Tenuous Ecological Divorce and Unemployment Link with Suicide: A U.S. Panel Analysis 1968-2020. *Journal of Statistical and Econometric Methods.* 2022;**11**(3):1-2.
5. Freud S. Contributions to a discussion on suicide. In: Strachey J, Freud A, Strachey A, Tyson A, Richards A, editors. *The Standard Edition of the Complete Psychological Works of Sigmund Freud, Volume XI (1910): Five Lectures on Psycho-Analysis, Leonardo da Vinci and Other Works.* London: Hogarth Press; 1957. p. 231-2.
6. Menninger KA. Psychoanalytic aspects of suicide. *Int J Psychoanal.* 1933;**14**:376-90.
7. Shneidman ES. *Suicide as Psychache: A Clinical Approach to Self-destructive Behavior.* Lanham: Jason Aronson; 1993.
8. Abramson LY, Alloy LB, Hogan ME, Whitehouse WG, Gibb BE, Hankin BL, et al. The Hopelessness Theory of Suicidality. In: Joiner T, David Rudd M, editors. *Suicide Science.* Boston, MA: Springer; 2002. p. 17-32. [https://doi.org/10.1007/0-306-47233-3\\_3](https://doi.org/10.1007/0-306-47233-3_3).
9. Vohs KD, Baumeister RF. Escaping the Self Consumes Regulatory Resources: A Self-Regulatory Model of Suicide. In: Joiner T, David Rudd M, editors. *Suicide Science.* Boston, MA: Springer; 2002. p. 33-41. [https://doi.org/10.1007/0-306-47233-3\\_4](https://doi.org/10.1007/0-306-47233-3_4).
10. Tangney JP, Dearing RL. *Shame and guilt.* New York: Guilford Press; 2003.
11. Durkheim E. *Suicide: A study in sociology.* London: Routledge; 2005. <https://doi.org/10.4324/9780203994320>.
12. Rasmussen SA, Fraser L, Gotz M, MacHale S, Mackie R, Masterton G, et al. Elaborating the cry of pain model of suicidality: Testing a psychological model in a sample of first-time and repeat self-harm pa-

- tients. *Br J Clin Psychol*. 2010;**49**(Pt 1):15–30. [PubMed ID: 19302734]. <https://doi.org/10.1348/014466509X415735>.
13. Joiner TE. *Why people die by suicide*. Cambridge: Harvard University Press; 2005.
  14. O'Connor RC. Towards an Integrated Motivational-Volitional Model of Suicidal Behaviour. In: O'Connor RC, Platt S, Gordon J, editors. *International Handbook of Suicide Prevention: Research, Policy and Practice*. Chichester: John Wiley & Sons, Ltd; 2011. p. 181–98. <https://doi.org/10.1002/9781119998556.ch11>.
  15. Klonsky E, May AM. The Three-Step Theory (3ST): A New Theory of Suicide Rooted in the "Ideation-to-Action" Framework. *Int J Cogn Ther*. 2015;**8**(2):114–29. <https://doi.org/10.1521/ijct.2015.8.2.114>.
  16. Van Orden KA, Witte TK, Cukrowicz KC, Braithwaite SR, Selby EA, Joiner Jr TE. The interpersonal theory of suicide. *Psychol Rev*. 2010;**117**(2):575–600. [PubMed ID: 20438238]. [PubMed Central ID: PMC3130348]. <https://doi.org/10.1037/a0018697>.
  17. Gooding P, Tarrrier N, Dunn G, Shaw J, Awenat Y, Ulph F, et al. The moderating effects of coping and self-esteem on the relationship between defeat, entrapment and suicidality in a sample of prisoners at high risk of suicide. *Eur Psychiatry*. 2015;**30**(8):988–94. [PubMed ID: 26497469]. [PubMed Central ID: PMC4682192]. <https://doi.org/10.1016/j.eurpsy.2015.09.002>.
  18. Little TD, Bovaird JA, Widaman KF. On the Merits of Orthogonalizing Powered and Product Terms: Implications for Modeling Interactions Among Latent Variables. *Struct Equ Modeling*. 2006;**13**(4):497–519. [https://doi.org/10.1207/s15328007sem1304\\_1](https://doi.org/10.1207/s15328007sem1304_1).
  19. O'Connor RC, Kirtley OJ. The integrated motivational-volitional model of suicidal behaviour. *Philos Trans R Soc Lond B Biol Sci*. 2018;**373**(1754):20170268. [PubMed ID: 30012735]. [PubMed Central ID: PMC6053985]. <https://doi.org/10.1098/rstb.2017.0268>.
  20. Flores-Kanter PE, Garcia-Batista ZE, Moretti LS, Medrano LA. Towards an Explanatory Model of Suicidal Ideation: The Effects of Cognitive Emotional Regulation Strategies, Affectivity and Hopelessness. *Span J Psychol*. 2019;**22**. E43. [PubMed ID: 31679556]. <https://doi.org/10.1017/sjp.2019.45>.
  21. Dhingra K, Boduszek D, O'Connor RC. A structural test of the Integrated Motivational-Volitional model of suicidal behaviour. *Psychiatry Res*. 2016;**239**:169–78. [PubMed ID: 27137980]. <https://doi.org/10.1016/j.psychres.2016.03.023>.
  22. Gilbert P, Allan S. The role of defeat and entrapment (arrested flight) in depression: an exploration of an evolutionary view. *Psychol Med*. 1998;**28**(3):585–98. [PubMed ID: 9626715]. <https://doi.org/10.1017/s0033291798006710>.
  23. Tarsafi M, Kalantar Kousheh SM, Lester D. [Exploratory Factor analysis of the Defeat Scale and its Relationship with Depression and Hopelessness among Iranian University Students]. *Clin Psychol Stud*. 2015;**5**(19):81–98. Persian.
  24. Ghamarani A, Siadatian SH, Pishdad R. [An Investigation of Validity and Reliability of Entrapment Scale in the Students of Isfahan University of Medical Sciences, Iran]. *Qom Univ Med Sci J*. 2014;**7**(6):54–61. Persian.
  25. Beck AT, Kovacs M, Weissman A. Assessment of suicidal intention: the Scale for Suicide Ideation. *J Consult Clin Psychol*. 1979;**47**(2):343–52. [PubMed ID: 469082]. <https://doi.org/10.1037//0022-006x.47.2.343>.
  26. Esfahani M, Hashemi Y, Alavi K. Psychometric assessment of beck scale for suicidal ideation (BSSI) in general population in Tehran. *Med J Islam Repub Iran*. 2015;**29**:268. [PubMed ID: 26793659]. [PubMed Central ID: PMC4715388].
  27. Garnefski N, Kraaij V. Cognitive emotion regulation questionnaire – development of a short 18-item version (CERQ-short). *Pers Individ Differ*. 2006;**41**(6):1045–53. <https://doi.org/10.1016/j.paid.2006.04.010>.
  28. Besharat MA, Bazzazian S. [Psychometric properties of the Cognitive Emotion Regulation Questionnaire in a sample of Iranian population]. *Adv Nurs Midwifery*. 2015;**24**(84):61–70. Persian.
  29. Van Orden KA, Witte TK, Gordon KH, Bender TW, Joiner Jr TE. Suicidal desire and the capability for suicide: tests of the interpersonal-psychological theory of suicidal behavior among adults. *J Consult Clin Psychol*. 2008;**76**(1):72–83. [PubMed ID: 18229985]. <https://doi.org/10.1037/0022-006X.76.1.72>.
  30. Van Orden KA, Cukrowicz KC, Witte TK, Joiner Jr TE. Thwarted belongingness and perceived burdensomeness: construct validity and psychometric properties of the Interpersonal Needs Questionnaire. *Psychol Assess*. 2012;**24**(1):197–215. [PubMed ID: 21928908]. [PubMed Central ID: PMC3377972]. <https://doi.org/10.1037/a0025358>.
  31. Hill RM, Rey Y, Marin CE, Sharp C, Green KL, Pettit JW. Evaluating the Interpersonal Needs Questionnaire: Comparison of the Reliability, Factor Structure, and Predictive Validity across Five Versions. *Suicide Life Threat Behav*. 2015;**45**(3):302–14. [PubMed ID: 25308815]. <https://doi.org/10.1111/sltb.12129>.
  32. Amini-Tehrani M, Sadeghi R, Nasiri M, Jalali T, Zamanian H. Suicide-related interpersonal needs of young Iranian people: A preliminary validation of thwarted belongingness and perceived burdensomeness constructs. *Clin Psychol Psychother*. 2021;**28**(2):422–37. [PubMed ID: 32852132]. <https://doi.org/10.1002/cpp.2507>.
  33. R Core Team. *R: A language and environment for statistical computing*. Vienna, Austria: R Foundation for Statistical Computing; 2022. Available from: <https://www.r-project.org/>.
  34. Rosseel Y. lavaan: An R Package for Structural Equation Modeling. *J Stat Softw*. 2012;**48**(2):1–36. <https://doi.org/10.18637/jss.v048.i02>.
  35. Kline RB. *Principles and practice of structural equation modeling*. New York: Guilford Press; 2016.
  36. Schreiber JB, Nora A, Stage FK, Barlow EA, King J. Reporting Structural Equation Modeling and Confirmatory Factor Analysis Results: A Review. *J Educ Res*. 2006;**99**(6):323–38. <https://doi.org/10.3200/joer.99.6.323-338>.
  37. Busemeyer JR, Jones LE. Analysis of multiplicative combination rules when the causal variables are measured with error. *Psychol Bull*. 1983;**93**(3):549–62. <https://doi.org/10.1037/0033-2909.93.3.549>.
  38. Taylor PJ, Gooding P, Wood AM, Tarrrier N. The role of defeat and entrapment in depression, anxiety, and suicide. *Psychol Bull*. 2011;**137**(3):391–420. [PubMed ID: 21443319]. <https://doi.org/10.1037/a0022935>.
  39. Siddaway AP, Taylor PJ, Wood AM, Schulz J. A meta-analysis of perceptions of defeat and entrapment in depression, anxiety problems, posttraumatic stress disorder, and suicidality. *J Affect Disord*. 2015;**184**:149–59. [PubMed ID: 26093034]. <https://doi.org/10.1016/j.jad.2015.05.046>.
  40. Baumeister RF. Suicide as escape from self. *Psychol Rev*. 1990;**97**(1):90–113. [PubMed ID: 2408091]. <https://doi.org/10.1037/0033-295x.97.1.90>.
  41. Ng RMK, Di Simplicio M, McManus F, Kennerley H, Holmes EA. 'Flash-forwards' and suicidal ideation: A prospective investigation of mental imagery, entrapment and defeat in a cohort from the Hong Kong Mental Morbidity Survey. *Psychiatry Res*. 2016;**246**:453–60. [PubMed ID: 27792974]. <https://doi.org/10.1016/j.psychres.2016.10.018>.
  42. Taylor PJ, Gooding PA, Wood AM, Johnson J, Tarrrier N. Prospective predictors of suicidality: defeat and entrapment lead to changes in suicidal ideation over time. *Suicide Life Threat Behav*. 2011;**41**(3):297–306. [PubMed ID: 21463354]. <https://doi.org/10.1111/j.1943-278X.2011.00029.x>.
  43. O'Connor RC, Portzky G. The relationship between entrapment and suicidal behavior through the lens of the integrated motivational-volitional model of suicidal behavior. *Curr Opin Psychol*. 2018;**22**:12–7. [PubMed ID: 30122271]. <https://doi.org/10.1016/j.copsyc.2017.07.021>.
  44. ten Have M, de Graaf R, van Dorsselaer S, Verdurmen J, van 't Land H, Vollebergh W, et al. Incidence and course of suicidal ideation and suicide attempts in the general population. *Can J Psychiatry*. 2009;**54**(12):824–33. [PubMed ID: 20047721]. <https://doi.org/10.1177/070674370905401205>.