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Instagram and Life-satisfaction: Does Fear of missing out act as a mediator in the relationship between Instagram use and Life-satisfaction of young adults?

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Abstract

With more than one billion monthly users, Instagram is currently the fastest growing social networking site in the world. Its image-driven nature might encourage users to mainly share positive and idealized moments of their lives, as it has been argued. But how might the continuous access to information about other people's lives affect one's own satisfaction with life? While fear of missing out (FoMO) describes the fear that others might be having pleasing experiences which one is missing, the present study aimed to investigate whether FoMO might act as a mediator in the relationship between Instagram use and life-satisfaction. Furthermore, it was expected that Instagram use would be negatively associated with life-satisfaction, and positively related to FoMO. Additionally, it was hypothesized that FoMO would be negatively associated with satisfaction with life. To test these hypotheses, an online survey that was part of a larger study on smartphone use, was conducted. The final sample consisted of 109 participants with a mean age of 21,6 years, of which 76 were female and 33 were male. Spearman's rank correlation analysis revealed no significant association between Instagram use and life-satisfaction, and between Instagram use and FoMO. A significant, negative association was found between FoMO and satisfaction with life, indicating that individuals with lower FoMO tend to be more satisfied with their lives. As expected, the indirect effect of Instagram use on life-satisfaction was found to be significant, showing that a mediation effect of FoMO did occur. To conclude, it can be said that FoMO played a significant role in the relationship between Instagram use and satisfaction with life. Future research within the field should further investigate the concept of FoMO and focus on the development of strategies that help with its management in everyday life. Additionally, future studies should consider the different motives and types of Instagram use and the influence of other factors besides FoMO when investigating their relation to satisfaction with life.

Introduction

Over the last decade, smartphones and social media have become increasingly important in many people`s every-day lives. Social networking sites like Instagram make it possible to follow online what others are doing in their life, from anywhere at any time (Lup, Trub, & Rosenthal, 2015). Since many online platforms, such as Instagram, require the user to upload photos or videos to create new content, people might feel encouraged to share only the most positive or favorable moments of their life, as journalists have argued. Due to the omnipresence of social media, its effects on the users' way of thinking, behaving, and feeling have received considerable attention during the last years (Pavot & Diener, 2008). Nevertheless, opinions about the impact of social media use have been inconsistent (Berryman, Ferguson, & Negy, 2017). While some are worried that the growing presence of social media may have adverse outcomes on mental health, others are convinced of its usefulness as an interactive tool and its importance in young adults' developmental process of forming and presenting their identities online (Berryman, Ferguson, & Negy, 2017). Hence, further research is needed to determine which opinions and beliefs can be supported by scientific evidence.

Research findings of the consequences of social media use have been mixed and sometimes even conflicting (Yang, 2016). Some studies demonstrate that social media use might be associated with lower feelings of loneliness, whilst others reported higher feelings of loneliness in social media users than in non-users (Yang, 2016). Potential benefits of social networking have been related to increased social interaction, social capital, and self-esteem (Lup, Trub, & Rosenthal, 2015). However, especially the passive use of social media (e.g. reviewing other's profiles without posting new content oneself) has been linked to negative consequences for one's psychological well-being (Lup, Trub, & Rosenthal, 2015). Problematic Instagram use refers to excessive use due to an uncontrollable urge that may lead to symptoms and consequences that are addiction-like (Kircaburun, & Griffiths, 2018) and has been associated with lower self-liking (Balta et al., 2018). Additionally, in a recent study that examined the prevalence of Instagram addiction, it was found that about one-third of a sample of 752 university students had problematic levels of Instagram use (Kircaburun, & Griffiths, 2018). Social media use, in general, has been linked to depressive symptoms, negative affect, decreased life-satisfaction, and diminished subjective well-being (Jackson & Luchner, 2018). Considering previous research findings for a better understanding of the processes that are at work, this study will focus on Instagram use in specific and its relation to the user's satisfaction with life.

Concerned about the psychological consequences of the ever-expanding presence of social media and the continuous access to information about other people's lives, researchers recently have started to focus on a phenomenon called "fear of missing out" (FoMO) (Alt, 2015). FoMO describes the fear that others might be having pleasing experiences which one is missing. It might therefore partly account for adverse effects of social media on mental health, such as more negative evaluations of one's quality of life, and thus result in lower levels of life-satisfaction. Even though the phenomenon of FoMO does not necessarily have to happen online, it has been studied almost exclusively in the context of social media (Baker, Krieger, & LeRoy, 2016). Through its definition, the concept of FoMO has obviously been linked to social comparison processes (Reer, Tang, & Quandt, 2019). At the same time, it has been found that individuals high in depression, anxiety, and loneliness are more likely to compare themselves with others (Reer, Tang, & Quandt, 2019). Those people might therefore conclude more often that others are having better lives or more rewarding experiences, which is a central aspect of FoMO (Przybylski et al., 2013). This consequently stresses the importance of focussing on FoMO when investigating the relationship between Instagram use and satisfaction with life.

Despite the growing body of research on social media and mental health in general, there is not much existing scientific literature about Instagram usage in relation to user's life-satisfaction and the concept of FoMO. For that reason, the present study will focus on the relationship between Instagram use and fear of missing out, as well as on the relationship of these two concepts with the user's life-satisfaction. Since individuals between the ages of 20 and 30 were found to be the most frequent users of social media (Thayer & Ray, 2006), this study will target young adults.

Instagram

Instagram is currently the fastest growing social networking site in the world (Sheldon & Bryant, 2016). This mobile-based application, which was founded in 2010, is used to share photos and videos online (Ting et al., 2015). Hashtags provide the opportunity to search for specific pictures and videos, while the users are offered a range of filters and special effects to edit their photos before uploading them (Sheldon & Bryant, 2016). Through a more recent update of Instagram, the user now even has the possibility to broadcast live streams (Kircaburun & Griffiths, 2018). With Instagram being a valuable communication and marketing tool, it became more and more attractive to the individual, as well as for companies (Ting et al., 2015). In a recent estimation, it was reported that Instagram has more than one billion monthly users, while it mostly reaches the younger generation (Kang & Wei, 2020). Differences have been

found in the way of making use of Instagram, as well as in the general motivations for its use, both will be explained further in the following.

Instagram provides a social connectivity that allows it to follow an unlimited number of other users (Hu, Manikonda, & Kambhampati, 2014). Users that follow other Instagram users are called "followers". Furthermore, Instagram's social network is organized asymmetrically, meaning that if user A follows user B, user B does not necessarily need to follow user A back. Instagram users can view the latest stream of photos or videos posted by the accounts they follow. However, even though images and videos are by default visible for everybody, users have the possibility to adjust their privacy preferences. Additionally, they can like others' photos or videos by clicking on a heart icon, yet there is no option to "dislike" posts (Lup, Trub, & Rosenthal, 2015).

Yang (2016) conducted an online self-report survey to measure participants' frequency of engaging in different types of Instagram activities. The outcomes of his study indicated that Instagram uses generally could be divided into three types of activities: *IG interaction*, *IG browsing,* and *IG broadcasting* (Yang, 2016). *IG interaction* includes interactive behaviors such as direct communication, commenting on, or replying to other people's posts, or "tagging" others in one's own comments and posts. *IG browsing* describes the passive reviewing of the newsfeed/ homepage or checking out other people's profiles without leaving comments. Despite its passive nature, *IG browsing* is still regarded as an interactive activity. *IG broadcasting* is defined as the active sharing of information that is not directed at a specific person, such as posting or uploading content without tagging another person. It is, therefore, the only non-interactive form of using Instagram.

Previous research has shown that individual users value Instagram mainly for its usefulness in sharing information and staying in contact with friends (Ting et al., 2015). Peer pressure, or simply using Instagram because all their friends have an account, might be another "social" reason for some people, as it was found by Subrahmanyam et al. (2008). In another study, Sheldon and Bryant (2016) conducted a survey to investigate students' motives to use Instagram. The results of their study revealed four main motives for the use of Instagram, with the most influential one being the ability to follow online what others are doing. Apart from that, "Documentation", "Creativity" and "Coolness" were found to be the remaining three main motives for using Instagram (Sheldon, & Bryant, 2016).

Studies that have been done within the context of social media and life-satisfaction have found positive associations between extensive social media use and stress, as well as between anxiety and depression, which consequently decreased satisfaction with life (Hawi & Samaha,

2016). Instagram use was found to be positively associated with depressive symptoms, and with depressive symptoms resulting from social comparison (Lup, Trub, & Rosenthal, 2015). Especially people who follow more "strangers" seem to struggle with more negative emotions due to comparisons of oneself to others and the belief that those "others" have better lives. This belief might be supported by the image-driven nature of Instagram, which encourages the sharing of mostly favorable photos and positive moments of one's life. In contrast to Facebook, following someone on Instagram must not necessarily be reciprocal, and might therefore only go in one direction. Lup, Trub, and Rosenthal (2015) argue that this feature might contribute to the trend of following celebrities on Instagram. That, in turn, adds to the tendency of judging oneself in relation to the idealized and filtered photos of those celebrities and/ or "strangers".

Satisfaction with life

Since the ability to follow other's activities online has been identified as the main motive for using Instagram, one might wonder how the continuous access to information about other people's lives might be related to the users' satisfaction with their own lives. Life-satisfaction has been identified as one of three components of subjective well-being, with the other two components being positive and negative affect (Pavot & Diener, 2008). Life-satisfaction itself has been defined as a construct that embodies a global and cognitive evaluation of one's life as a whole (Pavot & Diener, 2008). It refers to a cognitive judgement of a person's overall quality of life according to the person's individually chosen criteria (Diener et al., 1985). Hence, individual satisfaction with life depends upon comparisons of one's present life circumstances with what one perceives as an appropriate standard for him- or herself (Diener et al., 1985). Due to its judgemental nature, life-satisfaction is related to the affective components of subjective well-being, but despite that, it remains partially independent. Scientific evidence revealed that life-satisfaction judgements can be influenced by temporarily accessible information and recent contexts, indicating that a person's life-satisfaction evaluations might vary from time to time (Schwarz, & Strack, 1999). Generally, judgements of one's satisfaction with life are thought to rely mainly on chronically accessible information inlcuding a person's moods, temperament, and emotions, while the impact of events or changes in one's life is usually temporary (Pavot & Diener, 2008). Moreover, previous research established that the influence of personality dispositions on an individual's satisfaction with life is mediated by the impact of those personality dispositions on the individual's chronic moods (Pavot & Diener, 2008).

With the growing influence of the internet, scientists have started to investigate life-satisfaction in relation to social media use (Longstreet & Brooks, 2017). Outcomes of a study

by Longstreet and Brooks (2017) about life-satisfaction as key to managing social media addiction, indicated that life-satisfaction and social media addiction might be inversely related. According to their findings, as stress increases, individuals' satisfaction with life will decrease, which in turn might lead to increased use of social media (Longstreet & Brooks, 2017).

Despite the growing body of research about the association between social media and psychological well-being, little existing literature focuses on Instagram use specifically in relation to life-satisfaction, which is why this study aims to elaborate on that.

Fear of Missing Out (FoMO)

The concept of life-satisfaction incorporates a global and cognitive evaluation of one's life quality (Pavot & Diener, 2008). This raises the question of how this evaluation might be influenced by the continuous exposure to information about the lives of others and the feeling that those people are doing better than oneself (Przybylski et al., 2013). The fear of missing out has been defined as "(…) *a pervasive apprehension that others might be having rewarding experiences from which one is absent* (…)" (Przybylski et al., 2013, p.1). Regarding the concept of life-satisfaction, FoMO might play a role in the cognitive evaluation of one's life quality.

People who fear missing out have a strong ambition to stay connected and to keep up with what others are doing (Przybylski et al., 2013). Consequently, these people are likely to make use of social media applications such as Instagram to ensure their social connection. Especially the younger, or so-called iGeneration, consisting of those born in the 1990s and 2000s, are becoming increasingly dependent on social media and on average check their phones every 15 minutes (Stead & Bibby, 2017). Recent studies found that problematic Instagram and smartphone use might be related to higher levels of FoMO (Balta et al., 2018).

Especially with the increasing presence of social media in people's daily lives, the interest in FoMO has been rising. Despite that, the concept of FoMO is scientifically still rather unexplored. However, fear of missing out seems to be universal across cultures and more prevalent in the younger generation (Baker, Krieger, & LeRoy, 2016). Przybylski et al. (2013) found that individuals with lower levels of basic psychological needs satisfaction in terms of efficacy, autonomy, and relatedness to others, showed higher levels of fear of missing out. Additionally, they observed that young adults and students with higher levels of FoMO reported ambivalent feelings towards social media in general, while they were found to more likely give in to the temptation of checking messages and social media utilities than those with lower levels of fear of missing out. Furthermore, fear of missing out seems to be related to social envy and social exclusion since individuals with high FoMO tend to overestimate the positive emotional

experiences and underestimate negative emotional experiences of other people's lives in comparison to their own (Stead & Bibby, 2017).

Existing research indicates that individuals high in FoMO are likely to suffer from negative impacts on their mental and physical health (Baker, Krieger, & LeRoy, 2016). In fact, proponents of social monitoring theories have argued that, due to a perceived threat to one's social connections, FoMO might activate the social monitoring system, which in turn can lead to the somatic experience of physical pain (Baker, Krieger, & LeRoy, 2016). Social monitoring theories hold that people can, to some extent, detect social threats and are able to assess the likelihood of being excluded by others. According to this view, people who feel rejected by a group or other individuals might experience social pain, which is thought to have common neural correlates and somatic experiences as physical pain (Baker, Krieger, & LeRoy, 2016). Additionally, it is known that high social pressure or distress, such as the fear of missing out, can lead to psychosomatic symptoms and sickness behaviors (e.g. sleepiness, reductions in activity etc.).

The present study

The general aim of the present study was to understand whether fear of missing out plays a role in the relation between Instagram use and satisfaction with life.

Instagram use in general has been positively associated with depressive symptoms and negative social comparison (Lup, Trub, & Rosenthal, 2015). Since the concept of life-satisfaction comprises a global and cognitive evaluation of one's life-quality (Pavot & Diener, 2008), Instagram use is expected to be negatively associated with satisfaction with life.

For many, the main motive for using Instagram is to keep up with what others are doing (Ting et al., 2015). However, due to its image-driven nature, Instagram encourages users to share and emphasize mostly positive and favorable moments of their life (Lup, Trub, & Rosenthal, 2015). FoMO on the other hand describes the fear that others might be having pleasing experiences which one is missing. Hence, it is hypothesized that Instagram use is positively associated with fear of missing out.

The experience of fear of missing out can lead to high levels of psychological distress (Baker, Krieger, & LeRoy, 2016). It is therefore not surprising that Przybylski et al. (2013) found in their study of motivational, emotional, and behavioral correlates of fear of missing out, that those with higher levels of FoMO tend to report lower levels of life-satisfaction. Thus, fear of missing out is expected to be negatively associated with satisfaction with life.

In a study of 360 Facebook users, Błachnio and Przepiórka (2018) found that low levels of FoMO are related to satisfaction with life. Furthermore, recent studies suggested that

problematic Instagram and smartphone use might be related to higher levels of FoMO (Balta et al., 2018). At the same time, it has been discovered that individuals high in FoMO are likely to suffer from negative impacts on their mental and physical health (Baker, Krieger, & LeRoy, 2016), which in turn have been found to decrease satisfaction with life (Hawi, & Samaha, 2016). Based on this reasoning, FoMO is expected to have a mediating effect on the relationship between Instagram use and life-satisfaction (see Figure 1).

The present study aims to investigate whether FoMO may act as a mediator in the relationship between Instagram use and life-satisfaction of young adults between 18 and 30 years. Furthermore, the relationship between Instagram use, fear of missing out, and life-satisfaction will be investigated. With regard to these research aims, four hypotheses have been posed.

**Hypothesis 1:** Instagram use is negatively associated with satisfaction with life.

Hypothesis 2: Instagram use is positively associated with fear of missing out.

Hypothesis 3: Fear of missing out is negatively associated with satisfaction with life.

Hypothesis 4: Fear of missing out acts as a mediator in the relationship between Instagram use and life-satisfaction.

Figure 1

Model of the expected mediation effect
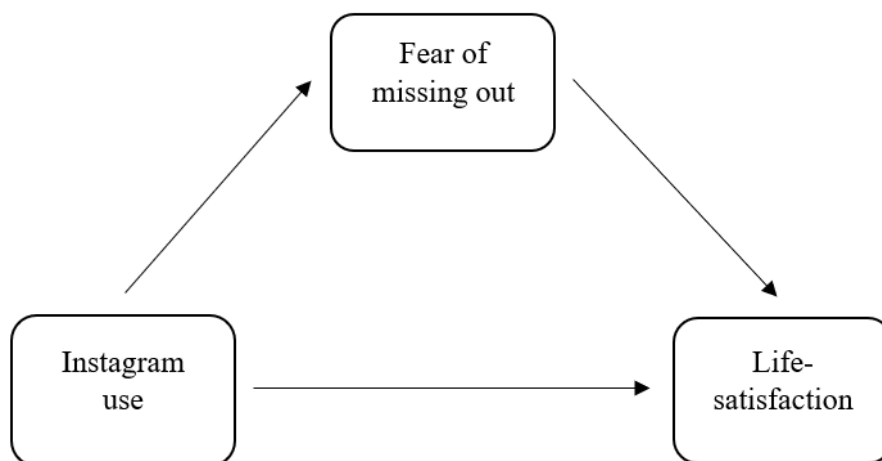
Note. Conceptual model of the expected mediation effect of fear of missing out on the relationship between Instagram use and life-satisfaction.

Methods

Design

The present study had a cross-sectional design and was part of a larger study on smartphone use. The questionnaire was created in cooperation with three other researchers. It consisted of a total of 156 items and was partly composed of pre-existing questionnaires and scales, of which some are not relevant for the purpose of this research and will therefore not be discussed further.

Materials

Instagram use was assessed by the amount of time spent on this platform per day. Of the sixty items that have been created to assess the participants' smartphone and social media use, only those were used which referred to Instagram as the participants' first, second, or third most used social media platform. Participants were asked to respond to a corresponding follow-up question about their daily Instagram usage ("How much time do you spend on average daily on your first/second/third most used social media platform?"). This item was assessed using an eight-point Likert-scale, with answer options ranging from "5 – 15 minutes" to "more than two hours". In consideration of whether Instagram had been indicated to be the first/ second or third most used platform, the item was used to create individual composite scores, which reflected how much time on average each respondent spends daily on Instagram.

The Fear of Missing Out scale was developed by Przybylski et al. (2013) and is a brief self-report assessment, sensitive to different levels of the fear of missing out construct as an individual difference. The scale consists of 10 items that are assessed by the means of a five-point Likert-scale ranging from "Not at all true of me" to "Extremely true of me". Items are made up of statements like "I get anxious when I don't know what my friends are up to.". For the calculation of the final test score, which reflected the respondent's level of fear of missing out, the individual scores per item were added up and divided by the number of items. Final scores could range from 1-5, with higher scores indicating higher levels of FoMO. The scale has shown to possess high reliability with a Cronbach's Alpha of .87 (Przybylski et al., 2013). Within the present study, the fear of missing out scale displayed good internal consistency (α = .79).

The 10 items of the FoMO scale were subjected to a factor analysis using principal component analysis as the extraction method. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was .73 and Bartlett's Test of Sphericity was significant ($p < .01$), indicating that the selected items were suitable for the factor analysis (Yong & Pearce, 2013). The determinant score of .27 assured the absence of multicollinearity (the cut-off score is at .00001)

(Yong & Pearce, 2013). For the FoMO scale in the current sample, the scree plot showed a one-factor solution that accounted for 35.35% of the variance, with an Eigenvalue of 3.54. These findings were consistent with previous dimensionality assessments of the FoMO scale that revealed a strong single-factor solution (Przybylski et al., 2013). Factors are said to explain a lot of the variance if the factor-specific variables have high communalities (Yong & Pearce, 2013). The factor loadings of a variable determine how much it contributes to a certain factor. Variables with a factor loading of less than .20 are usually eliminated from the analysis (Yong & Pearce, 2013). For the present analysis, factor loadings ranged from .32 to .81, indicating that all 10 items of the FoMO scale were suitable for further analysis.

The Satisfaction With Life Scale (SWLS) was developed by Diener et al. (1985) and is used to measure an individual's global satisfaction with life. It asks respondents for an overall evaluation of their life, rather than focussing on more specific domains of life-satisfaction (Diener et al., 1985). The scale is composed of five items that consist of statements like "In most ways, my life is close to my ideal.". The individual is asked to indicate the degree to which these statements apply to him- or herself by the means of a seven-point Likert-scale ranging from "strongly disagree" to "strongly agree". The test scores for every item were then added up to create a total score, which mirrored the respondent's overall satisfaction with life. This total score could range from 5-35, while a higher score displayed higher satisfaction with life. With its high internal consistency and high temporal reliability, the SWLS has shown to have favorable psychometric properties (Diener et al., 1985). Within the present study, the SWLS displayed high internal consistency with a Cronbach's Alpha of .87. To assess whether the five items of the SWLS had the same latent factor in common, a factor analysis using principal component analysis as the extraction method was conducted. The KMO measure was .84 and Bartlett's Test of Sphericity was significant ($p < .01$), demonstrating suitability for the factor analysis. The determinant score was .08, which displayed the absence of multicollinearity. The factor analysis revealed a one-factor solution, explaining 66.95% of the variance with an Eigenvalue of 3.35. Factor loadings ranged from .76 to .90. Overall, the results of this factor analysis were consistent with previous factor analyses of the SWLS (Diener et al., 1985).

Participants

Inclusion criteria required sufficient English skills and being between 18 and 30 years old. Since this study focused on Instagram use, only participants who reported Instagram to be their most used, second most used, or third most used social media platform were included in the study. A total of 181 questionnaires was filled out, of which 43 have been deleted due to incomplete participation and 29 due to deficiencies in fulfilling the inclusion criteria. The final

sample consisted of 109 participants, of which 76 were female and 33 were male. The mean age was 21,6 years and the large majority of the respondents reported to be students (99 participants). The total sample included participants from 11 different countries. While most of the respondents were German (77 participants), Dutch, Turkish, French, Argentinian, Australian, Bulgarian, Dominican, Romanian, and Norwegian nationalities were also represented.

Procedure

The research was approved by the Ethics Committee of the Faculty of Behavioural Sciences (file number 200335). The questionnaire used for data collection was created using Qualtrics and uploaded on SONA systems, which is a research platform provided by the University of Twente. Participants were recruited through convenience sampling. Besides uploading the questionnaire on SONA, where it is only available to students of the University of Twente, the link for the survey was shared via the messaging WhatsApp and the social media platform Instagram within the social network of the researchers. The participants took part voluntarily and had agreed on the consent form (see appendix 1.1) before completing the questionnaire. The link to the questionnaire was online for a period of three weeks.

Before responding to the actual questionnaire, participants were asked to answer four demographic questions concerning their age, gender, nationality, and occupation, and to indicate whether they owned a smartphone or not. If that was not the case, participants were directly led to the next block of questions. The completion of the questionnaire took participants 36 minutes on average.

Data analysis

The gathered data was imported to the statistical program IBM SPSS statistics (version 26) for further analysis. Descriptive statistics were calculated with the three variables Instagram use, life-satisfaction, and fear of missing out. Since analyses of normality and linearity with the respective variables revealed that the conditions for Pearson's correlation could not be met, a nonparametric Spearman's Rank correlation test was computed to test the first three hypotheses. According to Cohen (1988), a correlation coefficient is considered low when $r < .30$, moderate when r is between .30 and .50, and high when $r > .50$.

For testing the last hypothesis (H4: Fear of missing out is expected to act as a mediator in the relationship between Instagram use and life-satisfaction.), a mediation analysis using the PROCESS macro for SPSS, was conducted. Instagram use was entered as the independent variable, fear of missing out as the expected mediator, and life-satisfaction as the dependent variable (see Figure 2 & 3). Bootstrapping was used as a non-parametric approach to effect-

size estimation, as it produces a test that is not based on large sample sizes and can therefore be applied more confidently to smaller samples (Preacher & Hayes, 2004).
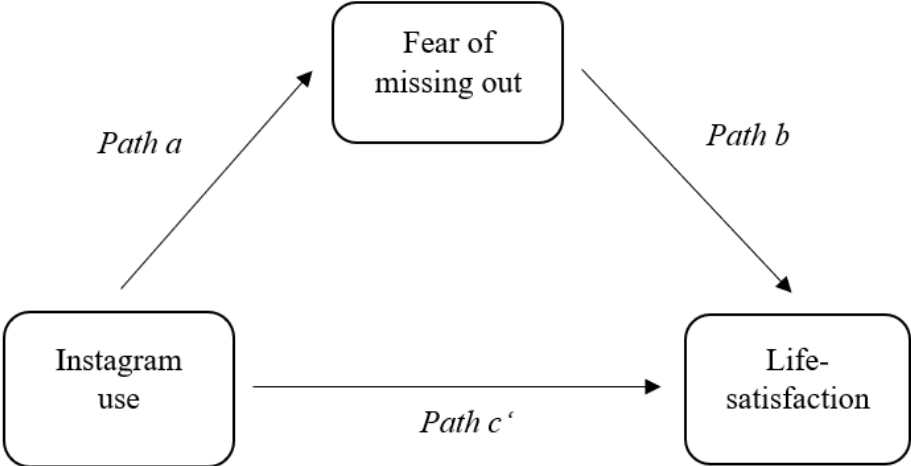
Figure 2

Model of the total effect
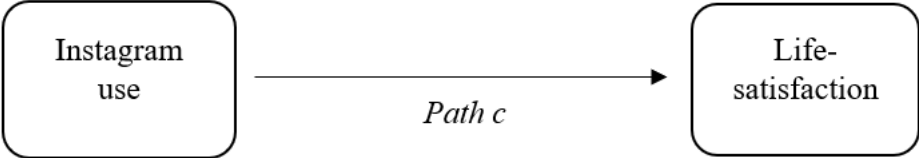
Note. Conceptual model of the relationship between the independent variable Instagram use and the dependent variable life-satisfaction.

Figure 3

Model of the (expected) indirect effect

Note. Conceptual model of the (expected) mediation effect of fear of missing out in the relationship between the independent variable Instagram use and the dependent variable life-satisfaction.

Results

The results of the analyses will be reported sequentially in the following. Before doing so, the descriptive statistics of the three variables will be presented. As can be seen in Table 1, the mean score for Instagram use was 5.25, meaning that respondents spend on average between one and one and a half hours a day on Instagram. For life-satisfaction, the mean score was 23.88, which, according to Diener et al. (1985), indicates that participants on average reported to be slightly satisfied with their lives. The average life-satisfaction of the present sample was lower in comparison to the life-satisfaction mean score of 26.18 another study with a sample of

Dutch students (Arrindell, Heesink, & Feij, 1999). The mean FoMO score was 2.53, while scores could range from 1-5, with higher scores indicating higher levels of FoMO. Compared to the study of motivational, emotional, and behavioral correlates of fear of missing out by Przybylski et al. (2013), the mean FoMO score of the present sample was higher than the mean FoMO score of 1.89 in their study.

Table 1

Descriptive statistics

Variables	N	Min.	Max.	M	S.E.	SD
Instagram Use	109	1	8	5.25	.20	2.13
Life Satisfaction	109	5	35	23.88	.59	6.14
FoMO	109	1.1	4.2	2.53	.06	.65

Hypothesis 1

For the assessment of the first hypothesis (H_1: Instagram use is expected to be negatively associated with satisfaction with life.) a Spearman's rank correlation between the variables Instagram use and life-satisfaction was calculated. The results indicated a non-significant correlation (r_s = -.05, p = .65) (see table 2). The first hypothesis could therefore not be confirmed.

Hypothesis 2

For the second hypothesis (H_2: Instagram use is expected to be positively associated with fear of missing out.) a Spearman's rank correlation was computed between Instagram use and fear of missing out. The test revealed a non-significant association between Instagram use and fear of missing out (r_s = .17, p = .07), which contradicted with hypothesis 2 (see table 2).

Hypothesis 3

To test the third hypothesis (H_3: Fear of missing out is expected to be negatively associated with satisfaction with life.), a Spearman's rank correlation was calculated with the variables fear of missing out and life-satisfaction. The analysis revealed a statistically significant, low negative correlation between FoMO and life-satisfaction (r_s = -.27, p < .01). This indicates that individuals with lower FoMO tend to be more satisfied with their lives. These findings were in line with hypothesis 3 (see table 2).

Table 2

Nonparametric correlations (Spearman's rank correlations) between Instagram use, satisfaction with life, and fear of missing out.

		Life-satisfaction	Instagram use	FoMO
Life-satisfaction	r_s	1.00		
Instagram use	r_s	-.05	1.00	
FoMO	r_s	-.27*	.17	1.00

Note. *p < .05; r_s = Spearman's correlation coefficient

Hypothesis 4

To test the last hypothesis (H$_4$: Fear of missing out is expected to act as a mediator in the relationship between Instagram use and life-satisfaction.), a mediation analysis using the PROCESS macro for SPSS with 5000 bootstraps was carried out. The outcome variable for the analysis was life-satisfaction, fear of missing out was the expected mediator and Instagram use was the independent variable.

The effect of Instagram use on life-satisfaction was mediated by fear of missing out. Instagram use and fear of missing out (see path a in table 3) showed a low positive, statistically significant association with an unstandardized coefficient of .06 [t(107) = 2.12, p = .04)]. Fear of missing out and life-satisfaction (see path b in table 3) were significantly negatively related, the unstandardized coefficient of the regression was -2.71 [t(106) = -3.01, p< .01]. The unstandardized regression between Instagram use and life-satisfaction was found to be insignificant, both without controlling for fear of missing out (see path c in table 3) [b = .04; t(107) = .14, (p = .89)] and when controlling for fear of missing out (see path c' in table 3) [b = .21; t(106) = .75; p = .46]. The analysis showed that the unstandardized indirect effect between Instagram use and life-satisfaction was significant since the 95% bootstrap confidence interval did not contain zero [effect = -.17, 95% C.I. (-.3804, -.0036)]. This indicates that a mediation effect of fear of missing out did occur. Hence, hypothesis four could be confirmed.

Table 3

Table of the regression paths with Instagram use as the independent variable, life-satisfaction as the dependent variable, and fear of missing out as mediator.

Path	b	ß	se	t	p	F	R^2
a	.06	.02	.03	2.12	.04	(1,107) 4.49*	.04
b	-2.71	-.29	.91	3.01	<.01	(2,106) 4.55*	.08
c (total effect)	.04	.01	.28	.14	.89	(1,107) .02*	.00
c' (direct effect)	.21	.07	.27	.75	.46	(2,106) 4.55*	.08

Note. *95% confidence interval. b = unstandardized coefficient; ß = standardized coefficient
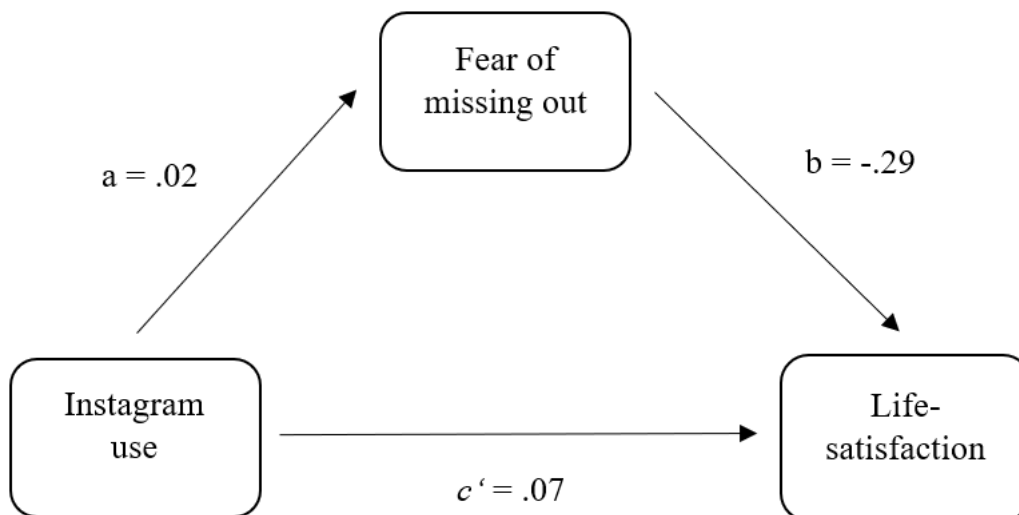
Figure 4

Model of total effect when fear of missing out is not controlled for.
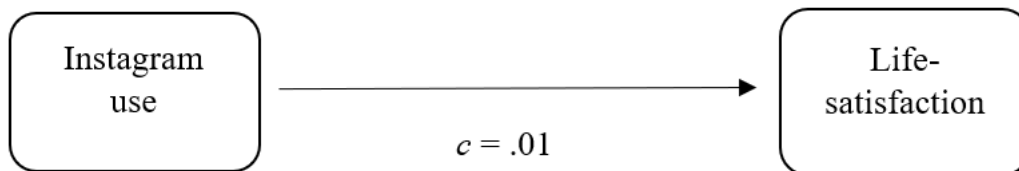
Note. Model of the standardized, insignificant regression between Instagram use and life-satisfaction.

Figure 5

Model of the regression paths when fear of missing out is controlled for.

Note. Model of the relationship between Instagram use and life-satisfaction when fear of missing out is controlled for. The coefficients are standardized.

Discussion

The goal of the present study was to examine whether fear of missing out acts as a mediator in the relationship between Instagram use and life-satisfaction of young adults (H_4). The analysis revealed that a mediating effect of FoMO did indeed occur. It was hypothesized that Instagram use and life-satisfaction would be negatively related (H_1), while Instagram use was expected to be positively associated with fear of missing out (H_2). These two hypotheses were rejected due to the nonsignificant outcomes of the correlation analysis. Furthermore, it was anticipated that fear of missing out would be negatively related to satisfaction with life (H_3). This hypothesis was confirmed by the correlation analysis.

Does Fear of missing out act as a mediator in the relationship between Instagram use and life-satisfaction of young adults? The outcomes of the correlational analysis revealed no significant association between Instagram use and life-satisfaction. Previous studies that investigated the relationship between Instagram or other social networking sites and life-satisfaction yielded mixed results. While some researchers found that individuals who are less satisfied with their lives tend to spend more time on social media platforms such as Instagram (Sheldon & Bryant, 2016), others revealed that Instagram use and direct messaging applications were related to higher levels of life-satisfaction (Keipi et al., 2017). A possible explanation for the finding of a nonsignificant correlation between Instagram use and life-satisfaction might be the influence of other factors besides FoMO, such as loneliness or stress (Yang, 2016; Longstreet & Brooks, 2017). Stress, anxiety, and depressive symptoms for instance were found to decrease satisfaction with life (Hawi & Samaha, 2016), while, at the same time, they have been linked to extensive social media and Instagram usage (Lup, Trub, & Rosenthal, 2015). In line with this argumentation, Hawi and Samaha (2016) proposed that the relation between social media use and life-satisfaction might be nonsignificant since the latter assesses one's overall quality of life and therefore incorporates other factors as well, which were beyond the scope of this study. Those factors might include constantly available information such as moods, temperaments, and emotions, which are thought to significantly influence an individual's satisfaction with life (Pavot & Diener, 2008). However, at this point, it should be considered that the present study was conducted during the global health emergency caused by the Covid-19 pandemic. Preventional measures to avoid an excessive spreading of the virus included social distancing, travel restrictions, as well as complete lockdowns of entire cities (Zarei et al., 2020). Moreover, it is assumed that the worldwide outbreak of the Coronavirus pandemic might lead to higher levels of stress, anxiety, and depression (Wang et al., 2020). In turn, stress, anxiety, and depression have been found to be negatively associated with satisfaction with life,

which is why it is possible that participants' life-satisfaction scores of the present study may have been affected by the COVID-19 pandemic (Longstreet, & Brooks, 2017). Indeed, the mean life-satisfaction score of the present sample (M = 23.88) was lower in comparison to the mean life-satisfaction score of 26.18 in a previous study with a sample of 1700 Dutch students (Arrindell, Heesink, & Feij, 1999). An alternative explanation might be the fact that this study focused exclusively on the frequency of Instagram use. As mentioned before, Yang (2016) found that Instagram use could be divided into different types of activities, while especially the passive use of social media has been associated with negative consequences on one's psychological well-being (Lup, Trub, & Rosenthal, 2015). Hence, it is possible that the individual types of Instagram use vary in their influence on life-satisfaction, which might partly account for the nonsignificant relation between Instagram use and satisfaction with life found in this study.

The second correlational analysis revealed a nonsignificant association between Instagram use and FoMO and therefore did not confirm hypothesis two. This finding contradicts past research within the field which has repeatedly connected higher Instagram and other social media use with higher levels of fear of missing out (Hunt et al., 2018; Balta et al., 2018). However, this outcome might also have been influenced by the exceptional circumstances posed by the Coronavirus. The WHO and US Centers for Disease Control and Prevention (CDC) issued advice to keep social contacts at a minimum (Sohrabi et al., 2020). Considering that FoMO has been defined as "(…) *a pervasive apprehension that others might be having rewarding experiences from which one is absent* (…)", one possible explanation for the insignificant outcome of the correlation analysis might be that the respondents probably experienced less fear of missing out than usual, simply because there was nothing to miss out on (Przybylski et al., 2013, p.1). If that would have been the case, one would expect the average FoMO scores of the present study to be lower than those in other studies. However, comparing the mean FoMO scores of the present study (M = 2.53) with the mean scores of another study (M = 1.89) by Przybylski et al. (2013) did not support this argumentation. Alternatively, a reason for the nonsignificant relationship between Instagram use and fear of missing out might concern the different motives for using Instagram. Next to "Knowledge about others", the other main motives for using Instagram were found to be "Coolness", "Documentation" and "Creativity" (Sheldon, & Bryant, 2016). While the motive of "Knowledge about others" has been linked to FoMO before (Przybylski et al., 2013), other reasons for using Instagram, such as "Documentation" or "Creativity" might not be as strongly related to fear of missing out. Since this study did not consider different types of motives in the measurement of Instagram

use, this might serve as an explanation for the nonsignificant outcome of the correlation analysis between Instagram use and FoMO.

As expected, the third correlation analysis revealed a statistically significant, (low) negative association between fear of missing out and life-satisfaction. This outcome is in line with previous studies that investigated the concept of FoMO in relation to satisfaction with life (Przybylski et al., 2013; Błachnio & Przepiórka, 2018). A potential explanation for the negative link between FoMO and life-satisfaction is that individuals with higher levels of FoMO are likely to suffer from negative impacts on their mental and physical health (Baker, Krieger, & LeRoy, 2016). Since the concept of life-satisfaction embodies an evaluative judgment of one's life quality, this might consequently lead to lower overall satisfaction with life (Pavot & Diener, 2008). Alternatively, due to the cross-sectional design of this study, it might also be the other way around, meaning that individuals with lower life-satisfaction might experience higher levels of FoMO.

As hypothesized, the results of the mediation analysis revealed that fear of missing out significantly mediated the relationship between Instagram use and life-satisfaction. Considering the outcomes of the first three analyses, it is surprising that a mediating effect was found despite the nonexistent or rather low correlations between Instagram use, life-satisfaction, and FoMO. However, according to Preacher and Hayes (2004), it is possible that paths between the individual variables might be nonsignificant simply due to low statistical power, whilst a mediation effect can still be observed.

Strengths and limitations of the present study

While the relation between social media use and psychological well-being has received substantial attention from many researchers, the present study also focused on less explored concepts such as FoMO and Instagram use in specific, which can be considered as a strength of the present study. Another strong point of this study revolves around the fact that the age group of the sample was powerful, considering that the respondents grew up using smartphones and consequently might be more involved in social media than older generations (Bell et al., 2013).

A limitation of this study was that 74% of the final sample consisted of female respondents, which does not represent the general gender distribution of young adults. Previous research revealed that women are more likely to use Instagram than men which might, to some extent, account for the uneven gender distribution of the sample (Sheldon & Bryant, 2016). Additionally, it has been found that women tend to score higher on FoMO than men do (Elhai et al., 2018), which could have led to the averagely higher FoMO scores in comparison to the

study of Przybylski et al. (2013). However, as respondents were recruited through convenience sampling, the sample consisted mainly of (psychology) students of the University of Twente. Hence, the sample might have been representative of that specific group, even though it was not for young adults in general.

Another limitation of this study could be seen in the measurement strategy of Instagram use, which might provoke self-report biases. It may be difficult for the individual to estimate accurately how much time on average they spend daily on Instagram, which is why it might be questionable to solely rely on those measures. Additionally, the individual measurements of Instagram use might become more meaningful when not only the frequency, but also the kind of use (active or passive), and the motivation for it are considered.

Furthermore, it should be noted that the data collection for the present study took place in times of a global health emergency caused by the Covid-19 pandemic. Due to precautionary measures, such as social distancing, social media has become a vital tool in maintaining social connectivity (Zarei et al., 2020). It is therefore questionable whether the participants' scores of Instagram use accurately reflected how much time on average they spend daily on Instagram, or if those scores might have been influenced by the current situation.

Implications and future directions

The aim of this study was to investigate whether fear of missing out acts as a mediator in the relation between Instagram use and satisfaction with life. Even though the correlational analyses revealed mainly insignificant or very low associations between Instagram use, life-satisfaction, and FoMO, the latter was found to play a significant role in the relationship between Instagram use and life-satisfaction.

The implications of the present study shed light on the need for more extensive research about the concept of fear of missing out, especially regarding Instagram use. Since this study "only" investigated how these two variables are related, it would be interesting to research whether one of them causes the other. Practical implications comprise the development of strategies and interventions that help with dealing with FoMO in every-day life and might prevent it from negatively affecting one's life-satisfaction and overall well-being.

Moreover, the relation between Instagram use and life-satisfaction should be explored regarding other pathways besides FoMO, such as social comparison or loneliness. Next to that, future studies should consider the different types of Instagram use and the various motivations for using it when investigating their relation to FoMO and the corresponding satisfaction with life of the users. This could be done by examining whether the three general types of Instagram activities, *IG interaction*, *IG browsing*, and *IG broadcasting* (Yang, 2016), vary in their impact

on the user's level of FoMO. Alternatively, it could be differentiated between the four main motives for using Instagram "Knowledge about others", "Coolness", "Creativity", and "Documentation" (Sheldon, & Bryant, 2016) when investigating the user's level of FoMO and it's relation to their life-satisfaction. Additionally, future studies should focus on alternative strategies for the measurement of Instagram use to decrease the threat of self-report bias.

Conclusion

The goal of the present study was to investigate whether fear of missing out may act as a mediator in the relationship between Instagram use and life-satisfaction. While the analysis did indeed confirm a significant mediation effect of fear of missing out, the expected correlations between Instagram use and life-satisfaction, as well as between Instagram use and fear of missing out were found to be insignificant. However, as hypothesized, a (low) negative, statistically significant association between fear of missing out and life-satisfaction was discovered, indicating that individuals with higher levels of FoMO are likely to be less satisfied with their lives. In light of these findings, it is important to consider the several limitations of the present study, as well as the special circumstances posed by the COVID-19 pandemic. Recommendations for future research within the field pointed out the need for further investigation of the concept of FoMO, and the consideration of other influential factors when exploring its relationship with satisfaction with life.

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Appendix

1.1 Informed consent form

Consent form to participate in a research project from students of the University of Twente

I understand and consent that:

1. I am 18 years old or older

2. The procedure will approximately take 30 minutes

3. I understood the content and agree to contribute my data for the use of this research

4. I can withdraw from this research at any time by closing the questionnaire and without having to give a reason. In this case, my responses will be deleted within 24 hours.

5. My personal information will be anonymised to protect my privacy.

6. With my permission, I agree that all my data can be evaluated and used for the research.

7. I have been given the guarantee that this research project has been reviewed and approved by the BMS Ethics Committee. For research problems or any other questions regarding the research project, the Secretary of the Ethics Commission of the faculty Behavioural, Management and Social Sciences at the University of Twente can be contacted through the following mail address: ethicscommittee-bms@utwente.nl

In case of questions or ambiguities, the researchers Pauline Kersebaum (p.kersebaum@student.utwente.nl), Samuel Dittrich (s.m.dittrich@student.utwente.nl), Dorvanique Cocks (d.s.cocks@student.utwente.nl) and Robin Untiet (r.untiet@student.utwente.nl) can be contacted in order to help.

I confirm that I read the informed consent form and agree with all listed conditions.

1.2 Questions about Instagram user behavior

1. Rank the 3 social media platforms you spend the most time on.

    Most used platform _____.

    Second most used platform _____.

    Third most used platform _____.

2. How much time on average do you spend daily on your most used/ second most used/ third most used social media platform?

    _ "5-15 minutes"

    _ "15-25 minutes"

    _ "25-35 minutes"

    _ "35-45 minutes"

    _ "approximately one hour"

    _ "1-1:30 hours"

    _ "1:30-2:00 hours"

    _ "more than two hours"

1.3 Fear of missing out scale

Never - - - - - - Always
1. I fear others have more rewarding experiences than me.
2. I fear my friends have more rewarding experiences than me.
3. I get worried when I find out my friends are having fun without me.
4. I get anxious when I don't know what my friends are up to.
5. It is important that I understand my friends ''in jokes''.
6. Sometimes, I wonder if I spend too much time keeping up with what is going on.
7. It bothers me when I miss an opportunity to meet up with friends.
8. When I have a good time it is important for me to share the details online (e.g. updating status).
9. When I miss out on a planned get-together it bothers me.
10. When I go on vacation, I continue to keep tabs on what my friends are doing.

1.4 Satisfaction With Life Scale

Below are five statements that you may agree or disagree with. Using the 1 - 7 scale below, indicate your agreement with each item by placing the appropriate number on the line preceding that item. Please be open and honest in your responding.

• 7 - Strongly agree

• 6 - Agree

• 5 - Slightly agree

• 4 - Neither agree nor disagree

• 3 - Slightly disagree

• 2 - Disagree

• 1 - Strongly disagree

_____ In most ways my life is close to my ideal.

_____ The conditions of my life are excellent.

_____ I am satisfied with my life.

_____ So far I have gotten the important things I want in life.

_____ If I could live my life over, I would change almost nothing.

- 31 - 35 Extremely satisfied
- 26 - 30 Satisfied
- 21 - 25 Slightly satisfied
- 20 - Neutral
- 15 - 19 Slightly dissatisfied
- 10 - 14 Dissatisfied
- 5 - 9 Extremely dissatisfied