

Bodroža, B., Obradović, V., & Ivanović, S. (2022). Active and passive selfie-related behaviors: Implications for body image, self-esteem and mental health. *Cyberpsychology: Journal of Psychosocial Research on Cyberspace*, 16(2), Article 3. <https://doi.org/10.5817/CP2022-2-3>

## Active and Passive Selfie-Related Behaviors: Implications for Body Image, Self-Esteem and Mental Health

Bojana Bodroža, Vojana Obradović, & Sara Ivanović

Department of Psychology, Faculty of Philosophy, University of Novi Sad, Novi Sad, Serbia

### Abstract

*Research on online social networks has indicated that it is appropriate to differentiate between active and passive use of these services, especially since they often have reverse effects on well-being. This study focused on Instagram selfies as a specific form of Instagram activity. We adopted the proposed distinction between active and passive use of social networks and applied it to selfies. In two correlational studies, we measured three aspects of selfie-related behaviors: self-presentation through selfies (active form), selfie preoccupation (active form), and upward physical appearance comparison with others' selfies (passive form). We explored their relationships with body image concerns and self-esteem (in Study 1, N = 284, 16.9% men, age ranged from 17 to 53) as well as subjective well-being and mental health (in Study 2, N = 473, 12.5% men, age ranged from 16 to 49) on the samples of Instagram users from Serbia and Balkan region who reported they take selfies. The results indicated that upward comparison with others' selfies is detrimental to both body image and subjective well-being. However, self-presentation and selfie preoccupation were related to stronger fear of negative appearance evaluation and better social self-esteem, but they had negligible relationship with indicators of mental health. This research was the first to study both active and passive selfie-related behaviors within the same framework and it showed that these behaviors have similar relations to body image, but different to self-esteem and well-being.*

**Keywords:** selfie; body image; self-esteem; subjective well-being; depression; loneliness; Instagram

### Editorial Record

First submission received:  
January 25, 2021

Revisions received:  
September 15, 2021  
December 14, 2021  
February 2, 2022

Accepted for publication:  
February 3, 2022

Editors in charge:  
Lenka Dedkova  
Marie Bedrosova

### Introduction

Instagram is a social networking service (SNS) initially released in 2010. It primarily serves as a platform for editing and sharing photos and videos. The social nature of Instagram is based on communication related to shared visual material, which is why it is sometimes referred to as highly visual social media (Marengo et al., 2018). On such media, the focus is on sharing user-generated visual content, while the communication takes form of liking, posting public comments, sending private messages, and making voice or video calls. The popularity of Instagram started increasing in 2014 and the latest statistics from July, 2020 show that it has surpassed 1 billion monthly active users, with 36% of users being 24 years old or younger and an additional 34% being 25 to 34 years old (Statista, 2020). The popularity of Instagram raises the question of possible psychological benefits and detriments of Instagram use. Although Statista revealed that young people predominantly experience positive emotions during Instagram use (Statista, 2018), thorough scientific research is still needed in order to better understand the

psychological dynamics between Instagram and well-being in all age groups. In this study we are particularly interested in the phenomenon of selfies and their relevance for the body image concern and, more broadly, for mental health.

## Two-Sided Phenomenon of Selfies

Selfies are self-portraits made by photo-camera, which are usually posted on social networks. Aside from having fun or documenting their memories, people often take selfies in order to gain positive social feedback from others and receive social approval (Al-Kandari & Abdelaziz, 2017). To achieve that, people make selfies in which they strive to present themselves as attractive: they pose in a sexually provocative manner (with an alluring and sultry gaze, a pouting expression, and winking), the pose is chosen to accentuate the good sides of one's face and/or body and hide the flaws (e.g., an arching back, a semi-profile). Editing and filtering photos have crucial roles in creating and enhancing personal images in order to reach high beauty standards, which is in line with the sociocultural theory of body image that stresses societal pressures on internalization of beauty standards and body image (Cafri et al., 2005). Thus, posting selfies has a twofold psychological function. On the one hand, it helps an individual make the desired impression on others. On the other hand, by gaining approval from others, the individual also gains self-approval and self-affirmation (Burrow & Rainone, 2017; Jong & Drummond, 2016). Thus, selfies play an important role in maintaining and confirming the desired self-image, especially regarding the physical looks and attractiveness.

However, aside from actively taking selfies in order to influence others' impression of oneself, people are also exposed to other peoples' selfies on social networks. This process was shown to have important consequences for body image concerns and well-being in general (e.g., increased body dissatisfaction, decreased body appreciation, greater symptoms of anxiety and depressed mood; Brown & Tiggemann, 2020; Frison & Eggermont, 2017; Thorisdottir et al., 2019). Therefore, we can talk about two sides of the selfie phenomenon: *selfie posting* (and all behaviors related to it, including selfie taking and editing) and *exposure to other peoples' selfies* (and the processes evoked by it, i.e., subsequent cognitions and emotions, such as social comparison and affective states). This division of selfie-related behaviors corresponds to the broad concepts of *active* and *passive SNS use*. Active use refers to actively creating content (i.e., posting) and maintaining interaction with other users of an SNS. Passive use refers to consuming the content without social interaction, i.e., browsing other-generated content on an SNS (Gerson et al., 2017).

The research on SNS use and mental health most often does not differentiate between the two forms of SNS behaviors (e.g., Marengo et al., 2018), but when analyzed separately, the results are largely different. Results converge on the conclusion that passive social network browsing is related to poorer mental health (Frison & Eggermont, 2017; Krasnova et al., 2013; Verduyn et al., 2015). On the other hand, the results regarding active SNS use are mixed, with some studies revealing no relationship with mental health variables (Frison & Eggermont, 2017), some revealing positive relationship with positive indicators of mental health and negative with negative indicators (Apaolaza et al., 2013; Apaolaza et al., 2014; Hanley et al., 2019) or this relationship depends on additional factors such as gender (Frison & Eggermont, 2016). All of this stresses the importance of distinguishing between active and passive forms of general or specific use of SNS.

In this study, we first aimed to develop the questionnaire for measuring both active and passive forms of selfie-related behaviors and subjective experiences related to these behaviors and then we further examined their relationships with body image concerns, self-esteem and mental health (depression, loneliness, positive and negative affect, satisfaction with life).

## Active Form of Selfie Use

Social reinforcement theory (Vollmer & Hackenberg, 2001) stresses that the more positive the feedback received, the more satisfied individuals feel and the more likely they are to continue repeating the action that attracted positive feedback. In the context of selfies, positive feedback on a selfie is expressed in the form of likes and public or private comments. "Likes" on social networks perform the function of social reward, which is a crucial part of shaping and reinforcement learning. In addition to neural reactions (Sherman et al., 2018), "likes" elicit psychological responses. In one study, participants who were high on self-promotion and self-disclosure reported they felt positive while taking selfies (Diefenbach & Christoforakos, 2017). Etgar and Amichai-Hamburger (2017) reported that self-presentational selfie posting was related to frequent checking for "likes". Other research has

shown that a great number of “likes” and responses to one’s posts could satisfy the need to belong as well as the need for self-esteem (Greitemeyer et al., 2014; Reich et al., 2018).

### ***Active Selfie Use and Self-Esteem***

Some findings have shown that lower levels of self-esteem are associated with posting more selfies (March & McBean, 2018), while Ahadzadeh and colleagues (Ahadzadeh et al., 2017) have suggested that Instagram use leads to body image dissatisfaction, but only among individuals with low self-esteem. Although self-esteem is sometimes seen as a motivator for posting selfies, it can also be considered its consequence—it can be reinforced by the number of “likes” that people receive on their photos (Burrow & Rainone, 2017; Krause et al., 2021). When it comes to social benefits of SNS use, Valkenburg and colleagues (Valkenburg et al., 2017) showed that general SNS use was positively related to social self-esteem when measured concurrently. However, the longitudinal results of their study revealed that SNS use did not promote social self-esteem in the long run, but rather that social self-esteem led to an increase in subsequent SNS use. These findings indicate that the relationship between behaviors on SNS and self-esteem (and its domains) probably is bidirectional. (Low) self-esteem can motivate behaviors such as posting selfies, but these behaviors can in return reinforce the self-image.

### ***Active Selfie Use and Body Image***

When it comes to body esteem and body (dis)satisfaction in relation to selfies, research has been more focused on exposure to others’ selfies and attractive photographs, than on active creating and seeking feedback about selfies. Mills et al. (2018) have found that taking and posting selfies lead to feeling less physically attractive and more anxious, even if photos were retaken or edited in order to appear more beautiful. Few studies offer indirect insight into the relationship between active aspect of selfie use and body image. The study of Tiggemann et al. (2018) have revealed that Instagram users who were highly involved in obtaining more Instagram likes engaged in more appearance comparison and had higher facial dissatisfaction. Likewise, greater investment in selfies, rather than general SNS use, was shown to be associated with body dissatisfaction and bulimia symptomatology even after body mass index (BMI) and thin-ideal internalization were controlled (Cohen et al., 2018).

### ***Active Selfie Use and Mental Health***

Studies on the relationship between selfies and mental health variables—e.g., subjective well-being, positive and negative affect, depression, anxiety, or loneliness—have been rare. Such studies have usually focused broadly on the intensity of use of highly-visualized social media (Marengo et al., 2018) without distinguishing between active and passive use of such media or selfies. Rare findings regarding the mental health and selfie activities are inconsistent in terms of both the causality and the (positive/negative) direction of their relationship. Only one study that enable causal interpretations was found. Longitudinal study by Frison and Eggermont (2017) have found that depressive mood increased posting on Instagram and not the other way around, but they did not focus specifically on selfies.

To sum up, it seems that preoccupation with taking selfies and obtaining “likes” is related to body image concerns, but findings regarding the relationship between taking selfies and mental health are still insufficient. In this study, we aim to fill the gap in the literature regarding the relationship between active selfie use and mental health as well as to offer additional insight into the relationship between selfie activities, body image concerns and self-esteem.

### **Passive Selfie Use—Exposure to Others’ Selfies and Social Comparison**

The other important aspect of the selfie phenomenon is exposure to other peoples’ selfies which corresponds to passive selfie use. Exposure to others’ highly attractive photographs on Instagram can be spontaneous—when users browse photos of people they are following and come across their selfies—or deliberate—when users search for attractive photos of celebrities or other people who pique their interest. People can be motivated to browse others’ attractive selfies for different reasons. They may wish to inform themselves about popular looks or see how they compare to others in terms of physical appearance (Chua & Chang, 2016). Exposure to others’ selfies is a widely researched topic, especially in relation to body image concerns.

Social comparison theory (Festinger, 1954) stresses the importance of social comparison for the development of self-image, while negative effects of upward comparison—comparison with those who are better than oneself—is widely researched in the context of the influence of media on body dissatisfaction (e.g., Fardouly et al., 2017). Recently, the focus of research has shifted from traditional media to social networks (Ahadzadeh et al., 2017; Brown & Tiggemann, 2016; Fardouly et al., 2015; Fardouly & Vartanian, 2016; Hendrickse et al., 2017; Tiggemann & Slater, 2013). On social media, as opposed to traditional media, the pool of comparison models is not limited to famous persons but may also include friends, acquaintances, and unfamiliar peers who present themselves in an idealized manner (Brown & Tiggemann, 2016).

### ***Passive Selfie Use and Self-Esteem***

A systematic review of existing literature regarding the effect of SNS use on individuals' self-esteem suggests that passive SNS use mostly results in decreased self-esteem (Krause et al., 2021). Results of one study have shown that, even when self-esteem is controlled for as a protective factor, passive use was still related to symptoms of anxiety and depressed mood among adolescents (Thoridsottir et al., 2019). These findings lead to an assumption that passive SNS use has detrimental effects on self-esteem. An experience sampling study revealed that most of respondents (88%) did not experience the effects of SNS use on self-esteem (Valkenburg et al., 2021). However, all cited studies dealt with general form of passive SNS use rather than the specific phenomenon of selfies, which clearly points to the gap in the literature regarding the relationship between exposure to others' selfies and general self-esteem. Therefore, this study aims to include indicators of general self-esteem and other domains of self-esteem (e.g., social self-esteem), other than those focused on body and appearance, which are typically the focus of attention of studies dealing with exposure to attractive photos of others.

### ***Passive Selfie Use and Body Image***

One of the first experimental studies in this field (Fardouly et al., 2015) compared the influence of mere exposure to an online fashion magazine, a social network (Facebook), and a control condition on negative mood, body dissatisfaction, and body ideal discrepancy. Exposure to one's own Facebook newsfeed caused more negative mood than the control condition. Among women who often engaged in social comparison, spending time on Facebook led to more face, hair, and skin-related discrepancy. However, this study found only limited support for the effects of exposure to media on body image concerns and this result could possibly be attributed to a brief exposure to media content (only 10 minutes). Engeln and associates (Engeln et al., 2020) have shown that Instagram has a stronger influence on body satisfaction and affect than Facebook. Another experimental study (Tiggemann et al., 2018) analyzed how appearance dissatisfaction was affected by thin-ideal vs. average Instagram photos and the number of "likes" of these photos. Exposure to thin-ideal Instagram photos led to higher body and facial dissatisfaction, while the number of "likes" only affected facial dissatisfaction. Yet, a more recent study has shown that Instagram influencers' idealized photos induce body dissatisfaction and negative mood, regardless of the number of "likes" of these photos (Lowe-Calverley & Grieve, 2021).

The studies that have focused on the process of upward social comparison as a mechanism through which exposure to social media affects body image, have unequivocally confirmed that such effect is detrimental (Fardouly et al., 2015; Hendrickse et al., 2017; Krause et al., 2021; Park & Baek, 2018; Stapleton et al., 2017). Individuals who engage in more appearance-related comparisons on Instagram report experiencing a more intense drive towards thinness and greater body dissatisfaction (Hendrickse et al., 2017).

### ***Passive Selfie Use and Mental Health***

When it comes to mental health issues in relation to passive exposure to others' Instagram photos, studies that directly address this topic are not numerous, but they do offer a possibility to conclude on the causality of the relationship. Frison's and Eggermont's (2017) longitudinal study have shown that browsing on Instagram leads to increase in depressive mood over the time, while Hawes et al. (2020) have found that feelings related to social comparison on social media are related to depression, social and appearance anxiety. Furthermore, Sherlock and Wagstaff (2019) have shown that experimental exposure to beauty and fitness images decreased self-rated attractiveness, and although the exposure itself was not related to anxiety, depressive symptoms, self-esteem, and body dissatisfaction, the pre-post experimental change in self-rated attractiveness was related to these

measures of mental health. All these studies directly or indirectly suggest that exposure to others' attractive photos can lead to damaged mental health of users of highly visual social media.

The review of the literature revealed extensive findings regarding the passive Instagram use and body image concerns and somewhat less numerous studies relating exposure to others' attractive photos with measures of mental health and self-esteem. The findings of all these studies indicate that passive exposure to photos of attractive individuals have detrimental consequences. In this study, we wanted to further address this issue by examining the relationship of the passive exposure to others' selfies with self-esteem, subjective well-being, mental health, as well as body image concerns.

## Research Problem

The main conceptual problem of studies examining benefits and detriments of selfies or social network use, in general, was that these behaviors were usually operationalized as the frequency of posting the content, frequency of use or time spent on SNSs (see Holland & Tiggemann, 2016). Thus, we do not know what psychological aspects of use or which particular behaviors on SNSs are detrimental or beneficial to individual, especially in terms of behaviors related to selfie posting and exposure to other peoples' selfies (Cohen et al., 2018). Some authors have suggested that future research should focus on photo-based social networks (like Instagram) and more specific features and user activities on these social networks (Cohen et al., 2018; Fardouly & Vartanian, 2016; Holland & Tiggemann, 2016).

This study aimed to address the gap in the existing literature by covering a range of specific selfie-related activities and experiences emerging on Instagram, rather than just focusing on the general frequency of selfie posting or the intensity of Instagram use. Namely, previous studies have focused on either posting selfies (e.g., the frequency of taking selfies or the number of selfies on the profile) or being exposed to other people's selfies. In our study, we strived to cover both of these aspects of selfie-related behaviors—active and passive—and to encompass inner psychological processes and *subjective experiences* leading to and being evoked by active and passive selfie-related activities. We aimed to include emotions evoked after posting selfies and receiving feedback, thoughts provoked by such feedback, reasons (i.e., motives) for taking selfies, and emotions and cognitions evoked after exposure to other's selfies. In order to encompass all these aspects of selfie-related experiences within the same framework, we developed a new questionnaire and, then, examined the relationship of these experiences with other relevant constructs, such as body image and mental health in general. In the first study, we developed the initial version of the questionnaire measuring selfie-related behaviors and experiences and examined its relationship with body image and general and domain specific self-esteem. In the second study, we cross-validated the questionnaire and examined its relation with indicators of subjective well-being and mental health. Since the items from the questionnaire on selfie-related behaviors refer to both active and passive selfie use, in both studies we limited our target samples only to those who use Instagram in an active way, because passive users would not be able to answer questions on active use, while the other way round would not be a problem.

## Study 1

### The Aim of the Study

In the first study, we developed a new questionnaire in order to cover both active selfie-related behaviors and experiences (i.e., taking, editing, and posting selfies, communication evolving around them, as well as emotions and cognitions related to these processes) and passive selfie-related behaviors and experiences (i.e., exposure to others' selfies and cognitions and emotions evoked by such exposure). These experiences were examined in relation to physical appearance variables (body mass index, body esteem, fear of negative evaluation of one's appearance) and self-esteem variables (general self-esteem and social self-esteem), to understand the broader role of self-image in selfie-related behaviors.

Since in this study we developed a new measure of selfie-related behaviors and experiences, it was not possible to define the hypotheses around the specific forms of such behaviors before the latent structure is examined. However, based on the literature, we formulated some general expectations based on the distinction between active and passive forms of selfie use.

We expect that *active selfie-related behaviors and experiences* would be related to indicators of lower body esteem, higher appearance sensitivity (i.e., fear of negative evaluation of one's appearance), and lower general self-esteem (e.g., Ahadzadeh et al., 2017; Cohen et al., 2018; March & McBean, 2018; Tiggemann et al., 2018). As for the body mass index (BMI), studies have found that individuals with lower BMI post and edit selfies more frequently (Loneragan et al., 2019; Niu et al., 2020) and they invest themselves more in feedback on their Instagram selfies (Butkowski et al., 2019). Therefore, we can expect a negative relationship between BMI and active use of selfies. Finally, following the findings of Valkenburg (Valkenburg et al., 2017), we proposed that active selfie-related behavior would be related to higher social self-esteem.

When it comes to *passive forms of selfie use*, in accordance with research findings on the effects of social media on body dissatisfaction and internalization of societal beauty standards (e.g., Brown & Tiggemann, 2016; Engeln et al., 2020; Fardouly et al., 2015; Holland & Tiggemann, 2016; Lowe-Calverley & Grieve, 2021), we hypothesized that it would be related to more fear of evaluation of one's physical appearance, lower body esteem and lower general self-esteem. Since we found no previous studies on the relationship between passive SNS/selfie use and social functioning or BMI, we examined these relationships in an exploratory manner.

## Methods

### *Procedure*

For the purpose of this study, we created an online survey including information about the study and an invitation to Instagram users to take part in it. The survey was spread using the snowball sampling method. Participants were invited through personal SNS account of the authors of the study and asked to forward the invitation for the study participation. Survey included a wider range of questionnaires, with the results presented in this paper referring to only one part of the survey. At the time when the study was conducted, IRB approvals were not obligatory for all studies. As our study did not meet any of the criteria indicating ethical concerns, IRB approval was not required.

At the beginning, respondents were informed on the study purpose, privacy and anonymity issues, and other relevant details and only those who gave informed consent were able to proceed and fill out the questionnaires. Participants did not receive any incentives for participation in the study. The survey contained three selection questions. The first question asked whether the person had an Instagram account. Those who chose the positive answer were allowed to continue with the survey. The second selection question asked whether the person used their Instagram account for personal or business needs. Users with personal accounts continued answering questions regarding personal use of Instagram. Finally, the third question asked if the person posted selfies on their Instagram account. If the answer was *yes*, a range of questions regarding selfies was administered. Only this part of the overall sample was used in the present study. Data were gathered in February and March 2018.

### *Sample*

Out of 356 Instagram users from Serbia and Balkan region who took part in this study, 339 used Instagram for personal purposes (as opposed to business purposes) and only 284 stated that they posted selfies. These 284 participants comprised the sample used for the analyses reported in this study. The majority of the sample included female university students living in an urban environment who were either in a relationship or single (Table 1). Participant age ranged from 17 to 53 ( $M = 23.15$ , Median = 22,  $SD = 4.29$ ).

### *Instruments*

The existing scales that were used in this research were translated into the Serbian language through a back-translation process. The original authors of the scales were contacted to obtain permission for the use of the scales.

**The Body Esteem Scale for Adolescents and Adults** (Mendelson et al., 2001) measures self-evaluation of one's body and appearance. We only used the Body Esteem—Appearance subscale, which contains 10 items (e.g., *I'm pretty happy about the way I look*). Items were presented with a 4-point Likert scale (1 = *never*, 4 = *always*). Negatively worded items were reverse coded. The reliability of the scale was  $\alpha = .86$ . Higher scores on the scale represented higher body esteem.

**Table 1.** *Sample Characteristics in Study 1 and Study 2.*

Variable	Category	Study 1		Study 2	
		N	%	N	%
Gender	Men	48	16.9	59	12.5
	Women	236	83.1	414	87.5
Place of living	Village (up to 20 000 citizens)	46	16.2	64	13.5
	Town (20 000–50 000 citizens)	35	12.3	53	11.2
	City (more than 50 000 citizens)	203	71.5	356	75.3
Professional status	Secondary school student	10	3.5	7	1.5
	University student	194	68.3	270	57.1
	Unemployed	17	6.0	38	8.0
	Full-time employed	40	14.1	158	33.4
	Half-time employed	19	6.7	0	0.0
Relationship status	Other	4	1.4	0	0.0
	In a relationship	112	39.4	164	34.7
	Single	136	47.9	206	43.6
	Married	13	4.6	48	10.1
	Divorced	20	7.0	1	0.2
	Widowed	3	1.1	0	0.0
	In common-law union	0	0.0	53	11.2
Total		284	100	473	100

**The Fear of Negative Appearance Evaluation Scale** (Lundgren et al., 2004) is a 6-item measure of concern about others' negative evaluation of one's appearance (e.g., *I worry that people will find fault with the way I look*). The scale was presented along with a 5-point Likert scale (1 = *not at all*, 5 = *very much*). The internal consistency of the scale was  $\alpha = .89$ .

**The Rosenberg Self-Esteem Scale** (Rosenberg, 1965) is a 10-item measure of global self-esteem (e.g., *On the whole, I am satisfied with myself*). Items were presented with a 5-point Likert scale (1 = *do not agree at all*, 5 = *completely agree*). Negatively formulated items were recoded so that higher scores represented higher self-esteem ( $\alpha = .88$ ).

**The Social Self-Esteem Inventory** (Lawson et al., 1979). The original version of the scale consists of 30 items. In this study, we used the shortened adapted Bosnian version of the scale (Kerla & Repišti, 2013), which consists of 9 items (e.g., *I feel confident in social situations*;  $\alpha = .94$ ) with a 5-point Likert scale (1 = *do not agree at all*, 5 = *completely agree*).

**The Selfie-Related Behaviors and Experiences Questionnaire** (SRBEQ) was developed for the purpose of this study. The items were created based on careful observation of typical behaviors of Instagram users and formulated through discussion and brainstorming sessions among the authors of the study. The aim was to include all possible behaviors, emotions, and cognitions related to selfies. Scale items encompassed both actions related to taking and posting selfies (e.g., the frequency of posting photos, occasions when selfies are taken, consultations with others before posting selfies, and reactions to others' comments to selfies) and experiences related to exposure to other people's selfies (e.g., comparison to others' selfies, emotions elicited by such comparisons, and learning from others' selfies). The initial version of the scale consisted of 31 items and was administered along with a 5-point Likert scale (1 = *do not agree at all*, 5 = *completely agree*). The latent structure of the scale is explored in this paper and further information on the scale structure is presented in the Results section.

**The Body Mass Index.** Our respondents provided information regarding their body weight and height, based on which the BMI was calculated using the following formula:  $BMI = \text{weight (kg)} / \text{height}^2 \text{ (m)}$ .

**Socio-demographic information** on gender, age, place of living, and professional and relationship status was also collected (see Table 1).

## ***Statistical Analyses***

In order to explore the latent structure of the range of selfie-related behaviors and experiences encompassed by the preliminary version of the SRBEQ scale, we carried out an exploratory factor analysis (EFA) with the Principal Components Analysis extraction method. The Kaiser-Meyer-Olkin measure of sampling adequacy yielded a value of .88, indicating that the sample size was large enough to evaluate the factor structure. Several criteria for determining the optimal number of factors and item retention were taken into consideration: a) the Kaiser-Guttman criterion, b) the Scree criterion, c) the minimum of 3 items per factor, d) item loadings  $\geq .40$ , e) no cross-correlations in the pattern matrix, f) interpretability of the factor solution, and g) theoretical and practical importance of the factor. Items not meeting the criteria under c), d), and e) were excluded. The EFA was carried out iteratively until a satisfactory solution was obtained. The final factor solution was rotated by employing the Promax method with the Kaiser normalization to allow for mutual correlations between factors. The oblique rotation was chosen because different aspects of selfie-related behaviors were expected to be mutually related.

The Pearson correlations were used to examine the intercorrelations between all variables included in the study. To examine the relationship between extracted dimensions of SRBEQ with physical appearance and self-esteem variables, hierarchical regression analyses were carried out. In these analyses, dimensions of SRBEQ were treated as criterion variables. To account for the gender and age differences in effects of media on body image (Myers & Crowther, 2009), we controlled for gender and age of the participant in the first regression model, while physical appearance variables (BMI, body esteem, and fear of negative appearance evaluation) and self-esteem variables (general self-esteem and social self-esteem) were entered as predictors in the next two models. Adding the predictors in the consecutive steps allowed us to determine the unique contribution of every group of predictors to the overall prediction of the criterion variable.

Since measures related to physical appearance and different domains of self-esteem were expected to be correlated, we inspected the issue of collinearity of the planned set of predictors. The highest Variance Inflation Factor of 2.37 was obtained for the self-esteem variable, indicating that collinearity should not be a problem.

## **Results**

### ***The Latent Structure of the Selfie-Related Behaviors and Experiences Questionnaire***

In the iterative process of EFA analyses, the preliminary version of the questionnaire comprising 31 items was cut down to 15 items (the initial version of the scale is available at <https://osf.io/ay9m4/>). Both the Scree criterion and the Kaiser-Guttman criterion suggested 3 factors. The 3 extracted factors were interpretable and theoretically relevant, so we opted for a three-factor solution. The 3-factor solution explained 60.4% of the variance. Factors were interpreted based on the pattern matrix (Table 2). The first factor included items describing the use of Instagram selfies to attract the attention of others, which results in heightened self-confidence, especially in terms of one's appearance. In order to achieve that, high-score individuals chose attractive and sexually provocative photos. The factor was named *Self-Presentation*. The second factor described browsing others' selfies on Instagram, comparing oneself to others and, consequently, feeling dissatisfied with one's own looks. This factor was named *Upward Physical Appearance Comparison* (abbr. Upward Comparison). The third factor included items describing frequent selfie posting, special attention paid to choosing the right selfie as well as dressing up and taking selfies especially for Instagram. The factor was named *Selfie Preoccupation*. Intercorrelations of factors were moderate and positive (see Table 3). We calculated the mean scores of the belonging items of the three SRBEQ dimensions and used them in further analyses. The Cronbach's alpha of the subscales was .84, .87, and .70 (in the given order), while the reliability of the whole scale was .88.

The central question of this study was whether selfie-related behaviors and experiences were related to physical appearance variables (BMI, body esteem, fear of negative appearance evaluation) and general and social self-esteem. In order to answer this question, we carried out a series of hierarchical regression analyses, in which we controlled for gender and age in the first step, then we added physical appearance predictors in the second step and self-esteem variables in the third step.

When it comes to self-presentation, hierarchical regression analyses showed that gender and age were not related to this criterion, although gender became statistically significant after other sets of predictors were entered in the regression model—the results indicated that men self-present more than women. Both physical appearance and



self-esteem variables gave significant contributions to the explanation of self-presentation through selfies and the whole model explained around 27% of the criterion variance (Table 4). There were three statistically significant predictors. Higher BMI was associated with lower self-presentation, while higher fear of negative appearance evaluation and social self-esteem were related to higher self-presentation. Nevertheless, the effect of BMI qualifies as the suppression effect<sup>1</sup>, since its Pearson correlation with self-presentation is not statistically significant (see Table 3).

**Table 2.** *The Structure of the Selfie-Related Behaviors and Experiences Questionnaire Obtained in the EFA (Study 1) and Cross-Validated in the CFA (Study 2).*

Item	EFA			CFA		
	1	2	3	1	2	3
7. My selfies on Instagram contribute to making women/men like me more.	.83			.74		
8. I post selfies on Instagram to attract the attention of women/men.	.77			.72		
6. Since I have started posting selfies on Instagram, I have more self-confidence in my appearance.	.73			.65		
2. I try to take more provocative selfies than others in order to gain more likes.	.71			.45		
1. I try very hard to make my Instagram selfies attractive and to attract as much attention as possible.	.68			.58		
4. I feel that people appreciate me more after seeing my Instagram selfies in which I look attractive.	.64			.59		
5. I receive compliments for my looks from people who see my Instagram selfies.	.54			.47		
9. When I look at selfies of attractive persons on Instagram, I compare my body to theirs.		.86			.88	
3. I feel a bit down when I see very attractive photos of other people of my gender on Instagram.		.83			.84	
11. When I look at selfies of attractive persons of my gender on Instagram, I feel dissatisfied with my own appearance.		.81			.77	
14. I look at selfies of other attractive people on Instagram to estimate my own worth.		.78			.66	
15. I feel pressured to look like other attractive people on Instagram.		.76			.72	
13. I often post Instagram selfies.			.82			.72
10. Whenever I dress up for a night out or a special occasion, I take a selfie for Instagram.			.78			.72
12. I take a lot of selfies before I'm happy with the one I'm going to post on Instagram.			.70			.54

### ***The Relationship of Selfie-Related Behaviors and Experiences With Physical Appearance and Self-Esteem***

Descriptive statistics and intercorrelations of all variables (including SRBEQ dimensions) are presented in Table 3.

**Table 3.** *Descriptive Statistics and Intercorrelations of all Variables From Study 1.*

	<i>M (SD)</i>	2	3	4	5	6	7	8	9
1. Self-Presentation	1.85 (0.78)	.38**	.51**	-.07	.36**	-.13*	-.02	.22**	-.08
2. Upward comparison	1.62 (0.86)		.39**	-.05	.61**	-.45**	-.33**	-.12*	-.18**
3. Selfie preoccupation	2.32 (1.08)			-.18**	.39**	-.19**	-.09	.14*	-.22**
4. Body Mass Index	21.80 (3.16)				.08	-.29**	-.11	-.05	.22**
5. Fear of negative appearance evaluation	2.21 (0.96)					-.60**	-.52**	-.16**	-.17**
6. Body esteem	3.05 (0.52)						.68**	.40**	.04
7. Self-esteem	3.85 (0.79)							.56**	.09
8. Social self-esteem	3.73 (0.84)								.06
9. Age	23.29 (4.79)								

Note. \* $p \leq .05$ , \*\* $p \leq .01$  (two-tailed).

Upward physical appearance comparison on Instagram was related to gender and age and these variables explained 5% of criterion variance (Table 4). Women and younger individuals were more prone to upward comparison, but effects of age and gender diminished after physical appearance variables were entered into the model. Physical appearance variables explained an additional 36% of criterion variance, while self-esteem variables did not uniquely contribute to the prediction of criterion. Lower BMI and body esteem as well as higher fear of negative appearance evaluation were related to more upward comparison with others' selfies. However, the Pearson correlations of the BMI with upward comparison indicated that there was a suppression effect (see Table 3).

The selfie preoccupation dimension was significantly predicted by all three sets of variables entered into the regression model (Table 4). All variables together explained around 26% of the variance of this criterion. Results indicate that women and younger individuals are more preoccupied with selfies. Fear of negative appearance evaluation was the strongest predictor, while other statistically significant predictors were a lower BMI and higher social self-esteem.

The detailed presentation of the results with exact *p* values, *b* coefficients, *SE*, and 95% CI is provided in the Appendix (Tables 1A–3A).

**Table 4.** Regression Analyses Predicting Dimensions of the Selfie-Related Behaviors and Experiences Questionnaire Based on Socio-Demographic Variables, Physical Appearance and Self-Esteem Variables.

Criterion variable	Self-presentation			Upward comparison			Selfie preoccupation		
	1	2	3	1	2	3	1	2	3
Gender	-.05	-.18**	-.20***	.13*	.01	.00	.21***	.11	.09
Age	-.10	-.01	-.02	-.16**	-.06	-.06	-.19***	-.12*	-.12*
Body Mass Index		-.12*	-.15*		-.13*	-.13*		-.15*	-.17***
Fear of negative appearance evaluation		.49***	.51***		.50***	.52***		.35***	.36***
Body esteem		.14	-.02		-.18*	-.23***		.02	-.13
Self-esteem			.10			.09			.07
Social self-esteem			.27***			-.02			.19**
<i>R</i>	.10	.42	.52	.22	.64	.64	.31	.47	.51
Adjusted <i>R</i> <sup>2</sup>	.01	.18	.27	.05	.41	.41	.09	.21	.26
$\Delta R^2$		.17	.09		.36	.00		.12	.04
$\Delta F$	1.49	18.71***	16.61***	7.03**	55.82***	0.89	14.60***	14.10***	8.04***
<i>df</i> <sub>bg</sub> / <i>df</i> <sub>wg</sub>	2/277	3/274	2/272	2/277	3/274	2/272	2/277	3/274	2/272

Note. \**p* ≤ .05, \*\**p* ≤ .01, \*\*\**p* ≤ .001.

## Discussion

Three aspects of selfie-related behaviors and experiences were extracted by the newly created questionnaire: two of them—self-presentation and selfie preoccupation—correspond to active forms of selfie behaviors. The third aspect—upward comparison—corresponds to passive aspects of selfie-related behavior. All three dimensions were most strongly related to fear of negative appearance evaluation. The two active forms of selfie use were also related to higher social self-esteem, while selfie preoccupation also characterized individuals with a lower BMI. Upward comparison with others' selfies was also related to lower body esteem. Analyses indicated that women and younger individuals were more prone to upward comparison and selfie preoccupation. The findings are discussed in more detail in the General discussion section.

## Study 2

### The Aim of the Study and Hypotheses

Study 1 found that all aspects of selfie behaviors and experiences were related to fear of negative evaluation of one's physical appearance, but active forms of selfie behaviors were related to positive social self-esteem. Thus,

we wanted to further examine how these domain-specific feelings of (dis)satisfaction related to selfies reflected on more general subjective well-being. The main goal of Study 2 was to reveal the relationship between selfie-related behaviors and experiences and indicators of subjective well-being and mental health, as well as to cross-validate the structure of the SRBEQ scale. We leaned on Diener's tripartite model (Diener, 1984), which encompasses three components of subjective well-being: life satisfaction as the cognitive component and positive and negative affect as the affective components. Additionally, we included measures of depression and loneliness as important indicators of mental health, which are often analyzed in the context of SNS use.

The research on active use of selfies in relation to well-being and mental health is still scarce. Mills et al. have found that taking and posting selfies is related to more anxiety (Mills et al., 2018), while longitudinal study by Frison and Eggermont (2017) has revealed that more frequent Instagram posting did not lead to depression at a later time, but depression led to more Instagram posting. Although these results are somewhat mixed, we hypothesized that self-presentation through selfies and selfie preoccupation will be negatively related to three indicators of subjective well-being and positively to depression and loneliness.

As for the upward comparison with others' selfies, the studies have shown that this particular process evoked by passive consumption of social media leads to detrimental consequences (Frison & Eggermont, 2017; Hawes et al., 2020; Sherlock & Wagstaff, 2019). Thus, we hypothesized that the upward comparison with others' selfies will be related to worse subjective well-being (i.e., negatively related to satisfaction with life and positive affect and positively to negative affect) and with higher depression and loneliness.

## Methods

### *Procedure*

An online survey was created calling for Instagram users to take part in the study. The call for participation was distributed through social networks and users were invited to forward it to other people as well. As in the Study 1, participants received information about the study and only respondents who gave informed consent were allowed to fill out the questionnaires. The survey contained two selection questions. The first question asked whether the person had an Instagram account and only those who had an Instagram account could continue answering. The second selection question asked whether the individual posted selfies on their Instagram account. Respondents who answered *yes* were presented with questions regarding selfies. Data were gathered in August 2019.

### *Sample*

Out of 699 participants who took part in this study, 473 Instagram users stated that they posted selfies. All participants were from Serbia and Balkan region. The average participant age was 24.15 (Median = 23,  $SD = 4.68$ ), with participant age ranging from 16 to 49 years old. More details about the sample are presented in Table 1.

### *Instruments*

**The Satisfaction with Life Scale** (SWLS; Diener et al., 1985). The scale contains 5 items for assessing global life satisfaction (e.g., *I am satisfied with my life*). Items were presented with a 7-point Likert scale (1 = *do not agree at all*, 7 = *completely agree*). The scale's internal consistency obtained in this study was  $\alpha = .88$ .

**The Scale of Positive and Negative Experience** (SPANE; Diener et al., 2010). This instrument measures affective well-being. The instruction asks participants to think about how much they experienced each of the listed feelings in the previous four weeks. The scale offers scores for positive affect (SPANE-P; 6 items, e.g., *joyful*) and negative affect (SPANE-N; 6 items, e.g., *sad*). The items were presented with a 5-point Likert scale (1 = *rarely or never*, 5 = *often or always*). In this study, the internal consistency was  $\alpha = .66$  for the SPANE-P subscale and  $\alpha = .83$  for the SPANE-N subscale.

**The Depression Subscale from the Depression, Anxiety and Stress Scale** (DASS-21; Lovibond & Lovibond, 1995). The Depression subscale consists of 7 items (e.g., *I felt that I had nothing to look forward to*). The respondents were asked to rate how they were feeling during the previous week on a scale from 0 = *not at all* to 3 = *mostly or almost always*. The internal consistency for this scale was  $\alpha = .89$ .

**The De Jong Gierveld Loneliness Scale** (DJGLS; de Jong-Gierveld & Kamphuis, 1985). The scale measures two components of loneliness: emotional and social. However, we only used a general score of loneliness in this study. The instrument contains 11 items (e.g., *I miss having people around me*), 6 of which are negatively formulated and reverse coded. The participants gave answers on a 3-point scale (*yes—more or less—no*). The reliability of the scale was  $\alpha = .82$ .

**The Selfie-Related Behaviors and Experiences Questionnaire** (SRBEQ). We used the 15 items of the scale that were retained based on the results of the EFA in Study 1.

### *Statistical Analyses*

In order to cross-validate the structure of the SRBEQ scale, a confirmatory factor analysis (CFA) was carried out. Before testing the fit indices, we checked if all item loadings were higher than .40 or possibly even higher than .50. Several statistics were used to assess model fit: chi-square ( $\chi^2$ ) and the ratio of chi-square and degrees of freedom, the GFI, the CFI, the RMSEA and the SRMR. The values of  $\chi^2/df$  should be lower than 3. For the GFI and the CFI, values exceeding .90 indicate an acceptable fit and those exceeding .95 indicate a very good fit. The RMSEA and the SRMR should be under .05, with values lower than .08 representing an acceptable fit (Hu & Bentler, 1999; Jöreskog & Sörbom, 1993; Kline, 2005; B. Thompson, 2004).

To test the relationship of the dimensions of SRBEQ with subjective well-being and mental health variables, we used multiple regression analysis. Although this study is correlational, our premise was that the use of selfies influences well-being and mental health. Thus, we treated dimensions of SRBEQ as predictors and measures of subjective well-being and mental health as criterion variables in the regression analyses. We tested the set of predictors for multicollinearity and the highest VIF of 2.13 was obtained for positive affect, indicating no multicollinearity problems.

## **Results**

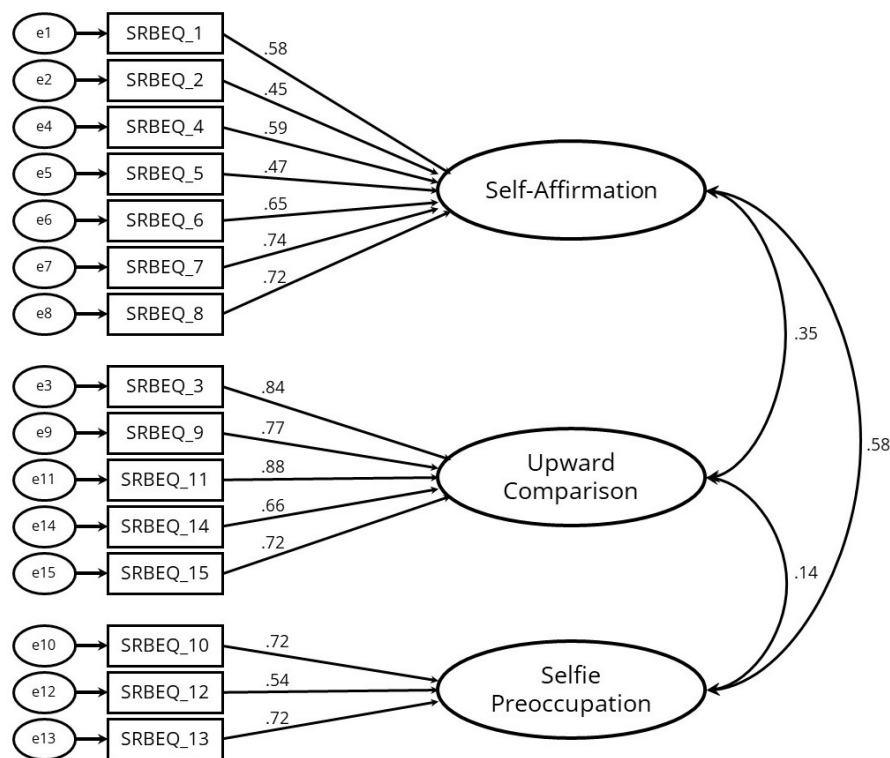
### *The CFA of the Selfie-Related Behaviors and Experiences Questionnaire*

To cross-validate the structure of the SRBEQ obtained in Study 1, we contrasted the three-dimensional structure obtained in the EFA with one-dimensional and two-dimensional structures. In the two-dimensional structure, we loaded all items referring to active use of selfies, i.e., self-presentation and selfie preoccupation subscales on one factor and items referring to passive exposure to others' selfies, i.e., the upward comparison subscale on the other factor. Finally, in the three-dimensional structure, two items had loadings between .40 and .50 (see Figure 1), which is why we also tested a shortened three-dimensional structure with these two items excluded. The results showed that the full three-dimensional structure had the best fit indices compared to all other specified models (Table 6). All indices of the full three-dimensional model fell within the acceptable fit category. Excluding two items with loadings between .40 and .50 did not improve the fit. Therefore, we decided to keep these items.

**Table 6.** *The Goodness of Fit Indices of Different Structural Models of the SRBEQ.*

Model	$\chi^2$ (df)	$p$	$\chi^2/df$	GFI	CFI	RMSEA	SRMR
1 factor, full scale	1230.37 (90)	<.001	13.67	.625	.566	.164	.1551
2 factors, full scale	442.37 (89)	<.001	4.97	.879	.865	.092	.0781
<b>3 factors, full scale</b>	<b>321.10 (87)</b>	<b>&lt;.001</b>	<b>3.69</b>	<b>.915</b>	<b>.911</b>	<b>.076</b>	<b>.0725</b>
3 factors, shortened scale	252.11 (62)	<.001	4.07	.925	.921	.081	.0735

**Figure 1.** Standardized Factor Loadings From the CFA of the Selfie-Related Behaviors and Experiences Questionnaire.



### ***The Relationship of Selfie-Related Behaviors and Experiences With Subjective Well-Being and Mental Health***

Descriptive statistics and Pearson intercorrelations for all variables from this study are presented in Table 7.

**Table 7.** Descriptive Statistics and Intercorrelations of Variables From Study 2.

Variable	<i>M (SD)</i>	2	3	4	5	6	7	8
1. Self-presentation	2.03 (0.75)	.33**	.49**	-.01	-.02	.05	≈.00	.10*
2. Upward comparison	1.75 (0.91)		.18**	-.23**	-.23**	.33**	.38**	.35**
3. Selfie preoccupation	2.61 (1.08)			.05	≈.00	.06	≈.00	.09
4. Satisfaction with life	4.66 (1.32)				.57**	-.39**	-.50**	-.40**
5. Positive affect	3.83 (0.71)					-.60**	-.59**	-.38**
6. Negative affect	2.52 (0.76)						.56**	.33**
7. Depression	0.69 (0.67)							.50**
8. Loneliness	0.42 (0.28)							

Note. \* $p \leq .05$ , \*\* $p \leq .01$ , \*\*\* $p \leq .001$  (two-tailed).

**Table 8.** Regression Analyses Predicting Subjective Well-Being and Mental Health Based on the Dimensions of the Selfie-Related Behaviors and Experiences Questionnaire.

Criterion	$\beta$				
	Satisfaction with life	Positive affect	Negative affect	Depression	Loneliness
Self-presentation	.03	.05	-.08	-.14**	-.04
Upward comparison	-.25***	-.25***	.35***	.43***	.35***
Selfie preoccupation	.08	.02	.04	-.01	.04
<i>R</i>	.25	.24	.34	.40	.35
<i>R</i> <sup>2</sup>	.06	.06	.11	.16	.12
<i>F</i>	10.01***	9.35***	19.95	30.17***	22.04**
<i>df</i> <sub>bg</sub> / <i>df</i> <sub>wg</sub>	3/472	3/472	3/472	3/472	3/472

Note. \* $p \leq .05$ , \*\* $p \leq .01$ , \*\*\* $p \leq .001$ .

Five regression models tested the contribution of the dimensions of SRBEQ to the prediction of three indicators of subjective well-being and depression and loneliness<sup>2</sup>. Selfie-related behaviors and experiences explained between 6% and 16% of variance of criterion variables (Table 8). The most consistent predictor of all five indicators of subjective well-being and mental health was upward comparison, while self-presentation was only negatively related to depression. Note, however, that this is the suppression effect, since the Pearson correlation between self-presentation and depression was null (Table 7). Selfie preoccupation was not related to any indicator of subjective well-being or mental health. The detailed presentation of the results with exact *p* values, *b* coefficients, *SE*, and 95% CI is provided in the Appendix (Tables 4A–8A).

## Discussion

The three-dimensional structure of the SRBEQ obtained in Study 1 was confirmed in the CFA. Analyses indicated that self-presentation and selfie preoccupation dimensions, which depict different aspects of active selfie-related behaviors, were mostly unrelated to indicators of well-being and mental health, with the exception of self-presentation which was related to lower depression. However, upward comparison of one's look with others' selfies was related to lower subjective well-being, less positive affect, more negative affect, more depression and loneliness. These findings suggest that exposure to others' attractive selfies, especially when it evokes comparison with one's looks, can have a detrimental effect of subjective well-being.

## General Discussion

This study focused on the psychological aspects of the two-sided phenomenon of selfies—posting selfies and exposure to others' selfies—as well as on the (mal)adaptive aspects of this phenomenon. The Selfie-Related Behaviors and Experiences Questionnaire, initially developed in this study, indicated the existence of three distinct aspects of selfie experiences: upward physical appearance comparison with others' selfies, self-presentation through selfies, and selfie preoccupation. Upward comparison with others' selfies was the only dimension that depicted psychological experiences related to exposure to others' selfies, i.e., a specific aspect of the passive selfie-related behaviors. This dimension describes the feelings of inadequacy and dissatisfaction when the person is faced with (unrealistically positive) selfies of other people, along with the pressure to reach these standards of beauty. The remaining two dimensions encompass different psychological aspects of the process of selfie taking and posting, i.e., active selfie-related behaviors. The self-presentation dimension describes the use of selfies to attract the attention of others and the consequential feeling of satisfaction and self-confidence that arises from others' confirmation. Selfie preoccupation describes the effort put into creating and choosing the right photo to present oneself in an idealized manner. Our analyses indicated that women and younger individuals are more preoccupied with taking selfies and that they are more exposed to others' selfies, in addition to comparing themselves more with others' selfies. These findings are in line with findings that show that women (especially at younger age) experience more pressure to reach the societal standards of beauty (e.g., Grogan, 2008).

The analysis of the relationship between selfie-related behaviors and experiences and body image revealed that the strongest and the most consistent predictor of selfie-related experiences was fear of negative appearance evaluation. It was a strong motivator not only of the efforts to take desirable selfies and to seek positive social feedback, but also of attentiveness to others' attractive selfies and the urge to compare oneself with them. Once again, it was shown that the more individuals compare themselves to attractive Instagram users, the more they are dissatisfied with their bodies (Fardouly et al., 2015; Hendrickse et al., 2017; Krause et al., 2021; Park & Baek, 2018; Stapleton et al., 2017). However, the causal relationship between selfie-related behaviors and appearance (dis)satisfaction is still unclear. On the one hand, one experimental study found that selfie taking and editing lead to facial dissatisfaction, but not the other way around (Tiggemann et al., 2020). On the other hand, de Vries showed that it is body dissatisfaction that shapes SNS use and not SNS use that induces body dissatisfaction (de Vries et al., 2016). Close to that conclusion is our finding that individuals with slimmer bodies (i.e., a lower BMI) are more preoccupied with and put more effort into taking selfies, probably because they expect positive feedback on their looks. On the other hand, individuals who deviate more from the ideal of thinness (in other words, who have a higher BMI) are initially discouraged from posting selfies, despite all the possibilities of photo editing and provocative posing.

Contrary to findings of other authors (Burrow & Rainone, 2017; Krause et al., 2021; March & McBean, 2018), in our study, an active approach to creating selfies and self-presenting and boosting one's confidence through them was

not related to global self-esteem, but it was related to higher social self-esteem. The correlational nature of our research does not allow us to make causal conclusions, but previous studies showed that SNS does not improve social self-esteem, but the other way around—high social self-esteem leads to more active use of SNSs (Valkenburg et al., 2017). It seems that individuals need to have initial confidence in their social competencies and feel socially accepted in order to gain the courage to step up and seek positive affirmation through selfies.

However, the mere content of the self-presentation dimension suggests that some individuals do feel that they self-enhance through the social feedback they receive (see also Diefenbach & Christoforakos, 2017). If that is possible, our results indirectly suggest that this kind of benefit can be enjoyed by those who are sensitive to body image issues, but are still confident regarding their social relations. Nevertheless, the long-term effects of positive feedback on selfies are still under question. Our study showed that self-presentation through selfies is generally unrelated to subjective well-being and mental health. The positive effect of self-presentation was found only after upward comparison with others' selfies was controlled for, which means that only after we exclude the (inevitable) effects of exposure to others' selfies, self-presenting and receiving positive feedback from others can have a beneficial effect on an individual in terms of lower depression. However, it would be important to examine if these effects can be long-lasting. Metzler and Scheithauer (2017) concluded that although positive self-presentation attracts positive feedback and enhances self-esteem in the present, it leads to lower self-esteem in the future. Bayens et al. (2020) found that benefits and detriments associated with SNS use are largely individual. In their experience sampling study (ESM), they found that the effects of both active and passive social media use on well-being were positive for some persons and negative for others. The efficiency and longevity of the positive effect of social feedback on SNSs may also depend on its immediacy (Jong & Drummond, 2016). Finally, basing self-esteem on online affirmation can lead to the feeling of contingency on this source of positive feedback, which when absent can cause even deeper feelings of inadequacy or ill-being (Crocker, 2002; Crocker & Park, 2004). ESM studies are certainly needed in order to gain insight into the complexity of such dynamics, while future longitudinal studies should shed light on causal relations between active forms of selfie use and mental health.

The results regarding upward physical appearance comparison on Instagram suggest that this cognitive process, provoked when an individual is exposed to others' overly attractive photographs, is probably the most detrimental aspect of Instagram use. Not only is it related to a dysfunctional body image, but also to all indicators of lower subjective well-being and poorer mental health. Previous studies have mostly explored the relevance of appearance-related upward comparison on social networks for body image concerns and negative affect (Ahadzadeh et al., 2017; Brown & Tiggemann, 2016; Fardouly et al., 2015; Fardouly & Vartanian, 2016; Hendrickse et al., 2017; Tiggemann & Slater, 2013), and to some extent to depression (Frison & Eggermont, 2017; Hawes et al., 2020; Sherlock & Wagstaff, 2019), but they have rarely analyzed its effects on loneliness or self-esteem. Thus, our findings regarding the relationship between upward comparison and loneliness seem particularly interesting, but the causality of this relationship should be clarified in longitudinal studies. When it comes to general and social self-esteem, our findings showed that, although they are negatively related to upward comparison of one's physical appearance (see Table 3), they did not bring the unique predictive contribution and their effect can be brought down to the effects of physical appearance variables.

In this study we did not focus on gender differences, as gender disbalance in our sample was considerable and male subsample was underrepresented. Previous studies have shown that women are especially sensitive to the mental health risks of SNS use (e.g., Thorisdottir et al., 2019), although some findings indicate that men themselves are not immune to it (Holland & Tiggemann, 2016). However, Frison and Eggermont (2016) found that active SNS use can be beneficial for girls. When it comes to selfies, rare studies that examined gender differences in selfie activities have shown that women are not more invested in taking selfies, but they do engage in more photo editing than men (Loneragan et al., 2019). Our results revealed that women are more prone to upward comparison and selfie preoccupation, but the relationship between selfie-related behaviors and experiences, on the one hand, and physical appearance, self-esteem and mental health variables, on the other, did not change when gender was controlled for in the analyses. While these findings could indirectly suggest that gender did not moderate these relationships, we would refrain from drawing such a conclusion until a larger sample of men is available.

## **Limitation and Future Directions**

Several limiting factors should be taken into consideration when interpreting the results of this research. First, the samples in both studies were convenient and consisted predominantly of women, which means that our conclusions can only be generalized to a similar population. In particular, conclusions regarding selfies and body

image concerns might be influenced by the gender disbalance in the sample. Therefore, future studies should attempt to validate the results on a more balanced sample or on men. This study was correlational by design and thus directional conclusions were not warranted. We tried to infer the direction of influence only when previous studies have already confirmed such a relation. However, longitudinal studies and ESM studies can offer a better insight in the nature of relationships between the examined variables. ESM studies seem especially promising since they can offer a better insight into individual level fluctuations of SNS-related behaviors and well-being.

Qualitative studies can be useful in illuminating the dynamics between the three aspects of selfie-related behaviors that we measured in this study. Positive correlations between the three dimensions indicate their interplay. However, we also assume that these behaviors can influence one another and that they can influence well-being as well. For example, there is a positive relationship between self-presentation through selfies, which implies a boost of self-confidence, and upward comparison with others' selfies, which is related to ill-being. This finding may indirectly suggest that the dynamics of selfie-related behaviors and experiences are turbulent: one may browse attractive others' selfies to learn what is needed to attract the attention of others and then create and post selfies to get noticed. During this process, an individual may experience a "rollercoaster" of emotions, from feeling inadequate and inferior to feeling affirmed and accepted. Such dynamics may result in compulsive selfie posting whenever the person experiences self-doubts. Likewise, some qualitative studies have indicated that peer comparison and self-presentation online can form a self-perpetuating cycle, especially among low self-esteem individuals (Chua & Chang, 2016). Thus, the dynamics of positive and negative selfie-related emotional experiences should be further examined in qualitative studies, preferably with individuals who compulsively post selfies.

It is important to note that, in an effort to examine active and passive forms of selfie activities under the same framework, we included in the study only Instagram users who indicated that they post selfies. This way we excluded the participants who have experiences of passive exposure to others' selfies, but who do not post selfies. It might be possible that these individuals are psychologically different, e.g., that they are not confident enough in their appearance to post selfies and that this could lead to different relations of their pattern of selfie activities with body image concern and mental health. Therefore, future studies regarding the passive selfie activities need to include this group of Instagram users to offer the full picture of the variety of selfie-related experiences.

Finally, the newly developed SRBEQ questionnaire should be further validated on different samples and in different cultures to prove its usefulness.

## Footnotes

<sup>1</sup> Suppression effect implies that, although the real relation between two variables (in this case, BMI and self-presentation) does not exist, as shown by their null Pearson correlation, their relationship in the multiple regression analysis becomes statistically significant due to the covariances of the suppressor with other predictors and covariances of these predictors with criterion, giving the false picture of predictor influencing the criterion. The suppressor's coefficient is typically not interpreted.

<sup>2</sup> We also carried out the hierarchical regression analyses where gender and age were entered as control variables in the first step, but they were not statistically significant predictors in any of the five regression models, nor their inclusion in the model changed the relations between selfie-related behaviors and experiences and criterion variables. Therefore, we decided to present the analyses without these control variables. The analyses with sociodemographic variables are uploaded at the project OSF page as a supplementary file (see <https://osf.io/ay9m4/>).

## Conflict of Interest

The Authors declare that there is no conflict of interest.



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## Appendix

### The Detailed Results of Regression Analyses From the Study 1

**Table 1A.** Detailed Results of the Hierarchical Regression Analysis Predicting Self-Presentation Based on Socio-Demographic Variables, Physical Appearance and Self-Esteem Variables (Study 1).

Model	Predictor	Unstandardized coefficient				$\beta$	$t$	$p$
		$B$	$SE$	95% LLCI	95% ULCI			
1	Constant	2.471	0.373	1.739	3.203		6.617	.000
	Gender	-0.113	0.126	-0.360	0.135	-.054	-0.894	.372
	Age	-0.018	0.011	-0.039	0.004	-.097	-1.600	.111
2	Constant	1.742	0.684	0.401	3.083		2.546	.011
	Gender	-0.369	0.126	-0.616	-0.123	-.177	-2.941	.004
	Age	-0.002	0.010	-0.023	0.018	-.013	-0.229	.819
	Body Mass Index	-0.031	0.015	-0.061	0.000	-.124	-1.984	.048
	Fear of negative appearance evaluation	0.400	0.058	0.286	0.514	.491	6.857	.000
	Body esteem	0.207	0.107	-0.003	0.418	.139	1.931	.055
3	Constant	1.351	0.652	0.072	2.629		2.071	.039
	Gender	-0.423	0.120	-0.657	-0.189	-.203	-3.538	.000
	Age	-0.004	0.010	-0.023	0.016	-.020	-0.374	.709
	Body Mass Index	-0.037	0.015	-0.066	-0.009	-.152	-2.544	.012
	Fear of negative appearance evaluation	0.411	0.057	0.299	0.523	.505	7.195	.000
	Body esteem	-0.028	0.118	-0.259	0.203	-.019	-0.238	.812
	Self-esteem	0.103	0.079	-0.052	0.258	.104	1.299	.195
	Social self-esteem	0.259	0.058	0.145	0.372	.274	4.460	.000

**Table 2A.** Detailed Results of the Hierarchical Regression Analysis Predicting Upward Comparison Based on Socio-Demographic Variables, Physical Appearance and Self-Esteem Variables (Study 1).

Model	Predictor	Unstandardized coefficient				$\beta$	$t$	$p$
		$B$	$SE$	95% LLCI	95% ULCI			
1	Constant	1.845	0.408	1.045	2.644		4.523	.000
	Gender	0.291	0.138	0.021	0.561	.125	2.110	.036
	Age	-0.032	0.012	-0.056	-0.009	-.161	-2.713	.007
2	Constant	2.541	0.646	1.275	3.808		3.932	.000
	Gender	0.022	0.119	-0.211	0.255	.009	0.186	.853
	Age	-0.012	0.010	-0.031	0.007	-.060	-1.236	.218
	Body Mass Index	-0.035	0.015	-0.063	-0.006	-.127	-2.385	.018
	Fear of negative appearance evaluation	0.454	0.055	0.346	0.562	.501	8.247	.000
	Body esteem	-0.303	0.101	-0.502	-0.104	-.183	-2.989	.003
3	Constant	2.480	0.650	1.205	3.754		3.813	.000
	Gender	0.008	0.119	-0.226	0.242	.003	0.067	.946
	Age	-0.012	0.010	-0.032	0.007	-.061	-1.265	.207
	Body Mass Index	-0.037	0.015	-0.065	-0.008	-.134	-2.500	.013
	Fear of negative appearance evaluation	0.472	0.057	0.361	0.584	.521	8.299	.000
	Body esteem	-0.379	0.118	-0.609	-0.148	-.229	-3.220	.001
	Self-esteem	0.103	0.079	-0.052	0.258	.093	1.306	.193
	Social self-esteem	-0.019	0.058	-0.132	0.094	-.018	-0.326	.745

**Table 3A.** Detailed Results of the Hierarchical Regression Analysis Predicting Selfie Preoccupation Based on Socio-Demographic Variables, Physical Appearance and Self-Esteem Variables (Study 1).

Model	Predictor	Unstandardized coefficient				$\beta$	$t$	$p$
		$B$	$SE$	95% LLCI	95% ULCI			
1	Constant	2.319	0.495	1.350	3.289		4.690	.000
	Gender	0.614	0.167	0.286	0.942	.213	3.673	.000
	Age	-0.048	0.015	-0.076	-0.020	-.192	-3.308	.001
2	Constant	2.775	0.926	0.961	4.590		2.998	.003
	Gender	0.316	0.170	-0.018	0.649	.109	1.857	.064
	Age	-0.029	0.014	-0.057	-0.002	-.117	-2.086	.038
	Body Mass Index	-0.051	0.021	-0.092	-0.010	-.149	-2.433	.016
	Fear of negative appearance evaluation	0.391	0.079	0.236	0.545	.347	4.952	.000
3	Body esteem	-0.033	0.145	-0.318	0.252	-.016	-0.226	.821
	Constant	2.396	0.908	0.616	4.177		2.639	.009
	Gender	0.264	0.167	-0.063	0.590	.091	1.583	.115
	Age	-0.031	0.014	-0.057	-0.004	-.122	-2.231	.027
	Body Mass Index	-0.057	0.021	-0.098	-0.017	-.168	-2.800	.005
	Fear of negative appearance evaluation	0.401	0.079	0.245	0.557	.356	5.043	.000
	Body esteem	-0.260	0.164	-0.582	0.062	-.126	-1.582	.115
	Self-esteem	0.098	0.110	-0.118	0.314	.071	0.888	.375
Social self-esteem	0.251	0.081	0.093	0.409	.193	3.113	.002	

## The Detailed Results of Regression Analyses From Study 2

**Table 4A.** Regression Analyses Predicting Satisfaction With Life Based on the Dimensions of the Selfie-Related Behaviors and Experiences Questionnaire (Study 2).

Predictors	Unstandardized Coefficients				$\beta$	$t$	$p$
	$B$	$SE$	95% LLCI	95% ULCI			
Constant	4.942	0.197	4.556	5.327		25.111	.000
Self-presentation	0.056	0.094	-0.129	0.241	.032	0.595	.552
Upward comparison	-0.365	0.069	-0.500	-0.230	-.251	-5.295	.000
Selfie preoccupation	0.093	0.063	-0.030	0.216	.076	1.476	.141

**Table 5A.** Regression Analyses Predicting Positive Affect Based on the Dimensions of the Selfie-Related Behaviors and Experiences Questionnaire (Study 2).

Predictors	Unstandardized Coefficients				$\beta$	$t$	$p$
	$B$	$SE$	95% LLCI	95% ULCI			
Constant	4.052	0.106	3.845	4.260		38.210	.000
Self-presentation	0.047	0.051	-0.053	0.146	.050	0.925	.355
Upward comparison	-0.196	0.037	-0.268	-0.123	-.250	-5.264	.000
Selfie preoccupation	0.010	0.034	-0.056	0.077	.015	0.299	.765

**Table 6A.** Regression Analyses Predicting Negative Affect Based on the Dimensions of the Selfie-Related Behaviors and Experiences Questionnaire (Study 2).

Predictors	Unstandardized Coefficients				$\beta$	$t$	$p$
	$B$	$SE$	95% LLCI	95% ULCI			
Constant	2.105	0.109	1.891	2.319		19.275	.000
Self-presentation	-0.079	0.052	-0.181	0.024	-.078	-1.503	.134
Upward comparison	0.290	0.038	0.215	0.365	.349	7.590	.000
Selfie preoccupation	0.025	0.035	-0.043	0.094	.036	0.721	.471

**Table 7A.** Regression Analyses Predicting Depression Based on the Dimensions of the Selfie-Related Behaviors and Experiences Questionnaire (Study 2).

Predictors	Unstandardized Coefficients				$\beta$	$t$	$p$
	$B$	$SE$	95% LLCI	95% ULCI			
Constant	0.407	0.094	0.223	0.592		4.324	.000
Self-presentation	-0.121	0.045	-0.210	-0.033	-.136	-2.688	.007
Upward comparison	0.314	0.033	0.249	0.378	.426	9.513	.000
Selfie preoccupation	-0.008	0.030	-0.067	0.051	-.012	-0.256	.798

**Table 8A.** Regression Analyses Predicting Loneliness Based on the Dimensions of the Selfie-Related Behaviors and Experiences Questionnaire (Study 2).

Predictors	Unstandardized Coefficients				$\beta$	$t$	$p$
	$B$	$SE$	95% LLCI	95% ULCI			
Constant	0.226	0.040	0.147	0.305		5.610	.000
Self-presentation	-0.014	0.019	-0.052	0.024	-.037	-0.720	.472
Upward comparison	0.109	0.014	0.081	0.137	.354	7.731	.000
Selfie preoccupation	0.011	0.013	-0.014	0.037	.044	0.881	.379



## About Authors

**Bojana Bodroža** (Ph.D., University of Novi Sad) is the associate professor of social psychology at the Department of Psychology, Faculty of Philosophy, University of Novi Sad. Her research interests include self and identity, social networking, and more recently gender-based violence and sexual harassment. Her papers have been published in journals including *Computers in Human Behavior*, *European Journal of Social Psychology*, *Frontiers in Psychology*, *Assessment*, *School Effectiveness and School Improvement*, *Personality & Individual Differences*.

**Vojana Obradović** (MA, University of Novi Sad) is a Junior research assistant at the Department of Psychology, University of Novi Sad, Serbia. In addition, she is a Ph.D. student at the Department of Psychology, University of Novi Sad, Serbia. Her research focuses on subjective well-being, social networks, on the relation between social media, subjective well-being, and mental health.

**Sara Ivanović** (B.Sc., University of Novi Sad) works as a clinical psychologist at the Center for Early Development and Inclusion. She specializes in working with children with developmental problems and youth counseling. Her research interests focus on the effects of social media on the mental health of young people and the application of cyberpsychology in the prevention and promotion of mental health.

### ✉ Correspondence to

Bojana Bodroža, Faculty of Philosophy, Zorana Đinđića 2, Novi Sad, 21000, Serbia, [bojana.bodroza@ff.uns.ac.rs](mailto:bojana.bodroza@ff.uns.ac.rs)

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