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The Relationship between Type D Personality and Mental Stress: The Mediating Role of Cognitive Appraisal

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ABSTRACT

Objective: This research explores the intricate dynamics between Type D personality, cognitive appraisal, and mental stress, seeking to unravel the mediating role of cognitive appraisal in the association between Type D personality and mental stress.

Methods: A structural equation modeling was conducted, emphasizing the influence of personality traits on mental stress and the potential mitigating impact of cognitive appraisal skills. Data was collected via Type D personality scale, Cognitive reappraisal scale and Mental stress inventory.

Results: The study confirmed the positive influence of Type D personality on mental stress while revealing that cognitive appraisal operates as a significant mediator, exerting a moderating effect on the relationship between Type D personality and mental stress. The findings underscore the nuanced interplay between individual personality traits and the cognitive interpretation of stressors, shedding light on how cognitive appraisal could potentially serve as a buffer against the adverse impact of Type D personality on mental stress.

Conclusions: These results provide a framework for further research into effective interventions aimed at enhancing cognitive appraisal skills to alleviate mental stress, particularly in individuals with Type D personalities, fostering the development of targeted mental health strategies.

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Introduction

The concept of distressed personality, also known as type D personality, emerged in the scientific literature in the mid-1990s when clinical psychologist Johan Denollet of the University of Tilburg delved into identifying personality risk factors associated with cardiovascular diseases, particularly their progression and mortality (Denollet, 2005) Type D personality represents a distinct type of personality that can be characterized by two primary dimensions: negative affectivity and social inhibition. Individuals with this personality type often find themselves immersed in a myriad of negative emotions such as depression, anxiety, anger, or hostility. Furthermore, they frequently experience negative self-perception and often report a multitude of psychosomatic complaints (Denollet, 2000). Additionally, they display a pronounced tendency to withdraw from social interactions, avoiding any potential threats that may arise from such engagements. This inclination towards social withdrawal primarily stems from their fear of disapproval or rejection by other members of society. The construct of type D personality is rooted in the concepts of positive and negative emotionality, which ultimately serve as manifestations of two significant personality traits: neuroticism and introversion (De Fruyt & Denollet, 2002).

The classification of type D personality is grounded on two enduring and comprehensive personality attributes, which encompass negative affectivity (NA) and social inhibition (SI), as stated in the literature (Gogheri et al., 2023; Oginska-Bulik, 2006). Negative affectivity refers to the inclination to undergo pessimistic emotions across various periods and circumstances. In other words, individuals classified as having a high level of negative affectivity (High-NA) tend to experience heightened feelings of dysphoria, anxiety, and irritability (Emons et al., 2007). Furthermore, they possess a tendency to hold a negative perception of themselves and perpetually scrutinize their surroundings for any indications of impending trouble. On the other hand, social inhibition entails the inclination to restrain the expression of emotions and behaviors during social interactions in order to evade disapproval from others (Hausteiner et al., 2010). A person with a high degree of social inhibition (High-SI) typically experiences feelings of inhibition, tension, and insecurity within the realm of social relationships. Consequently, an individual who is characterized as having elevated levels of both negative affectivity and social inhibition is deemed to possess a distressed or type D personality, rendering them susceptible to stress and life events. As a result, type D patients face an increased risk of encountering a wide array of detrimental

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health consequences. These include physiological hyperreactivity, immune activation, and an inadequate response to cardiac treatment. These plausible processes serve as a means of explaining the predictive role of type D in relation to such health outcomes (Smith et al., 2008). Lastly, type D patients are also highly prone to the clustering of various psychological risk factors, which encompass depression, anxiety, and irritability. Moreover, they often exhibit lower levels of self-esteem and endure impaired quality of life.

Stress, which can be defined as the adaptive reaction of an individual to threats originating either internally or externally, is a phenomenon that is subject to the unique response of each person (Lecic-Tosevski et al., 2018) The perception of stress, on the other hand, is the outcome of an individual's assessment of a stressor as either posing a threat or not, and is influenced by one's personal ability to cope with said stressor, such as their perceived efficacy or available resources to tackle the impending challenge. An important determinant that can impact the evaluation and subsequent reaction to stress is an individual's personality. In this regard, the Five-Factor Model provides a framework consisting of five broad personality traits, namely neuroticism, conscientiousness, extroversion, openness, and agreeableness, each possessing distinct characteristics (Lecic-Tosevski et al., 2011). Neuroticism, for instance, encompasses the propensity to experience emotional instability and manifest feelings of anxiety, worry, and fear, while conscientiousness is associated with being responsible, organized, hard-working, and goal-oriented. The third trait, extroversion, involves being sociable, assertive, positive, and displaying a high level of activity. Furthermore, openness entails being perceptive, creative, reflective, and possessing an appreciation for fantasy and aesthetics. Lastly, agreeableness encompasses being kind, cooperative, altruistic, trustworthy, and generous. These five factors collectively contribute to an individual's personality composition, which in turn influences their perception and response to stress (Pejuskovic et al., 2017).

Stress can be conceptualized as the burden that exists alongside a demand, creating a coexistence that has the potential to initiate a cascade of hormonal, neurological, and other biological responses commonly referred to as the "fight or flight" mechanism. Perceived stress, on the other hand, is a subjective reaction to a threat within a particular situation, typically a transient occurrence (Taelman et al., 2009). The symptoms of anxiety encompass the apprehension of unforeseeable and impending dangers or stressors. This psychological condition persists even after the threat has

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dissipated and does not simply vanish. In addition to instilling feelings of fear and panic, excessive and persistent anxiety also manifests itself through a variety of physiological manifestations such as weariness, headaches, perspiration, and abdominal discomfort. Once an individual has undergone a distressing event, their perception and cognition will inevitably formulate a judgment on the seriousness of the crisis, thereby eliciting a certain level of physiological and psychological reaction.

Anxiety is one such reaction. The greater the perceived stress, the more pronounced the anxiety becomes. If the stress remains unresolved over an extended period, the anxiety may transform into a state of prolonged distress, eventually meeting the criteria for diagnosing anxiety-related symptoms. Numerous studies have demonstrated the intimate correlation between anxiety and the perception of stress, establishing that both acute and chronic exposure to stress can contribute to the development of anxiety disorders (Toda & Nakanishi-Toda, 2011).

Cognitive reappraisal, a strategy of regulating emotions (Wolgast et al., 2011), is a profound concept that entails an individual's deliberate intention to selectively interpret the meaning of an event. By directly targeting appraisals and altering the subjective evaluation of a situation that elicits emotions, cognitive reappraisal holds immense value. Its utility lies in its ability to assist individuals in recognizing when their thoughts have taken a negative turn and enabling them to effectively downregulate negative emotions, transforming them into more positive ones (Cutuli, 2014). Numerous studies have demonstrated the positive outcomes associated with cognitive reappraisal, including reduced depression, fewer negative effects, and heightened life satisfaction (Gruber et al., 2014; Kivity & Huppert, 2016). Moreover, when comparing healthy controls to individuals with clinical levels of anxiety and/or depression, it has been observed that the former employ cognitive reappraisal significantly more frequently. Therefore, cognitive reappraisal emerges as a protective factor against psychopathology.

According to the appraisal theories of emotion, it is not the event itself but rather an individual's subjective appraisal of the event that leads to a specific emotional reaction (Dryman & Heimberg, 2018). Interestingly, a previous study has established a correlation between the initial negative cognition and beliefs formed by individuals after experiencing trauma and subsequent depression, anxiety, and post-traumatic stress disorder (PTSD). Consequently, the ability to modify appraisals

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in emotional situations plays a pivotal role in various psychological interventions, such as cognitive and cognitive-behavioral therapy (CBT).

By learning to change their cognitive processes when confronted with stressful life events, individuals can naturally alter their subsequent emotional experiences. Cognitive reappraisal proves immensely beneficial in enabling individuals to view stress as a positive challenge rather than a negative threat, thereby empowering them to better manage stress. Researchers have consistently found that the consistent use of cognitive reappraisal is associated with increased positive affect, decreased negative affect, and enhanced interpersonal functioning (Haga et al., 2009). Conversely, individuals exhibiting symptoms of anxiety tend to employ cognitive reappraisal less frequently and less effectively (Riepenhausen et al., 2022). In contrast, maladaptive emotion appraisal skills hinder the recovery from negative moods triggered by stressful events. Collectively, these studies provide evidence that cognitive reappraisal acts as a protective buffer against negative outcomes, particularly anxiety symptoms. By offering an effective means to down-regulate negative emotions, cognitive reappraisal emerges as a crucial protective factor.

Building upon the aforementioned concerns, we posit that there exists a positive association between type D personality and perceived stress. However, our hypothesis suggests that cognitive reappraisal can moderate this association. This model serves to deepen our understanding of the risk factors associated with mental stress symptoms while simultaneously guiding the development of prevention and intervention plans tailored to high-risk populations. Our ultimate aim is to examine the relationship between personality type D and mental stress mediated by cognitive appraisal.

Materials and Methods

The study that is currently being conducted is a study that utilizes structural equation modeling. This particular study involved a group of university students who were recruited from the Islamic Azad University's Bandar Abbas Branch. It is important to note that participation in this research study was completely voluntary, meaning that the students were not required to take part if they did not wish to do so. In order to ensure that the statistical power of the study was sufficient, the sample size was determined to be 300 students, which was determined through a power analysis.

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Measures

Type D Personality Scale: The determination of the presence of type D personality was carried out by utilizing the Persian version of the 14-item type D scale, also known as DS-14, which was developed and validated by (Denollet, 2005). The DS-14 scale comprises two distinct subscales, namely negative affectivity and social inhibition, each consisting of seven items. It is worth mentioning that the DS-14 has demonstrated strong reliability, with both subscales exhibiting internal consistency. The assessment of negative affectivity and social inhibition is conducted on a 5-point Likert scale, ranging from 0 (false) to 4 (true). In order to classify individuals as having a type D personality, a cutoff score of ≥10 must be attained on both subscales. Conversely, individuals with scores below 10 on both dimensions are considered non-type D. Moreover, those who obtain a score of 10 or higher in only one dimension are classified as having an intermediate type. It is important to note that, for the purpose of this study, the focus was solely on type D personality scores. The Persian version of the DS-14 has been found to possess good internal consistency, with Cronbach's alpha coefficients of 0.86 for negative affectivity and 0.84 for social inhibition, as reported by (Bakhshayesh & Dehghani, 2013).

Cognitive Reappraisal Scale: Cognitive reappraisal, a concept that refers to the process of reframing one's thoughts and emotions in order to regulate and manage them, was assessed in this study using the Emotion Regulation Questionnaire (ERQ) (Gross & John, 2003). The ERQ, a widely used self-report measurement scale, consists of 10 items that assess two subscales: cognitive reappraisal and expression inhibition. The cognitive reappraisal subscale, which focuses specifically on the use of cognitive strategies to regulate emotions, was the only subscale utilized in this particular study. This subscale includes six items that provide insight into individuals' ability to employ cognitive reappraisal techniques. The sample items provided to participants included statements such as "When I want to feel happier, I think about something different" and "I control my feelings about things by changing the way I think about them". Participants were asked to rate their agreement with each statement using a 7-point Likert scale, ranging from "strongly disagree" to "strongly agree". The scores for all six items were then summed, with higher total scores indicating a greater frequency of cognitive reappraisal strategy implementation. It is worth noting that the ERQ has demonstrated strong psychometric properties, including high test-reliability and

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internal consistency, as reported in previous research (Gross & John, 2003). Additionally, the Cronbach's alpha values, a measure of internal consistency, obtained for the Persian version of the ERQ were found to be acceptable (Sadatrasol & Alizadehfard, 2021). In the present study Cronbach's alpha of this scale was calculated as 0.82.

Mental Stress Scale: The Perceived Stress Scale (PSS) (Cohen et al., 1983) has been utilized as a valuable tool for assessing and evaluating the subjective pressure that individuals experience within the previous month. This scale is available in various versions, namely PSS-14, PSS-10, and PSS-4, all of which serve the purpose of measuring perceived stress levels. For the purpose of this study, the Persian version of PSS-14 (CPSS-14) was specifically chosen as the assessment tool. The CPSS-14 comprises a total of fourteen items, seven of which are focused on describing negative emotions and the remaining seven on expressing positive feelings. In order to gauge the intensity of these emotions, a 5-point Likert scale is implemented, whereby a score of 1 represents "never" and a score of 5 stands for "always". The sum of the scores obtained from each of the fourteen items is then calculated to determine the total score. It is important to note that a higher total score indicates that the individual has perceived a greater amount of stress within the past month. Furthermore, the CPSS-14 has demonstrated its reliability and consistency through high internal consistency and test-reliability (She et al., 2021). Additionally, in the present study the internal consistency of the scale was assessed, resulting in a Cronbach's alpha coefficient of 0.81

Ethical Considerations: All participants were provided with informed consent, wherein they were provided with a comprehensive explanation regarding the purpose of the study, their entitlements, and the confidential nature of their responses.

Data Analysis: The collected data underwent analysis through a range of statistical techniques, encompassing correlation analyses aimed at investigating the associations between type D personality, mental stress and cognitive reappraisal. Additionally, mediation analyses were conducted, utilizing established mediation models, to evaluate the potential mediating role of cognitive reappraisal in the relationship between type D personality and mental stress in AMOS-23.

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Results

Table (1) presents the Descriptive Statistics, Mean, Standard Deviation, and Normality Assessment of the Type D personality and its components, cognitive reappraisal and mental stress.

Table 1. Descriptive Statistics and Normality Assessment of Research Variables

Variable	Skewness	Kurtosis	Mean	SD
NA	-0.91	1.02	17.25	2.11
SI	0.84	1.52	14.42	2.51
Type D	0.91	1.012	31.67	3.65
Cognitive reappraisal	0.82	1.11	23.47	3.21
Mental stress	-0.93	1.52	45.84	4.33

According to the data presented in Table (1), it is apparent that the mean score for Type D is 31.67, cognitive reappraisal is 23.47, and mental stress is 45.84. Furthermore, taking into consideration that the skewness and kurtosis values of the data lie within the interval of -2 to +2, it can be inferred that the data demonstrate a normal distribution at a significance level of 0.05. Table (2) delineates the correlation coefficients matrix among the variables under investigation.

Table 2. Correlation Coefficients Matrix of Research Variables

Variable	1	2	3	4
1. NA	1			
2. SI	0.56**	1		
3. Type D	0.58**	0.62**	1	
4. Cognitive reappraisal	-0.53**	-0.65**	-0.51**	
5. Mental stress	0.66**	0.64**	0.65**	-0.62**

** $p < 0.01$

Table (2) displays the findings of the correlation analysis conducted on the relationship between negative affectivity. social inhibition, Type D, cognitive reappraisal and mental stress. Based on the results obtained, all calculated correlation coefficients are statistically significant ($p < 0.01$). To investigate the model of the relationship between Type D and mental stress mediated by cognitive reappraisal, SEM was employed. The model fit indices can be found in table 3.

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Table 3. Model Fit Indices

Fit indices	Accepted value	Obtained value	Result
IFI	> 0.90	0.91	Suitable
GFI	> 0.90	0.92	Suitable
RMSEA	< 0.08	0.059	Suitable
CFI	> 0.90	0.91	Suitable
NFI	> 0.90	0.90	Suitable

Considering the cumulative model fit indices, the model of the relationship between Type D and mental stress mediated by cognitive reappraisal is confirmed. In table 4 and figure 1, the direct path coefficients of the effects were provided.

Table 4. Direct path coefficients of the effects of academic engagement on rumination and cognitive-behavioral avoidance

Path			Beta	T value	p
Self-efficacy	to	Academic engagement	0.48	2.87	0.001
Resilience	to	Academic engagement	0.41	2.75	0.001
Psychological hardiness	to	Academic engagement	0.39	2.61	0.001
Self-efficacy	to	Psychological hardiness	0.44	2.85	0.001
Resilience	to	Psychological hardiness	0.51	3.12	0.001

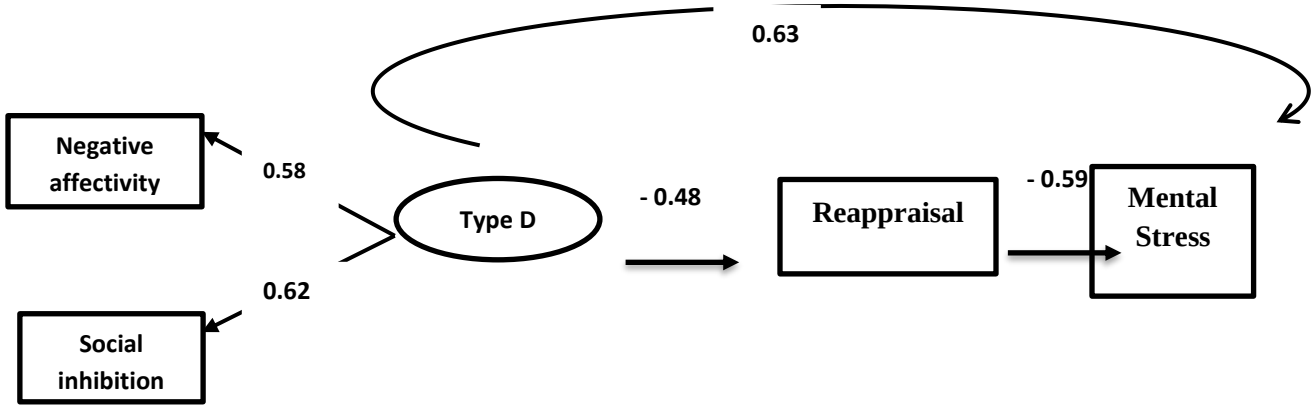


Figure 1. The proposed model

According to the table 4 and figure 1, all path coefficients related to the relationship between Type D, mental stress and cognitive reappraisal are significant ($p < 0.001$). To determine the statistical

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significance of the mediating role of cognitive reappraisal in the relationship between Type D and mental stress, the bootstrap method was used (table 5).

Table 5. Indirect effects

Indirect path			Beta	p
Type D	Cognitive reappraisal	Mental stress	0.28	0.05

According to the obtained results in Table (5), the coefficients related to the indirect effect related to mediating role of cognitive reappraisal in the relationship between Type D and mental stress is significant ($p < 0.05$). Therefore, the research hypothesis regarding the mediating role of cognitive reappraisal is confirmed.

Discussion

The primary objective of the present study was to examine the intricate correlation between personality type D and mental stress, with the mediating role of cognitive appraisal being taken into consideration. The results of the study provided support for the appropriateness of the proposed model, thereby indicating that personality type D exerts a positive and statistically significant influence on mental stress. Furthermore, it was observed that the association between cognitive appraisal and mental stress exhibited a negative and statistically significant pattern, aligning with the anticipated expectations. The findings of this investigation shed light on the notion that a combination of traits linked to personality type D can heighten the individuals' experience of mental stress, while possessing proficient cognitive appraisal skills has the opposite effect by mitigating mental stress levels. Moreover, the analysis conducted on the indirect effect revealed its significance, signifying that cognitive appraisal plays a moderating role in the impact of personality type D on mental stress. Ultimately, the outcomes of this study are in line with previous research studies conducted in the same field, thus establishing consistency (Gaab et al., 2005; Gogheri et al., 2023; Gomes et al., 2013; Polman et al., 2010; Sher, 2005; Whiteman et al., 2019).

The research findings validate and confirm the significant impact and influence of personality type D on mental stress levels. Type D, which is characterized by a combination of negative affectivity

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encompassing traits such as pessimism and social inhibition, as well as exposure to common stressors, has been observably associated with heightened levels of mental stress (Polman et al., 2010). It is noteworthy to mention that individuals possessing traits associated with type D are more susceptible to experiencing increased mental stress, a correlation that aligns with the existing body of literature on this particular personality type and its recognized connection to stress. This study serves to emphasize and underscore the existence of a negative relationship between cognitive appraisal, defined as the process of interpreting and evaluating stressors, and mental stress. The empirical findings of this research illustrate that individuals who possess effective cognitive appraisal skills tend to experience lower levels of mental stress. This finding is in accordance with various psychological theories that propose that the way individuals interpret and perceive stressors significantly influences their overall stress levels (Esler, 2017). Individuals who possess adept cognitive appraisal skills are more likely to accurately assess and effectively manage stressors, thereby leading to a reduction in mental stress levels.

The study highlights the moderating role of cognitive appraisal in the relationship between personality type D and mental stress. The analysis of the indirect effect signifies that cognitive appraisal acts as a moderator, influencing the impact of personality type D on mental stress levels. It implies that effective cognitive appraisal skills can mitigate the influence of personality type D on mental stress, potentially offering a protective mechanism against the detrimental effects of this personality type.

In summary, this research emphasizes the significance of both personality type D and cognitive appraisal in shaping an individual's experience of mental stress. It underscores how the combination of certain personality traits can heighten stress levels, while effective cognitive appraisal can play a crucial role in alleviating mental stress, thereby offering insights into potential interventions to manage and reduce stress levels.

Despite the valuable insights gleaned from this study, it's essential to acknowledge its limitations. Firstly, the research predominantly focused on a specific population or demographic, which might restrict the generalizability of the findings to a broader context. Secondly, the study primarily relied on self-reported measures for personality type D, cognitive appraisal, and mental stress, which might introduce response biases or subjective interpretations. Additionally, while the research established a connection between personality type D, cognitive appraisal, and mental

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stress, it didn't delve into potential confounding variables or alternative factors that might contribute to mental stress. Furthermore, the cross-sectional nature of the study limits the ability to ascertain causality or the temporal sequence of variables. Therefore, future longitudinal or experimental research is warranted to validate the causal relationships and further dissect the nuanced interactions among personality, cognitive appraisal, and mental stress.

This study's findings hold several significant implications for both research and practical applications. Understanding the link between personality type D, cognitive appraisal, and mental stress could pave the way for targeted interventions and therapeutic strategies. Researchers can delve deeper into this relationship, possibly through longitudinal studies or experimental designs, to better grasp the causality and mechanisms at play. Practically, these findings offer promising pathways for mental health interventions. By fostering interventions that focus on bolstering cognitive appraisal skills, individuals can potentially learn effective stress-coping strategies, thereby mitigating the impact of personality traits on mental stress. Developing programs that cultivate adaptive cognitive appraisal skills may hold promise in reducing stress levels and improving mental well-being, especially for individuals at risk of heightened mental stress due to their personality type.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by ethics committee of Razi University. The patients/participants provided their written informed consent to participate in this study.

Author contributions

All authors contributed to the study conception and design, material preparation, data collection and analysis and contributed to the article and approved the submitted version.

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