Research letter

Psychology

Investigation of the relationship between university students' attentional impulsivity levels and psychological and physiological stress responses

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Abstract

Introduction: The purpose of this study is to investigate the relationship between attentional impulsivity levels and physiological and psychological stress responses of university students.
Methods: 300 university students participated in the study. Four different data collection tools were used in the study: a personal information form, the Physiological Stress Response Inventory, and the Attentional Impulsivity Part of Barratt Impulsiveness Scale.
Results: We showed that attentional impulsivity of the participants is significantly related to both physiological stress responses (R^2 = 0.04, F[1;267] = 11.45, p < 0.05) and psychological stress responses (R^2 = 0.04, F[1;270] = 10.40, p < 0.05). At the same time, there is a significant negative association between physiological stress responses and psychological stress responses (r = –0.68).
Conclusions: The attentional impulsivity is an important variable for explaining changes in both physiological and psychological stress responses. Physiological and psychological stress responses should be considered as separate kinds of stress responses in stress response measurements.

Key words: stress responses, attentional impulsivity, university students, physiological and psychological states.

Attentional impulsivity is an important factor associated with different social and mental problems [1–3]. Attentional impulsiveness is a kind of problem leading to "an inability to focus attention or concentrate" [4]. Peluso *et al.* and Swann *et al.* reported that attentional impulsivity is positively associated with depression, hopelessness, and suicidality [5, 6]. Moreover, attentional impulsivity has also been shown to be associated with the stress level of individuals; higher attentional impulsivity leads to higher level stress [7]. But these findings are limited in terms of their attention to one kind of stress and their controversial findings on the association between attentional impulsivity and stress. In particular, the impact of attentional impulsivity on the stress levels of individuals and the mechanism of the association between stress and attentional impulsivity is not clear in the literature. Previous studies are limited in terms of both seeing stress responses as outcomes of one kind of stress and focusing only on a limited number of variables such as depression, hopelessness, and suicidality. This unclear picture becomes more obscure

when the stress situation is not seen as one kind of situation. In the literature, 2 different kinds of stress have been explained by different researchers [8, 9]. Explaining the impact of the attentional impulsivity on stress levels of individuals and the mechanism of the association between stress and attentional impulsivity requires considering these 2 kinds of stress responses to draw a clearer picture about the problem.

In the literature, a limited number of studies, indirectly, investigated the relationship between impulsivity and stress. Mwendwa-Karinge *et al.* studied the relationship by focusing on the suicidality of undergraduate students, and they found that the stress factor underlying suicidality is indirectly associated with trait impulsivity [10]. In another study focusing directly attentional impulsivity, Cavaliere reported that attentional impulsivity is negatively associated with stress-related eating behaviour [11]. Moreover, another researcher revealed that attentional impulsivity is not significantly associated with the perceived stress of individuals [12]. Phillipou *et al.* examined the association between the attentional impulsivity and stress of participants with anorexia nervosa; their findings showed a significant positive correlation between attentional impulsivity and stress [11]. Meule *et al*. investigated the association between stress-dependent eating behaviour and attentional impulsivity, the results revealed a significant positive relationship between the variables [13]. They reported that stress-dependent eating is specifically related to higher attentional impulsivity. When the literature about the associations between attentional impulsivity and stress is examined, it can be seen that conflicting results are reported, some of them reported significant association while the others reported no significant association. This difference might be related to the kind of stress they considered.

In this study, the model of impulsivity according to Mobbs *et al.* was considered due to the fact this model is based on both physiological and psychological aspects of impulsivity and stress-related behaviour such as stress-dependent eating [14]. According to the model, impulsivity has 4 dimensions involving urgency, lack of perseverance, lack of premeditation, and sensation seeking. All these factors were found to be associated with self-control abilities and certain neurological networks. The urgency involves an inability to suppress dominant and automatic responses when intense emotions occur. The lack of perseverance aspect involves difficulty in resisting interrupting thoughts and images. The lack of premeditation corresponds to the inability to consider the positive or negative consequences of a decision. The sensation seeking involves a disposition to exaggerate the impact of rewards and punishments. Stress conditions in this model might be associated with difficulty in refraining physiological and psychological emotional responses, occupation with negative thoughts related to stressors (lack of perseverance), and high sensitivity to reward and punishment coming from the environment. Based on the model, it can be hypothesised that attentional impulsivity of individuals is positively associated with physiological and psychological stress responses.

When the literature and current findings on the relationship between attentional impulsivity levels and physiological and psychological stress responses of university students were examined, it was seen that there is a gap in understanding the nature of the relationship due to accepting stress response as a single type of response and contradictory findings on the relationship. Neither contradictory findings nor acceptance of stress response as a single type of response helped to understand the relationship well. In this study, stress responses are classified as physiological and psychological stress responses, and the purpose of the study is to examine the relationship between attentional impulsivity levels and these stress responses.

Methods. In this study, correlational research methodology was used to examine the relationship between attentional impulsivity and psychological and physiological stress levels.

Research Group. A total of 300 university students in their first, second, third, and fourth years participated in the study. The sample size for 95% confidence interval and 5% margin of error was found as 278. Hence, the sample size was deemed appropriate for this study. In the study group, 196 of the participants were female while 104 of them were male. The participants were students in the faculty of education. The ages of the participants ranged from 19 to 34 years, and their weights varied between 43 and 115 kg. Their heights were between 152 and 196 cm. 270 of them did not have a chronic health problem while 84 of them did not regularly play any sports, 166 of them practised sports sometimes, and 50 of them played sports regularly. Again, in terms of regular feeding, 67 of the participants stated that they did not eat regularly at all, 172 of them stated that they sometimes ate regularly, and 61 of them stated that they ate regularly. In the study, all the participants were informed about voluntary participation and anonymity, and then gave their informed consent. Table I represents the descriptive values of the dependent variables of the study.

Data collection instruments. For the collection of data, 4 different tools were applied. The first tool,

a personal informal form, was used to collect data about the participants' age, gender, grade levels, health problems, regular nutrition status, and regular exercise status. The second tool, the Physiological Stress Response Inventory, is a one-dimensional instrument with 12 items asking about the frequency of physiological stress responses under different stress conditions. In the inventory, Likert scaling was used, and the responses were categorised under 4 categories as follows: 1 for never, 2 for sometimes, 3 for often, and 4 for always. An example item for the inventory was "I feel my heart throb when I am exposed to stress". The third tool, the Psychological Stress Response Inventory, is a one-dimensional instrument with 17 items asking about frequency of psychological stress responses under different stress conditions. In the inventory, Likert scaling was used, and the responses were categorised under the following 4 categories: 1 for never, 2 for sometimes, 3 for often, and 4 for always. An example item for the inventory was "My self-confidence decreases when I am exposed to stress". The fourth measurement tool, the Attentional Impulsivity part of the Barratt Impulsivity Scale [15], is a 4-item scale asking about the frequency of representing the situation in the items of the scale. The questionnaire was answered on a 4-point scale (rarely, occasionally, often, always). One example of the items in the scale is "I say things without thinking".

In this study, explanatory factor analysis (principal axis factoring with varimax rotation) and Cronbach's α reliability analysis were performed for all measurement tools because the tools were applied on a new group for a different purpose. Table II presents the results of the validity and reliability studies of the scores regarding attentional impulsivity, physiological stress response, and psychological stress response, and the results revealed that both reliability and validity evidence supported the usability of the tools for the participants of the study.

As seen in Table II, the Cronbach α value for the Attentional Impulsivity Scale is acceptable, but it is not as high as expected. However, it is similar to the values reported in previous studies on Korean, Italian, and Japanese versions; hence, it is used for further analysis in this research.

Data analysis. In data analysis, SPSS 26 program package was used, and descriptive values (standard deviation and minimum-maximum values, see Table I) regarding the scores gained from the measurement tools were calculated. For analysis of the association between the variables of the study, the linear regression analysis with the enter method was applied after the assumptions of the analysis were provided. Preliminary analysis showed that the scores were normally distributed, the variances of them were homogeneous, and the measurements were independent. The type I error rate was set as 0.05 for all analyses. The regression formulas for regression analysis with the random effect model are as follows. Psychological Stress Response = B0 + B1 (attentional impulsivity). Physiological Stress Response = B0 + B1 (attentional impulsivity).

Results. The descriptive findings shown in Table I reveal that the "sometimes" and "occasionally" categories were chosen by the participants for physiological stress and psychological stress responses, and attentional impulsivity, respectively. Correlational analysis showed that there were significant negative and positive relationships between the variables. Table III presents the correlation analysis results.

Table I. Descriptive values regarding attentional impulsivity, physiological stress response level, and psychological stress response level

Variables	*N*	Min.	Max.	Mean	SD
Attentional impulsivity level	300	1	4	2.16	0.67
Physiological stress response level	300	1	4	2.36	0.72
Psychological stress response level	300	1	4	2.38	1.27

Min. – minimum, Max. – maximum, N – number of participants, SD – standard deviation.

Table II. Results of the validity and reliability studies of the attentional impulsivity scale, physiological stress response inventory and the psychological stress response inventory

Measurement tools	KMO	Bartlett's test	Range of communalities	Total variance explained	Range of factor loadings	Cronbach α
Attentional Impulsivity Scale	0.71	148.022 ($df = 6$, $p < 0.05$)	0.200–0.480	0.33	0.446–0.694	0.65
Physiological Stress Response Inventory	0.91	1203.89 ($df = 66$, $p < 0.05$)	0.281–0.577	0.39	0.530–0.760	0.89
Psychological Stress Response Inventory	0.95	3276.72 ($df = 136$, $p < 0.05$)	0.406–0.681	0.54	0.637–0.825	0.95

KMO – Kaiser-Mayer-Olkin test, Results of Exploratory Factor Analysis, and Cronbach α Analysis are represented in this table.

Table III. The results regarding the relationship between physiological and psychological stress response, and attentional impulsivity (N = 300)

Variables	Values	Variables		
		Physiological stress response	Psychological stress response	Attentional impulsivity
Physiological stress response	*r*		–0.68	0.19
	P-value	–	0.00*	0.00*
Psychological stress response	*r*	–0.68	1.00	–0.19
	P-value	0.00*	–	0.00*
Attentional impulsivity	*r*	0.19	–0.19	1.00
	P-value	0.00*	0.00	–

r – Pearson correlation, p – significance level. The results of Pearson correlation analysis are represented in this table.

As seen in Table III, there is a statistically significant negative correlation between physiological and psychological stress responses. At the same time, there is a statistically significant positive correlation between physiological stress response and attentional impulsivity, while there is a statistically significant negative correlation between psychological stress response and attentional impulsivity. The regression equations regarding the criterion variables (physiological stress responses and psychological stress responses) and predictor variable (attentional impulsivity) are written as separate equations. Regression analysis results show that the attentional impulsivity levels of the participants are significantly associated with the psychological stress responses (R^2 = 0.04, F[1;267] = 11.45, p < 0.05) while there is also a significant relationship between attentional impulsivity levels of the participants and physiological stress responses (R^2 = 0.04, F[1;270] = 10.40, p > 0.05). (Psychological stress responses) = 2.6 – 0.12 (attentional impulsivity). (Physiological stress responses) = 1.9 + 0.10 (attentional impulsivity).

Correlation coefficient (R = 0.20) revealed that 4% of the variation in psychological stress responses could be calculated by the attentional impulsivity levels of the participants. As the attentional impulsivity level increases, the amount of psychological stress response decreases. At the same time, the correlation coefficient (R = 0.19) revealed that 4% of the variation in physiological stress responses could be calculated by attentional impulsivity levels of the participants. As the attentional impulsivity level increases, the amount of physiological stress response also increases.

Discussion. In this study, 2 important findings were reported. In the first finding, it was seen that there was a significant negative relationship between physiological and psychological stress responses. In the second finding, it was seen that there was a negative regression coefficient between attentional impulsivity and psychological stress response, while there was a positive regression coefficient between attentional impulsivity and physiological stress response. The negative relationship between physiological and psychological stress responses was an expected result. Since Köksal [8] also reported that there was a significant negative correlation between physiological and psychological stress responses of university students. This finding refers to the gap between biochemical and physiological mechanisms concerning physiological and psychological stress responses, and to different factors mediating this relationship. In fact, the biological mechanism of stress responses is explained well by previous studies [16–18]. However, these studies considered physiological and psychological stress responses as one type of response, i.e. physiological stress response rather than 2 different but associated stress responses. The biological and psychological roots of stress responses might be associated with different factors; for example, health problems directly associated with biological stress response or stimuli leading to psychological stress response might play mediator roles for the association between these 2 kinds of stress responses. Moreover, one kind of stress response might suppress the emergence of other kind of stress response due to focusing on one component of stressors. Here, it is claimed that physiological and psychological stress responses differ in terms of timing of response, effective moderators in emergence of the response, threshold levels for stimulation, biochemical path variations, and networks with other stimuli, and hence they do not emerge at the same time and in the same direction. Therefore, there is a need to make a distinction between physiological and psychological stress reactions when we examine stress responses of the individuals in certain stress conditions. Also, based on this research, it can be said that the nature of the relationship between physiological and psychological stress responses is very complicated, and new approaches to investigate it are needed.

Another finding of this study is a significant negative association between attentional impulsivity and psychological stress response. Even if it is not directly related to the variables of this study, Cavaliere reported that attentional impulsivity is negatively associated with stress-related eating behaviour [19]. This result is consistent with the result of the current study. The reason for this negative relationship might be related to high sensitivity to reward; because high psychological stress might be related to an urgent search for reward, when it is not provided (consequences) low attentional impulsivity might lead to lower level of reactions [14]. Moreover, high psychological stress response might be associated with an inability to consider the consequences of a decision, and after experiencing the consequence it might lead to low attentional impulsivity [14]. For the positive association between attentional impulsivity and physiological stress response, it can be said that 2 important studies support this finding. Phillipou *et al.* investigated the association between attentional impulsivity and stress of participants with anorexia nervosa, and their findings showed a significant positive correlation between attentional impulsivity and stress [11]. Meule *et al.* examined the association between stress-dependent eating behaviour and attentional impulsivity; the results revealed a significant positive relationship between the variables [13]. However, the findings of these studies are not directly related to the variables of this study because they do not see stress response as 2 different types of stress responses, and they measured different kinds of stress. Therefore, when discussing the findings regarding the association between attentional impulsivity and physiological stress response, the Mobbs *et al.* model will be helpful [14]. The positive relationship might be associated with an inability to suppress dominant and automatic responses due to the early effects of physiological responses. In other words, physiological stress responses might lead to a block in the suppression of dominant and automatic responses and increase attentional impulsivity. When viewed in the aspect of attentional impulsivity, it can be seen that lack of perseverance might be stimulated by high physiological stress, leading to a high level of attentional impulsivity. In some studies, it is also reported that important health problems leading physiological stress, e.g. constipation, might also be associated with high-level attention problems [20]. It can be stated that the association between attention impulsivity and physiological stress might be moderated by other factors such as constipation. In general, it can be seen that when the physiological stress response increases, the attentional impulsivity level also increases.

In conclusion, the results of this study showed that physiological and psychological stress responses should be considered as separate kinds of stress response in stress response measurements, and they are negatively associated with each other. Moreover, there are significant relationships between physiological and psychological stress responses and attentional impulsivity. Although there are meaningful findings in the study, it should be noted that this study is limited in terms of sample size and data analysis. The number of the participants in this study was 300, and the participants were determined by convenient sampling. Subsequent studies should increase the sample size by adding different groups of students such as students with disabilities, and they should also apply a random sampling process. There is also an acceptable but low reliability value for Attentional Impulsivity Scale, and this is a limitation of the study. Further studies might use different instruments with higher reliability values for impulsivity. Students in different departments involving psychology and medicine should be added to the study to increase the diversity in the research sample. Subesquent studies should also use more sophisticated techniques involving path analysis to examine causal relationships in more detail in future.

Conflict of interest

The author declares no conflict of interest.

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