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Investigating the structural model of procrastination based on transdiagnostic factors

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Abstract

Background: Procrastination is a common and widespread phenomenon that affects 15-20% of the general population and 50% of students. Since developing and providing beneficial and effective interventions for procrastination needs a strong, comprehensive theoretical background explanation, the aim of the study was to assess the underlying transdiagnostic factors of procrastination and presenting a causal model.

Methods: In this cross-sectional study, 390 college students were asked to fill out a packet of self-report measures, which included the Pure procrastination scale, Difficulties in emotion regulation scale, Depression-anxiety-stress scales, Frost multidimensional perfectionism scale, Rumination response scale, Penn state worry questionnaire, Acceptance and action questionnaire. The causal model was tested using structural equation modeling (SEM).

Results: Results of the SEM indicate that perfectionism was significantly associated with increasing emotion dysregulation (β=0.446, P<0.001) and emotion dysregulation was significantly associated with increasing anxiety (β=0.499, P<0.001) and depression (β=0.478, P<0.001), and then anxiety and depression with other variables, such as worry (β=0.245, P<0.001; β=0.004, P=0.935), rumination (β=0.046, P=0.424; β=0.418, P<0.001) and experiential avoidance (β=0.277, P<0.001; β=0.319, P<0.001) related to procrastination. Finally, worry has the most significant increasing effect on procrastination. The very small root mean square error of approximation (RMSEA=0.038), together with large values of comparative fit index (CFI=0.985), relative fit index (RFI=0.917), and normed fit index (NFI=0.979) indicated that the model was well fit.

Conclusion: Perfectionism, emotion dysregulation, negative affects, worry, rumination, and experiential avoidance, known as transdiagnostic factors, had a causal relationship with procrastination, and reducing each transdiagnostic factor will improve procrastination. This study could be considered as a cornerstone for further studies on procrastination from a transdiagnostic approach.

Keywords: Procrastination, Emotion Dysregulation, Transdiagnostic Factors, Structural Equation Modeling

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↑What is "already known" in this topic:
Procrastination is a self-regulation failure. Self-regulation involves the required processes to utilize behavioral, emotional, and cognitive resources to achieve a goal. Procrastination research has so far focused on its relationship with cognitive, emotional, and behavioral structures, such as lack of motivation, difficulty in planning and prioritization, difficulty concentrating on tasks and resistance to distractions and low self-efficacy.

→What this article adds:
There is a causal relationship between perfectionism, emotion dysregulation, negative affects, worry, rumination, experiential avoidance, and procrastination. It's important because these processes are common among mental disorders and causally contribute to the development and/or persistence of symptoms. Knowing these processes, more effective interventions can be designed and adjusted for procrastination.

Introduction

Procrastination is a common and widespread phenomenon defined as an intentional delay in starting or ending one's tasks/assignments or decision-making processes in spite of the negative consequences (1-3). The prevalence of problematic procrastination is reported at 15-20% in the general population and over 50% among s tudents, which has risen from 4-5% in 1970 to 20-25% in 2012 (4-7). It negatively affects various aspects of people's lives, especially educational functions, occupational promotion, mental and physical health and the overall quality of life (3, 5, 8-10).

Due to the high prevalence and detrimental effects of procrastination, many treatment interventions that specifically target procrastination have been explored, but there is insufficient and obscure evidence about their efficacy and utility (5, 11-13). Nowadays, with the emergence of the transdiagnostic approach, the role of common predispositions and vulnerability processes that underlie many disorders, known as transdiagnostic factors, had taken the spotlight (14, 15). Perfectionism (16, 17), emotion dysregulation (18-21), negative affects (22), experiential avoidance (23-25), and negative repetitive thinking (rumination, worry) (26-30) have been identified as transdiagnostic factors.

Although procrastination does not have a diagnostic nature and is not considered as a psychiatric disorder, it is related to other disorders, particularly anxiety, depression, and obsessive-compulsive disorder (31, 32). Understanding the underlying mechanisms, mediator and predictor factors of procrastination and presenting an accurate model would help clinicians to select the proper treatment interventions.

A major part of the studies in the field of procrastination is devoted to examining the cause and effect relationship between perfectionism and procrastination so that perfectionism has been recognized as a precursor to procrastination (33-38). Findings from the research indicate that perfectionists, due to their illogically high standards, show procrastination; and procrastinators often have perfectionistic characteristics regarding others' evaluations about them, thus demonstrating a causal relation between these constructs (38). Furthermore, as the highly correlated elements, anxiety and depression have been significantly associated with both procrastination and perfectionism (39, 40). Moreover, several studies have demonstrated perfectionism as a risk factor for anxiety and depression (41, 42). Considering these studies, some research assert that procrastination temporarily reduces anxiety and depression (negative affects). However, these negative affects increase after procrastination and could result in more procrastination (43-45).

The other transdiagnostic factor that has been associated with procrastination is emotion dysregulation. In fact, when people believe that desirable emotions can be achieved through avoidance rather than pursuing their goals, procrastination becomes the strategy of choice (46). In order to experience short-term positive effects, individuals postpone doing their tasks or avoid them at the expense of not achieving their long-term goals (47). In an effort to explain the effect of emotion dysregulation on procrastination, Pychyl and Sirois introduced the concept of counterfactual thinking. It means that individuals compare the adverse outcomes that really occurred in the past with the better or worse outcomes that could have happened in the past. Thinking about better outcomes provokes negative emotions such as shame and guilt that in turn lead to impaired self-regulation and, as a result, they procrastinate. On the contrary, thinking about the worse outcomes improves real feelings but leads to poor future performance, which increases procrastination in succession (43).

In addition, negative repetitive thoughts -- rumination and worry -- are significantly correlated with procrastination, depression, and anxiety (33, 40, 48-52). Indeed, individuals with a higher level of worry hesitate more and are slower in the decision-making process and tend to postpone their decisions and duties, which is the cornerstone of procrastination. Moreover, individuals with a higher level of rumination tend to avoid negative affects, so they are more likely to put over unpleasant tasks and do their tasks halfway or incomplete (53). In general, people with high levels of neuroticism experience severe negative emotions and perceive them as unpleasant, which makes them more prone to avoidance coping strategies such as rumination, worry, emotional suppression, and experiential avoidance to manage their emotions but instead, they end up increasing the frequency or severity of these negative experiences (54). Experiential avoidance as a transdiagnostic factor plays an important part in the development and perpetuation of various pathologies, especially anxiety and depression (25, 55-57) and it might significantly contribute to maintaining procrastination.

Since developing and providing beneficial and effective interventions for procrastination needs a strong, comprehensive theoretical background explanation, the main aim of this study was to assess the structural model of procrastination through transdiagnostic factors. In this regard, the present study evaluated the associations of perfectionism, emotion dysregulation, anxiety, depression, worry, rumination, experiential avoidance with procrastination and investigated mediator and predictor role of these factors on procrastination.

Methods

Study design and participants

In this cross-sectional study, 400 students participated, but 390 students completed the questionnaires. 10 participants didn't fill out the packet completely, so they were excluded from the analysis. Samples were selected from the students of Iran Medical Sciences University, Tehran University, and Azad University of Tehran using the multi-stage cluster sampling method. The sample size was in accordance with Klein's recommendations that suggest the sufficient sample size would be 10 to 20 respondents per estimated parameters (58). According to Klein's proposal and the number of variables in this study, 400 students were recruited. The inclusion criteria were being a student at the mentioned universities and age over 18. The

exclusion criteria were: having any physical condition that would limit the ability of the person to participate in the study and refusal to give written informed consent.

Before data collection, the study was affirmed by the research ethics committee of Iran University of Medical Sciences (IR.IUMS.REC.1397.647). Written informed consent that described the objectives and procedures of the study was obtained from all students and anonymity was assured. Then, Participants were asked to fill out the packet of self-report measures, which included PPS, DERS, DASS-21, MPS, RRS, PSWQ and AAQ-II. Students were not paid for their participation.

Measures

Pure Procrastination Scale (PPS): This scale is not a separate scale and is composed of 12 items from Decisional Procrastination Scale (DPS), General Procrastination Scale (GPS), and Adult Inventory of Procrastination Scale (AIP) and measures decisional procrastination, delay in implementation, and timeliness/lateness. Each item is rated on a 5-point Likert scale from 1 (very seldom or not true of me) to 5 (very often true or true of me). Cronbach's alpha coefficient of the scale is 0.92 (59, 60). The Persian version of PPS contains 12 items and the alpha coefficient for the whole scale is 0.95 and 0.90, 0.84, 0.85 for decisional procrastination, delay in implementation, and timeliness/lateness, respectively (61).

Difficulties in Emotion Regulation Scale (DERS): DERS is a 36-item self-report scale that is designed to assess emotion dysregulation. Higher scores demonstrate more difficulty in emotion regulation. Items are rated on a 5-point Likert scale from 1 (almost never) to 5 (almost always). It includes six subscales: (1) lack of awareness of emotional responses (awareness: 6 items); (2) lack of clarity of emotional responses (clarity: 5 items); (3) non-acceptance of emotional responses (non-acceptance: 6 items); (4) limited access to effective strategies (strategies: 8 items); (5) difficulties in controlling impulsive behavior when experiencing negative affect (impulse: 6 items); and (6) difficulties in engaging goal-directed behavior when experiencing negative affect (goals: 5 items). Reliability results show high internal consistency for DERS (Cronbach's alpha 0.93) and all subscales (alpha coefficients ranging from 0.80- 0.89) (62). The Persian version of DERS has 36 items and 6 subscales as its original version. Alpha (63).

Depression Anxiety Stress Scales (DASS-21): DASS-21 is a self-report scale, which assesses the emotional states of depression, anxiety, and stress. Each of the three dimensions includes seven items, with a 3-point Likert scale ranging from zero (did not apply to me at all) to three (applied to me very much). Results show high reliability, with alpha coefficients 0.95, 0.90, 0.93 and 0.97 for depression, anxiety, stress and total score, respectively (64). The Persian version of DASS-21 is a reliable and valid scale so that the Cronbach alpha for depression, anxiety, stress and total score are 0.85, 0.85 and 0.87, 0.94, respectively. The results also show good concurrent validity with BDI-II (0.70), Zung Self-Rating Anxiety Scale (0.67) and Perceived Stress Scale (0.49) (65).

Frost Multidimensional Perfectionism Scale (MPS): MPS is a self-report scale that measures multiple aspects of perfectionism. It includes 35 items and 6 subscales: Concern over Mistakes (CM; 9 items), Personal Standards (PS; 7 items), Parental Expectations (PE; 5 items), Parental Criticism (PC; 4 items), Doubts about actions (D; 4 items), and Organization (O; 6 items). Each item is scored on a five-point Likert scale, from 1 (strongly disagree) to 5 (strongly agree). For calculating the total score, the organization subscale is excluded because it is loosely related to the other subscales. So, the total score is based on 29 items, ranging from 29-145. The internal consistency of the original version is estimated to be 0.53 to 0.84 for subscales and test-retest reliability over one week is 0.90 (66, 67). The Persian version of MPS contains 35 items and 6 subscales and the internal consistency is 0.86 for the total scale and 0.85, 0.72, 0.57, 0.47, 0.78 and 0.83 for Concern over Mistakes, Personal Standards, Parental Expectations, Parental Criticism, Doubts about actions and Organization, respectively. Also, test-retest reliability for the whole questionnaire over one week is 0.90 (68).

Rumination Response Scale (RRS): This measure includes 10 items and 2 dimensions (brooding and reflection) which is scored on a 4-point Likert scale ranging from 1 (almost never) to 4 (almost always). Higher scores demonstrate higher degrees of ruminative symptoms. Nolen et al. had reported acceptable levels of internal consistency, with alpha Cronbach 0.92. The Persian version of RRS has shown good psychometric properties (overall alpha of 0.88).

Penn State Worry Questionnaire (PSWQ): PSWQ is a 16-item scale with each item rated on a scale from 1 (not at all typical of me) to 5 (very typical of me). It is designed to assess the severity and uncontrollability of worry in clinical and non-clinical populations. PSWQ is a sound instrument with excellent internal consistency and good test-retest reliability (Mayer 1990). The Persian version of PSWQ has shown good psychometric properties (overall alpha of 0.86).

Acceptance and Action Questionnaire – II (AAQ-II): AAQ-II is a 7-item scale that is rated on a 7-point Likert scale from 1 (never true) to 7 (completely true). It assesses psychological flexibility or experiential avoidance, and higher scores indicate higher psychological flexibility. Results have shown good internal consistency, with the mean alpha coefficient being 0.84. Test scores on the Persian version of AAQ-II have indicated good psychometric properties.

Statistical analysis

In the first step, Spearman's rank correlation was applied, and stepwise linear regression was obtained to assess the associations between the studied variables and to implement the conceptual framework. Then, structural equation modeling (SEM) with maximum likelihood estimation (MLE) was used to assess the path diagram (Fig. 1). Structural equation modeling includes causal modeling and analysis of covariance structures. Path standardized coefficients (β) as the effect sizes of this model were calculated. Goodness of fit (GOF) indices (e.g., root mean

square error of approximation (RMSEA), root mean square residual (RMSR), standardized RMSR) were applied for assessing the fitness of the model (69). A comparative fit index (CFI) greater than 0.95 and a root mean square error of approximation (RMSEA) less than 0.08 were the criteria for acceptable model fit (70, 71). All of the statistical analysis was performed using AMOS-SPSS 22. The P-value of less than 0.05 was considered statistically significant.

Results

Out of 390 students, 207 (53%) students were male, and 183 (47%) were female. The mean (SD) age was 24.77 (5.32), range: 18-50 years. The marital status of the sample was as follows: 347 (89%) were single, and 43 (11%) were married. Their educational level was as follows: 22 (5.6%) two-year college, 205 (52.6%) bachelor's degree, 138 (35.4%) master's degree, 6 (1.5%) MD, and 19 (4.9%) PhD.

As shown in Table 1, the bivariate correlation was conducted among the variables. It revealed that the correlation between all variables was significant in the expected direction. Procrastination is positively correlated with all of the study measures.

Figure 1 shows the proposed model, and the following tables are presented to confirm the fitness of this model.

According to Table 2, straight lines demonstrate the direction of the path from exogenous variables to indigenous variables. Standard path coefficients (β) indicate direct effects. As shown, all of path coefficients are significant except the path of Depression ---> Worry (β=0.004, P=0.935) and Anxiety ---> Rumination (β=0.046, P=0.424).

Figure 2 presents the diagram of the fitted model with path coefficients.

According to Table 3, all of these indices except the chi-square test indicated that the model has an acceptable fit. The chi-square test was significant. It should be noticed that chi-square test is highly sensitive to sample size (72, 73). If the sample size is large (above 200 cases), the p-value of chi-square will tend to be small, and if it is significant, the model will fail to fit. So, a raft of approximate fit indices is presented to justify acceptable model-fit. The very small root mean square error of approximation (RMSEA) (<0.05), and together with large values of comparative fit index (CFI), relative fit index (RFI), and normed fit index (NFI) (>0.9) indicated that the model was well fit.

Table 1. Pearson correlation among variables used in path model

Variable	Perfectionism	Difficulties in emotion regulation	Anxiety	Depression	Rumination	Worry	Experiential Avoidance	Procrastination
perfectionism	1							
Difficulties in emotion regulation	0.446**	1						
Anxiety	0.266**	0.499**	1					
Depression	0.338**	0.478**	0.616**	1				
Rumination	0.378**	0.337**	0.304**	0.446**	1			
Worry	0.545**	0.668**	0.497**	0.415**	0.395**	1		
Experiential Avoidance	0.421**	0.551**	0.473**	0.489**	0.397**	0.606**	1	
procrastination	0.359**	0.470**	0.264**	0.341**	0.343**	0.435**	0.434**	1

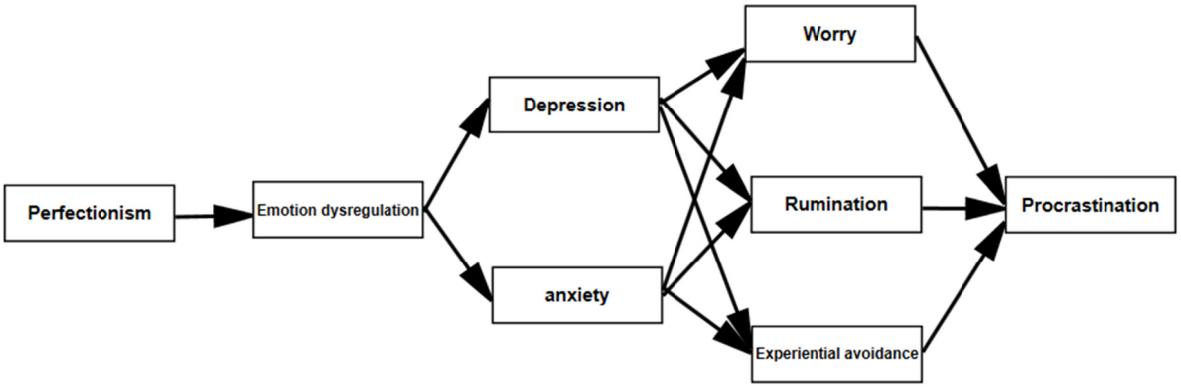

Fig. 1. Conceptual path diagram of the model

Table 2. The total effect obtained by path analysis

Exogenous		Indigenous	β	Standard Error	P
Perfectionism	--->	Emotion dysregulation	0.446	0.045	<0.001
Emotion dysregulation	--->	Depression	0.478	0.045	<0.001
Emotion dysregulation	--->	Anxiety	0.499	0.044	<0.001
Depression	--->	Worry	0.004	0.046	0.935
Depression	--->	Rumination	0.418	0.058	<0.001
Depression	--->	Experiential avoidance	0.319	0.054	<0.001
Anxiety	--->	Worry	0.245	0.046	<0.001
Anxiety	--->	Rumination	0.046	0.058	0.424
Anxiety	--->	Experiential avoidance	0.277	0.054	<0.001
Experiential avoidance	--->	Procrastination	0.229	0.056	<0.001
Worry	--->	Procrastination	0.233	0.056	<0.001
Rumination	--->	Procrastination	0.160	0.049	<0.001

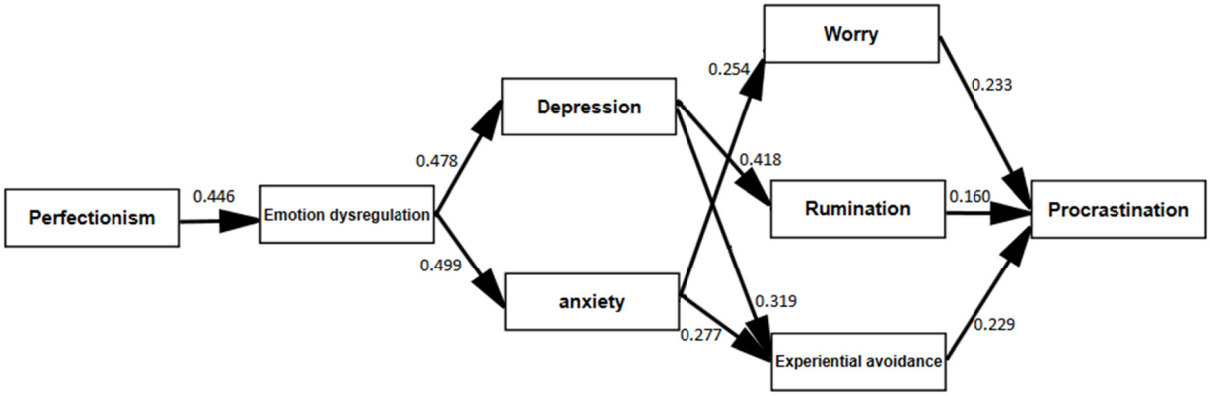

Fig. 2. The diagram of the fitted model

Table 3. Model fit indices

Criteria fit index	Chi-square	Degree of freedom	Probability level	Chi-square/degree of freedom	RMSEA	RFI	CFI	NFI
	25.72	7	0.001	3.67	0.038	0.917	0.985	0.979

Discussion

The main purpose of this study was to examine and form a structural model to present a theoretical foundation for the relationship between perfectionism, emotion dysregulation, anxiety, depression, worry, rumination, experiential avoidance, and procrastination.

The structural model showed that there was a significant relationship between the constructs, which is consistent with previous researches (35-37, 40, 46, 53, 55, 74). Similar to the prior studies, procrastination was positively correlated with anxiety, depression, rumination, and worry. These findings underline the negative psychological correlates of deliberately postponing tasks. As shown, the relationship between anxiety and rumination and also between depression and worry was insignificant. It should be noted that repetitive negative thinking (RNT), both rumination and worry, are present in emotional disorders, but rumination may be more prevalent in depression and worry in anxiety disorders (75, 76). Recent studies indicate that rumination and worry are transdiagnostic processes that are similarly related to both disorders (77, 78). Nevertheless, in this study, depression and anxiety were considered as symptoms not disorders, and DASS was used for assessing these emotional states, not a specific inventory for depression and anxiety disorders. On the other hand, the sample of the study was selected from college students, who were presumed as the normal population. It seems that these deliberations might play a role in the insignificance of the relationship between anxiety and rumination and also between depression and worry.

This study, like every other study, has some limitations. The sample of the study was just selected from college students, and individuals with pathological procrastination were not included in the study. Future research in this field shall include the pathologic procrastinators. Also, all the variables were assessed via self-report scales, and participants evaluated their own psychological difficulties and symptoms. Future research would do well to use observer-rating measures and interviews. Also, the number of the instruments and the questions are high, and it may cause fatigue. Thus, it is better to reduce the tests in future studies. Furthermore, the sample was not very diverse and was selected just from Tehran's universities; this may lead to the problem of generalization in the results. While the larger sample size would have influenced the goodness of model-fit, there were approximately 15 participants in the current study per one variable that is in line with the common guideline SEM (58) but the higher ratio could have increased the power. Despite the limitations, the sample size of the study was large, and powerful and

complicated statistical methods were performed for data analysis to assure the accuracy and validity of the results.

Conclusion

Overall, the result showed the significant effects of transdiagnostic factors on procrastination. This study could be assumed as a cornerstone for further studies on procrastination from the transdiagnostic approach and also should be considered as a pioneering study for examining transdiagnostic treatment on individuals with pathological procrastination.

Ethical approval and consent to participate

The study was affirmed by the research ethics committee of Iran University of Medical Sciences (IR.IUMS.REC.1397.647). Written informed consent that described the objectives and procedures of the study was obtained from all students and anonymity was assured.

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Conflict of Interests

The authors declare that they have no competing interests.

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