## Abstract

Preliminary studies have shown that trait emotional intelligence (trait EI) can be a risk factor for higher problematic use of specific online activities. However, the possible mediating role of mindfulness and rumination on the relationship of trait EI with problematic social media use (PSMU) and problematic online gaming (POG) is unclear. Among a sample of 470 adolescents, the present study examined the direct and indirect associations of trait EI with PSMU and POG and the potential mediational role of mindfulness, rumination, and depression while controlling for gender and age. Multiple mediation analyses indicated that trait EI was indirectly associated with PSMU via mindfulness, rumination, and depression, and with POG via mindfulness and rumination. Furthermore, rumination affected PSMU positively. The study provides empirical evidence of the theoretical assumption that different types of specific problematic online behaviors are related to both shared and specific risk factors.

**Introduction**

Problematic social media use (PSMU) and problematic online gaming (POG) are two different types of specific technology-mediated problematic online behaviors (Brand, Young, Laier, Wölfling, & Potenza, 2016) that are linked with various negative psychological and health effects on adolescents and young adults (Andreassen, 2015; Kuss & Griffiths, 2012). The Interaction of Person-Affect-Cognition-Execution (I-PACE) model attempts to understand the mechanisms that lead to such problematic online behaviors (Brand et al., 2016). According to the I-PACE model, an individual's core characteristics including personality (e.g., trait emotional intelligence), psychopathology (e.g., depression), and coping style (e.g., rumination) encompass important risk factors that may lead to engagement in specific technology-mediated problematic online behaviors (Brand et al., 2016). Although preliminary empirical evidence indicates that decreased trait emotional intelligence (EI) can play a pivotal role in the technology-mediated problematic online behaviors, these associations should be further investigated to understand the many mechanisms that lead adolescents with low trait EI to PSMU and POG. Moreover, trait mindfulness has been associated with problematic internet use (Arslan, 2017) and has been reported to mediate the relationship between trait EI and psychopathology (Petrides, Gómez, & Pérez-González, 2017). Therefore, theoretically anchored within the I-PACE model, the present study tested a mediation model in which (i) trait EI was the distal predictor, (ii) mindfulness, rumination, and depression were the proximal predictors, and (iii) PSMU and POG were the outcome variables.

**Trait emotional intelligence and technology-mediated problematic behaviors**

Trait EI is defined as a constellation of emotional perceptions and can be assessed via self-report questionnaires and rating scales (Petrides, Pita, & Kokkinaki, 2007). According to Petrides and Furnham (2001) and Petrides et al. (2016), this construct consists four

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components including emotionality (e.g., emotion perception), sociability (e.g., emotion

management), self-control (e.g., impulse control), and wellbeing (e.g., optimism). Trait EI is

an important psychological trait that is established as a protective factor against various health

and behavioral problems for adolescents because emotion-related personality facets and

abilities develop with age and experience (Mayer et al., 1999). Given that problematic use of

online activities is associated with real-life social connectedness and deficits in impulse

control (Brand et al., 2016; Kircaburun et al., 2018a), having higher trait EI is likely to be

related to decreased use of these activities.

There is little doubt that among a minority of individuals (Kuss & Griffiths, 2011,

2012, 2017), technology-mediated problematic behaviors are maladaptive coping strategies

used to counter real-life problems or dissociate from unbearable states of mind (Andreassen,

2015; Kuss & Griffiths, 2012; Schimmenti & Caretti, 2010). Adolescents with low trait EI are

more likely to experience problems in their lives both socially and psychologically

(Mavroveli, Petrides, Rieffe, & Bakker, 2007), which makes them at increased risk to develop

excessive use of online activities to cope with their distress and escape from real life

(Beranuy, Oberst, Carbonell & Chamarro, 2009). To date, empirical studies have shown that

high trait EI can be an important protective factor against the problematic use of smartphones,

online gaming, and internet use more generally (Beranuy et al., 2009; Che et al., 2017; van

Deursen, Bolle, Hegner & Kommers, 2015). Therefore, it was hypothesized that there would

be a direct negative association of trait EI with PSMU and POG.

**The mediating role of mindfulness**

Mindfulness has been defined as "being aware of present moment experience in a clear

and balanced manner so that one neither ignores nor ruminates on disliked aspects of oneself

or one's life (Neff & Costigan, 2014; p.114), and is an important predictor of well-being, life

satisfaction, and self-esteem (Bajaj & Pande, 2016; Shonin, Van Gordon & Griffiths, 2016;

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Thompson & Waltz, 2008). The present study included mindfulness into the model as a personality component (person's core characteristic) of the I-PACE model (Brand et al., 2016) because it enhances individuals' ability to cope with stress (Arslan, 2017). Although, the predictor role of mindfulness on PSMU and POG has yet to be empirically examined (Shonin, Van Gordon & Griffiths, 2014), previous studies have found a direct association of mindfulness with problematic internet use and problem gambling (Arslan, 2017; Riley, 2014; Shonin et al., 2016). Also, Li et al. (2017) showed that mindfulness-based intervention studies mitigate POG symptoms in persons endorsing DSM-5 criteria for Internet Gaming Disorder (American Psychiatric Association, 2013). Hence, high levels of mindfulness trait is likely a protective factor in the acquisition, development, and maintenance of PSMU and POG.

Moreover, it was hypothesized that mindfulness trait would mediate the relationship of trait EI with PSMU and POG because individuals with elevated levels of mindfulness are more aware of their emotional states, and have the capacity to manage and regulate their emotions (Brown & Ryan, 2003), in which these abilities overlap with trait EI. In a model testing study, mindfulness moderately correlated with trait EI and partially mediated the relationship between trait EI and psychopathological symptoms (Petrides et al., 2017). Individuals with increased trait EI have elevated levels of mindfulness and feel less need for developing maladaptive coping strategies to deal with their problems (Petrides et al., 2017). Therefore, it was hypothesized that trait EI would negatively relate with PSMU and POG via mindfulness.

**The mediating role of rumination and depression**

Depression is one of the psychopathological risk factors highlighted in the I-PACE model and the role of depression on technology-mediated problematic behaviors is well established (Brand et al., 2016). Adolescent PSMU and POG are both known to co-occur with depression (e.g., Kuss et al., 2014; Li et al., 2018). It appears adolescents try to avoid

depressive feelings by engaging in technology use (Kircaburun et al., 2018a), which is susceptible to result in excessive and addictive-like use. Additionally, the role of rumination, which plays a pervasive role in depression symptoms (Watkins, 2008), has also been investigated in relation to technology-mediated problematic online behaviors. Rumination has been defined as "the intrusive thoughts or images about past mistakes or failures that cause negative feelings when they occur" (McLaughlin, Borkovec, & Sibrava, 2007; p.27), and is a maladaptive emotion regulation strategy known to perpetuate and exacerbate negative affect (McLaughlin & Nolen-Hoeksema, 2011). Rumination is a representative example for one of the core elements of the I-PACE model, i.e., coping style (Brand et al., 2016). According to the I-PACE model, maladaptive coping style leads to poor affective and cognitive responses (e.g., urge to regulate mood) and to the acquisition, development, and maintenance of specific technology-mediated problematic online behaviors (Brand et al., 2016). Adolescents who are more prone to ruminate may attempt to avoid these negative thoughts and images by excessively engaging in online activities that consequently becomes problematic. For instance, increased rumination has been associated with problematic smartphone use (Elhai et al., 2018) which often co-occur with PSMU (Salehan & Negahban, 2013). Therefore, it was hypothesized there would be a positive relationship of rumination with PSMU and POG.

Extant literature suggests that trait EI is positively associated with mental health and negatively associated with rumination and depression (Mavroveli et al., 2007; Petrides et al., 2017; Rudenstine & Espinosa, 2018). Adolescents with higher trait EI attempt to solve their real-life problems by using adaptive coping strategies while those with lower trait EI have higher emotional and maladaptive coping (e.g., rumination) and depression (Mikolajczak, Petrides, & Hurry, 2009). Given that those with lower trait EI are more likely to be unsuccessful in their real-life interactions, they will have more negative experiences and memories susceptible to promote rumination and depressive symptoms (Kong, Zhao, & You,

2012; Zhang, Zou, Wang, & Finy, 2015). In addition, recalling poor real-life experiences

leads individuals with lower trait EI to higher deterioration of their mood when compared to

those with higher trait EI (Sevdalis, Petrides, & Harvey, 2007). Similar to trait EI,

mindfulness is an important predictor of life satisfaction and decreased stress (Brown & Ryan,

2003; Shonin et al., 2016) and can be a strong preventive factor for rumination and depression

(Liu et al., 2018; Petrides et al., 2017; Petrocchi & Ottaviani, 2016). Those with elevated

mindfulness are able to regulate and express their emotions and deal more effectively with

their negative emotions, thus reducing ruminative thoughts and depressive feelings (Bajaj,

Robins, & Pande, 2016; Borders, Earleywine, & Jajodia, 2010; Pickard, Caputi, & Grenyer,

2016). Therefore, it was hypothesized that rumination and depression would explain the

relationships of trait EI and mindfulness with PSMU and POG.

**The present study**

Based on the evidence reviewed and the predictions of the I-PACE model (Brand et

al., 2016), the present study tested an integrative model where the direct and indirect

associations of trait EI with PSMU and POG and the potential mediational role of

mindfulness, rumination, and depression while adjusting for gender and age. Although, there

may be other confounding factors that might have been included into the model (e.g.,

educational level), gender and age are the most frequently adjusted confounders in research

concerning PSMU and POG (Kuss & Griffiths, 2011, 2012, 2017). While constructing the

research model, temporal precedence of the variables according to the theoretical rationale

was taken into account (Kline, 2015). Trait EI was included as the distal predictor because of

its precedence as a partly biologically determined trait (Petrides et al., 2017). Mindfulness

takes precedence over depression and rumination because an individual's mindful awareness

and attention to their emotions and state of mind determine their engagement in depressive

mood and ruminative thoughts, rather than the other way around (Hofmann, Sawyer, Witt, &

Oh, 2010). Indeed, previous studies have reported higher PSMU and depression for females, and higher POG and trait EI for males (Andreassen et al., 2016; Kuss & Griffiths, 2011, 2012; Petrides & Furnham, 2000; Piccinelli & Wilkinson, 2000), implicating that score differences of the variables across sex were also examined.

## Methods

### Participants and procedure

The study comprised 470 participants (280 females and 190 males; $M_{age}$ = 16.29 years, $SD_{age}$ = 1.17; range = 14 to 18 years) attending a high school in Turkey. Paper-and-pencil questionnaires were administered during the class by the research team after students were provided with the necessary information about the study. Informed consent was taken from the participants and participation in the study was voluntary and anonymous. Ethical approval for the study was received from the provincial directorate of national education committee before the recruitment of the participants[1], and complied with the Helsinki declaration. Other data, not related with the current study, will be presented elsewhere.

### Measures

*Bergen Social Media Addiction Scale (BSMAS):* The unidimensional BSMAS (Andreassen et al., 2016) is an adapted version of the Bergen Facebook Addiction Scale (Andreassen, Torsheim, Brunborg, & Pallasen, 2012) which comprises six items scored on a 5-point Likert scale from "*very rarely*" to "*very often*" that assess components of six addiction-like symptoms (salience, withdrawal, mood modification, conflict, tolerance, relapse). The Turkish form had sound psychometric properties (Tosuntaş, Karadağ, Kircaburun, & Griffiths, 2018) and high internal consistency in the present study (Cronbach's α = .85).

*Ten-Item Internet Gaming Disorder Test (IGDT-10):* The unidimensional IGDT-10 (Király et al., 2017) comprises 10 items scored on a 3-point Likert scale ("*never*", "*sometimes*", and

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"*often*") that assess the nine criteria designated in DSM-5 to measure Internet Gaming Disorder. The scale was used dichotomously via recoding "*never*" and "*sometimes*" as 0 and "*often*" as 1. The ninth and tenth items belong to the same criterion, and were recoded accordingly. The Turkish form of the scale (Kircaburun et al., 2018b) has high internal consistency in the present study ($\alpha$ = .84).

*Trait Emotional Intelligence Questionnaire-Short Form (TEIQue-SF):* The TEIQue-SF (Petrides, 2009) comprises 20 items measuring four emotional intelligence-related factors: emotionality, sociability, and wellbeing. Items are scored on a 7-point Likert scale from "*absolutely disagree*" to "*absolutely agree*". The Turkish form of the scale (Deniz, Özer, & Işık, 2013) reported optimal validity and reliability. The Cronbach's alpha in the present study was .80

*Mindful Attention Awareness Scale (MAAS):* The MAAS (Brown & Ryan, 2003) comprises 15 items that assess the level of awareness and attention. Items are scored on a 6-point Likert scale from "*almost never*" to "*almost always*" Turkish form of the scale (Ozyeşil, Arslan, Kesici, & Deniz, 2011) has good psychometric properties ($\alpha$ = .84). The Cronbach's alpha in the present study was .84.

*Ruminative Thoughts Style Questionnaire (RTSQ):* The RTSQ (Brinker & Dozois, 2009) comprises 20 items that assess the general proneness to ruminate. The present study employed 15-item short version of the scale (Brinker & Dozois, 2009; Elhai, Tiamiyu, & Weeks, 2018). Items are scored on a 7-point Likert scale from "*does not describe me at all*" to "*describes me very well*". The Turkish form of the scale (Karatepe, Yavuz, & Turkcan, 2013) reported good psychometric properties. The Cronbach's alpha in the present study was .91.

*Short Depression-Happiness Scale (SDHS):* The SDHS (Joseph, Linley, Harwood, Lewis, & McCollam, 2004) originally comprised six items. However, the Turkish adaptation study (Kircaburun et al., 2018a) reported good psychometric properties of the scale that had three

items measuring depressive symptoms on a 4-point Likert scale from "*never*" to "*often*". The Cronbach's alpha in the present study was .84.

## Results

Descriptive statistics and correlations between PSMU, POG, trait EI, mindfulness, rumination, and depression are presented in Table 1. In addition to alpha coefficients, Omega ($\Omega$) coefficients for all the study variables were calculated employing the R package (Peters, 2014). Interval level $\Omega$ values and $\Omega$'s confidence intervals were as follows: BSMAS (.85 [.83; .87]), IGDT-10 (.84 [.82; .86]), TEIQue-SF (.80 [.77; .82]), MAAS (.84 [.82; .86]), RTSQ (.91 [.90; .93]), SDHS (.84 [.82; .87]).To test for gender differences, *t*-tests were applied. Females were found to have significantly higher scores on PSMU (*t*[470]=2.56, *p*=.04, *df*=468), rumination (*t*[470]=5.60, *p*=.001, *df*=468), and depression (*t*[470]=2.15, *p*=.04, *df*=468) while males scored higher on POG (*t*[470]=-6.84, *p*=.001, *df*=468) and trait EI (*t*[470]=-3.02, *p*=.01, *df*=468).

-- INSERT TABLE 1 HERE –

Next, a saturated multiple mediation model was tested, while adjusting for gender and age, in order to examine the mediating role of mindfulness, rumination, and depression on the relationship of trait EI with PSMU and POG[2]. Mediation analyses were carried out using bootstrapping method with 5,000 bootstrapped samples and 95% bias-corrected confidence intervals. Indirect effects of mindfulness, rumination, depression, mindfulness-related rumination, and mindfulness-related depression were calculated via using different tools provided by AMOS 23.0 software (Byrne, 2016). As a result, all three mediators fully accounted for the association between trait EI and PSMU while mindfulness and rumination

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[2] We also tested a path analysis where the POG scores were only considered for the participants who were gamers (N=163), and the results were identical. We therefore kept the POG score in the path analysis reported.

were significant mediators between trait EI and POG. However, even though rumination did not initially correlate with POG, there was a negative and significant association between the former and latter in the model (Table 2). As the correlation between POG and rumination was not significant ($r$= -.03), it is possible that a *suppressor variable* (a variable correlated with POG which could have influenced the relation between POG and rumination) impacted the analysis conducted so that the null relationship observed became significant in the path analysis (Ludlow & Klein, 2014). As the correlation between POG and rumination was not significant, and because we cannot exclude the possibility that the significant relationship observed in the path analysis is a statistical artifact, this finding is not interpreted or discussed. The tested model explained 26% of the variance in PSMU and 20% of the variance in POG (Figure 1).

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**Discussion**

The present study, based on the theoretical assumptions of the I-PACE model (Brand et al., 2016), examined the direct and indirect relationship of trait EI with PSMU and POG via mindfulness, rumination, and depression. The findings provide empirical support for the I-PACE model that the interaction of different risk factors may result in the development of different types of technology-mediated problematic online behaviors. Contrary to our expectations, the present study found that the direct effect of trait EI on PSMU became non-significant when mindfulness, rumination, and depression were included into the equation, while the relationship between trait EI and POG was explained via mindfulness. These findings are also consistent with the Spectrum hypothesis stipulating that technology-mediated problematic online behaviors can be conceptualized within a spectrum of related,

yet relatively distinct disorders that are associated with both common and unique etiological factors (Baggio et al., 2018; Starcevic & Billieux, 2017).

As expected, trait mindfulness had an important mediating role in the model. Higher trait EI was associated with increased mindfulness, and in turn, higher mindfulness was related with lower PSMU and POG. This finding is consistent with the previous studies reporting a negative association between mindfulness and both problematic internet use and problem gambling (Arslan, 2017; Riley, 2014). Elevated mindfulness can constitute a protective factor against various psychological health problems arising from negative real life events, reducing the risk of using maladaptive coping strategies such as excessive online activities (Arslan, 2017; Brand et al., 2016). Another potential explanation is that individuals with low mindfulness tend to be more impulsive and present with poorer self-control abilities (Lattimore, Fisher, & Malinowski, 2011). Given that technology-mediated problematic online behaviors are strongly related to an individual's lack of impulse control and inhibition (Kuss & Griffiths, 2012), higher engagement in PSMU and POG would be expected from those who have low mindfulness.

Somewhat consistent with expectations, rumination partially and negatively mediated the relationships of trait EI and mindfulness with PSMU. Adolescents with higher trait EI and mindfulness had reduced rumination, and in turn, decreased PSMU. In two cross-sectional studies, rumination has been positively correlated with shame (Orth, Berking, & Burkhardt, 2006), and shame was a significant predictor of problematic internet use (Craparo et al., 2014). In order to escape from negative feelings arising from negative repetitive thoughts, such individuals may try and distract themselves via the over-involvement in social media. In contrast, there was no significant correlation between rumination and POG. This differential pattern of relationships between rumination and the targeted problematic online behaviors (POG and PSMU) could be due to the fact that females are known to use rumination more

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frequently than males as a maladaptive emotion regulation strategy (Nolen-Hoeksema, 2001)
and are more prone to present PSMU than males (Andreassen et al., 2016).

Finally, and partially consistent with our expectations, depression was a significant
predictor of PSMU but not POG. Adolescents who had higher trait EI and mindfulness had
reduced depression, and in turn, reduced PSMU. Depression is a consistent predictor of
PSMU (Kuss & Griffiths, 2017). A longitudinal study with a large sample of Chinese
adolescents showed that there was a bidirectional relationship between depression and PSMU
(Li et al., 2018). Depressed adolescents may prefer online communication instead of face-to-
face interactions and try to regulate their mood via engaging in PSMU. However, those who
became problematic users of social media felt more depressed (Li et al., 2018). An additional
explanation for this finding may be that individuals with higher levels of depression are more
prone to boredom and get bored more easily, and in turn, become more vulnerable to
problematic technology use searching for a relief from boredom (Elhai, Vasquez, Lustgarten,
Levine, & Hall, 2017). The absence of link between depression and POG in the model was
unexpected. A potential explanation is that POG less frequently constitutes a coping strategy
to face depressive symptoms in non-clinical adolescent population than PSMU. Indeed,
although significantly significant, the correlation observed between POG and depression is
much lower than the one observed between PSMU and depression. Another explanation may
be that the present study's specific sample characteristics played a role in this unexpected
finding. It appears the present sample did not cope with their depressive symptoms by
engaging in POG.

**Limitations and conclusions**

The present study has several limitations that should be considered when interpreting
the results. First, the study sample only comprised adolescent students from a Turkish high
school. This prevents generalizing the findings of the present study. For instance, mean scores

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and personality correlates of *Facebook* addiction and internet addiction in previous studies have shown differences among Turkish, Polish, and Ukranian individuals (Blachnio, Przepiorka, Senol-Durak, Durak, & Sherstyuk, 2017), indicating that the present results should be tested and confirmed using samples from different cultures to make more definitive statements regarding relationships found in the present study. Second, the cross-sectional nature of the study means that the causal relationships between variables are unknown. Therefore, future studies should use longitudinal studies to help determine causality and examine the directions of these effects. Third, the present study only used self-report questionnaires that have well-known limitations (such as memory recall and social desirability biases).

Despite its limitations, the present study has several noteworthy contributions to the literature. First, it was empirically shown for the first time that trait emotional intelligence has a role on problematic social media use and online gaming. The study also explained how emotional intelligence can affect these problematic online behaviors via mediator factors. Second, the role of mindfulness and rumination as mediating variables were also introduced to the literature for the first time. It is suggested that health professionals and clinicians who are trying to reduce the prevalence of adolescent problematic online use should focus on increasing mindfulness levels and reducing rumination (e.g., Watkins et al., 2012) and targeting depression symptoms in order to prevent or reduce the demonstration of these problematic behaviors. The study also provided empirical support for the I-PACE model that the interaction of different risk factors may lead to different types of problematic online behaviors.

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**TABLES**

Table 1. *Mean scores, standard deviations, score ranges, and Pearson's correlations of the study variables*

|  | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| 1. Problematic social media use | - | | | | | |
| 2. Problematic online gaming | .25*** | - | | | | |
| 3. Trait emotional intelligence | -.33*** | -.13** | - | | | |
| 4. Mindfulness | -.44*** | -.32*** | .55*** | - | | |
| 5. Rumination | .39*** | -.03 | -.50*** | -.44*** | - | |
| 6. Depression | .32*** | .13*** | -.43*** | -.37*** | .39*** | - |
| *M* | 2.63 | .13 | 4.60 | 3.48 | 4.51 | 2.42 |
| *SD* | 1.05 | .22 | .80 | .67 | 1.23 | .98 |

\* *p* < .05, \* *p* < .01, \* *p* < .001

Table 2. *Standardized estimates of total, direct and indirect effects on problematic social media use and problematic online gaming*

|  | Effect | S.E. |
|---|---|---|
| Trait EI → PSMU (total effect) | -.32*** | .04 |
| → PSMU (direct effect) | .00 | .06 |
| → PSMU (total indirect effect) | -.32*** | .04 |
| → Mindfulness → PSMU | -.18*** | .04 |
| → Rumination → PSMU | -.06*** | .02 |
| → Depression → PSMU | -.04** | .02 |
| → Mindfulness → Rumination → PSMU | -.03*** | .01 |
| → Mindfulness → Depression → PSMU | -.01** | .01 |
|  |  |  |
| Trait EI → POG (total effect) | -.17*** | .04 |
| → POG (direct effect) | -.02 | .06 |
| → POG (total indirect effect) | -.15** | .05 |
| → Mindfulness → POG | -.18*** | .01 |
| → Rumination → POG | .04** | .01 |
| → Mindfulness → Rumination → POG | .02** | .01 |

*Note:* EI = Emotional intelligence; PSMU = Problematic social media use; POG = Problematic online gaming;  S.E. = Standard error. Only significant indirect effects are shown in the table.  \*\**p* < .01, \*\*\**p* < .001

**FIGURES**

Figure 1. *Final model of the significant path coefficients.*
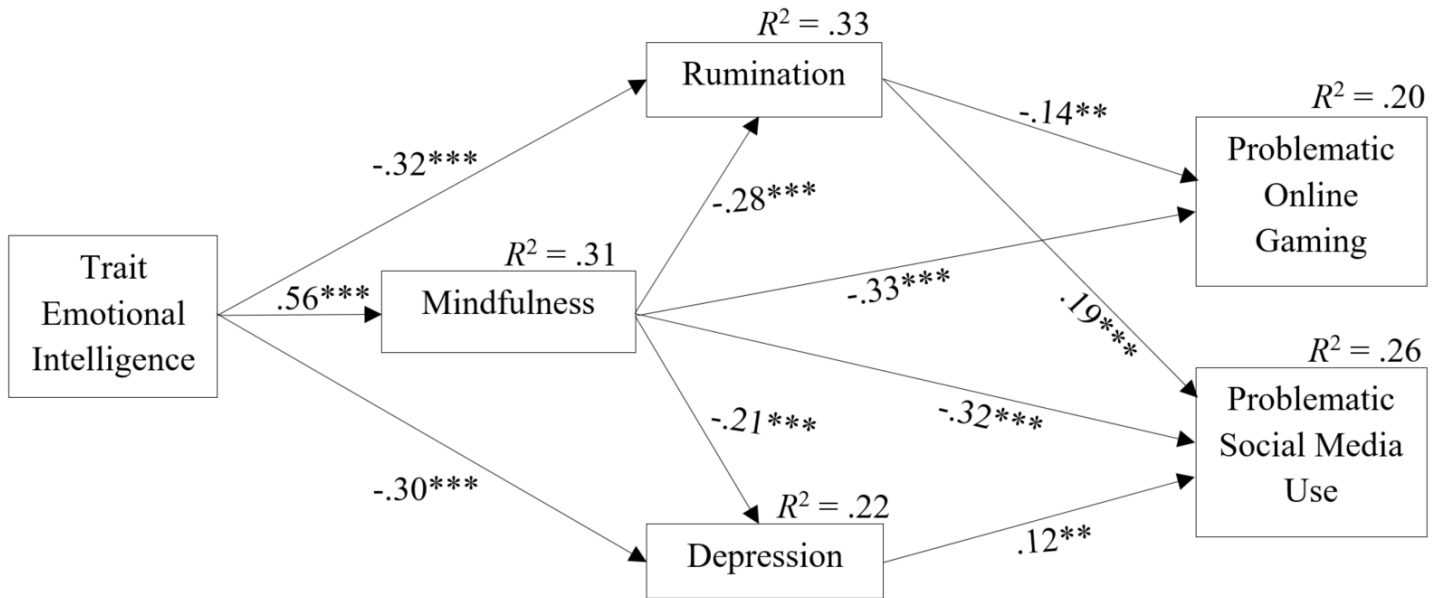


For clarity, non-significant pathways, control variables, and covariates between mediator

variables were not depicted in the figure. **$p < .01$, ***$p < .001$