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Cognitive Failure in Relation to Personality: Analyzing the Moderating Role of Mindfulness

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The objectives of the present study were twofold. The first objective was to examine the correlation between big five personality traits, cognitive failure, and, dispositional mindfulness; and the second objective was to investigate the moderating role of dispositional mindfulness between the association of personality traits and cognitive failure across its three levels of low, average and high. Method: The sample consisted of 453 young adults aged 18-30 years from Himachal Pradesh, India. Cognitive failure questionnaire, Big Five Inventory, and Mindful Attention Awareness Scale were used for measuring variables. Pearson's Product Moment Correlation and Hayes Process Macro- 3.5 were used for data analysis. Results: Personality traits and dispositional mindfulness were significantly related to the cognitive failure. Moderation analysis revealed that dispositional mindfulness has a significant effect on the relationship between personality traits and cognitive failure across its three levels i.e., low, average, and high dispositional mindfulness.

Keywords: Cognitive Failure, Personality, Minfulness

Cognitive failure is a cognitive error happening amid the execution of a task that an individual would normally carry through in day-to-day life (Elfferich et al. 2010). These failures eventuate due to troubles with concentration, memory loss, and abated perception. Such cognition-based slips/errors on simple tasks that one should conventionally be able to execute without mistake have been labeled cognitive failures (Martin, 1983). Cognitive failures or errors cover distractions, blunders, slips of memory, and omissions and are quite prevalent and can have from insignificant to ravaging consequences Cognitive failures have been related to impotence to attend to a task and the downturn of attention (Carriere et al. 2008; Smallwood et al. 2004) to inaccuracies in task performance and personality traits (Kass et al. 2001). Therefore, the second variable of interest is personality traits in this study.

Personality variables have been inculpated in cognitive failures, for instance, boredom proneness in extraversion (Kass et al. 2001) and wobbling emotional patterns in neuroticism makes one prone to cognitive failures (Fabio, 2006). Therefore, the present study examines the association between personality traits and cognitive failure.

Cognitive failures have also been linked with attentiveness. Hence, third variables of interest in this study is mindfulness. Mindfulness is commonly defined as being observant, attentive, perceptive, cognizant and aware of the present and an enhanced attention to and awareness of present reality (Klockner & Hicks, 2015 An overlay between (lack of) mindfulness and cognitive failures has been reported (Klockner & Hicks, 2015). With non-reactivity, non-impulsivity, and nonjudgmentalism as basic features of traits/dispositional mindfulness (Tang et al., 2015), it would be interesting to investigate how it interacts with the big five personality traits and affects cognitive failure.

Anthony et al., (2021) in their research reported that personality traits influence the thoughts, emotions, and motivation of people. The researcher found out in his study that neuroticism, conscientiousness, and extraversion are significantly related to cognitive failure. This research also puts forward protective factors i.e., mindfulness that can mitigate everyday cognitive failures. Higher self-reported measures

of mindfulness have a significant correlation with lower neuroticism and low scores on cognitive failure. Similar findings have been reported in research conducted by Rose et al., (2020). This study suggests that mindfulness acts on neuro-biological networks related to emotion regulation which in turn enhances cognitive control and reduces cognitive failure and neuroticism score. Studies have consistently shown a significant association between personality traits, cognitive failure, and mindfulness (Rojiani et al., 2017; Marchand, 2014; Pace et al., 2013, Dvorakova et al., 2017; Daya and Hearn, 2018). The literature surveyed suggested high levels of mindfulness are related to low cognitive failure (Giluk, 2009; Katz &Toner, 2013; Kozasa et al., 2012).

Objectives:

- To study the correlation between personality traits and cognitive failure.
- To study the correlation between mindfulness and cognitive failure.
- To assess the moderating effect of mindfulness on the association between personality traits and cognitive failure.

Hypotheses:

- There would a significant correlation between personality traits and cognitive failure.
- There would a significant correlation between mindfulness and cognitive failure.
- Mindfulness would have significant moderating effect on the association between personality traits and cognitive failure.

Method

Research Design

A correlation research design was used to study the relationship between personality traits, cognitive failure and mindfulness and to analyze the moderating role of mindfulness on the association between personality and cognitive failure.

Sample

A sample of 453 young adults from Himachal Pradesh, India participated in the study. The sample was in the age range of 18 to 30 years with the mean age being 25. Both male and female participants were included in the study. Those practicing mindfulness were excluded from the sample.

Measures

Big Five Inventory (John, Naumann & Soto, 2008): The Big Five Inventory was designed to examine the most global domains of personality among the adult population, the Big Five trait domains include extraversion, agreeableness, conscientiousness, neuroticism (vs. emotional stability), and openness to experiences. It is an inventory with 44-items. Respondents are required to rate the items on a Likert-V point scale ranging from 1= strongly disagree to 5= strongly agree. Eight of the items of this inventory assessed neuroticism (Cronbach alpha=.81), another Eight items assessed extraversion (Cronbach alpha= .82), 10 items assessed openness to experience (Cronbach alpha=.76), nine of the items assessed agreeableness (Cronbach alpha=.72), nine of the items assessed conscientiousness (Cronbach alpha= .79).

Cognitive Failure Questionnaire (CFQ, Broadbent et al., 1982): The Cognitive Failures Questionnaire (CFQ) is a subjective measure with 25 items The CFQ assesses the frequency of lapses in forgetfulness, distractibility and false triggering however, for the present study composite score will be used. The twenty-five items are to be rated on a Likert-V point scale from 0= Never to 4= Very often. Cronbach alpha for this scale is .76.

Mindful Attention Awareness Scale (MAAS (Brown & Ryan, 2003): The MAAS is a 15-item one-dimensional tool for trait mindfulness assessment. This scale has been reported to have the longest empirical record of being a valid measure for the assessment of trait mindfulness (Sussman et al. 2012). MAAS assesses the frequency of open and receptive attention to and awareness of ongoing events and experiences. The response options range from 1= rarely to 6=

almost always. Item scores were reverse-coded to make higher scores on a scale indicative of a high degree of mindfulness. The Cronbach alpha of this scale is .76.

Statistical Analysis

Pearson's Product Moment Correlation was carried out to see the association between variables under the study. In addition, Hayes Process Macro 3.5 was used for examining the moderating effect of dispositional mindfulness.

Results

Pearson's Product Moment Correlation showed that openness to experience (r = -.412, p<.01), conscientiousness (r = -.459**, p<.01), extraversion (r =-.512**, p <.01), agreeableness (r = -.381, p<.01) had significant negative correlation with cognitive failure whereas neuroticism (r =.574**, p<.01) had significant positive correlation with cognitive failure. Dispositional mindfulness (r = -.583**, p<.01) also had significant negative correlation with cognitive failure.

Table 1. Pearson's Product Moment Correlation between Personality Traits and Cognitive Failure

Variable	Cognitive Failure Questionnaire
Openness to Experience	-.412**
Conscientiousness	-.459**
Extraversion	-.512**
Agreeableness	-.381**
Neuroticism	.574**

Moderation analysis revealed that dispositional mindfulness significantly affects the association between big five personality traits and cognitive failure. The results have been mentioned below under separate heads for each personality trait.

Categorical Dispositional mindfulness moderating association between Openness to Experience and Cognitive Failure

Table 2. Group differences and Moderation of Categorical Dispositional Mindfulness for the association of Openness to Experience and Cognitive Failure

	b	se	t	p
Openness to experience	.2017	.1746	0.0905	.0697
W1	11.0488	3.3932	3.2561	.0012
W2	18.5320	3.4781	5.3281	.0000
Int_1	-.5599	.2738	-2.0453	.0414
Int_2	-.7593	.2287	-3.3196	.0010

Note: W1=Low versus Average Group; W2= Low versus High Group; Int_1: Openness to experience x W1; Int_2 Openness to experience x W2

Overall model was found significant with F (5,447) =215.98, p=.00, R2 = .7073; it explained 71% of the variance. The interaction of categorical mindfulness and openness to experience was also found significant. Int_1 and Int_2 (from Table 2) are dummy coded variables which shows interaction between openness to experience and low versus average dispositional mindfulness group; and interaction between openness to experience and low versus high dispositional mindfulness group respectively. Int_1 b= -.55, t (447) = -2.04, se= .27, p= .04 was significant. Int_2 b=-.75, t (447) =-3.31, se= .22, p=.001 was significant.

Table 3. Association of openness to experience and Cognitive Failure across the level of dispositional Mindfulness

Levels of Mindfulness	Effect	SE	t	p
Low mindfulness	.2017	.1746	.0905	.0697
Moderate mindfulness	-.3583	.1639	-2.1860	.0293
High mindfulness	-.5576	.0650	-8.5757	.0000

From Table 3 it can be seen that for low mindfulness group openness to experience (b = .20, t= .09, se= .17, p= .06) predicts an insignificant increase in cognitive failure by .20 points. For the average mindfulness group openness to experience (b = -.35, t= -2.18, se=

.16, p= .02) predicts a decrease in cognitive failure by .35 points. For the high mindfulness group openness to experience (b = -.55, t= -8.57, se= .06, p= .00) predicts a decrease in cognitive failure by .55 points.

Categorical Dispositional mindfulness moderating association between Conscientiousness and Cognitive Failure

Table 4. Group differences and Moderation of Categorical Dispositional Mindfulness for the association of Conscientiousness and Cognitive Failure

	b	se	t	p
Conscien-tiousness	-.2114	.0986	-1.9995	.0477
W1	7.5488	1.7454	4.3251	.0000
W2	14.9766	1.7317	8.6486	.0000
Int_1	-.1396	.0333	-2.4059	.0050
Int_2	-.8556	.0702	-2.8499	.0046

Note: W1=Low versus Average Group; W2= Low versus High Group; Consciousness x W1; Int_2 Consciousness x W2

Overall model was found to be significant with F (5,447) =276.09, p=.00, R^2 = .7554; it explained 75% of variance. Int_1 (Table 4) show interaction of low versus average mindfulness group by conscientiousness. Int_1 b= -.13, t (447) = 1.99, se= .10, p= .03was significant. Int_2 show interaction of low versus high mindfulness group by conscientiousness. Int_2 b=-.85, t (447) =-2.84, se= .07, p=.00 was also significant.

Table 5. Association of Conscientiousness and Cognitive Failure across the level of dispositional Mindfulness

Levels of Mindfulness	effect	se	t	p
Low mindfulness	-.2114	.0986	-1.9995	.0477
Moderate mindfulness	-.3510	.1856	-1.8911	.0443
High mindfulness	-1.0670	.0798	-13.3647	.0000

Form Table 5 it is evident that the low mindfulness group conscientiousness (b = -.21, t= -1.99, se= .09, p= .04) predicts decrease in cognitive failure by .21. For the average mindfulness group conscientiousness (b = -.35, t= -1.89, se= .04, p= .00) predicts decrease by .35 points in cognitive failure. For the high mindfulness group conscientiousness (b = -.56, t= 10.36 se= .07, p= .00) predicts a decrease in cognitive failure by .56 points.

Categorical Dispositional mindfulness moderating association between Extraversion and Cognitive Failure

Overall model was found significant with F (5,447) =209.70, p=.00, R2 = .7011; it explained 70% of the variance. Int_1 (Table 6) show interaction of low versus average mindfulness group by extraversion. It was seen that Int_1 b= -.43, t (447) = -3.50, se= .17, p= .00, is significant. Int_2 show interaction of low versus high mindfulness group by extraversion. Int_2 b=-.58, t (447) =-2.78, se= .21, p=.001 was also significant.

Table 6. Group differences and Moderation of Categorical Dispositional Mindfulness for the association of Extraversion and Cognitive Failure

	b	se	t	p
Extraver-sion	.0745	.0457	.0143	.5702
W1	9.5122	2.9191	3.2586	.0012
W2	17.0837	3.0002	5.6942	.0000
Int_1	-.4327	.1774	-3.5061	.0005
Int_2	-.5895	.2116	-2.7856	0056

Note: W1 = Low versus Average Group; W2= Low versus High Group; Int_1: Extraversion x W1; Int_2 Extraversion x W2

Table 7. Association of Extraversion and Cognitive Failure across the level of dispositional Mindfulness

Levels of Mindfulness	effect	se	t	p
Low mindful-ness	.0745	.0457	.0143	.5702
Moderate mindfulness	-.3583	.1656	-2.1634	.0310
High mindful-ness	-.5150	.0646	-7.9706	.0000

It can be seen in Table 6 low mindfulness group extraversion (b = .074, t= -5.21, se= .00, p= .00) predicts an insignificant increase in cognitive failure by .07 points. For the average mindfulness group extraversion (b = -.35, t= -2.16, se= .16, p= .03) predicts a decrease in cognitive failure by .35 points. For the high mindfulness group extraversion (b = -.51, t= -7.97, se= .06, p= .00) predicts a decrease in cognitive failure by .51 points.

Categorical Dispositional mindfulness moderating association between Agreeableness and Cognitive Failure

Overall model has been found significant. With F (5,447) =194.58, p=.00, R_2 = .6852; it explained 68% of the variance. Int_1 (Table 8) show interaction of low versus average mindfulness group by agreeableness. Int_1 b= -.33, t (447) = -2.00, se= .17, p= .03, was significant. Int_2 show interaction of low versus high mindfulness group by agreeableness. Int_2 b=-.57, t (447) =-3.36, se= .16, p=.00 was also significant.

Table 8. Group differences and Moderation of Categorical Dispositional Mindfulness for the association of Agreeableness and Cognitive Failure

	b	se	t	p
Agreeable-ness	-.0249	.1393	-.1785	.8584
W1	7.4815	1.9548	3.8271	.0001
W2	16.0700	2.1773	7.3808	.0000
Int_1	-.3334	.1764	-2.0080	.0396
Int_2	-.5712	.1697	-3.3668	.0008

Note: W1=Low versus Average Group; W2= Low versus High Group; Int_1: Agreeableness x W1; Int_2 Agreeableness x W2

Table 9. Association of Agreeableness and Cognitive Failure across the level of dispositional Mindfulness

Levels of Mindfulness	Effect	se	t	p
Low mindfulness	-.0249	.1393	-.1785	.8584
Moderate mindfulness	-.3583	.1700	-2.1080	.0356
High mindfulness	-.5961	.0969	-6.1501	.0000

Table 9 shows that for low mindfulness group agreeableness does not predict cognitive failure (b = .02, t= -.17, se= .13, p= .85). For the average mindfulness group agreeableness (b = -.35, t= -2.10, se= .17, p= .03) predicts a decrease in cognitive failure by .35 points. For the high mindfulness group agreeableness (b = -.59, t= -6.15, se= .09, p= .00) predicts a decrease in cognitive failure by .59 points.

Categorical Dispositional mindfulness moderating association between Neuroticism and Cognitive Failure

Table 10. Group differences and Moderation of Categorical Dispositional Mindfulness for the association of Neuroticism and Cognitive Failure

	B	se	t	p
Neuroticism	.2926	.0757	5.6445	.0000
W1	-6.3877	.9923	-6.4372	.0000
W2	-9.5895	1.0252	-9.3535	.0000
Int_1	-.3010	.1293	-7.3283	.0003
Int_2	-.4269	.2495	-7.2547	.0045

Note: W1=Low versus Average Group; W2= Low versus High Group; Int_1: Neuroticism x W1; Int_2 Neuroticism x W2

Overall model has been found significant with F (5,447) =171.50, p=.00, R2 = .6573; it explained 66% of variance. Int_1 (Table 10) show interaction of low versus average mindfulness group by neuroticism. Int_1 b= -.30, t (447) = -7.32, se= .12, p= .00, the interaction is significant. Int_2 show interaction of low versus high mindfulness group by neuroticism. Int_2 b=-.42, t (447) =-7.45, se= .24, p=.01 is also significant.

Table 11. Association of Neuroticism and Cognitive Failure across the level of dispositional Mindfulness

Levels of Mindfulness	effect	se	t	p
Low mindful-ness	.2926	.0757	5.6445	.0000
Moderate mindfulness	-.5984	.2335	-7.4929	.0030
High mindful-ness	-.7195	.2927	-9.802	.0000

From table 11 it is evident that the low mindfulness group, neuroticism (b = .29, t= 5.64, se= .00, p= .00) predicts an increase in cognitive failure by .29 points. For the average mindfulness group neuroticism (b = -.59, t= -7.49, se= .23, p= .00) predicts a decrease in cognitive failure by .59 points. For the high mindfulness group neuroticism (b = -.71, t= -9.08, se= .29, p= .00) predicts a decrease in cognitive failure by .71 points.

Discussion

The objectives of this study were twofold first to see the association between personality traits and cognitive failure and to see the association between dispositional mindfulness and cognitive failure; the second was to examine how this association between personality traits and cognitive failure gets moderated by dispositional mindfulness across its three categories i.e., low, average and high. Correlation analysis showed a statistically significant association between personality traits and cognitive failure and also between dispositional mindfulness and cognitive failure. A high level of openness to experience, conscientiousness, extraversion, and agreeableness was related to the low experience of cognitive failure. Whereas a high level of neuroticism was related to a greater experience of cognitive failure. These findings are in line with most of the findings. For instance, Sutin et al. (2019) reported in their study that neuroticism was associated with a greater level of cognitive failure whereas conscientiousness agreeableness, and extraversion related negatively to cognitive failure. The rationale for such findings is that people with high neuroticism are overly critical of themselves and also of their cognitive abilities and are preoccupied with their mistakes. Therefore, they make more cognitive errors, and also this makes it difficult to take out their true cognitive failure from their negative reporting biases completely. Extravert people on the other hand have a positive appraisal of themselves and their cognitive abilities in general (Soto, 2015; Colvin, 2018), this may be associated with them scoring low on cognitive failure. But this can also be partially explained due to their attentive behavior which may lower their cognition. Agreeableness is also related significantly and negatively to cognitive failure. It may be due to the tendency of people high on agreeableness to orient toward others and care for significant others and cooperate with them, display of superior cognitive abilities might for them become an intentional, conscious, and resolute endeavor (Fayyaz & Kamal, 2011;). In addition, those that are empathetic, trusting, and straightforward reported less experience of cognitive errors (Kelly & Donaldson, 2016). Openness has been reported to correlate with cognitive ability as it comprises a basic receptivity and responsiveness to intellectual experience (Costa & McCrae 1992; Costa & McCrae 1997). Openness reflects a behavioral tendency by which cognitive engagement is related with a lower risk of dementia and cognitive decline.

Dwelling into the findings generated by moderation analysis, it suggested a significant moderating effect of depositional mindfulness. People high on conscientiousness are generally very responsive, abide by rules and regulations, and are disciplined. Dispositional mindfulness encompasses responding consciously, non-judgmentally and non-impulsively, and non-habitually therefore, their interaction yielding a significant decrease in cognitive failures is obvious. Dispositional mindfulness promotes a higher level of awareness, regulation, and transcendence of self that is referred to as S-ART which is a troupe of capacities that enhances well-being (Menon et al. 2014). A high level of awareness of self-advances regulation of self (S-ART) which in turn promotes transcendence of maladaptive behavioral and cognitive style/ patterns. “Acting with attentiveness, awareness, non-reactivity, and non-judgment, tendencies to regulate behavior and thoughts adaptively. These characteristics seem to be associated concurrently with high intentional, purposeful goal-directed behavior (i.e., conscientiousness).

Interaction of openness to experience and agreeableness with dispositional mindfulness is also significant in predicting cognitive failure. High dispositional mindfulness is characterized by openness to intrinsic and extrinsic experiences and also it is characterized by an empathetic attitude toward others which may reduce one’s cognitive failures (Menon et al. 2014). We can

understand these findings by understanding the definition of mindfulness given by Kabat-Zinn (1994) as paying non-judgmental attention to the present moment. An understanding based on these definitions can be developed i.e., being mindful can assist one in recognition of the mind's habitual patterns which are automatic and not conscious, having the realization of these patterns over time can enable them to respond nobly and flexibly rather than perpetually. Thus, mindfulness encapsulates a feature of consciousness that encompasses purity and evocative experiences and functioning (Brown & Ryan, 2003).

Dispositional mindfulness was found to have a significant effect on the relationship between extraversion and cognitive failure. It was found that as the level of traits mindfulness is increasing i.e., from average to high the association between extraversion and cognitive failure is more and more negative while at a low level it is positive i.e., to say that it may increase cognitive failure.

It can be concluded based on the findings of the present study that with increasing levels of dispositional mindfulness cognitive failure decreases for openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism. Therefore, it makes one more efficient and proficient in their cognitive activities which is critical in young adulthood as this age of development is associated with many challenges.

Dispositional mindfulness also includes decentering which is the capability to get out of the personal frame of reference of momentary experiences and dissociate from thoughts (Fresco et al. 2007). It has also been found to reduce rumination which incorporates negative self-focused thoughts about either past or future (Trapnell & Campbell, 1999). Dispositional mindfulness is also predictive of reducing impulsivity. This is possible through the mechanism of self-regulation, non-reactivity, and being present at the moment that dispositional mindfulness inhibits impulsiveness. Tendencies of impulsiveness are characterized by a lack of self-control, dispositional mindfulness on the other hand increases self-control (Rajesh et al. 2013). Therefore, with increasing levels of mindfulness (i.e., average and high) the direction of association between neuroticism and cognitive failure which was earlier positive is getting reversed altogether, it became negative at average and high levels of mindfulness whereas at low levels of mindfulness it stayed positive and also increasing in strength with increasing mindfulness. Therefore, it shows that dispositional mindfulness has a buffering effect here.

Implications:

The present study has a significant contribution to the literature as it enhances the understanding of the association between personality and cognitive failure and also there are relatively few studies that examine the association between dispositional mindfulness and cognitive failure. There is also a paucity of research evidence investigating the moderating effect of dispositional mindfulness. Use of subjective measures of cognitive failure instead of objective measures in the present study. Literature indicates that sometimes objective measures cannot identify the cognitive decline which can be traced by subjective measures. Therefore, this study provides the basis for reducing cognitive failure by promoting dispositional mindfulness with the help of mindfulness-based intervention.

Suggestions for Future Research:

Demographic variables can be studied either directly or by their inclusion as covariates in the future studies such as gender. Gender as well as age could be used as a potential moderator in future studies for the association of personality traits and cognitive monitoring. Facet level analysis of domain for various measures would be beneficial for deeper insight of the variables under study. The present study recruited sample from Himachal Pradesh, therefore, the future studies can replicate this study on the participants of different states and regions for a comprehensive understanding that would enhance external validity as well as generalization. As presents study employed a sample of young adults only, studies in future can study cognitive monitoring across age and make comparison of cognitive monitoring across age.

Conclusion

The present study aimed to examine the relationship between personality traits and cognitive failure and; dispositional mindfulness and cognitive failure; and assess the moderating effect of dispositional mindfulness on the association of personality traits and cognitive failure across its low, average, and high levels. Based on the findings of the present study it can be concluded that personality traits and dispositional mindfulness significantly correlated with cognitive failure. And dispositional mindfulness significantly moderated the relationship between personality traits and cognitive failure across its three levels.

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