




Associations Between Instagram Addiction, Academic Performance, Social Anxiety, Depression, and Life Satisfaction Among University Students

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Abstract

The use of social networking sites (SNSs) has become increasingly popular. Although several studies have been carried out on the addictive use of SNSs such as Twitter and Facebook, there is little research on Instagram addiction and its drivers. The present study investigated the association between students' needs and Instagram addiction by incorporating physical activity as a moderator among 364 university students. Additionally, the associations between Instagram addiction, academic performance, depression, social anxiety, and life satisfaction were investigated. The results showed that recognition needs, social needs, and entertainment needs all contributed to Instagram addiction. However, information needs were not a significant predictor of Instagram addiction. The findings also illustrated that physical activity had a moderating role in the effect of social needs and entertainment needs on Instagram addiction. The findings also provide evidence of the negative impact of Instagram addiction on academic performance and the positive effect of Instagram addiction on social anxiety and depression. Academic performance was a positive predictor of life satisfaction, while social anxiety and depression negatively influenced students' life satisfaction. The findings contribute to the extant literature by investigating the precursors and outcomes of Instagram addiction.

Keywords: needs; Instagram addiction; life satisfaction; academic performance; depression; social anxiety.

Introduction

Supported by the internet's technological advancement, social networking sites (SNSs) have become deeply integrated into people's daily lives. Worldwide, the number of active Instagram users is approximately one billion monthly (Statista, 2019), and more than 500 million active users enjoy the platform daily (Omnicores, 2019). Instagram is one of the most utilized social networks, especially among young adults (Kircaburun & Griffiths, 2019; Ponnusamy et al., 2020), and 59% of individuals on this platform are aged 18 to 29 years (Alhabash & Ma, 2017). While prior studies have demonstrated the benefits of using Instagram such as passing time, expressing oneself, and entertainment (Kircaburun et al., 2019), for a minority of users, this popularity carries the risk of developing addiction symptoms (Kuss & Griffiths, 2017).

Concern over the addictive use of SNSs has attracted a growing body of literature investigating the consequences and causes of this behaviour (Iranmanesh et al., 2019; Nikbin et al., 2020). Although, this field of research has focused on social media in general or the addictive use of specific SNSs, such as Twitter (Dwyer & Fraser, 2016; Ndasauka et al., 2016), Facebook (Brailovskaia et al., 2018; Casale & Fioravanti, 2018; Foroughi et al., 2019; Satici, 2019), and YouTube (Balakrishnan & Griffiths, 2017; de Bérail et al., 2019; Klobas et al., 2018), little research has been done to study the addictiveness potential of Instagram. Given that each SNS platform has a characteristic structure, unique features, varied use habits, and different gratifications and motives underlying its use (Alhabash & Ma, 2017; Griffiths, 2018), it is necessary to investigate Instagram addiction alongside potentially related factors. Therefore, in line with the preceding discussion, the present study was carried out in order to understand the drivers and consequences of Instagram addiction.

Since SNSs continue to attract members of the younger generation (Kuss et al., 2013), previous scholarly works on the undesired consequences of SNS addiction have investigated a variety of issues regarding students' academic wellbeing, such as academic performance (Al-Yafi et al., 2018; Andreassen, 2015; Cao et al., 2018), social anxiety (Atroszko et al., 2018), depression (Donnelly & Kuss, 2016; Satici, 2019; Shensa et al., 2017), and life-satisfaction (Longstreet & Brooks, 2017; Satici & Uysal, 2015). While these results provide evidence on the consequences of SNS addiction, it is uncertain how Instagram addiction influences students' academic performance, social anxiety, depression, and life satisfaction. Moreover, to further understand the predictors of SNS addiction, a growing number of studies have emphasized that particular SNS uses and gratifications predict SNS addiction among young adults (e.g., Dhir & Tsai,

2017; Foroughi et al., 2019; Park & Lee, 2014). However, less is known about the possible drivers of Instagram addiction. In the present study, these limitations are addressed by investigating the predictors of Instagram addiction and examining the interrelationships between Instagram addiction, academic performance, social anxiety, depression, and life satisfaction.

Although the literature has demonstrated the impacts of uses and gratifications concerning SNS addiction, preventive policies and practices are needed to control the growth of Instagram addiction among young adults, especially university students. Recent studies have shown that physical activity can be a protective factor against some addictive behaviours (e.g., Brailovskaia et al., 2018; Li et al., 2018; Zheng et al., 2020). Therefore, it is expected that engaging in physical activity would reduce the influence of social and psychological needs of Instagram among its users. Consequently, physical activity is proposed as a potential moderator on the relationships between social and psychological needs and Instagram addiction. It is envisaged that the findings of the present study may provide guidelines for parents, policymakers, university managers, and other practitioners that can help them in reducing the extent of Instagram addiction among university students by mitigating the impacts of social and psychological needs by applying programs that promote physical activity.

Instagram Addiction

Mobile devices have contributed to the increase in internet use and in particular SNSs. Instagram, currently the most popular SNS among young generation, is “a mobile device application designed for the sharing of lifetime moments through photos in real time” (Kim et al., 2017, p. 540). It contains features such as photo and video sharing, commenting on or linking others’ photos, videos, and posts as well as the opportunity to create and share live stories. The unique interface of Instagram, makes it a social networking site with possible intensive use and psychological consequences (Mackson et al., 2019). However, in comparison to Instagram, other SNSs such as Facebook and Twitter have been the focus of several studies due to their sustained popularity. Prior studies investigating Instagram use have mainly examined Instagram content (Miles, 2014), motivation for its use (Lee et al., 2015; Sheldon & Bryant, 2016), and its specific association with intensive use (Kircaburun & Griffiths, 2018, 2019). Given the growing popularity of Instagram in recent years, the present study contributes to the literature on Instagram by investigating the potential causes and consequences of Instagram addiction among a student cohort.

Model conceptualization and hypotheses development

The uses and gratifications theory (UGT), developed by Katz et al. (1974), explains how various psychological and social factors influence people's preferences for social media and related platforms (Ifinedo, 2016). For example, although playing game or posting photographs may be the motivations of using SNSs for some individuals, meeting new people may be the motivation for other individuals. UGT has been applied in a number of studies concerning the motivations of social media use including Facebook (Annamalai, Foroughi, Iranmanesh, & Buathong, 2019; Meier, Reinecke, & Meltzer, 2016), Twitter (Kim et al., 2016; Kitamura et al., 2019), YouTube (Haridakis & Hanson, 2009), Pinterest (Mull & Lee, 2014; Wang et al., 2016), Instagram (Song, Lee, & Kim, 2019), and SNS use more generally (Dhir & Tsai, 2017; Lin et al., 2019), as well as exploring SNS addiction (Sofiah et al., 2011). For example, Mull and Lee (2014) reported five needs in relation to Pinterest use (i.e., entertainment, creative projects, organization, virtual exploration, and fashion). Alzougool (2018) reported six motivations for Facebook use (i.e., escapism and passing time, entertainment, exhibitionism and companionship, relationship formation, relationships maintenance, and social curiosity), while Alhabash et al. (2014) reported seven (i.e., entertainment, socialization, self-documentation, information sharing, medium appeal, self-expression, and escapism). In another study, Chan et al. (2012) categorised the gratifications of Weibo utilization into the four groups comprising recognition needs, information needs, social needs, and entertainment needs.

In the present study, and following Chan et al. (2012), four major motivations for using Instagram that may lead to Instagram addiction were employed (i.e., recognition needs, information needs, social needs, and entertainment needs). These four needs were chosen because they represent the needs highlighted in previous research (e.g., Papacharissi & Mendelson, 2010; Raacke & Bonds-Raacke, 2008). For instance, Raacke and Bonds-Raacke (2008) suggested the majority of individuals use Facebook to keep in touch with their peers, upload/download pictures, find new friends, and to reconnect with an old friends. Uploading pictures is related to recognition needs. Keeping in touch with friends, finding new friends, and reconnecting with old friend are all related to social needs. Balog, Pribeanu, and Ivan (2015) also found three main Facebook educational uses and gratifications among university students, namely keeping in touch with old classmates, communicating, and finding out what is going on at their educational institutions.

Previous studies have demonstrated that a variety of addictive behaviours can be moderated by physical activity (e.g., Brailovskaia et al., 2018; Li, Pursey, Duncan, & Burrows, 2018; Zheng et al., 2020). Therefore, it is expected that engaging in physical activity mitigates the risk of being addicted to Instagram by fulfilling the students' social and psychological needs. Consequently, physical activity was also introduced as a moderator that may mitigate the influence of different needs on Instagram addiction. In addition, this study investigates the association between Instagram addiction and its consequences, namely, academic performance, social anxiety, depression, and life satisfaction (Figure 1). The details of these relationships are discussed in the following sections.

Social and psychological needs

It has been asserted that social media usage and gratifications play an important role in explaining individuals' dependency to social media (Sun et al., 2006). It means, individuals use SNSs to fulfil specific needs. Consequently, fulfilling individuals' needs through using SNSs provides a strong incentive for incentive usage of SNSs, which for a small minority may lead to addiction (Choi & Lim, 2016). Prior research has supported the claim that social and psychological needs can shape individuals' SNS addiction (Foroughi et al., 2019; Masur et al., 2014). For instance, Floros and Siomos (2013) reported that more frequent SNS involvement was predicted by the motivations of escapism, relationship maintenance, and seeking friendship. Similarly, Alhabash et al. (2014) demonstrated that entertainment and self-expression gratifications are the significant drivers of SNS addiction. Park and Lee (2014) reported that the desire for self-expression, communication, entertainment needs, and relationship maintenance contribute considerably to the intensity of Facebook use. Instagram users are able to watch and comment on live streams and recent posts of others (Kırcaburun & Griffiths, 2019), which are provided and promoted on Instagram, and which may fulfil the individuals' recognition, information, social, and entertainment needs. For a minority, this may result in problematic usage of Instagram. Therefore, based on this line of reasoning, it was hypothesized:

- *H1.* (a) Recognition needs, (b) information needs, (c) social needs, and (d) entertainment needs are all positively associated with Instagram addiction among students.

Instagram addiction, academic performance, and life satisfaction

The concerns on influence of SNS addiction on students' achievement and performance are growing. Spending a lot of time on SNSs (including Instagram) has become a part of young people's daily routines (Foroughi et al., 2019). With the easy accessibility of SNSs via smartphones, students can spend an increasing amount of their daily time engaging with SNSs which may influence on the time that they allocate for their studies (Giunchiglia et al., 2018). Studies examining extensive use of SNSs have shown that it may lead to the degradation of students' academic achievements (Annamalai et al., 2019; Busalim, Masrom, & Zakaria, 2019). Similarly, Kirschner and Karpinski (2010) demonstrated time spent on SNSs has a positive association with dedicating less attention to studies, distraction, poor time management, and lower grade point averages (GPAs). Consistent with these results, Al-yafi et al. (2018) highlighted that the academic performance of passive and addicted users of SNSs is significantly lower than engaged users. It has also been reported that students' low academic performance negatively influences on their self-esteem, leading to increased withdrawal and demotivation from university or daily life (Baturay & Toker, 2017). Therefore, it can be assumed that Instagram addiction will lead to a decrease in students' academic performance. Consequently, it was hypothesized:

- *H2(a)*. Instagram addiction is negatively associated with lower academic performance among students.
- *H2(b)*. Good academic performance is positively associated with higher life satisfaction among students.

Instagram addiction, social anxiety, and life satisfaction

Social anxiety has been defined as “a batch of negative self-schemata regarding social interactions and dysfunctional beliefs in the social settings, such as lack of self-presentational confidence and perfectionistic standards for social performance” (Hong et al., 2019, p. 302). Social anxiety is characterised by an extreme fear of being negatively judged by others in social environments (Lin et al., 2019). Some studies have demonstrated that SNS use may affect users' mental health including social anxiety (Frost & Rickwood, 2017). Labraugue (2014) and Shaw et al. (2015) found Facebook to worsen anxiety symptoms, specifically among students who spent excessive time on the SNS. Additionally, Grieve et al. (2013) identified a negative association between social media addiction and anxiety, while Frost and Rickwood (2017)

demonstrated that individuals who used Facebook intensively were at risk of developing anxiety.

On the other hand, individuals who suffer from social anxiety experience functional impairment in occupational, educational, and/or social domains resulting in a poor quality of life (Dryman et al., 2016). The findings of previous studies have demonstrated widespread challenges among individual with social anxiety, such as reduced work performance, higher rates of unemployment, and higher divorce rates (Wittchen et al., 2000), being single and living alone (Rapaport et al., 2005), and dropping out of high school (Simon et al., 2002). According to Jazaieri et al. (2012), these overwhelming difficulties may have an impact on several aspects of individuals' lives, with an adverse influence on their ability to enjoy life. Jazaieri et al. (2017) reported that social anxiety has a negative effect on wellbeing and quality of life. Consequently, it was hypothesized that:

- *H3(a)*. Instagram addiction is positively associated with social anxiety among students.
- *H3(b)*. Social anxiety is negatively associated with lower life satisfaction among students.

Instagram addiction, depression, and life satisfaction

Depression refers to “a mood disorder that affects the way a person feels, thinks or behaves, which impairs social or occupational functioning” (Joffres et al., 2013, p. 775). Depression has an adverse influence on people's life satisfaction (Celik et al., 2018; Oosterveer et al., 2017). The significant effect of intensive use of internet or social media on depression has been demonstrated in several studies (Hussain et al., 2017; Scherr & Brunet, 2017; Foroughi et al., 2019). Tandoc et al. (2015) found that SNS use is associated with an imbalanced upward comparison, thus contributing to increased depression and poorer life satisfaction. Donnelly and Kuss (2016) found that depression was significantly predicted by social media addiction and Instagram use, while Hoare et al. (2017) illustrated that individuals using the internet intensively experience a higher level of depressive symptoms. Similarly, Yao and Zhong (2014) reported that internet addiction may have negative and serious consequences such as depression. On the basis of the above discussion, it was assumed that depression would be related to Instagram addiction and life satisfaction. Consequently, it was hypothesized:

- *H4(a)*. Instagram addiction is positively associated with depression among students.
- *H4(b)*. Depression is positively associated with low life satisfaction among students.

The moderating role of physical activity

Yuede et al. (2018, p. 159) defined physical activity as “any movement of the body resulting from skeletal muscle contraction that elevates total body energy expenditure above that at rest”. Physical activity includes a wide range of activities such as gardening, running, mowing the lawn, and walking around the block. The positive effect of physical activity on health is well proven in the literature. Previous studies on young adults’ mental health have shown that regular physical engagement can serve as a buffer against the negative effect of health-related behaviours and can lead to better scholastic achievement and cognitive performance (Brailovskaia et al., 2018; Kindermann et al., 2016; Klaperski et al., 2012; Wunsch et al., 2017). Prior research has reported that there is a negative association between reduced physical activity and technology-related addictions. For instance, Brailovskaia et al. (2018) found that less daily physical activity is a predictor of a problematic use of Facebook. Also, according to Kara (2019), the relationship between a decrease in physical activities and Internet addiction is significant. It appears that individuals’ engagement in physical activities often displaces other activities. In the case of Instagram, physical activity would replace activities such as exchanging information and communicating, with physical activity fulfilling individuals’ needs and desires, and thus, reducing their dependency upon Instagram, which may contribute to symptoms of Instagram addiction. Consequently, it was hypothesized:

- *H5(a)*: Physical activity negatively moderates the association between recognition needs and Instagram addiction.
- *H5(b)*: Physical activity negatively moderates the association between information needs and Instagram addiction.
- *H5(c)*: Physical activity negatively moderates the association between social needs and Instagram addiction.
- *H5(d)*: Physical activity negatively moderates the association between entertainment needs and Instagram addiction.

Methods

Participants and procedure

Employing a paper-based survey, the data were obtained by recruiting undergraduate students from [Universiti Sains Malaysia](#). Given the subjectivity of the cumulative grade point average (CGPA) among different universities, the data were collected from a single university to ensure homogeneity of the data, which otherwise would have biased the result on the association

between Instagram addiction and academic performance. Furthermore, the students' life satisfaction may be subject to the area in which they reside (Wardle et al., 2004). Studies on students are essential because they are the largest segment for the use of social media (Sharma et al., 2016). In total, a convenience sample of 382 students with an active Instagram account completed the survey. The questionnaires used for data collection were distributed in various places in university such as the library, the students centre, during breaks between classes, and in university cafeterias. Of those responses, 18 respondents failed to complete the entire questionnaires and were excluded before conducting any analysis, leaving a total of 364 usable responses. The final sample comprised 186 female students (51.1%) and 178 male students (48.9%) aged 19-26 years. The majority of respondents (83%) reported that they had used Instagram for more than four years.

Research instruments

Predictors of Instagram addiction: A total of 20 statements were used in present study to assess four needs (e.g., “I use Instagram to establish my personal identity” and “I use Instagram to get useful information”), adapted from Chan et al. (2012). A five-point Likert scale (1 = “strongly disagree” to 5 = “strongly agree”) was used to rate each item. The Cronbach's alpha values were excellent for recognition needs (0.93), information needs (0.92), social needs (0.84), and entertainment needs (0.91).

Instagram addiction: To measure Instagram addiction, the unidimensional “Bergen Facebook Addiction Scale” (BFAS: Andreassen et al., 2012) was utilized which includes six dimensions based on the core addiction components (Griffiths, 2005). This scale has been widely adapted and applied to measure addictive use of various social media platforms (Andreassen et al., 2016; Atroszko et al., 2018; Foroughi et al., 2019). The word “Facebook” was replaced with “Instagram”. The statements concern symptoms that have been experienced over the previous 12 months (e.g., “How often in the past year have you decided to use Instagram less frequently, but not managed to do so?”) on a five-point Likert scale (1= “very rarely” to 5= “very often”). Higher scores show greater addiction to Instagram. The studies on other types of addictions have used either polythetic approach (cut-off score of 3 on at least four of six dimensions) or conservative approach (cut-off score of 3 or more for all six dimensions) to identify the problematic BFAS values (Andreassen & Pallesen, 2014; Andreassen et al., 2012). However, there are no clinical and empirical study to support the suggested cut-off scores for this instrument (Pontes et al., 2016). The Cronbach's alpha for the Instagram Addiction Scale was very good (0.89).

Academic performance: Previous research have assessed academic performance in two ways, namely, the “cumulative grade point average” (CGPA) (Annamalai et al., 2019) and perceived performance (Ainin et al., 2015). CGPA can be obtained from registrar or self-reported CGPA. Following Kirschner and Karpinski (2010), self-reported CGPA was used in this study as an indicator of students’ academic performance.

Social anxiety: To assess social anxiety, the present study used the Social Avoidance and Distress Scale (SADS) specific to new people or situations (La Greca & Lopez, 1998). Six statements were answered using a five-point Likert scale specifying how much the statement “is true for you” (1 = “not at all” to 5 = “all the time”). A sample item on this scale is “I get nervous when I meet new people”. Higher scores indicate high social anxiety. The cut-off point of SADS was not reported in the previous studies. The Cronbach’s alpha of the SADS was very good (0.89).

Depression: The Centre for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) was used to assess depression. The scale comprises 20 items assessing the level of individuals’ depression (e.g., “I was bothered by things that usually don’t bother me”). Participants provide answers on a four-point Likert scale from 0 (“rarely or none of the time”) to 3 (“Most or all of the time”). Higher scores indicate greater depression. A cut-off point of 16 is frequently used to identify potential clinical depression (Nishitani et al., 2018; Radloff, 1977). Li and Hicks (2010) showed that cut-off score of 16 has sensitivity of 100%. The Cronbach’s alpha for the CES-D was excellent (0.93).

Life satisfaction: Life satisfaction was measured using the Satisfaction With Life Scale (SWLS; Diener et al., 1985). Respondents presented the level of their agreement on a seven-point Likert scale ranging from 1 = “strongly disagree” to 7 = “strongly agree”. Satisfaction level is categorized to three level: low satisfaction (19 and below), average satisfaction (20-32) and high satisfaction (33-35) (Parker et al., 2018). Higher scores indicate greater life satisfaction. The Cronbach’s alpha of the SWLS was very good (0.88).

Physical activity: Physical activity was measured using a self-reported scale developed by Arneklev et al. (1993). The scale comprises 4 items which were rated on a five-point Likert scale ranging from 1= “strongly disagree” to 5= “strongly agree” (e.g., “I seem to have more energy and a greater need for activity than most other people my age”). Higher scores indicate greater physical activity. The Cronbach’s alpha of this scale was very good (0.89).

Data analysis

The partial least squares (PLS) technique was employed to assess the proposed model. The main reason for this choice was the predictive nature of this research (Hair et al., 2011). Following Hair et al.'s (2017) suggestion, the present study utilized a two-step technique in order to test the model. The first step was concerned with testing the measurement model, while the second step assessed the structural model.

Results

Measurement model

In the process of evaluating the measurement model, verifying both convergent validity and discriminant validity is an essential (Atal et al., 2020; Hair et al., 2017). The present study conceptualized Instagram addiction as a second order construct. To create this construct, a two-stage approach was utilized (Becker et al., 2012; Foon et al., 2020; Foroughi et al., 2019). Table I demonstrates that the composite reliability (CR) of all first-order and second-order constructs, factor loadings, average variance extracted (AVE) were above 0.7, 0.7, and 0.5 respectively, indicating satisfactory convergent validity (Hair et al., 2017; Iranmanesh et al., 2020; Jozef et al., 2019).

Table 1 about here

As recommended by Henseler et al. (2015), the hetrotrait-monotrait ratio of correlations (HTMT) was employed to evaluate the discriminant validity. The HTMT values were less than 0.85 (Table 2), which fulfilled the criterion for discriminant validity of all constructs (Foroughi et al., 2019; Kline, 2016; Subramaniam et al., 2019).

Table 2 about here

Structural model

In the present study, all independent and moderating constructs explained 48.4% of the variance in Instagram addiction. The R^2 values for academic performance, social anxiety, depression and life satisfaction were 0.088, 0.165, 0.205, and 0.322, respectively. Based on changes in R^2 values, the present study determined the effect size (f^2) pertaining to each relationship in the research model. According to Cohen's (1988) suggestion, the findings confirmed the acceptable effect size for the supported relationships (Table 3). Moreover, the value of Stone-Geisser Q^2 was estimated to assess the predictive relevance. The findings

demonstrate that Q^2 value for Instagram addiction, academic performance, depression, social anxiety, and life satisfaction were more than zero (Table 3), thus verifying the predictive relevance of the endogenous variables in this study (Chang et al., 2019; Fereidouni et al., 2015; Fornell & Cha, 1994).

Non-parametric bootstrapping was implemented to assess the hypothesized relationships (Beh et al., 2019; Wetzels et al., 2009; Zailani et al., 2019) with 2000 replications (Table 3). Based on the results, recognition needs ($\beta = 0.295$; $p < 0.01$), social needs ($\beta = 0.243$; $p < 0.01$), and entertainment needs ($\beta = 0.207$; $p < 0.01$) had positive significant effects on Instagram addiction (Figure 2). The impact of information needs ($\beta = 0.058$; $p > 0.05$) on Instagram addiction was not significant. Thus, H1a, H1c, and H1d were supported, while H1b was not. The negative influence of Instagram addiction on academic performance ($\beta = -0.297$; $p < 0.01$), was significant, while social anxiety ($\beta = 0.406$; $p < 0.01$) and depression ($\beta = 0.452$; $p < 0.01$) were positively derived by Instagram addiction. Academic performance ($\beta = 0.204$; $p < 0.01$) was a positive predictor of life satisfaction. However, the findings demonstrated that social anxiety ($\beta = -0.247$; $p < 0.05$) and depression ($\beta = -0.323$; $p < 0.05$) have a negative relationship with life satisfaction. Therefore, all proposed direct relationships were supported except H1b.

Figure 2 and Table 3 about here

The two-stage approach was used to test the moderating effect of physical activity (Ali et al., 2019; Hair et al., 2017; Nikbin et al., 2014). The findings showed that physical activity negatively moderated the impacts of social needs ($\beta = -0.098$; $p < 0.05$) and entertainment needs ($\beta = -0.136$; $p < 0.01$) on Instagram addiction. However, the impact of recognition needs ($\beta = -0.012$; $p > 0.05$) and information needs ($\beta = 0.003$; $p > 0.05$) upon Instagram addiction were not moderated by physical activity. Thus, H5c and H5d were supported, while H5a and H5b were not supported. As seen in Figure 3, the positive impact of social needs and entertainment needs on Instagram addiction were less among students with high physical activity in comparison with those with low physical activity.

Figure 3 about here

Discussion

For young adults in modern society, using SNSs has become a popular daily activity. However, SNSs (such as Instagram) can generate several gratifications, and their usage may also cause negative outcomes such as addiction. Consequently, an addictive behaviour may lead a minority of users to lose control of their SNS usage and ultimately suffer SNS addiction. Consequently, the aim of present study was to explore the drivers and consequences of Instagram addiction in greater depth. This study investigated the effect of recognition, information, social and entertainment needs on Instagram addiction. Moreover, it investigated the association between Instagram addiction, academic performance, depression, social anxiety, and life satisfaction. Additionally, the moderating role of physical activity on the relationship between needs and Instagram addiction was investigated. The findings contribute to the literature on Instagram addiction and the factors associated with it in the following respects.

Needs and Instagram addiction

With regard to the relationship between Instagram addiction and its predictors, the findings demonstrated that recognition needs, social needs, and entertainment needs were positively associated with Instagram addiction. These findings are in line with prior research (e.g., Alhabash & Ma, 2017; Chen, 2017) and suggests that Instagram users return to Instagram so that recognition needs, social needs, and entertainment needs can be met. Sheldon and Bryant (Sheldon & Bryant, 2016) asserted that Instagram users place more emphasis on self-promotion and self-identity which support the findings here regarding the relationship between recognition needs and Instagram addiction. Moreover, Arnett (2014) stated that the younger generation are likely to establish their own identities by seeking others' approval. Research has shown that students tend to regularly share live streams, videos and photos on Instagram to get "like" and "comment" from peers as approval (Baker et al., 2019).

Such activities allow Instagram users to spend a lot of time and be completely involved with this platform, which, in turn, may lead to Instagram addiction among a minority of users. Contrary to expectation, the findings revealed a non-significant effect of information needs on Instagram addiction. This non-significant finding might be explained by the fact that, due to the different design and usability features of Instagram in comparison to other popular SNSs like Facebook and Twitter, other SNSs can be considered as a more appropriate platform for finding information and meeting information needs in comparison to Instagram. For instance,

Twitter is a better platform for acquiring information because it emphasizes text-based information sharing in comparison to Instagram which emphasizes visual image sharing.

Consequently, it can be concluded that there are better alternative platforms that exist for meeting information needs, and therefore these needs are not predictors of Instagram addiction. The results also showed that social needs were positively related with Instagram addiction. Young adults are at a critical stage in the maintenance of their relationships (Arnett, 2014) and now rely on social support via SNSs to maintain such relationships (Choi & Lim, 2016) such as Instagram. A sense of obligation to respond peers' social requests can become burdensome for students (Maier et al., 2015), and this responsibility may force them to spend more time on Instagram for social support and may result in addictive use of Instagram among a minority of users.

In addition, the desire to experience these social gratifications regularly may lead students to improve their sense of belonging to Instagram, which could also contribute to Instagram addiction (Gao et al., 2017). The results also found a positive association between entertainment needs and Instagram addiction. Selfie-posting on Instagram is an activity that is associated with entertainment gratifications (Sung et al., 2016) and it is a popular activity among young adults (Pounders et al., 2016). Instagram – as a life-sharing platform for “showing, not telling” stories to others – provides a filter on photos, allowing its users to embrace their own humility or to experience a new look. Instagram users (i.e., students) make efforts to meet their entertainment needs by frequently selfie-posting and become virtually involved in their social circles, which increase their Instagram use and may lead to Instagram addiction among a minority of users.

The consequences of Instagram addiction

The results of present study demonstrated that Instagram addiction had a negative impact on students' academic performance, which is consistent with previous studies (e.g., Koc & Gulyagci, 2013; Andreassen & Pallesen, 2014). This finding indicates that for students who may be intensive Instagram users, expressing themselves, maintaining relationships, and engaging on the platform are time-consuming activities that may reduce the time available to study and may have an adverse impact on their academic performance (Skiera et al., 2015). The present study also found that academic performance was a positive predictor of students' life satisfaction. This implies that an individual's failure or success in important life domains

(i.e., academic performance) can influence judgment of their life satisfaction. Academic performance for university students is considered one of the most critical domains in life satisfaction (Lepp et al., 2014).

The results demonstrated that Instagram addiction had a positive association with social anxiety. This result is consistent with the finding of Frost and Rickwood (2017) and Shaw et al. (2015) who found a significant association between social media addiction and social anxiety. Furthermore, the findings showed that social anxiety was a negative driver of life satisfaction. Instagram provides a variety of information for its users and this information can be source of social comparison. SNS users have a tendency to share positive aspects of their personal life and news (Delise, 2014) and this, in turn, may engage other users in upward social comparison. Moreover, individuals experience upward comparison behaviour when they compare themselves with others with more likes, comments, or followers (Chua & Chang, 2016). The aforementioned statements indicate that those addicted to Instagram are sometimes exposed to unrealistic information and they have a tendency to compare themselves with other users who are considered as superior and feel themselves as incompetent and, in turn, this upward comparison increases social anxiety (Karauskos et al., 2010; Koc & Gulyagci, 2013) which leads to lower life satisfaction (Chan, 2014; Błachnio et al., 2016). In relation to health and wellbeing, Cramer (2017) found that Instagram and Snapchat (i.e., two image-focused platforms), were the most problematic and they may cause feelings of anxiety and inadequacy among young people. In another study on the effect of fitspiration imagery on women's body image, Tiggemann and Zaccardo (2015) found that exposure to fitspiration images was associated with female body dissatisfaction and that appearance comparison mediated the influence of image type on body image. Such findings illustrate the role of social comparison in triggering negative mood states.

The results also found a positive association between Instagram addiction and depression, which is consistent with previous studies on addiction to social media platforms (Hussain et al., 2017; Foroughi et al., 2019). The negative relationship between Instagram addiction and depression can be explained by social competition and feeling of envy. Foroughi et al. (2019) stated that the addictive use of a social media platform may lead to feelings of envy, which in turn lead to depression. Additionally, individuals can feel depressed if they perceive that they have not succeeded to win in the competition for power and attractiveness (social competition). The feelings of low social attractiveness and power can be triggered by what others share about

themselves and also what other users say about themselves (Walther et al., 2009). The present findings also illustrated that life satisfaction was negatively associated with depression. The negative influence of depression on life satisfaction has been confirmed in the previous studies (Celik et al., 2018; Oosterveer et al., 2017).

Moderating effect of physical activity

The findings of the present study identified that physical activity negatively moderated the effect of students' social needs and entertainment needs in relation to Instagram addiction. This suggests that social and entertainment needs of students with higher physical activity are less likely to lead to Instagram addiction. The results explained that those on Instagram who have a low level of physical activity are more susceptible to Instagram addiction because they fulfil their social and entertainment needs via Instagram. Physical activity enables students to meet their entertainment needs by doing something physical instead of sitting and surfing on Instagram. Furthermore, the students with high level of physical activity are more likely to participate in social events offline and consequently have higher chance of meeting their social needs by being in touch with people in real world instead of using virtual alternatives such as Instagram. As such, they probably fulfil their desire and needs by engaging in sporting activities instead of spending time on Instagram.

Theoretical and practical implications

The findings provide theoretical and practical implications for solutions relevant to students' Instagram addiction. The main theoretical implications of the present study are the findings (i) address the previously unexplored associations between the uses and gratifications of Instagram, Instagram addiction, academic performance, social anxiety, depression, and life satisfaction. The relationships between these variables provide greater theoretical understanding and knowledge concerning Instagram addiction; and (ii) shed additional insight on the significant uses and gratifications that underlie Instagram use that potentially instigate Instagram addiction among university students. Moreover, by incorporating physical activity as a potential protective factor, present study extends the emerging line of research on preventing Instagram addiction. Based on the findings of the present study, physical activity appears to have the capacity to offset the impact of social and entertainment needs of Instagram addiction among students. by incorporating physical activity as a potential protective factor, present study extends the emerging line of research on preventing Instagram addiction. Based

on the findings of the present study, physical activity appears to have the capacity to offset the impact of social and entertainment needs of Instagram addiction among students.

The results offer relevant practical implication for Instagram users, educators, families, policymakers, and social media operators to assist them designing addiction prevention strategies and policies. The findings suggest that recognition needs, social needs, and entertainment needs play a vital role in the development and maintenance of Instagram addiction. Awareness of factors that contribute to Instagram addiction could be utilized by education policymakers, parents, and students to help overcome challenges and help them take preventive action to counteract them. According to the findings of the present study, physical activity appears to minimize the effect of both social needs and entertainment needs. For social media operators, it is vital to know the potential harm of their services and take appropriate action to prevent the growth of Instagram addiction among their clientele (i.e., students). For instance, they could design exercise-related pages to motivate their clientele to exercise and promote physical activity to counter excessive Instagram use, as well as avoiding its negative consequences. In addition, it is advisable that education policymakers and families promote sport-related activities (i.e., high rate walking, and cycling on university campus) to help students to reduce their Instagram usage directly or indirectly. Additionally, the present study illustrated that there appear to be detrimental consequences of Instagram addiction, such as reduced academic performance, social anxiety, depression, and decreased life satisfaction. Therefore positive interventions and activities are needed to counter overuse of Instagram. For example, promoting sport-related activities could be useful not only in directly targeting reduced Instagram use but also indirectly inhibiting anxiety and depression among students with the aim of boosting their academic performance and life satisfaction.

Limitations and future research

The research utilized a cross-sectional self-report survey which cannot determine causal inferences. To shed further insight on the understanding of the temporal stability of Instagram addiction, longitudinal studies are needed. Other types of methodologies are also needed given that self-report methods are subject to biases. Another limitation of present research was that it explored the effect of Instagram addiction on only two types of psychopathological outcomes. Future studies could consider additional constructs such as loneliness and shyness. Furthermore, the present study investigated the impacts of needs upon Instagram addiction. Future studies need to further test the impacts of other factors such as being totally preoccupied

with Instagram alongside other social and occupational dysfunctions. Another suggestion for future work is to explore these associations by considering cross-cultural aspects in different countries because the present study only used participants from one university on one country and the findings are not necessarily generalizable. Therefore, it would be of utility to understand the degree to which the findings of this study are vary with regard to cultural concerns such as individualistic cultures versus collectivistic cultures. Finally, future studies need to test the moderating effect of gender and sexual orientation to determine whether males or females, or individuals of particular sexual orientation are more susceptible to the deleterious effects of Instagram.

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Table 1. Convergent validity of the study variables

First-order constructs	Second-order construct	Number of items	Factor loadings	CR	AVE
Recognition needs		5	0.810-0.929	0.941	0.763
Information needs		5	0.749-0.927	0.932	0.735
Social needs		5	0.743-0.894	0.899	0.640
Entertainment needs		5	0.817-0.902	0.934	0.740
Salience		3	0.837-0.904	0.912	0.776
Tolerance		3	0.846-0.914	0.918	0.789
Mood modification		3	0.834-0.935	0.925	0.805
Relapse		3	0.812-0.924	0.908	0.768
Withdrawal		3	0.824-0.936	0.923	0.801
Conflict		3	0.748-0.925	0.893	0.737
	Instagram addiction	6	0.744-0.866	0.918	0.651
Physical activity		4	0.765-0.939	0.952	0.768
Social anxiety		6	0.712-0.878	0.935	0.706
Depression		20	0.717-0.829	0.958	0.604
Life satisfaction		5	0.741-0.892	0.912	0.675

Notes: CR: Composite Reliability; AVE: Average Variance Extracted

Table 2. Hetrotrait-Monotrait ratio (HTMT)

	AP	DEP	EN	IN	IA	LS	PA	RN	SA	SN
AP										
DEP	0.165									
EN	0.102	0.362								
IN	0.071	0.085	0.174							
IA	0.314	0.417	0.436	0.288						
LS	0.371	0.410	0.130	0.109	0.358					
PA	0.117	0.192	0.064	0.106	0.441	0.120				
RN	0.168	0.227	0.444	0.342	0.596	0.294	0.235			
SA	0.319	0.369	0.107	0.083	0.495	0.520	0.222	0.337		
SN	0.102	0.198	0.232	0.372	0.523	0.153	0.214	0.386	0.326	

Notes: AP: Academic Performance; DEP: Depression; EN: Entertainment Needs; IN: Information Needs; IA: Instagram Addiction; LS: Life Satisfaction; RN: Recognition Needs; SA: Social Anxiety; SN: Social Needs; PA: Physical Activity.

Table 3. Standardized estimates of direct and moderating effects

Hypotheses	Relationships	Std. Beta	t-value	f2	Q2	R2	Decision
H1a	RN -> IA	0.295	5.675**	0.117			Supported
H1b	IN -> IA	0.058	0.829	0.005			Not Supported
H1c	SN -> IA	0.243	6.348**	0.091			Supported
H1d	EN -> IA	0.207	5.185**	0.068	0.292	0.484	Supported
H2a	IA -> AP	-0.297	5.699**	0.097	0.086	0.088	Supported
H2b	AP -> LS	0.204	3.449**	0.055	0.200	0.332	Supported
H3a	IA -> SA	0.406	8.048**	0.197	0.085	0.165	Supported
H3b	SA -> LS	-0.247	5.005**	0.078			Supported
H4a	IA -> DEP	0.452	11.984**	0.257	0.138	0.205	Supported
H4b	DEP -> LS	-0.323	5.583**	0.124			Supported
H5a	RN*PA -> IA	-0.012	0.359	0.009			Not Supported
H5b	IN*PA -> IA	0.003	0.097	0			Not Supported
H5c	SN*PA -> IA	-0.098	3.158*	0.025			Supported
H5d	EN*PA -> IA	-0.136	3.434**	0.034			Supported

Note: * $p < 0.05$; ** $p < 0.01$ (one-tail)

AP: Academic Performance; DEP: Depression; EN: Entertainment Needs; IN: Information Needs; IA: Instagram Addiction; LS: Life Satisfaction; RN: Recognition Needs; SA: Social Anxiety; SN: Social Needs; PA: Physical Activity.

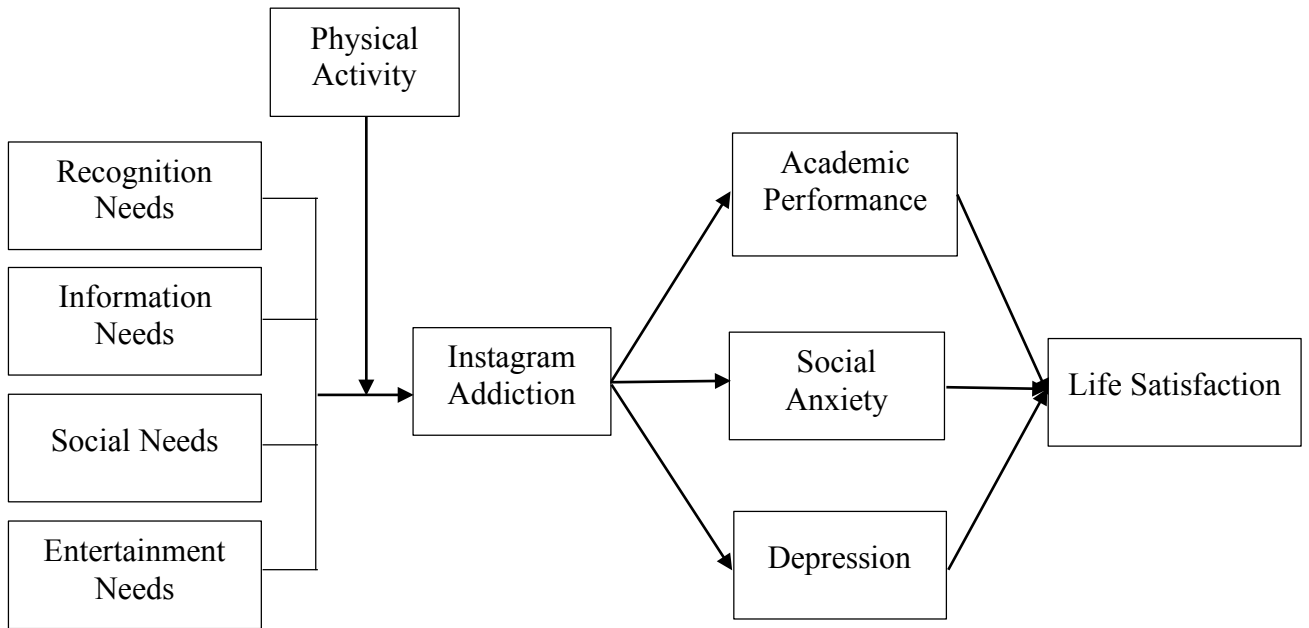


Figure 1. Research framework on drivers and outcomes of Instagram addiction

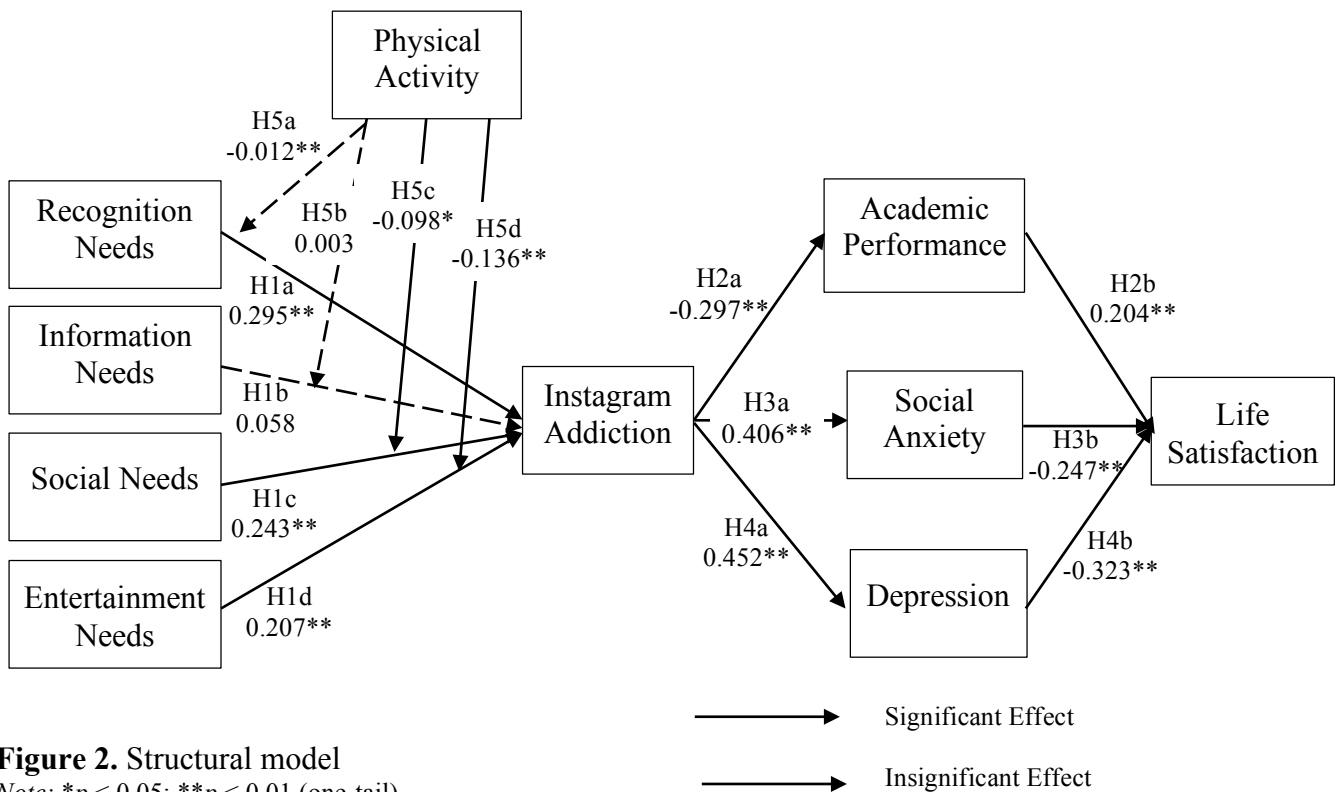
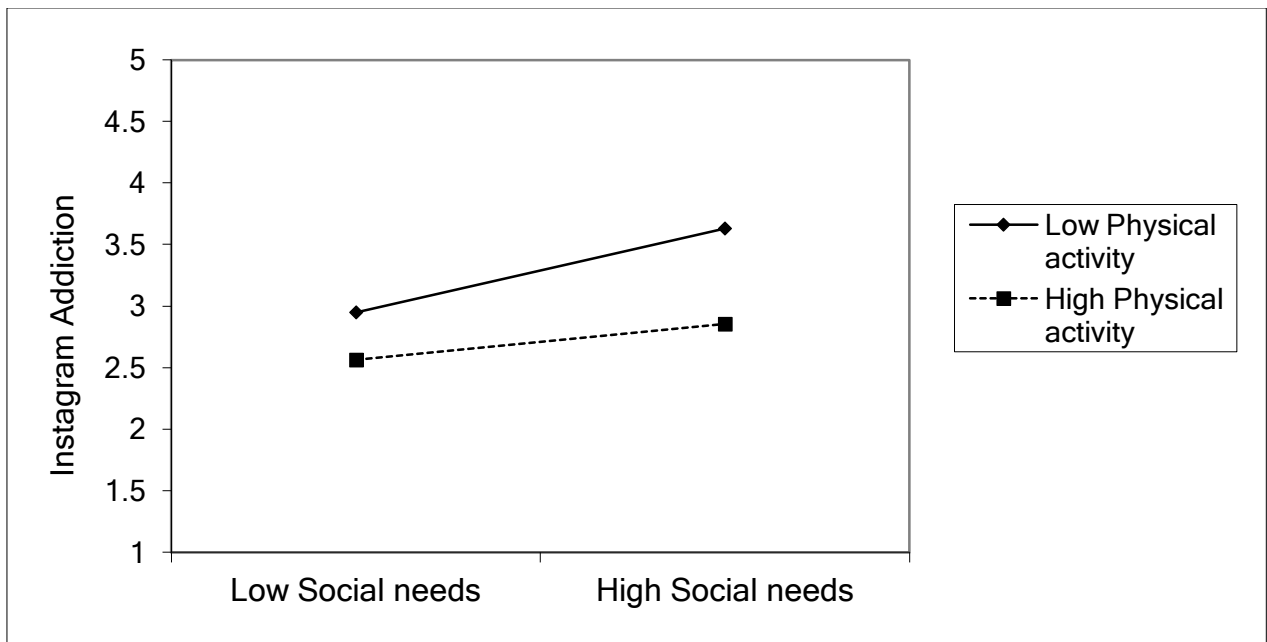


Figure 2. Structural model
 Note: * $p < 0.05$; ** $p < 0.01$ (one-tail)

a)



b)

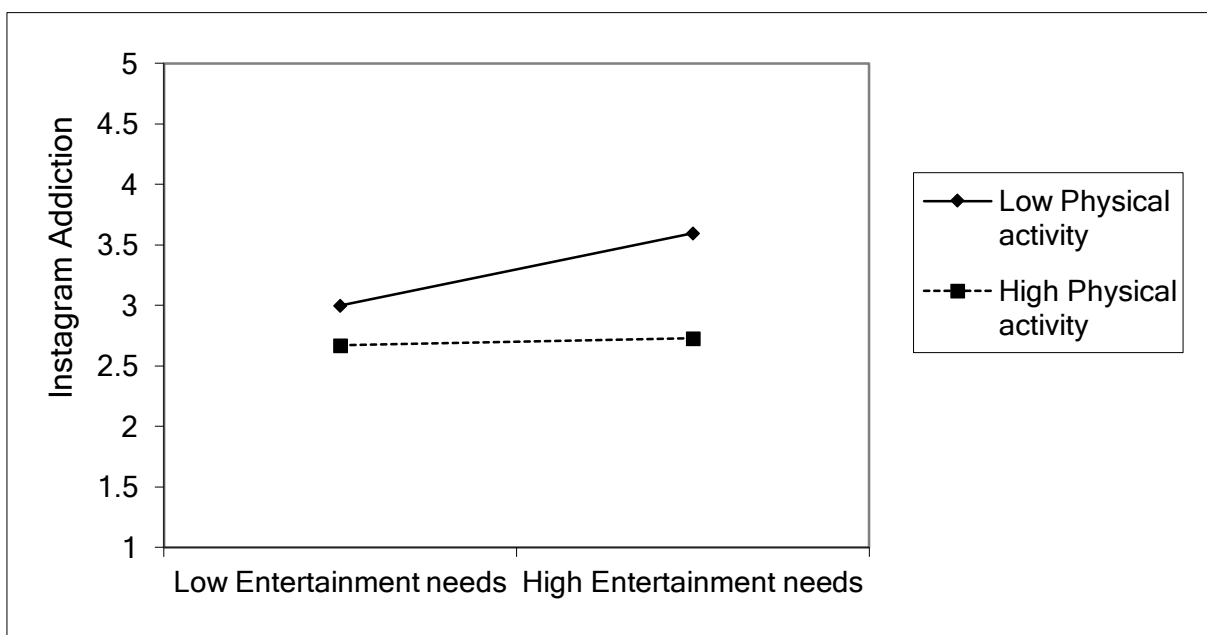


Figure 3. Moderating effect of physical activity