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What are the roles of emotional regulation and psychological rigidity in relationship between stress and pathological internet usage?

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Stres ve patolojik internet kullanımı arasındaki ilişkide duygu düzenlemenin ve psikolojik esnekliğin rolü nedir?

Özet

Amaç: Bu araştırma, duygu düzenleme zorluklarının ve psikolojik esnekliğin stres ve patolojik Internet kullanımı arasındaki ilişkide düzenleyici ya da aracı rollerinin olup olmadığını belirlemek için çeşitli modelleri test etmeyi amaçlamaktadır.

Yöntem: Çalışmada, belirlenen ölçekleri tamamlayan 400 lisans öğrencisi yer almıştır ve ardından oluşturulan modelleri test etmek için Pearson'un korelasyon analizleri ile düzenleyici ve aracı analizler yapılmıştır.

Bulgular: Sonuçlar, stres ve patolojik Internet kullanımı arasındaki ilişkide duygu düzenleme güçlüğünün aracı rolünü ve duygu düzenleme güçlüğü ve patolojik Internet kullanımı arasındaki ilişkide psikolojik esnekliğin düzenleyici rolünü desteklemektedir.

Tartışma: Stresli yaşam olayları duygu düzenlemede zorluklara yol açabilir; bu durumda, kişi psikolojik olarak ne kadar esnek olursa, patolojik Internet kullanımı olasılığının o kadar azalabileceği söylenebilmektedir. Kısacası, bu çalışma, hem stres ile patolojik Internet kullanımı arasındaki ilişkide duygu düzenleme güçlüklerinin ve psikolojik esnekliğin rollerini vurgulamaktadır, hem de çalışmanın bulguları bu problemli durumun kavramsallaştırılması için yeni bakış açıları sunabilmektedir.

Anahtar kelimeler: Patolojik internet kullanımı, stres, duygu düzenleme güçlükleri, psikolojik esneklik

What are the roles of emotional regulation and psychological rigidity in relationship between stress and pathological internet usage?

Abstract

Objective: This research aims to test various models to identify whether the moderation or mediation roles when faced with emotion regulation difficulties and psychological flexibility are influential on the relationship between stress and pathological Internet use (PIU).

Method: The study involved 400 undergraduate students, who completed several self-report instruments related to these concepts, and then, Pearson's correlation, mediation, and moderated-mediation analyses were carried out to test the models.

Results: The results supported the mediating role of difficulties in emotion regulation between stress and PIU and the moderating role of psychological flexibility between difficulties in emotion regulation and PIU.

Conclusion: Stressful life events may lead to difficulties in emotion regulation, in which case, the less a person is flexible psychologically, the more likely he or she is to engage in PIU. In short, this study highlights the roles of both emotion regulation problems and flexibility in the association of stress with PIU, and its findings may present new perspectives for the conceptualization of this problematic condition.

Keywords: Pathological Internet use, stress, emotion regulation difficulties, psychological flexibility

INTRODUCTION

It was in the 1960s that the Internet first emerged in the United States, and it has since become an indispensable part of our lives, allowing us to reach information easily and carry out many activities. Its growth in popularity has been astonishing; between 2000 and 2018, the number of Internet users is around 4.021 billion, this ratio corresponds to 53% of the world population (1). This prevalence of Internet usage is not limited to West as Turkey has recorded similar increases. For example, an April 2017 study conducted in Turkey identified an Internet usage rate of 66.8 percent among people aged 16–74 compared to 61.2 percent for the entire population in 2016 (2).

The Internet has many useful applications, including shopping; social media; sending messages; reading online news, newspapers, or magazines; searching for health-related information; and looking for information about goods and services (3). However, on the downside, Internet usage has also been associated with psychological problems, including addiction. To date, a number of preliminary criteria for describing this problem have been identified for research and administrative purposes: difficulties in controlling one's use of the Internet, lying about usage, use of the Internet for increasing amounts of time and for longer than planned, deterioration in functionality, preoccupation with the Internet, withdrawal when not using the Internet, and use of the Internet to escape problems and negative emotions (4). While Internet addiction is defined in this way, there are different explanations for the definition of PIU handled in current study. In their study, Morahan-Martin and Schumacher mentioned that there is no specific criteria for PIU, and described PIU as "disturbed patterns of Internet use" (5). In addition, PIU is defined as the use of Internet that causes many symptoms, including using Internet for changing mood, failure to fulfill basic life obligations, guilt and craving (5). In one of the studies related to PIU, it was stated that the symptoms of PIU were similar to Internet addiction (6).

The characteristics of Internet usage are similar in many cultures. For example, Internet usage is widespread among university students (7), who, given their easy online access, are strong candidates for PIU (5, 8). It was stated that stress may be one of the reasons why Internet addiction is widespread among university students. Being a student is challenging and it is time for the individual to create sense of identity and this leads to stress (9). Students may either cope with stress themselves or turn to maladaptive behaviors such as PIU because of the stress relief purposes of Internet (10). Given the emotional nature of stress, coping with this emotion may be important for the development of PIU (11). In other words, Internet might be considered as unhealthy emotion regulation for stressful events. Studies also showed that addiction might be related to inability in emotion regulation (12). Emotion regulation is described as

dynamic and complex processes involving the alteration of emotional reactions to meet the needs of the environment (13), has been shown to be influential in several psychological problems (14, 15) including Internet addiction (16, 17). There have been no studies to date in relevant literature examining specifically the relationships among difficulties in emotion regulation, PIU, and stress together.

It is thought that psychological flexibility may be a variable that may be protective for PIU in individuals with stress and difficulty in emotion regulation. Psychological flexibility refers to the ability to interact fully with one's present thoughts and emotions without the need for unnecessary defense and the ability to maintain goals and value-oriented behaviors. This construct would appear to be closely related to psychological well being (18); whereas at the opposite end of this continuum can be found psychological rigidity, which has been shown to play a role in the etiology and maintenance of psychopathology (19) including Internet addiction (20). However, no study has examined the relationship between psychological flexibility and PIU. Accordingly, this study takes another novel approach of testing the role of psychological flexibility in the relationship between stress and PIU.

In summary, both psychological flexibility and difficulties in emotion regulation have been identified in several psychological problems, but, to date, the role of these two variables in PIU has yet to be analyzed. Some authors touched upon the similarities and differences between psychological flexibility and difficulties in emotion regulation, emphasizing that difficulty in emotion regulation is a form of cognition while psychological flexibility is considered to be a willingness and effort towards such a regulation trend (21). This raises the question of how difficulties in emotion regulation and psychological flexibility interact in the relationship between stress and PIU. In light of the findings of the literature, the present study aims to investigate two models. The first model hypothesizes that experiences of stress lead to difficulties in emotion regulation, which, in turn, results in PIU; in other words, we tested the mediating role of difficulties in emotion regulation between stress and PIU (Figure 1). The second model focuses primarily on the mediating role of difficulties in emotion regulation between stress and PIU but also examines the moderating role of psychological flexibility between the difficulties in emotion regulation and PIU (Figure 2). In other words, we hypothesize that stress leads to problems in emotion regulation and that, depending on the level of psychological flexibility, people may experience PIU (i.e., moderated mediation).

METHOD

Participants

Following announcements, the study sample comprised 400 undergraduate students via method of convenience sampling (218 female, 182 male). Participants were enrolling in various departments (i.e.,

26.3% from Psychology, 20.2% from Electrical and Electronic Engineering, 12.9% from Business Administradition, 10.1% from Sociology, 9.3% from Linguistics, 7.6% from Textile Engineering, 5.6% from Faculty of Law, 3.5% from Statistics, and 4.5% from other departments) of two universities (Dokuz Eylül University and Gediz University) located in Izmir/Turkey with a mean age of 21.24 (*SD* = 1.73, ranging from 18 to 25). Most of the respondents said that they lived with their family or with a roommate (i.e., 45.3% & 25.3%).

Measures

Students-Life Stress Inventory (SSI). The original version of this inventory was developed by Gadzella. To evaluate level of life stress among students, 53 items with a 7-point response option are included in the SSI, in which the higher the score is, the higher the indicated level of stress is (22). While it is still possible to use the total score, it was originally made up of two subscales; the causes of stress subscale included items related to disappointment, conflicts, force, changes, and self-imposition, and the subscale of responses to stress comprised items related to physiological, emotional, behavioral, and estimator reactions. The original reliability scores were 0.52 and 0.81 in the respective subscales (22). The findings show that SSI has sufficient psychometric properties. Later, Baloğlu and Bardakçı examined the Turkish version of this inventory. It was found to have satisfactory internal consistency (total reliability coefficient = 0.88), and the findings of the inventory were associated with original subscales such as disappointment; conflicts; force; changes and self-imposition; and physiological, emotional, behavioral, and estimator reactions (23). As no specific hypothesis is put forward in this study related to subscales of the SSI, the total score of the SSI was only preferred, and the internal consistency was found to be 0.92.

Difficulties in Emotion Regulation Scale (DERS). The DERS was designed to evaluate difficulties in the emotion regulation by Gratz and Roemer, process and comprises 31 items with 5-point ratings on the five subscales of awareness, openness, acceptance, impulse, aims, and strategies (24). The higher the score within the total and subscale scores is, the greater the problems related to emotion regulation are. Depending on the aim of the research, either the total or subscale scores can be used (25, 26), although it was the total score that was used in the current study as the aim was to understand the total score mediating effect. The Cronbach's alpha score was 0.93 in the original study of this scale with satisfactory results on its validity. The DERS was adapted into Turkish by Rugancı and Gençöz (27). In addition to that Cronbach's alpha reliability of the Turkish version was 0.94, and the test–retest consistency reliability was 0.78, these authors revealed that it also examines problems in emotion regulation in this culture. For the current study, the Cronbach's alpha reliability was found to be 0.92.

Acceptance and Action Questionnaire—II (AAQ-II). The questionnaire developed by Bond and colleagues contains seven items with 7-point ratings, its aim was to evaluate psychological flexibility (28). The scale has no subscale and reflects a single factor of psychological rigidity which is other end of psychological flexibility at continuum, and the higher the score is, the greater the level of psychological rigidity is. Therefore, in the result section the term psychological rigidity was preferred, instead of psychological flexibility. The mean Cronbach's alpha score was 0.84 from six samples in the original study using this questionnaire (ranging between 0.78 and 0.88), while the test–retest consistency reliability was 0.78 (28). The AAQ-II was adapted into Turkish by Meunier and colleagues (29), and they found satisfsctory reliability and validity information. For the present sample, the internal consistency reliability coefficients were found to be 0.92.

Internet Addiction Test (IAT). The IAT designed by Young comprises 20 items with five Likert-type response options, the aim is to identify pathological use of the Internet, with higher scores indicating higher pathological Internet use (30). There have been several studies suggesting the use of cutoff scores to describe pathological use. To illustrate, a score in the 0–49 range means no pathological usage while scores between 50 and 79 indicate a moderate level of Internet usage. Those with scores exceeding 80 can be considered pathological Internet users (31, 32). High reliability scores were found in several studies (33, 34). It was adapted by Boysan and colleagues into Turkish culture (35). The Cronbach's alpha reliability of the IAT was 0.93, with additional evidence supporting its validity showed that the IAT has sufficient psychometric properties. The Cronbach's alpha reliability for the present study was found to be 0.90.

Procedure

After obtaining ethical approval from the Dokuz Eylül University Faculty of Letters Ethics Committee, an announcement about the study was first made to identify potential participants from universities. Later, an explanation of the research purpose emphasizing voluntary participation was presented to participants. Informed consent was obtained from all individual participants included in the study, and then, the participants were asked to complete a questionnaire set. The distributed questionnaires were returned about 1 month. Some participants dropped out via not delivering the questionnaires. To control for serial order effect, the order was counterbalanced. Completion of the questionnaires took almost 30 minutes.

Before starting the analysis, the data were made ready for analysis. Dealing with missing values, Expectation-Maximization (EM) algorithm was used. After the normality assumptions were checked, data was ready for analysis. First, Pearson's Correlation Coefficients were calculated to examine the

interrelations among the different aspects of the current study. Further analyses were conducted to understand the contribution of the predicted results. Since the current study investigated the role of emotion regulation difficulties and psychological flexibility in the relationship between stress and pathological Internet use, first the mediaton and then moderated mediation analyses were used to understand the context of relationship between related variables. For the mediation and moderated mediation analyses, the PROCESS analyses were conducted (36). According to Preacher and Hayes, three criteria should be met for a mediation model to be satisfied. Firstly, the mediator and independent variables should be significantly correlated (i.e., direct effect); secondly, the correlation between the mediator and dependent variables should be significant after controlling for the effect of the independent variable on the dependent variable (i.e., direct effect); and thirdly, there should be a significant indirect effect of the independent variable on the dependent variable (i.e., indirect effect) (37). In the second model we tested moderated mediation where four criteria should be met. First, it was examined that there must be relations between relation between independent, mediator, and dependent variable. Second criterion is that mediator and moderator variables should be related to each other. Third is that moderator variable should be a predictor of dependent variable. Last criterion is that indirect relationship should exist between independent variable and dependent variable by way of mediator variable across low and high levels of moderator variable (36). In the present case, the dependent variable was PIU and independent variable was primarily stress. Emotion regulation was a mediator variable, while psychological flexibility was the moderator variable of this research. In other words, before conducted analysis, four conditions were tested: (1) whether there was a significant effect of stress levels on difficulties in emotion regulation, (2) whether difficulties in emotion regulation had a significant effect on psychological flexibility level, (3) whether a significant interaction exists between difficulties in emotion regulation and psychological flexibility levels in predicting PIU levels, and (4) whether an indirect relationship exists between stress and PIU by way of emotion regulation problems across low and high levels of psychological flexibility. Prior to the analyses, all related predictors were well centered (38).

RESULTS

According to Pearson's correlation analysis, it was found that a tendency of PIU was positively related to the level of stress in the life of the student ($r = 0.40$, $p < 0.01$), psychological rigidity ($r = 0.41$, $p < 0.01$), and level of difficulty in emotion regulation ($r = 0.47$, $p < 0.01$). Furthermore, the stress level was found to also be positively related to psychological rigidity ($r = 0.65$, $p < 0.01$) and difficulties in emotion regulation ($r = 0.66$, $p < 0.01$). Generally speaking, a moderate degree of association was identified between PIU and other variables. In other words, it would appear that, as Internet usage increases, stress levels, psychological rigidity, and emotion regulation difficulties also increase (see Table).

Table

A regression analysis was used to test the hypothesis that emotion regulation alone mediated the relationship between stress and PIU. The results indicated that stress was a significant predictor of emotion regulation, $b = 0.50$, $p < 0.01$ and that emotion regulation was a significant predictor of PIU, $b = 0.31$, $p < 0.01$. These results support the mediational hypothesis. After controlling for the mediator, the level of stress was no longer a significant predictor of PIU or difficulties in emotion regulation, $b = 0.07$, $p > 0.05$, which is consistent with full mediation. With full mediation, one or more mediator variables transmit the total effect of independent variable on the dependent variable. Thus, the direct effect is total effects of the independent variable on the dependent variable. Whereas, indirect effect shows that the independent variable has no direct effect on the dependent variable. Approximately 23 percent of the variance in satisfaction was accounted for by the predictors ($R^2 = 0.23$, $F[2, 385] = 53.64$, $p < 0.01$). The indirect effect was tested using a bootstrap estimation approach containing 1,000 samples (39), and the results indicated that the indirect coefficient was significant ($b = 0.15$, $CI[0.11, 0.21]$) (see Figure 1).

Figure 1

Figure 2

In order to test moderated mediation criteria used in SPSS PROCESS (36), the relationship between stress and PIU was first checked. According to this analysis, stress level was a significant predictor of PIU (R^2 = 0.15, F[1, 389] = 71.68, p < 0.01, b = 0.23, CI[0.18, 0.29]). The results also revealed that stress was a significant predictor of emotion regulation problems and that stress explained 44 percent of the explained variance (R^2 = 0.44, F[1, 384] = 312.80, p < 0.01, b = 0.50, CI[0.44, 0.55]). Accordingly, it can be said that the first condition is supported for the moderated mediation model. For the second condition, it was understood that difficulties in emotion regulation were positively related to psychological rigidity (r = 0.70, p < 0.01). The third condition for the model was also confirmed in that the results of the analyses also showed that the moderation model for difficulties in emotion regulation with psychological rigidity was a significant predictor of PIU (R^2 = 0.25, F[4, 381] = 32.46, p < 0.01).

The interaction term for moderation was also significant. The findings showed that difficulties in emotion regulation mediated the association between stress levels and PIU. Furthermore, it was shown that psychological rigidity had a moderating effect on the relationship between difficulties in emotion regulation and PIU. When psychological rigidity was low, the level of PIU was also low (b = 0.09, CI[0.02, 0.16]). Likewise, the level of PIU was high when psychological rigidity was high (b = 0.16, CI[0.10, 0.23]). In summary, the high psychologically rigid group showed more Internet addictive characteristics than the low psychologically rigid group.

The direct effect of stress on PIU was removed through moderated mediation (direct effect = 0.04, SE = 0.03, p > 0.05, CI[−0.03, 0.11]). In this way, an indirect relationship was found between stress and PIU via difficulties in emotion regulation across low and high levels of psychological rigidity (b = −0.00, CI[−0.01, −0.00]), and, as a result, the hypothesis for the moderated mediation model was supported (see Figure 2).

DISCUSSION

The present study aimed to examine the relationship between psychological flexibility, emotion regulation, stress and PIU that have potential implications in both scientific and clinical areas. It has been known for a while that stress is associated with PIU; however, the roles of psychological flexibility and emotion regulation in this relationship is a matter of curiosity. Therefore, the present study invesitgated

the mediating role of difficulties in emotion regulation between stress and PIU, with the moderating role of psychological flexibility between difficulties in emotion regulation and PIU.

Correlation analyses revealed that people with higher levels of stress tend to be less psychologically flexible, experience more difficulties in emotion regulation, and report more PIU. These findings replicate and extend previous work demonstrating a relationship between stress and PIU (5, 8). As stres increases, individuals might gravitate to Internet. Another association found in current study was between emotion regulation and PIU. This finding is concordant with the predisposing nature of the emotion regulation. Emotion regulation was asserted to be predisposing factor for emotional disorders (40). Therefore, it might also important for the development of PIU. Moreover, there was found negative association between psychological flexibility and PIU, mirroring previous finding with Internet addiction (20). University students might use Internet to cope with stress and avoid unwanted experiences. Based on the extant literature, stress, emotion regulation and psychological flexibility might represent a feature of psychopathology in general, rather than specific to PIU (19, 40, 41, 42).

As mentioned above, stress was positively associated with PIU in accordance with previous studies (5, 8). Beyond confirming previous findings, the present study also showed that the relationship might be explained through emotion regulation. In other words, it was found that stress were directly related to PIU and indirectly related to PIU through emotion regulation. That is, an incremental rise in stress brings about an increase in emotion regulation problems, and this results in an increase in PIU. Based on the association found in this study, it was concluded that individuals with high stress had more difficulty in emotion regulation. This might be because individuals good at emotion regulation skills might be better able to cope with stressful situations, and these situations are become stressless. Therefore, based on the studies asserted that Internet is used for stress relief purposes (10), they do not need to use the Internet to relieve themselves from stress. Individuals who have lower ability to regulate emotion might experience difficulties because they cannot regulate the stressful situation. For this reason, they might use Internet pathologically. This finding is also consistent with the definition of difficulties in emotion regulation which is lack of behavioral control in the time of distress (43). In other words, individuals might use Internet pathologically because they are unable to control their behavior in times of stress. In conclusion, the results of the model testing consistently pointed out that difficulties in emotion regulation mediated the association between stress and PIU. Although there are several studies in which difficulty in emotion regulation plays a mediating role in psychological problems (44, 45), this is thought to be the first study confirming the mediating role of this construct in PIU.

It is thought that the effect of stress on PIU through emotion regulation might be lessened with psychological flexibility. Therefore, the moderating role of psychological flexibility in relation to

difficulties in emotion regulation and PIU in addition to a mediating role of emotion regulation difficulties between stress and PIU was investigated and was found to be satisfactory. In other words, it would seem that increases in stress bring about emotion regulation problems, and in that condition, if flexibility is low, there is a higher probability of PIU. This finding can be explained by the definition of psychological flexibility in terms of maintaining goals and value oriented behavior (18). Although the stressful individuals cannot manage their stress, goal-oriented behaviors can prevent the individual from using Internet pathologically. In case of low psychological flexibility, the individual might become stuck in a stressful condition and may use Internet pathologically to relieve stress. On the other hand, it is difficult for an individual to be both psychologically flexible and have difficulty in regulate their emotions. If an individual has a problem with emotion regulation, he/she might attend their emotion in a rigid way and might be see emotions as threats, and he/she is not considered as psychologically flexible. In addition, if an individual does not interact fully with present thoughts and emotions, he/she might not need regulate their emotion. This is where the similarities of emotion regulation and psychological flexibility come into play. While psychological flexibility defined as the ability to maintain goals and value-oriented behaviors (18), one component of emotion regulation is difficulty in engaging goal directing behavior (24). Therefore, an individual with emotion regulation difficulties is not expected to be psychologically flexible. They together might increase the effect of stress on PIU. While this is a point of view, there are differences between these two concepts. Psychological flexibility implies interaction with emotions but emotional regulation based on managing emotions. For this reason, they were handled in the current study. This finding is a fresh aspect of the current study in that this is the first time that flexibility has been addressed in model with regard to PIU, although the issue has been investigated under various conditions in the form of mediation or moderation (46, 47).

Considering the critical roles of both emotion regulation and psychological flexibility in PIU, both constructs should be included in psychological assessment, prevention and intervention programs of PIU. For decreasing the risk of PIU, it is important for university students to develop psychological flexibility. In terms of psychological flexibility key concept in Acceptance and Commitment Therapy (ACT), ACT might be used. ACT third wave psychotherapy interested in acceptance, midfullness and distancing techniques (18) was found beneficial for problematic Internet pornography use (48). In addition, adaptive emotion regulation techniques should be handled for preventing and treating PIU.

There are some drawbacks to the current study when considering its findings, one of which relates to the characteristics of the present sample, which included only undergraduate students. Future studies including participants who apply to psychiatry clinics with pathological Internet and/or other technological instrument usage would present more detailed information. Moreover, other kinds of

measures apart from those using self-report would provide a different perspective. Despite these limitations, the present study is the first study to investigate the association between stress, emotion regulation, psychological flexibility, and PIU.

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Table. Correlation Coefficient, Mean and Standard Deviation in the Study Measures

	Correlations					
Measure	1	2	3	4	Mean	SD
1.IAT	1				33	16
2.SSI	0.40*	1			133	27
3.DERS	0.47*	0.6	1		87	20
4.AAQ-II	0.41*	0.6	0.7	1	20	9.

SD: Standart deviation, IAT: Internet Addiction Test, SSI: The Students-Life Stress Inventory, DERS: Difficulties in Emotion Regulation Scale, AAQ-II: Acceptance and Action Questionnaire – II, SD: Standart deviation

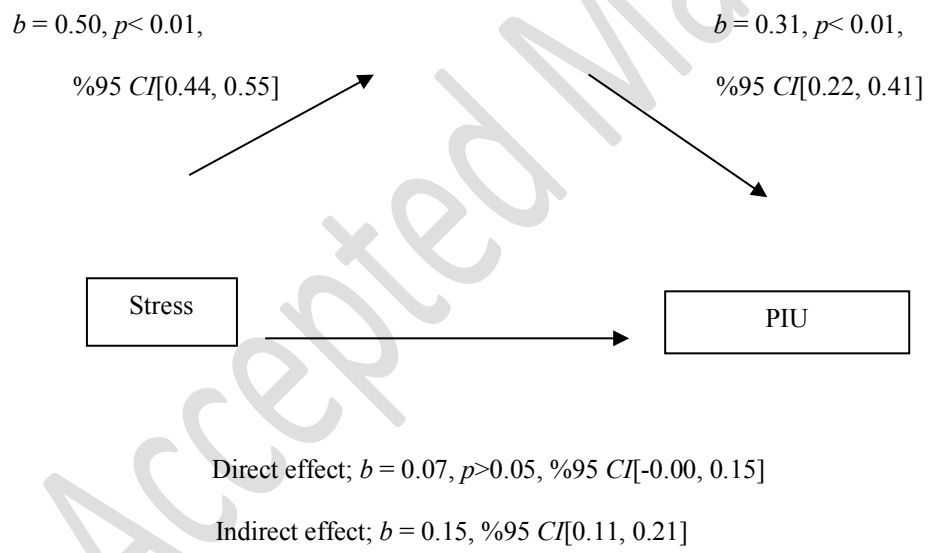

Figure 1: Proposed model of mediation by DERS

Note, DERS: Difficulties in Emotion Regulation Scale, *b*: Beta value, CI: Confidence interval, PIU: Pathological Internet Use

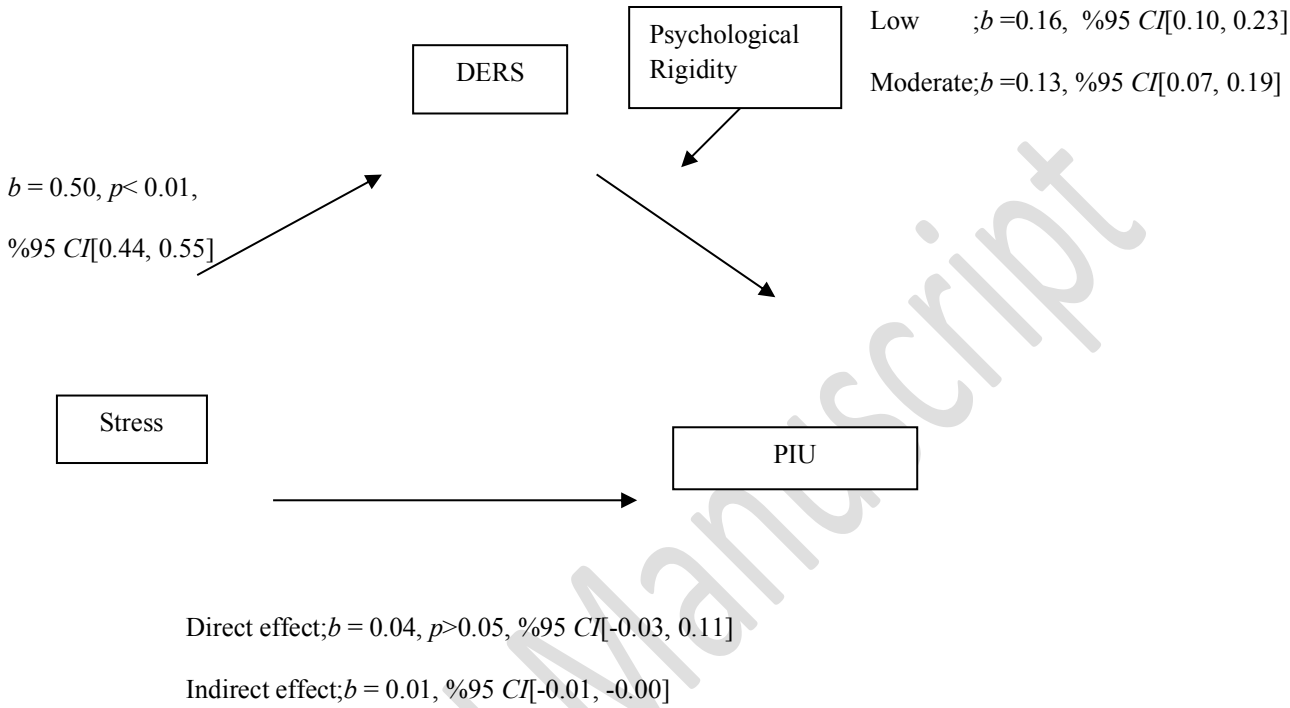

Figure 2: Proposed model of moderated mediation

Note, DERS = Difficulties in Emotion Regulation Scale, *b*: Beta value, CI: Confidence interval, PIU: Pathological Internet Use