



Why didn't you tag me?!: Social exclusion from Instagram posts hurts, especially those with a high need to belong

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ABSTRACT

Humans are highly sensitive to ostracism experiences and thus, even very short occurrences of being excluded and ignored can threaten fundamental needs and lower mood. We investigated whether not being tagged causes similar negative responses as being excluded in real life. Using a multi-method approach, we show across five studies (total $N = 1149$) that not being tagged in a posted photo strongly threatens fundamental needs. This effect is moderated by individuals' need to belong, such that individuals with a higher need to belong experience not being tagged as more aversive. Results replicate across vignette studies in which participants imagine not being tagged on Instagram (Studies 2 and 3) and across studies using an alleged group task paradigm that mimicked the psychological mechanism of not being tagged outside of Instagram (Studies 4a and 4b). All experimental studies were pre-registered and we freely share all materials, code and data. Extending ostracism effects to the social media phenomenon tagging, the present research bridges real-world and digital social interactions. The results add to theoretical knowledge on social media, ostracism, and digital well-being and have practical implications for social media app design, social media interventions and our everyday interactions that increasingly happen online.

1. Introduction

Ostracism, that is, being ignored and excluded (Williams, 2009), does not spare the digital world: Being un-friended (Bevan et al., 2012), not receiving a reply after an instant messenger indicated an own message had been read (Mai et al., 2015), or not receiving the usual amount of Likes in response to a post on social media (Wolf et al., 2015) are interpreted as ostracism and have similar negative consequences as being excluded in real life (e.g., Reich et al., 2018; Schneider et al., 2017). Previous research studying ostracism in social media has focused primarily on the negative consequences of one's self-created content being ignored, for example, not receiving enough Likes or feedback on a post or status text (Reich et al., 2018; Smith et al., 2017; Tobin et al., 2015). We propose that there might be another social media ostracism behavior that does not refer to self-created content, but content created by another person: Not being tagged in the social media post of another person.

1.1. Not being tagged as a form of social media ostracism

Ostracism typically has highly adverse psychological consequences, as prominently described by the Temporal Need Threat Model of Ostracism (Williams, 2009): Rooted in the evolutionary necessity for cooperation and belonging to larger groups for individuals' survival, humans have been theorized to possess an *ostracism detection system* (Williams & Zadro, 2005) that reacts strongly to even short incidents of being excluded. If ostracism is detected, in what is termed the *reflexive* response, individuals experience a strong, immediate sense of threat to four fundamental needs, namely, the need to belong, the need for control, the need for meaningful existence and the need for self-esteem (Williams, 2009). In a later, *reflective* stage, individuals make sense of their experience and cope with the consequences. While moderating effects of dispositions and aspects of the situational context are usually stronger within this latter stage (e.g., Hartgerink et al., 2015), reflexive responses have been shown to vary depending on the individuals' subjective construal of the situation, for instance, by prevailing social norms within the situation but also personal norms of the excluded individual (e.g., Greifeneder & Rudert, 2019; Rudert & Greifeneder, 2016).

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The power of ostracism is not limited to face-to-face-interactions: Studies comparing social media ostracism and *offline* forms of ostracism show that they elicit comparable levels of need threat (e.g., Wolf et al., 2015). Social media ostracism has been investigated on Facebook (e.g., Covert & Stefanone, 2020; Reich et al., 2018; Smith et al., 2017), Twitter and Instagram (e.g., Hayes et al., 2018), as well as on fictive social media platforms (e.g., Lutz & Schneider, 2020; Schneider et al., 2017; Wolf et al., 2015). These studies have in common that social content which individuals have created themselves, such as status texts, profiles, or posts, is being ignored by others. Here, we argue that exclusion in social media can also derive from being excluded and ignored in content that has been created by others, that is, by not being tagged in that content.

Tagging is a widely-used mechanism on many social media sites (e.g., Instagram, Facebook, or Twitter) that describes linking the profile of another user to a posted photo or text (e.g., Dhir & Torsheim, 2016). Posted photos can show, for example, a previous experience or social interaction that one has shared with the users tagged in the photo. Most social media users tag and are tagged on a regular basis (Hampton et al., 2012). According to the needs-affordances-features perspective of social media use (Karahanna et al., 2018), social media is used because certain features fulfill certain human needs such as, for example, needs of relatedness. Particularly, tagging allows “meta-voicing”, that is, users engage in interaction with each other by reacting to other’s content. Tagging thus goes beyond sharing self-created content to “adding meta-knowledge to the content that is already online.” (Majchrzak et al., 2013, p. 41). Being tagged may further serve as a source of self-esteem and belongingness for tagged social media users in two ways: First, being tagged might represent a cue to solve the uncertainties that come with real-world social interactions (e.g., Boothby et al., 2018): For example, individuals can never be completely sure if their interaction partners truly enjoyed a conversation, really liked their jokes, or secretly talked negatively about them behind their back. In trying to make sense of an ambiguous social situation, social media can provide a rich set of social cues such as Likes, tags, or emoji reactions (e.g., Ellison et al., 2014; Hayes et al., 2016) that reaffirm individuals that they are indeed perceived as valuable social interaction partners. Thus, tagging among friends may signal relationship closeness and importance (Burke et al., 2011; Burke & Kraut, 2014). Second, being tagged in social media also has a signaling function, as the tagged person’s belongingness is directly and publicly represented in a post or on a photo for everyone to see. Thus, being tagged may signal to others that the tagged individual is an interesting and desirable social interaction partner. Given these functions of tagging, it follows that not being tagged may be perceived as intentional or unintentional social media ostracism by others, elicit feelings of uncertainty (e.g., Chen et al., 2010), and threaten fundamental needs (e.g., Schneider et al., 2017). Notably, not being represented in a photo may not only be a social media phenomenon but can also be extended to phenomena in the real world: A prominent example is Vanessa Nakate, a climate activist, who was cut off from a photo of activists as the only non-white person by the press which caused a debate around racism (Evelyn, 2020). Nakate was cited describing the experience as very hurtful: “It showed how we are valued. It hurt me a lot. It is the worst thing I have ever seen in my life.” (Dahir, 2020).

In the present contribution, we differentiate between not being tagged by others and earlier studies investigating *untagging* oneself, that is, removing a tag of one’s profile (e.g., Birmholtz et al., 2017): Individuals may untag themselves from others’ social media post because they do not want the post to be displayed on their profile (e.g., because they do not like how they look in a photo or what they are doing in that photo). Untagging oneself has been argued to damage the connection of the tagger and the taggee (e.g., Birmholtz et al., 2017), which might be similar to not being tagged by others. However, untagging is something that the taggee actively decided to do themselves, while not being tagged by others is the absence of an action by someone else. Therefore, untagging might be more accurately described as a form of rejection,

that is, the direct communication that one does not want to interact (i.e., the taggee signals to the person that tagged them that they do not want to be tagged), while not tagging someone in the first place might be more accurately described as a form of ostracism, that is, ignoring someone (see Wesselmann et al., 2019).

1.2. A possible moderator: need to belong

It is arguable if (not) being tagged is equally important to all social media users. While the Temporal Need Threat Model conceptualizes the reflexive negative response to ostracism as universal and insensitive to moderation (Williams, 2009), recent studies as well as meta-analysis show that even the initial, reflexive response to ostracism can be moderated, albeit the effects are usually less strong compared to the reflective response (e.g., Hartgerink et al., 2015; Rudert & Greifeneder, 2016). Particularly, the initial ostracism response may also be moderated by interindividual differences such as personality traits (e.g., Foshati et al., 2017; Mazinani et al., 2021; Yaakobi, 2021).

The *need to belong* describes the general desire to be connected to important others or groups (Baumeister & Leary, 1995). Individuals with a higher need to belong feel it is highly important to gain acceptance by others, while for individuals with a lower need to belong gaining acceptance and belonging has a lower priority (e.g., Leary et al., 2013). There are two possible reasons why individuals with a higher need to belong might perceive being excluded online as more threatening than individuals with a lower need to belong: First, individuals with a higher (vs. lower) need to belong may place more importance on being included in all areas of their life, including areas that may not seem important to all people alike, such as on social media platforms. This notion is in line with research showing that social media offers features that fulfill the need to interact and connect with others (Karahanna et al., 2018) and that individuals’ need to belong motivates social media use (e.g., Gangadharbatla, 2008; Mai et al., 2015; Nadkarni & Hofmann, 2012; Reich & Vorderer, 2013; Wong et al., 2019). Second, the perception of ostracism depends on individuals’ subjective construal of the situation (e.g., Greifeneder & Rudert, 2019; Rudert & Greifeneder, 2016). Not being tagged may be a highly ambiguous situation, for example, because the reasons for why one has not been tagged are unclear. Therefore, this situation may first need to be construed as an exclusion experience, or not. Individuals with a high need to belong may be more inclined to construe an ambiguous situation as an experience of exclusion because they are more sensitive to threats of their belongingness than individuals with a lower need to belong. In line with this notion, previous research has shown that individuals with a higher compared to a lower need to belong react differently to being excluded (e.g., Eck et al., 2017). Based on these considerations, we hypothesize that the need to belong might moderate need threat following social media ostracism. That is, individuals with a higher (vs. lower) need to belong might experience a stronger decrease in need satisfaction when they are not tagged.

The Temporal Need Threat Model proposes that ostracism typically threatens four fundamental needs, the need to belong, the need for self-esteem, the need for a meaningful existence and the need for control (e.g., Williams, 2009). While self-esteem is also associated with social media use (e.g., Andreassen et al., 2017; Hawi & Samaha, 2019), within the present contribution we chose to focus on the need to belong. We argue that individuals’ need to belong should be particularly associated with responses to exclusion experiences as the need to belong represents the desire for acceptance and acknowledgement by others. Therefore, the need to belong is by definition tied to interactions with others, including social media interactions. In contrast, self-esteem may be fulfilled through various sources, including, but not limited to, experiencing belonging (e.g., Greenberg et al., 1986). It should be noted, however, that previous research has shown the four needs to be strongly correlated (e.g., Klein & Rudert, 2021).

1.3. Overview of the studies

We conducted five studies to explore effects of social media ostracism and the role of the need to belong as a possible moderator. Although forms of tagging are present in nearly all social media platforms (e.g., Twitter, Facebook, Instagram), in the present research we mainly focused on the photo-based social media site Instagram. Our focus on Instagram was motivated by the platform's high popularity and growth especially among young adults at the time of the contribution (cf., Anderson & Jiang, 2018; Lee et al., 2015; Lup et al., 2015).

In a preliminary observational study (Study 1), we assessed the frequency of different exclusion experiences on Instagram to ensure the real-world relevance of our research. Studies 2 and 3 used vignettes to experimentally test our assumption that not being tagged (Studies 2 and 3) or being cut off from an Instagram post (Study 2) would decrease individuals' need satisfaction. Study 3 additionally examined the interplay of Instagram and offline experiences by assessing how previous offline inclusion versus exclusion and being subsequently included versus excluded on Instagram may affect need satisfaction. In Studies 4a and 4b we sought to solidify and extend our findings by examining if the mechanism of (not) being tagged threatens needs in an alleged group task, outside of Instagram. We further examined trait need to belong (Studies 2, 3, 4a and 4b) as a moderator of the expected effect of Instagram ostracism on need satisfaction.

Verbatim materials and data for all studies are available at https://osf.io/c24z7/?view_only=e983037107634e53870e1d36439dc665.¹ We preregistered all experimental studies. All study procedures were approved by the University of [masked for peer review] Institutional Review Board and conform to the Declaration of Helsinki.

1.3.1. Analytic strategy

All analyses were conducted using R-Studio Version 1.4.1717 (RStudio Team, 2021). In all following studies, for reasons of comparability, we report (partial) eta squared for all analyses as indicators of effect size. Following established conventions, for t-tests, we also report Cohen's *d*. We also report unstandardized regression coefficients *b* as well as standardized betas β for regression and simple slope analyses. For power analyses, we report the input effect sizes used in G*Power (Faul et al., 2007). For regression analyses, moderators were mean-centered prior to analysis and conditions effect-coded (i.e., for each comparison, the exclusion condition was coded as -0.5 and inclusion was coded as 0.5).

2. Study 1

2.1. Methods

Study 1 was an exploratory study aimed to investigate exclusion experiences on Instagram as well as determine the frequency of those experiences. Particularly, we aimed to assess if Instagram users would feel ostracized by situations that go beyond not receiving Likes.

¹ We also measured and pre-registered a need for popularity scale (Santor et al., 2000), a self-constructed Instagram use frequency scale, and a self-constructed "need to belong publicly" scale as additional moderators. Initially, we focused on the "need to belong publicly". However, because the results are similar but less consistent than for the need to belong, we focused on the need to belong in later studies (Study 3, 4a and 4b) as well as within the manuscript for reasons of simplicity. However, we report all moderator analyses for need to belong publicly (Studies 2, 3 and 4a), need for popularity (Study 2), and Instagram use frequency (Studies 2 and 3) as supplemental analyses together with all other analyses and data sets here: https://osf.io/c24z7/?view_only=e983037107634e53870e1d36439dc665.

2.1.1. Participants and design

After being recruited through university e-mail newsletters as well as through snowball sampling focusing on friends and acquaintances, 193 active Instagram users filled out an online study on "Instagram experiences". After applying all inclusion criteria (having an active Instagram account, answering all questions, passing attention checks, self-reported ability to follow the study's instructions, a high level of self-reported seriousness of participation (>5 on a 9-point scale), no self-exclusion from data analysis), 176 participants remained ($M_{\text{age}} = 24.74$, $SD = 7.00$, 81.81% female, 1 non-binary). Among all participants, there was an anonymous lottery to win 20 Euros (approximately \$25 at the time).

2.1.2. Materials and procedure

Participants were presented with four situations that we assumed might be interpreted as social exclusion on Instagram. They were asked if they had experienced any of four described situations and/or if they knew others that had encountered those situations: (1) Not being tagged in another person's Instagram story, (2) not being tagged in another person's Instagram post, (3) being cut off from a photo in another person's Instagram post, and (4) seeing photos of others at an event that the participant attended as well, albeit the participant is not shown on the posted pictures themselves. We chose these four situations based on informal discussions within the lab group as well as consultations with social media research experts.

If participants indicated having experienced a described situation, they could describe the situation, indicate their experienced affect (one item: "How did you feel in that situation?", 1 = good - 9 = bad), as well as experienced need satisfaction on four 9-point semantic differentials (one for each need: belonging, 1 = rejected - 9 = accepted; self-esteem, 1 = - 9 = ; meaningful existence, 1 = invisible - 9 = recognized; and control, 1 = powerless - 9 = powerful; Rudert & Greifeneder, 2016; Cronbach's $\alpha = 0.84-0.93$, depending on the measured situation). There was also an open text field where participants could describe another situation in which they felt excluded on Instagram and subsequently rate their need satisfaction and affect for this situation.

2.2. Results

Instagram users experienced all of the four described ostracism situations frequently. The frequencies of the different exclusion experiences as well as the associated need satisfaction and mood levels are reported in Table 1. Participants' open responses indicated the hurtfulness of Instagram ostracism: Regarding not being tagged in a post, one participant wrote, for example, "It happened multiple times to me for sure, and I felt excluded because of it. It happens especially at parties etc.". Not being tagged in a story was descriptively experienced as less hurtful than not being tagged in a post (see Table 1). This might be due to the temporal component (i.e., stories are only visible 24 h in Instagram, posts are visible indefinitely unless the poster decides to delete them) as one participant wrote "It wasn't as bad as not being tagged in a post, because a story is only temporarily available, however I was still disappointed". Although it was the rarest experience, many participants described being cut off from a photo as hurtful, too. For example, one participant shared "It was worse for me than not being tagged in the post because it gave me the feeling that I didn't belong to the group. I was very hurt and I questioned the friendship.". Not being in a photo from an event that one attended was the most frequent experience and also described as hurtful, for example: "I actually felt left out and worthless, because it looked like others were more important than me.".

However, some Instagram ostracism situations were also attributed to external factors in the descriptions. For example, when not being tagged, some participants attributed that behavior to the poster generally not using tags at all, so that nobody had been tagged. Similar attributions were made for being cut off from a post. For example, some participants stated that they were being cut off because the other person wanted to post a selfie.

Table 1Frequencies of ostracism experiences and associated need satisfaction in Study 1, $N = 176$.

Instagram exclusion scenario	once	more than once	knowing someone	Mean need satisfaction (SD)	Mean mood (SD)
not being tagged in a story	48%	30%	40%	5.49 (1.72)	5.75 (2.13)
not being tagged in a post	41%	17%	42%	5.00 (1.70)	5.44 (2.22)
not being in a photo from an attended event	58%	30%	41%	4.90 (1.75)	5.49 (2.23)
being cut off from a photo	15%	3%	65%	4.66 (1.99)	5.21 (2.43)
other ostracism situation on Instagram	–	–	–	2.56 (1.05)	2.59 (1.45)

Note. ‘Once’ means that a participant experienced that situation themselves, ‘more than once’ means they experienced that situation multiple times and ‘knowing someone’ means that they reported knowing someone with that experience. Lower values reflect less need satisfaction (scale from 1 to 9) and lower mood (scale from 1 to 9).

The need satisfaction measurement descriptively confirmed the impression given by participants’ open responses: being cut off from a post was the most hurtful of the described experiences, followed by not being in a photo of an attended event, followed by not being tagged in a post, and not being tagged in a story. A repeated measures ANOVA showed a significant difference between the described situations’ effect on need satisfaction, $F(4, 311) = 16.26, p < .001, \eta^2 = 0.17$. Bonferroni-corrected post-hoc tests revealed no significant differences between not being tagged in a story, or a post, not being in a photo from an event that one attended, or being cut off from a photo, smallest $p = .207$, suggesting that the experience of these Instagram ostracism situations was similarly hurtful. Unsurprisingly, when participants were explicitly asked about situations in which they felt ostracized on Instagram, they reported significantly lower need satisfaction scores compared to any of the specified Instagram ostracism situations, all $ps < .001$. The same pattern of results was observed for mood.

2.3. Discussion

Study 1 demonstrated that being ostracized on Instagram is a frequent experience, showing the relevance of the phenomenon. In the open responses many participants reported how hurtful being ostracized on Instagram felt to them. However, some participants also reported that incidents in which they were not tagged related to external factors. Given the high salience of negative information in memory (Baumeister et al., 2001), it is possible that participants primarily reported incidents in which they had felt indeed excluded and threatened compared to incidents that they considered to be trivial. In Study 2, we thus aimed to manipulate exclusion experiences on Instagram to test their impact on need satisfaction. Further, we test the moderating impact of the need to belong.

3. Study 2

To experimentally study exclusion experiences on Instagram, we constructed three scenarios based on the findings of Study 1: Inclusion by being tagged and shown on a post, exclusion by not-being tagged, and exclusion by being cut off from the posted photo. Our main hypothesis was that individuals that are excluded by not being tagged or by being cut off from a posted photo experience less need satisfaction than individuals who are included on Instagram by being tagged and shown on a posted photo. We included a measure of trait need to belong as a possible moderator.

3.1. Methods

3.1.1. Participants and design

We ran an a priori power analysis using G*Power (Faul et al., 2007) to detect meaningful effect sizes of a medium magnitude in line with Cohen (1992) ($f^2 = 0.0625$ corresponding to $f = 0.25$) for the main effect of the experimental conditions, aiming at a statistical power of at least 0.90 with an alpha error of 0.05. With these assumptions, a minimal sample size of 85 participants per experimental group was suggested, so 255 participants in total. Data collection aimed at a plus of

approximately 20%, so 310 individuals, to ensure enough data points in case of drop-outs.

In total, 307 participants completed a “Study on experiences on Instagram” via Prolific Academic for a compensation of £0.80. Inclusion criteria for data analysis were answering all questions, passing all attention and manipulation checks, self-reported ability to follow the study’s instructions, a high level of self-reported seriousness of participation (>5 on a 9-point scale) and no self-exclusion from data analysis. Additionally, we pre-selected Instagram users between 18 and 30 years since Instagram is most popular among young individuals (e.g., Lee et al., 2015). Overall, 269 active Instagram users fulfilled all inclusion criteria ($M_{age} = 24.38$ years, $SD = 3.54$, 74% female, one person of non-binary gender). Participants were randomly assigned to one of three experimental conditions (inclusion vs. exclusion by not being tagged vs. exclusion by being cut off from the photo; between-subjects). All materials and hypotheses were preregistered (<https://aspredicted.org/kk8d7.pdf>, see Footnote 1).

3.1.2. Materials and procedure

All participants entered demographic information, and were then presented with the following scenario introduction:

Please imagine the following scenario: You have just come home from an evening out with some close friends. During the evening, a picture of all of you was taken. You can see the picture’s composition below. You are the green figure. Everyone is smiling into the camera and all of you look nice in the picture, including you.

At home, you open Instagram. As all of you follow each other on Instagram, you can see that a friend of yours has posted the group photo showing all of you that was taken earlier.

Next, participants read one out of three versions how the scenario continued. To make the situation as realistic as possible, we showed participants pictures with four colored figures representing them and three of their friends (see Fig. 1). In the inclusion condition, participants next read “*Everyone on the photo is tagged, including you*”, together with the same picture that looked like a post from Instagram in which their profile was tagged. In the exclusion by not being tagged condition, participants saw the same Instagram-like picture but without their profile tagged. The last sentence read as follows: “*(...) All of your friends’ profiles are tagged on the photo. However, your profile is not tagged on the photo.*” Finally, in the exclusion by being cut off condition, participants saw the picture with their figure being nearly completely cut off and read: “*(...) All of your friends’ profiles are tagged on the photo. However, you seem to be cut off from the picture and your profile is not tagged on the photo.*”

Following the Instagram scenario, need satisfaction was measured with the same four items scale as in Study 1² (Cronbach’s $\alpha = 0.95$).

² Due to a programming error, the semantic differentials of the need threat items belongingness and meaningful existence were switched in Study 2 and Study 3. Instead of ‘rejected - accepted’ and ‘invisible - recognized’, they were ‘rejected - recognized,’ and ‘invisible - accepted’. We re-ran all analyses on need threat item-level and found no differences in any of the results patterns or patterns of significance.

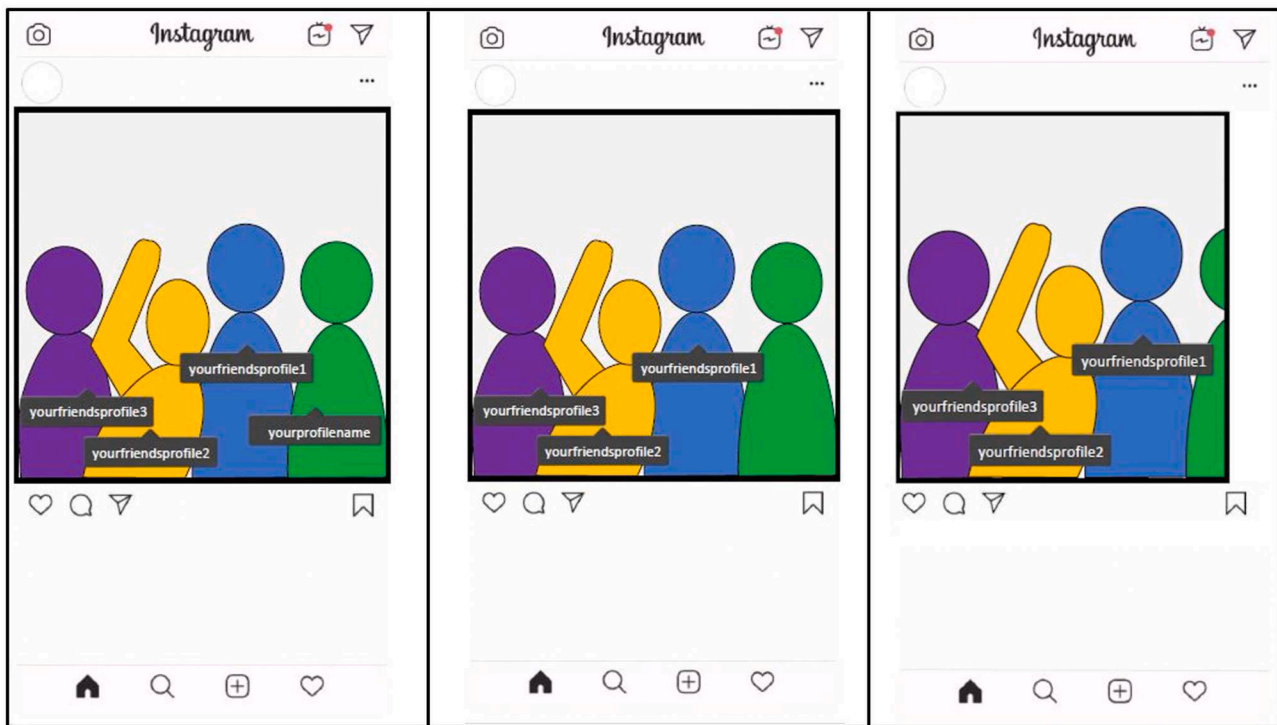


Fig. 1. Instagram vignettes shown in Studies 2 and 3: inclusion condition (left), exclusion by not being tagged condition (center), exclusion by being cut off condition (right).

Exploratively, participants were asked "What are your thoughts about the situation that you just read?". Next, we measured trait need to belong with 10 items (Leary et al., 2013, e.g., "I want other people to accept me," 1 = not at all to 7 = very much, Cronbach's $\alpha = 0.82$).³ Finally, participants answered questions about the content of the study serving as attention checks and the seriousness of their participation. Participants were then thanked, debriefed, had the opportunity to withdraw their answers from data analysis, and to leave comments.

3.2. Results

3.2.1. Need satisfaction

A one-sided Welch *t*-test showed that not being tagged ($M = 3.67$, $SD = 1.54$) resulted in significantly less need satisfaction compared to being included by being tagged ($M = 7.52$, $SD = 1.08$), $t(165.51) = -19.36$, $p < .001$, $d = -2.89$ (corresponding to $\eta^2 = 0.68$). Being excluded by being cut off ($M = 2.50$, $SD = 1.09$) resulted in even less need satisfaction compared to being included, $t(172.01) = -30.59$, $p < .001$, $d = -4.62$ (corresponding to $\eta^2 = 0.84$). There was also a significant difference between the two exclusion conditions, $t(166.05) = -6.02$, $p < .001$, $d = -0.88$ (corresponding to $\eta^2 = 0.16$). Mean need satisfaction by Instagram experience is shown in Fig. 2.

3.2.2. Moderator need to belong

An ANCOVA showed a significant main effect of need to belong on need satisfaction, $F(1, 263) = 5.21$, $p = .023$, $\eta^2_p < .01$, and a significant interaction between need to belong and Instagram experience, $F(2, 263) = 8.53$, $p < .001$, $\eta^2_p = .02$. To break down the effect, we conducted regression analyses, comparing each exclusion condition with the inclusion condition. Comparing the exclusion by not being tagged

³ Need to belong did not differ between experimental conditions: $F(2, 266) = 0.45$, $p = .637$, $\eta^2 < 0.01$, $M_{\text{Inclusion}} = 4.21$, $SD = 1.08$, $M_{\text{Not-tagged}} = 4.27$, $SD = 0.97$, $M_{\text{Cut off}} = 4.36$, $SD = 0.97$; nor did need to belong correlate with need satisfaction, $r(276) = -0.11$, $p = .061$.

condition with the inclusion condition, there was a significant main effect of need to belong, $\beta = -0.08$, $b(\text{SE} = 0.10) = -0.19$, $t(172) = -1.99$, $p = .048$, $\eta^2_p = .02$, and a significant interaction with Instagram experience, $\beta = 0.32$, $b(\text{SE} = 0.19) = 0.75$, $t(172) = 3.92$, $p < .001$, $\eta^2_p = .08$. Simple slope analyses indicated that the effect of excluded by not being tagged on need satisfaction was stronger for individuals with a higher need to belong (estimated at +1 SD, i.e., 5.26: $\beta = 1.96$, $b(\text{SE} = 0.27) = 4.61$, $p < .001$) than for individuals with a lower need to belong (estimated at -1 SD, i.e., 3.22: $\beta = 1.31$, $b(\text{SE} = 0.27) = 3.08$, $p < .001$). Fig. 3 shows the results of this simple slope analysis. Separate regression models showed that in the subset of included participants, need to belong did not significantly affect need satisfaction $\beta = 0.18$, $b(\text{SE} = 0.11) = 0.18$, $t(81) = 1.68$, $p = .097$, $\eta^2 = .03$. But in the subset of participants that were excluded by not being tagged, individuals with a higher (vs. lower) need to belong experienced less need satisfaction $\beta = -0.35$, $b(\text{SE} = 0.15) = -0.56$, $t(91) = -3.62$, $p < .001$, $\eta^2 = .13$.

For the comparison of included and excluded participants that were cut off from the Instagram post, there was no main effect of need to belong, $\beta < 0.01$, $b(\text{SE} = 0.08) = 0.01$, $t(172) = 0.09$, $p = .929$, $\eta^2_p < .01$. There was, however, a significant interaction effect with Instagram experience condition, $\beta = 0.13$, $b(\text{SE} = 0.16) = 0.35$, $t(172) = 2.21$, $p = .029$, $\eta^2_p = .03$. Simple slope analyses again showed the pattern that exclusion by being cut off decreased need satisfaction more strongly for individuals with a higher need to belong (estimated at +1 SD, i.e., 5.31: $\beta = 1.97$, $b(\text{SE} = 0.23) = 5.39$, $p < .001$) than for individuals with a lower need to belong (estimated at -1 SD, i.e., 3.26: $\beta = 1.70$, $b(\text{SE} = 0.23) = 4.67$, $p < .001$). This is shown in Fig. 3. In the subsample of excluded by being cut off participants however, the main effect of need to belong was not significant, $\beta = -0.15$, $b(\text{SE} = 0.12) = -0.17$, $t(91) = -1.45$, $p = .150$, $\eta^2 = 0.02$.

3.3. Discussion

Study 2 showed that exclusion on Instagram resulted in less need satisfaction in two separate situations, not being tagged in a post and

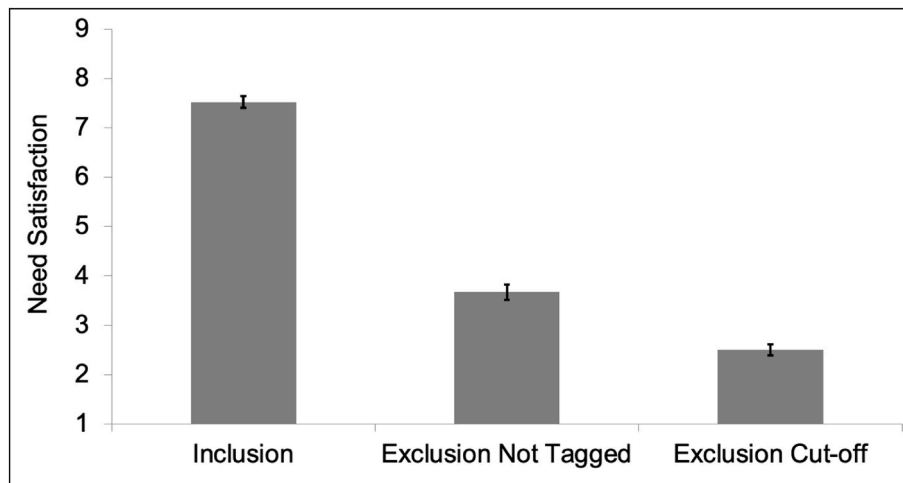


Fig. 2. Need satisfaction levels by experimental condition in Study 2.
Note. Vertical bars indicate standard errors. Lower values reflect less need satisfaction.

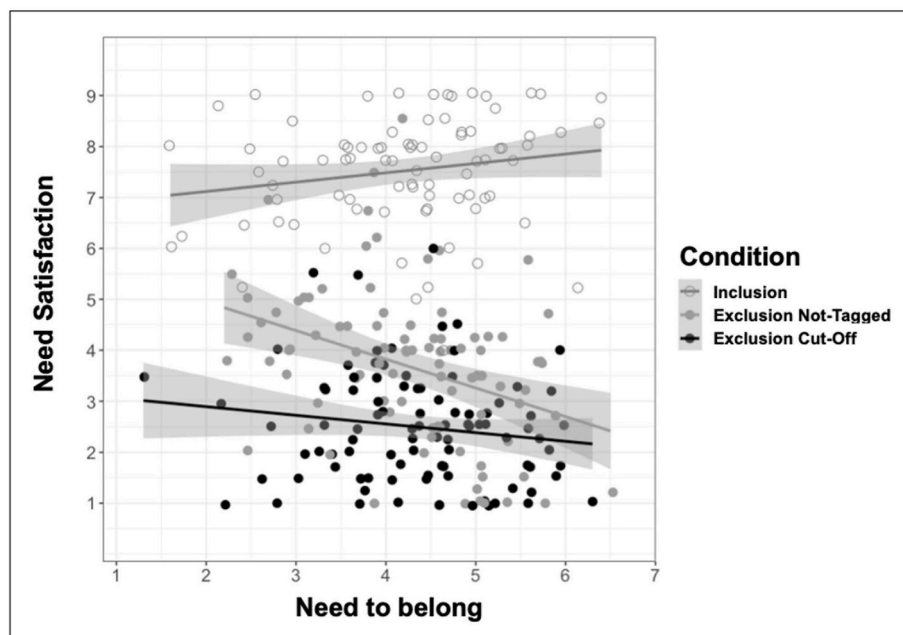


Fig. 3. Simple slopes moderator analysis of need to belong comparing inclusion, exclusion by not being tagged and exclusion by being cut off in Study 2.
Note. Light grey areas represent standard errors. Lower values on the y-axis reflect less need satisfaction.

being cut off from a post. Need satisfaction was even lower when being cut off from a post than when not being tagged. The effects were moderated by the need to belong: Effects of the Instagram experience (exclusion by not being tagged vs. inclusion; and exclusion by being cut off vs. inclusion) on need satisfaction were stronger for individuals with a higher need to belong. This suggests that individual differences play an important role in the perception of ostracism on Instagram. When analyzing each Instagram experience condition separately, need to belong predicted negative responses to not being tagged, but not to being cut off from the Instagram post. A possible explanation for this finding could be that being cut off from a photo might represent a strong situation that is equally painful for all individuals, regardless of their dispositions. This explanation would also be in line with the strong main effect of exclusion by being cut off on need satisfaction. In contrast, not being tagged in a post might be more ambiguous and thus be more susceptible to moderation by dispositional traits.

While there might be an inherent ambiguity in not being tagged, one could argue that there was a previous offline situation implied in the Study 2 vignettes: The vignette mentioned a get together with friends, that is, members of an ingroup, during which the picture was taken. However, we did not offer any information about that get-together. Since inclusion in one's ingroups is a societal norm (e.g., Rudert & Greifeneder, 2016), individuals might have interpreted that meeting as an inclusion experience, at least in the inclusion condition where they were tagged afterwards. Yet that offline meeting might have been construed differently by participants in the exclusion conditions. Thus, one could argue that individuals did not react to the online exclusion experience on Instagram per se, but to their anticipation with regard to the offline interaction. In Study 3, we therefore investigate how an offline ostracism experience would translate into the following experience of exclusion on Instagram. We included the need to belong as a possible moderator.

4. Study 3

In Study 3, we aim to establish the role of being tagged as a cue to make sense of an offline social interaction that might indicate inclusion or exclusion. We assumed that experiencing inclusion or exclusion on Instagram might affect responses to previously experienced offline inclusion or exclusion in one of three possible ways:

First, information about offline inclusion versus exclusion might resolve the ambiguity of exclusion on Instagram. Thus, inclusion versus exclusion on Instagram might no longer serve as a social cue and thus the Instagram experience might not affect need satisfaction. Based on this assumption, participants that receive information about offline exclusion would experience less need satisfaction than participants that receive information about offline inclusion, independently of the following Instagram experience. In statistical terms, we would expect only a main effect of the offline social experience.

Second, humans are generally very sensitive to experiences of ostracism (e.g., Williams & Zadro, 2005). Therefore, any experience of ostracism, whether it is offline or on Instagram, might decrease need satisfaction. Based on this assumption, participants that receive information about exclusion, regardless of whether on Instagram, offline, or both, will report lower need satisfaction compared to participants that receive information about being included both on Instagram and in an offline interaction. In statistical terms, we would expect an interaction between the offline social experience and the Instagram experience.

Third, it is also possible that several experiences of exclusion have additive effects on need satisfaction (e.g. Sandstrom et al., 2017) and that experiences of inclusion on social media have the potential to buffer the effects of distressing offline experiences such as offline exclusion experiences (e.g., Knausenberger et al., 2015; Knausenberger & Echterhoff, 2018a, 2018b). However, offline exclusion might still be more painful than exclusion on Instagram. Based on this assumption, both offline exclusion and exclusion on Instagram should have a significant main effect on need satisfaction. In addition, the effect of offline exclusion should be statistically larger than the effect of exclusion on Instagram. In statistical terms, we would expect two main effects of the offline social experience and the Instagram experience.

Additionally, we aimed to replicate our findings that the effects of not being tagged on need satisfaction would be stronger for individuals that have a higher trait need to belong, than for individuals that have a lower trait need to belong. We assumed that the need to belong might also be a suitable moderator for the offline experience of ostracism.

4.1. Methods

4.1.1. Design

We used a 2 (offline experience: inclusion vs. exclusion) x 2 (Instagram experience: inclusion by being tagged vs. exclusion by not being tagged) between-subjects design. The design and all hypotheses were preregistered (<https://aspredicted.org/gx2rn.pdf>, see Footnote 1).

4.1.2. Participants

We ran an a priori power analysis with G*Power (Faul et al., 2007), assuming large main effects of exclusion on need satisfaction based on the results of Study 2. Thus, aiming at a statistical power of at least 0.90 with an alpha error of 0.05, a minimal sample size of 68 participants would be sufficient to show a respective main effect ($f^2 = 0.40$ corresponding to $f = 0.63$). As one of our predictions entailed a so-called knock-out interaction pattern for offline exclusion x Instagram exclusion, quadrupling the sample size appears commendable (see Giner-Sorolla, 2018; Simonsohn, 2014), resulting in a sample size of 272 participants. Data collection aimed at a plus of approximately 20%, so 327 individuals in total, to ensure enough data points in case there are drop-outs. We further calculated power for the moderation analysis, showing that a sample of 255 should be sufficient to show an interaction effect of R^2 partial = .04 that was derived from Study 2.

Overall, 328 individuals between 18 and 30 years finished the study on Prolific Academic. After applying the same inclusion criteria as in Study 2, data of 286 active Instagram users ($M_{\text{age}} = 24.09$ years, $SD = 3.54$ years, 65.73% female, 1 person of non-binary gender) were analyzed. Study participation took approximately 8 min and was compensated with £0.80.

4.1.3. Materials and procedure

The study's procedure was largely identical to the procedure of Study 2. After general instructions on the study's content and giving informed consent, participants filled out the need to belong scale (Cronbach's $\alpha = 0.84$). Next, they answered demographic questions. After that, all participants read the following:

Today was a nice and sunny summer day in your home town. To enjoy the great weather, you and a few close friends of yours decided to have a BBQ in one of your friend's garden. You didn't see each other for a little while and everybody had a lot to talk about. Everybody gave a quick update about their life to the group.

Participants in the offline inclusion condition read:

Your friends asked many questions about your news and you talked a lot about what you had been up to lately. In conversations during the BBQ, you felt that your friends were attentive and genuinely interested in what you said. At the table, everybody laughed about a joke that you made.

Participants in the offline exclusion condition read:

Your friends asked many questions about each other's news and you didn't really get a chance to talk about what you had been up to lately. In some conversations during the BBQ, you felt that your friends were inattentive and not really interested in what you said. At the table, nobody laughed about a joke that you made.

The next part described the subsequent Instagram experience. The Instagram vignette was identical to the inclusion and the exclusion by not being tagged conditions in Study 2: half of the participants saw the composition of an Instagram post in which they were shown and tagged (i.e., inclusion); the other half of participants saw the composition of an Instagram post in which they were shown but not tagged (i.e., exclusion), see Fig. 1. Following that, participants filled out the need satisfaction scale (Cronbach's $\alpha = 0.94$) and described their thoughts in an open text field. Finally, participants answered attention checks, rated the seriousness of their participation and had the chance to self-exclude from data analysis. All participants were thanked and debriefed.

4.2. Results

4.2.1. Need satisfaction

A 2x2 ANOVA revealed a significant main effect of offline inclusion versus offline exclusion on need satisfaction, $F(1, 282) = 38.18, p < .001, \eta^2_p = .04$, such that offline exclusion resulted in less need satisfaction ($M = 4.63, SD = 2.24$) compared to offline inclusion ($M = 5.59, SD = 2.33$). Moreover, there was a significant effect of being included versus excluded on Instagram, $F(1, 282) = 573.31, p < .001, \eta^2_p = .64$, such that exclusion on Instagram resulted in less need satisfaction ($M = 3.31, SD = 1.30$) compared to inclusion on Instagram ($M = 7.06, SD = 1.46$). Yet, there was no significant interaction between offline experience and Instagram experience, $F(1, 282) = 2.83, p = .094, \eta^2_p < .01$. The means of need satisfaction by condition combination are depicted in Fig. 4.

4.2.2. Moderator need to belong

We ran a regression model, predicting need satisfaction with need to belong, Instagram experience condition and offline experience condition. There was a significant two-way interaction of Instagram

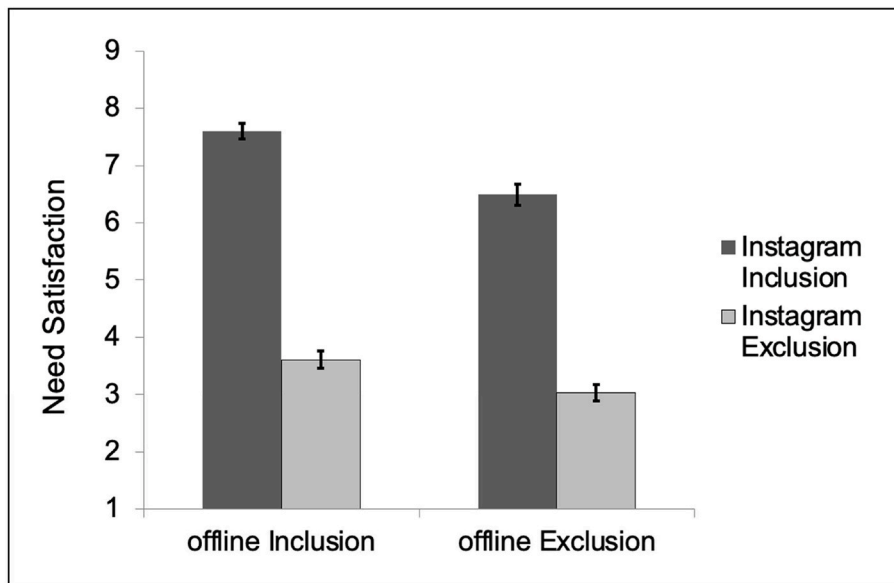


Fig. 4. Need satisfaction levels by Instagram experience condition and offline experience condition in Study 3. Note. Vertical bars indicate standard errors. Lower values reflect less need satisfaction.

experience condition and need to belong, $\beta = 0.19, b(SE = 0.15) = 0.43, t(278) = 2.88, p = .004, \eta^2_p = .03$. All other effects apart from the two main effects of offline experience condition and Instagram experience condition were not significant, including the three-way interaction, $\beta = 0.15, b(SE = 0.30) = 0.34, t(278) = 1.14, p = .256, \eta^2_p < .01$.

We then tested the effect of need to belong comparing Instagram inclusion versus Instagram exclusion and offline inclusion versus offline exclusion in separate regression models.

Comparing Instagram inclusion versus exclusion, there was no main effect of need to belong, $\beta < -0.01, b(SE = 0.08) = -0.01, t(282) = -0.18, p = .856, \eta^2_p < .01$. However, there was a significant interaction

between Instagram experience condition and need to belong, $\beta = 0.17, b(SE = 0.15) = 0.38, t(282) = 2.49, p = .013, \eta^2_p = .02$: The effect of Instagram inclusion versus exclusion on need satisfaction was stronger for individuals with a higher need to belong (estimated at +1 SD, i.e., 5.41: $\beta = 1.78, b(SE = 0.23) = 4.16, p < .001$) than for individuals with a lower need to belong (estimated at -1 SD, i.e., 3.30: $\beta = 1.44, b(SE = 0.23) = 3.35, p < .001$). Simple slope analyses are shown in Fig. 5. We subset the two Instagram conditions to understand the effects better: in the subset of Instagram exclusion, individuals with a higher (vs. lower) need to belong reported less need satisfaction, $\beta = -0.09, b(SE = 0.10) = -0.21, t(147) = -2.06, p = .041, \eta^2_p = .03$, suggesting that exclusion on

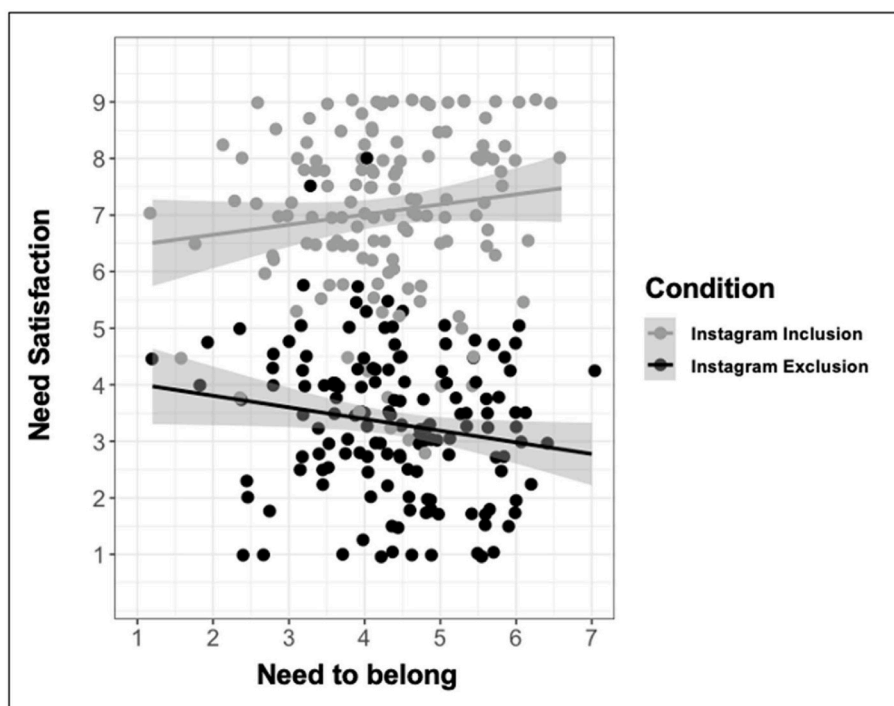


Fig. 5. Simple slopes moderator analysis of need to belong comparing Instagram inclusion versus Instagram exclusion in Study 3. Note. Light grey areas represent standard errors. Lower values on the y-axis reflect less need satisfaction.

Instagram was worse for individuals with a higher (vs. lower) need to belong. In the subset of Instagram inclusion however, there was no significant effect of need to belong, $\beta = 0.08$, $b(SE = 0.12) = 0.18$, $t(135) = 1.50$, $p = .135$, $\eta^2_p = .02$.

Comparing offline inclusion versus exclusion, there was no main effect of need to belong, $\beta = -0.09$, $b(SE = 0.13) = -0.20$, $t(282) = -1.56$, $p = .119$, $\eta^2_p < .01$, nor an interaction between offline experience condition and need to belong, $\beta = -0.13$, $b(SE = 0.26) = -0.30$, $t(282) = -1.15$, $p = .252$, $\eta^2_p < .01$.

4.3. Discussion

Study 3 showed how offline inclusion versus exclusion experiences might intertwine with following inclusion versus exclusion experiences on Instagram to affect need satisfaction. Our results generally support the assumption that both offline exclusion and Instagram exclusion have significant negative effects on need satisfaction. Surprisingly, the effects of being excluded versus included on Instagram were much larger than the effects of being excluded versus included offline ($\eta^2_p = .64$ vs. $\eta^2_p = .04$, respectively), moreover, deviating from our predictions (see Table 2), need to belong moderated the Instagram experience, but not the offline experience. One possible explanation for the stronger impact of the Instagram experience could be that the Instagram information was presented last. Thus, the information might have affected individuals more strongly in the sense of a recency effect. Given that participants are typically good in anticipating effects of exclusion and their corresponding emotional and behavioral reactions (e.g., Jauch et al., 2021; Klein & Rudert, 2021), this might also reflect processes in real life: Research shows that recovery typically starts immediately after an ostracism episode (Williams, 2009), and is typically fast (e.g., Büttner, Rudert, & Greifeneder, 2021; Jauch et al., 2021), thus, individuals might have anticipated that they had already partially recovered from an exclusion experience that had happened several hours ago.

An alternative explanation might be that participants used the information on Instagram to re-evaluate their perception of the previously described offline get-together. Therefore, the larger effects of being included versus excluded on Instagram might not mean that participants cared more about being excluded or included on Instagram, but that they used this information to dissolve uncertainty around the described offline social interaction.

A third explanation might be that being excluded on Instagram is

visible to a larger audience (i.e., all followers of the posting person if it is a private Instagram account or even potentially all Instagram users if it is a public Instagram account) than being excluded at a BBQ with few other people present. Previous research suggests that being excluded with an audience present might have more detrimental effects on need satisfaction (Hales et al., 2021), thus, being excluded on Instagram with many social media users to see might actually hurt more than being excluded at a BBQ with a few friends to see. Also, having other people see one's exclusion on Instagram might evoke fear to lose social connection, because others might deduct that the excluded individual is an undesirable interaction partner (e.g., Rudert et al., 2018, 2020).

Taken together, Study 3 demonstrated that being excluded on Instagram is still hurtful, even if inclusionary cues were present in offline interactions, meaning that the power of social media ostracism should not be underestimated.

Studies 2 and 3 both rely on vignettes. Although we show in Study 1 that ostracism on Instagram is frequent, and Studies 2 and 3 are in line with a plethora of research demonstrating that vignettes are a suitable experimental manipulation of ostracism (e.g., Fiset et al., 2017; Hitlan et al., 2006; Uskul & Over, 2014; Wirth, 2016), and also of social media ostracism (e.g., Reich et al., 2018; Smith et al., 2017), we aimed to replicate our results within a study that manipulated the social experience in an alleged group task and thus does not rely on participants' motivation and/or ability to imagine being in the described situation.

5. Study 4a

5.1. Method

5.1.1. Participants and design

We ran an a priori power analysis using G*Power (Faul et al., 2007) based on Studies 2 and 3. Power for the moderation analysis demanded for the largest number of participants, specifically, a sample of 255 should suffice to show an interaction effect of R^2 partial = .04, derived from Studies 2 and 3, with a power of .90. To ensure enough data points in case of drop-outs, we aimed at a plus of approximately 10%, so 281 individuals in total. As Studies 2 and 3 relied on crowdsourcing samples on Prolific, we aimed to replicate the effect of not being tagged on need satisfaction in a lab study using a student sample (Study 4a). However, due to a second major outbreak of the COVID-19 pandemic in autumn 2020 and the measures taken to prevent the disease's spread, we had to

Table 2

Pre-registered hypotheses and found effects.

Study	Pre-registered hypothesis	found effects
2	Hypothesis 1: Individuals that are excluded (vs. included) on Instagram experience less need satisfaction. Exploratory Hypothesis 2: The effects of social exclusion on need satisfaction will be higher for individuals that have a higher (vs. lower) need to belong.	support H1 support EH2
3	We pre-registered three competing hypotheses: Hypothesis 1a: Participants that receive information about previous social exclusion (SX) vs. social inclusion (SI), experience less need satisfaction, independently of the following experience on Instagram (main effect of the previous social experience). Hypothesis 1b: Participants that receive information about SX in any context will experience less need satisfaction than participants that only receive information about SI (interaction previous social experience x Instagram experience). Hypothesis 1c: Previous SX and SX on Instagram (vs. previous SI and SI on Instagram) both have a significant main effect on need satisfaction; the effect of previous SX should be statistically larger than the effect of SX on Instagram. Hypothesis 2: The effects of previous SX on need satisfaction will be stronger for individuals that have a higher (vs. lower) trait need to belong.	support H1c, but the effect of SX/SI on Instagram was larger
4a	Hypothesis 1: Participants that are excluded (vs. included) experience less need satisfaction. Hypothesis 2: The effects of social exclusion on need satisfaction will be stronger for individuals that have a higher (vs. lower) trait need to belong.	do not support H2 (but need to belong moderated the effects of the Instagram experience) support H1 descriptive pattern supports H2 (but interaction $p = .061$)
4b	Hypothesis 1: Participants that are excluded (vs. included) experience less need satisfaction. Hypothesis 2: The effects of social exclusion on need satisfaction will be stronger for individuals that have a higher (vs. lower) trait need to belong.	support H1 descriptive pattern supports H2 (but interaction $p = .282$)

Note. The pre-registered hypotheses are not quoted directly but paraphrased for reasons of simplicity and comparability. We omitted hypotheses that referred to constructs that are reported in the supplementary materials on OSF (<https://osf.io/c24z7/>).

close the lab and switch data collection to an online mode, using data pools from two different European universities. To ensure that participants believed to work on the task (detailed in the next section) with actual other students, we opted for a videoconferencing solution. That is, students logged in to a videoconference where they received the study link simultaneously with other study participants. Participants did not use their camera or microphone but saw that other participants were logged in to the call simultaneously. In the end, 220 participants ($M_{\text{age}} = 22.39$ years, $SD = 4.69$ years, 80.91% female, 1 person of non-binary gender) finished the study: 35 participants ($M_{\text{age}} = 21.37$ years, $SD = 3.40$ years, 88.57% female) finished the initial lab study and 185 participants ($M_{\text{age}} = 22.58$ years, $SD = 4.89$ years, 79.46% female, 1 person of non-binary gender) finished the online study.

Applying the same inclusion criteria as in Studies 2 and 3 left data of 168 participants (25 from the lab study, 143 from the online study; $M_{\text{age}} = 22.17$ years, $SD = 4.10$ years, 82.14% female, 1 person of non-binary gender) to be analyzed. Study duration was approximately 10 min and was compensated with course credit or a lottery to win one of two book vouchers of 25 Euros (approximately \$30 at the time). All materials and hypotheses were preregistered (<https://aspredicted.org/6jd88.pdf>, see Footnote 1).

5.1.2. Materials and procedure

Upon arrival in the lab or at the videoconference, participants learned that they would be working on a “Study on art in social groups” together with other study participants that were present or online at the same time. To increase credibility, there were always multiple participants or confederates present in the lab or in the videoconference. After general instructions on the study’s procedure, participants gave their consent and proceeded to the ostensible group task.

As it is neither possible nor ethical to implement a study design directly in Instagram, we aimed to mimic the psychological process of not being tagged as closely as possible. We identified three psychological key components that define the tagging process: 1) participants create visual content together with other individuals (i.e., in Instagram, taking a photo together), 2) their self-selected name (i.e., in Instagram, the profile name) is (not) represented in that content, 3) participants assume that the content will be visible to a large social media audience. Participants were informed that they would create a piece of art together with other participants (creating content together with others corresponding to taking a photo together for Instagram⁴). They were further told that, as a part of a media initiative to make science visible and comprehensible to the public, the finished art pieces would be presented in a virtual exhibition on social media accounts of their respective university (mimicking that created content on Instagram is visible to a larger social media audience). Next, participants created a nickname (as they would on social media platforms) and wrote a short text presenting themselves to the group (corresponding to a “bio”, as is customary on many social media platforms as well). On the next page, the nicknames and texts of the pre-scripted other group members were presented. Every group member had a specific task, ostensibly at random. The tasks were choosing the forms for the art project, arranging the forms, selecting the color for the arranged forms (this was always the participant’s task), and finally, adding details such as dots or stripes to the art project (verbatim material is available via OSF: <https://osf.io/c24z7/>). To uphold the impression that there were in fact real other group members making these decisions, participants were told that they needed to wait for their group members’ choices. In the meantime, they filled out the need to belong scale (Cronbach’s $\alpha = .79$), and answered demographic questions. Ostensibly, a group leader was chosen “at random” to give the art

⁴ Although tagging may be used in an identifying way to tag the person’s profile on a photo showing their face, it is also sometimes used to acknowledge someone in a post that doesn’t show faces. For example, friends meeting for coffee might take a photo of their coffee table and tag each other on the photo.

project a name and eventually send it in to the research team, together with a short text about the group work. Accompanied by the finished model, this text read as follows:

The Saluting Ostrich represents the different influences of the individual and the group. I would like to thank my group members Nick_Name, [in the inclusion condition the participant’s chosen nickname appeared here], and lisa_li for their valuable contributions. We would be happy if our model is displayed in the virtual exhibition of the university!

The text either acknowledged the participant’s contribution by mentioning their nickname along with the other nicknames of the group members (mimicking inclusion by being tagged), or acknowledged only the other group members by mentioning all nicknames but the participant’s nickname (mimicking exclusion by not being tagged). After reading the group leader’s text, participants rated their need satisfaction level (Rudert & Greifeneder, 2016; Cronbach’s $\alpha = .92$), answered manipulation and attention checks, and finally, they were fully debriefed and thanked.

5.2. Results

5.2.1. Need satisfaction

In line with results of Studies 2 and 3, a one-sided Welch *t*-test showed that not being acknowledged (i.e., not tagged; $M = 4.26$, $SD = 1.97$) in the group leader’s text resulted in significantly less need satisfaction compared to being acknowledged (i.e., tagged; $M = 6.68$, $SD = 1.35$), $t(146.65) = 9.27$, $p < .001$, $d = 1.43$ (corresponding to $\eta^2 = 0.34$).

5.2.2. Moderator need to belong

We compared the moderating effect of need to belong in the inclusion and exclusion condition: there was a significant main effect of need to belong on need satisfaction, $\beta = -0.20$, $b(SE = 0.14) = -0.47$, $t(164) = -3.33$, $p = .001$, $\eta^2_p = .06$. The interaction between experimental condition and need to belong just failed to reach statistical significance, $\beta = 0.23$, $b(SE = 0.28) = 0.54$, $t(164) = 1.89$, $p = .061$, $\eta^2_p = .02$. However, note that power was lower than intended within our sample due to pre-registered data exclusions pertaining to almost a quarter of the sample (52 of 220 participants). To test whether the interaction indeed failed to reach statistical significance due to limited power in the moderator analysis, we ran an exploratory moderation analysis with all 220 participants that completed the study, which rendered the interaction between experimental condition and need to belong significant, $\beta = 0.34$, $b(SE = 0.25) = 0.74$, $t(216) = 2.98$, $p = .003$, $\eta^2_p = .04$.

Consequently, we decided to break down the interaction further regardless (in the sample of $N = 168$, adhering to the pre-registration). In line with findings from Studies 2 and 3, simple slope analyses showed that the effect of experimental condition on need satisfaction was stronger for individuals with a higher need to belong (estimated at +1 SD, i.e., 5.41: $\beta = 1.41$, $b(SE = 0.36) = 2.92$, $p < .001$) than for individuals with a lower need to belong (estimated at -1 SD, i.e., 3.63: $\beta = 0.95$, $b(SE = 0.36) = 1.97$, $p < .001$), shown also in Fig. 6a. We also subset the two experimental conditions to probe the effects further: in the excluded subset, individuals with a higher (vs. lower) need to belong reported less need satisfaction, $\beta = -0.32$, $b(SE = 0.23) = -0.74$, $t(82) = -3.25$, $p = .002$, $\eta^2 = 0.11$, suggesting that exclusion was even more hurtful for individuals with a higher (vs. lower) need to belong. In the subset of included individuals, need to belong did not have a significant effect, $\beta = -0.09$, $b(SE = 0.17) = -0.20$, $t(82) = -1.22$, $p = .226$, $\eta^2 = 0.02$.

5.3. Discussion

Study 4a offers additional evidence that not being tagged elicits strong need threat. Further, we could again show that the effects are

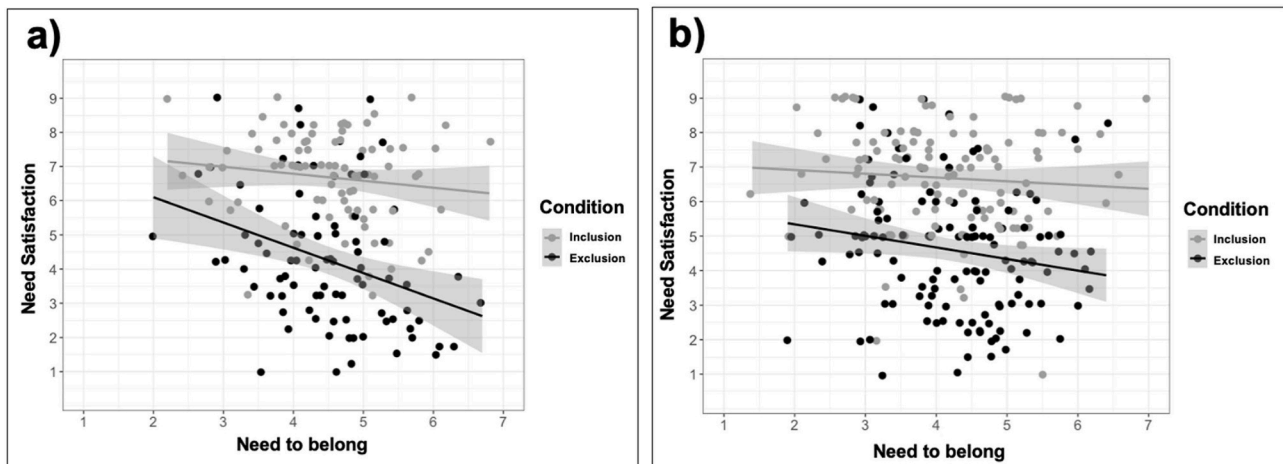


Fig. 6. Simple slopes moderator analysis of need to belong comparing inclusion versus exclusion in the group task in Study 4a ($N = 168$, Fig. 6a) and Study 4b ($N = 250$, Fig. 6b).

Note. Light grey areas represent standard errors. Lower values on the y-axis reflect less need satisfaction.

stronger for individuals with a higher (vs. lower) need to belong, with a tendency of even stronger effects following exclusion than inclusion. The findings extend our previous findings from Instagram vignettes (Studies 2 and 3) and show that the effects hold in another population, thus possibly also outside of Instagram in other social media networks. Unfortunately, due to the COVID-19 pandemic, we were unable to obtain the a priori calculated sample size. This was likely the cause for the non-significant interaction effect of the need to belong and experimental condition, that, albeit non-significant, represented half a scale point on our 7-point scale (i.e., $b = 0.54$). However, to ensure that the moderation effect of the need to belong is stable, we aimed to replicate the findings using the same paradigm in an online sample.

6. Study 4b

6.1. Method

6.1.1. Participants and design

The study design of Study 4b was largely identical to that of Study 4a. Following Study 4a's power analysis detailed above, we aimed to collect data from 281 individuals via Prolific Academic.

In total, 281 participants completed a "Study on art in social groups" via Prolific Academic (UK residents only, $M_{\text{age}} = 38.25$ years, $SD = 12.66$ years, 70.11% female, 2 persons chose to not disclose their gender). Applying the same inclusion criteria as in the previous studies left data of 250 participants ($M_{\text{age}} = 38.50$ years, $SD = 12.60$ years, 69.20% female, 2 persons chose to not disclose their gender) to be analyzed. Participants received £1.10 for completing the study via Prolific. All materials and hypotheses were preregistered (<https://aspredicted.org/6r9pp.pdf>).

6.1.2. Materials and procedure

The ostensible group task was identical to that of Study 4a. The need to belong scale (Cronbach's $\alpha = 0.84$) was measured prior to the manipulation.

6.2. Results

6.2.1. Need satisfaction

Replicating Studies 2 and 3 conceptually, and replicating Study 4a directly, a one-sided Welch t -test showed that not being acknowledged (i.e., not tagged; $M = 4.59$, $SD = 1.83$) in the group leader's text resulted in significantly less need satisfaction compared to being acknowledged (i.e., tagged; $M = 6.68$, $SD = 1.54$), $t(241.93) = 9.78$, $p < .001$, $d = 1.24$

(corresponding to $\eta^2 = 0.28$).

6.2.2. Moderator need to belong

There was a significant main effect of need to belong on need satisfaction, $\beta = -0.11$, $b(SE = 0.11) = -0.22$, $t(246) = -2.12$, $p = .035$, $\eta^2_p = .02$. However, the interaction between experimental condition and need to belong was not significant, $\beta = 0.12$, $b(SE = 0.21) = 0.23$, $t(246) = 1.08$, $p = .282$, $\eta^2_p < .01$. Probing the effects further, simple slope analyses showed that the effect of experimental condition on need satisfaction was stronger for individuals with a higher need to belong (estimated at +1 SD, i.e., 5.21: $\beta = 1.16$, $b(SE = 0.30) = 2.30$, $p < .001$) than for individuals with a lower need to belong (estimated at -1 SD, i.e., 3.18: $\beta = 0.93$, $b(SE = 0.30) = 1.84$, $p < .001$). Simple slope analyses are shown in Fig. 6b. We subset the two conditions to understand the effects better: in the excluded subset, individuals with a higher (vs. lower) need to belong reported less need satisfaction, $\beta = -0.17$, $b(SE = 0.16) = -0.34$, $t(124) = -2.05$, $p = .043$, $\eta^2 = 0.03$, suggesting that exclusion was even more hurtful for individuals with a higher (vs. lower) need to belong. In the subset of included individuals, need to belong did not have a significant effect, $\beta = -0.06$, $b(SE = 0.13) = -0.11$, $t(122) = -0.82$, $p = .411$, $\eta^2 < 0.01$.

6.3. Discussion

Taken together, the results observed in Study 4b were largely identical to those observed in Study 4a. However, both studies seemed to be insufficiently powered to detect the interaction of need to belong and experimental condition. Nevertheless, both studies descriptively suggest that individuals with a higher need to belong suffer more from exclusion while the experience of inclusion is unaffected by individual need to belong. To establish the robustness of this descriptive moderation, we conducted an integrative data analysis of Studies 4a and 4b.

7. Integrative data analysis of studies 4a and 4b

The interaction effect of need to belong and experimental condition in Studies 4a and 4b was inconclusive. In conceptual vicinity to an internal meta-analysis, we thus sought to assess the overall evidence for a moderating effect of need to belong by performing an integrative data analysis (Curran & Hussong, 2009). As Studies 4a and 4b had an identical design, we combined the data from both studies in one data set, thus consisting of 418 participants, and tested the moderating effect of need to belong on need satisfaction. A linear regression model showed a significant main effect of need to belong on need satisfaction, $\beta = -0.15$,

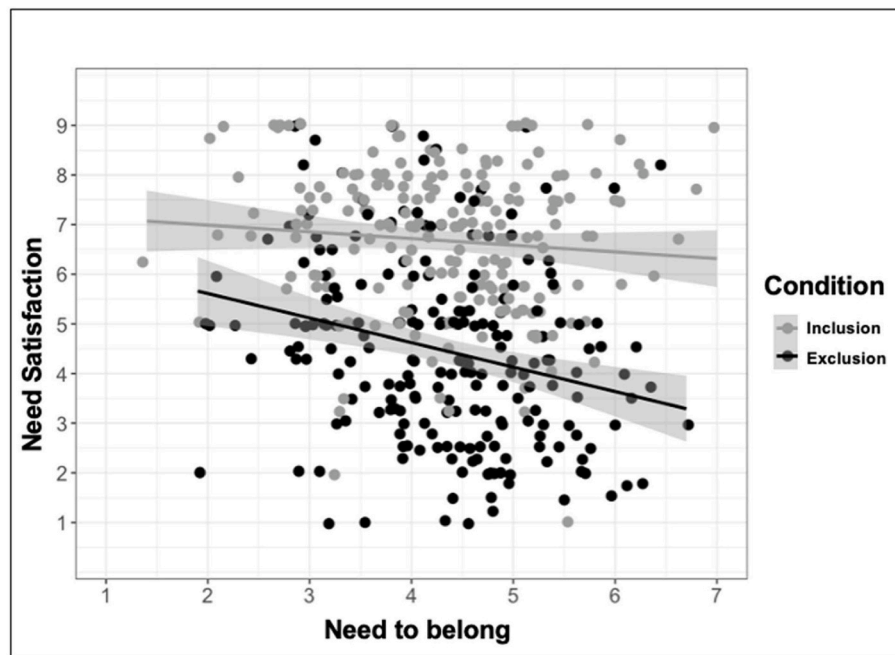


Fig. 7. Simple slopes moderator analysis of need to belong comparing inclusion versus exclusion in the group task in an integrative data analysis of Studies 4a and 4b.

Note. Light grey areas represent standard errors. Lower values on the y-axis reflect less need satisfaction.

$b(SE = 0.04) = -0.31, t(414) = -3.79, p < .001, \eta^2_p = .03$. Supporting the idea that Studies 4a and 4b were insufficiently powered to detect the interaction effect, in the integrative data analysis, the interaction between experimental condition and need to belong was significant, $\beta = 0.17, b(SE = 0.08) = 0.36, t(414) = 2.16, p = .031, \eta^2_p = .01$. Controlling for the study (student sample in Study 4a versus Prolific sample in Study 4b) did not change the significance level of any of the effects. As previously observed, simple slope analyses showed that the effect of experimental condition on need satisfaction was stronger for individuals with a higher need to belong (estimated at +1 SD, i.e., 5.30: $\beta = 0.92, b(SE = 0.23) = 2.56, p < .001$) than for individuals with a lower need to belong (estimated at -1 SD, i.e., 3.34: $\beta = 1.27, b(SE = 0.23) = 1.86, p < .001$). Simple slope analyses are shown in Fig. 7. We also subset the inclusion and exclusion condition: In line with findings from Studies 4a and 4b, after being excluded, individuals with a higher (vs. lower) need to belong reported less need satisfaction, $\beta = -0.24, b(SE = 0.13) = -0.49, t(208) = -3.73, p < .001, \eta^2 = 0.03$, suggesting that exclusion was even more hurtful for individuals with a higher (vs. lower) need to belong. For included individuals, need to belong did not have a significant effect, $\beta = -0.07, b(SE = 0.10) = -0.14, t(206) = -1.34, p = .183, \eta^2 < 0.01$. The integrative data analysis thus supports the existence of a moderating effect of the need to belong: Individuals with a higher need to belong suffer more from being excluded by not being tagged than individuals with a lower need to belong. A sensitivity power analysis with G*Power showed that with an alpha error of 0.05, the sample size of $N = 418$ was sufficient to detect a minimum effect size of $f = 0.16$ ($\eta^2 = 0.025$) for the interaction with a power of 0.90.

8. General discussion

Social media is a part of many individuals' daily lives and being excluded and ignored on social media hurts as much as in real life (e.g., Reich et al., 2018; Schneider et al., 2017; Wolf et al., 2015). The present contribution is the first to demonstrate a novel form of frequently occurring social media ostracism: Not being tagged, that is, not having one's nickname represented in others' content. In five studies, we established that not being tagged threatens fundamental human needs,

particularly for individuals with a higher need to belong. The combination of observational insights (Study 1) with vignette studies (Studies 2 and 3) and in-vivo experimental manipulations (Studies 4a and 4b) represents a multi-method approach that strengthens our findings. Particularly, the hypothesized effects show both in the context of the social media network Instagram and in an ostensible group task outside of social media. We offer an overview of the pre-registered hypotheses and the found effects in Table 2.

8.1. Not being tagged as a novel form of ostracism in social media

Previous research on social media ostracism has predominantly focused on the phenomenon of others ignoring one's self-created content (e.g., not receiving a desired number of Likes as response to one's post, e.g., Wolf et al., 2015). As a conceptual novelty, not being tagged is not about one's self-created content, but about being ignored in content that others posted. Thus, not being tagged may represent a different kind of signal to the target of ostracism as well as to potential observers. Further research is needed to investigate these processes, but, allowing for speculation, not being tagged may signal that albeit being physically present, the target was not really part of the interaction that is represented in the post of the ostracizer. Aside from being hurtful for the target, the signaling function to observers of the post may even be more harmful: When observers see that the target was present, but is ignored on social media, they may draw negative conclusions regarding the target's behavior or personality (see Rudert & Greifeneder, 2019, for an overview).

8.1.1. Limitations and future research

While generalization to other social media networks (e.g., Facebook) is yet to be tested, we are confident that our results would generalize to other social media platforms outside of Instagram for two reasons: First, we found that the negative effects of not being tagged also generalized to experiences that did not occur directly on Instagram (see Studies 4a and 4b). Second, many social media platforms, such as Facebook, use similar tagging mechanisms as Instagram. However, one might speculate about possible differences of effects in platforms that focus on individuals'

belonging needs versus informational needs, such as Facebook or Instagram versus Twitter. Studies investigating motivations of social media use back up this notion by showing that Instagram use is mainly motivated by seeking belonging, while Twitter-use is mainly motivated by seeking information (e.g., Alhabash & Ma, 2017; Nadkarni & Hofmann, 2012; Pittman & Reich, 2016; Wong et al., 2019). In line with that and comparing the platforms directly, it has been shown that image-based platforms such as Instagram may decrease loneliness, but text-based platforms like Twitter do not, probably because of the intimacy that images offer (Lee et al., 2015). Based on these findings, it is possible that individuals will experience more threat to their belonging when they are not tagged on Instagram or Facebook than on Twitter. Although ostracism manipulations typically lead to large effects on need satisfaction and mood (e.g., Godwin et al., 2014; Goodacre & Zadro, 2010; Hartgerink et al., 2015; Williams et al., 2002), future studies may compare different social media scenarios to compare the effects of not being tagged in a photo to text-based forms of exclusion, for example by not being commented on. By comparing different exclusion scenarios, the relative effect sizes could be established, for example, comparing offline and online exclusion or comparing having self-created content ignored (e.g., not receiving Likes on a post, e.g., Reich et al., 2018) with being excluded in other's content (i.e., not being tagged). However, previous investigations into effects of not receiving Likes (e.g., Reich et al., 2018; Wolf et al., 2015) yielded similar effect sizes of a medium to large magnitude as being excluded by not being tagged in the present investigation.

Future studies may also wish to manipulate whether ostracism in social media is happening in a public context (e.g., the ostracizer's profile is public and therefore the ostracism is visible to anyone) or in a private context (e.g., the ostracizer's profile is set on "private", so that only their followers can see the ostracism). Manipulating privacy settings of the posting person could test one explanation provided for the results of Study 3 where we found larger effects of being excluded online than being excluded offline. It is possible that being excluded with a larger audience present, such as on social media versus at a private BBQ, might have more detrimental effects on need satisfaction (Hales et al., 2021). Future studies may also manipulate the number of followers of the person that does (not) tag the target. Having many followers may represent status, likeability, and popularity in social media (e.g., De Veirman et al., 2017) and being excluded by individuals that are higher in social status has been shown to have more detrimental effects than being excluded by individuals with equal or lower social status (e.g., Fiset et al., 2017; Kuehn et al., 2015; Robinson et al., 2013). Therefore, being excluded by a person with many followers might have more detrimental effects than being excluded by a person with less followers. Consequently, being included (i.e., tagged) by a person with many followers may be more beneficial than being included by a person with less followers.

As an alternative explanation for the results of Study 3, we also discussed that participants may have used the information on Instagram to re-evaluate their perception of the previously described offline experience. Therefore, the online experience of being included versus excluded may have been used to dissolve uncertainty around the described offline social interaction. Future research might want to test this explanation directly by manipulating the level of uncertainty of being included or excluded online and offline. Alternatively, future studies could switch the sequence of scenarios, describing the online experience first, followed by the offline experience. If sequence effects were responsible for the pattern of results in Study 3, this should reverse with changing the sequence of the scenarios.

Another point that might be interesting for future research is possible context effects of not being tagged. While some research showed that ostracism is hurtful even when it originates from an undesired group (e.g., Fayant et al., 2014; Gonsalkorale & Williams, 2007), when being excluded has financial benefits (van Beest & Williams, 2006), or when targets are ostracized by a computer (e.g., Jauch et al., 2021; Zadro

et al., 2004), other research showed that the prevailing norm of the situation is decisive in determining the reaction to being excluded (e.g., Rudert & Greifeneder, 2016): Typically, humans expect to be included (Dvir et al., 2019; Rudert & Greifeneder, 2016), however, there may be situations in which one doesn't want to be included, for example one might not want to be tagged in an undesired depiction of oneself (see also untagging oneself, e.g., Birnholtz et al., 2017), for example, being drunk or committing a crime. Investigations into context effects of reactions to (not) being tagged might help to establish the conceptual core of the not being tagged paradigm. Another robustness test of the present findings might be to investigate the effects of (not) being tagged by an algorithm, for example, by a face recognition algorithm, as previous research in online ostracism paradigms showed that being excluded by a computer is as hurtful as being excluded by another human (e.g., Jauch et al., 2021). Again, it is likely that the prevailing norm of the situation is decisive (e.g., Rudert & Greifeneder, 2016): When it is preferable to be tagged by the algorithm because the depiction is favorable, not being tagged might be hurtful, if the depiction is not favorable, then not being tagged might not be hurtful or even preferred.

8.2. Moderator need to belong

Our findings further solidify evidence regarding the interplay of social media experiences and individual moderators such as the need to belong (e.g., Mai et al., 2015; Reich & Vorderer, 2013; Wong et al., 2019). It is especially interesting to note that the need to belong consistently moderated reactions to not being tagged, but neither moderated reactions to being cut off from a post (Study 2), nor reactions to offline exclusion (Study 3). A possible reason for that could be that there needs to be some ambiguity to the ostracism situation in order for individual differences to have an impact. Being cut off or excluded offline may not be as ambiguous as not being tagged, which might have occurred unintentionally. Thus, there might be more room for individual differences to moderate responses to not being tagged. Alternatively, need to belong might not moderate responses to being cut off because being cut off doesn't have the same signaling function to others as not being tagged: If a user is cut off from the photo, others cannot see that they were physically present. If a user is not being tagged in the post, others can see that they were physically present and see that they are now ignored because they are not tagged. Such a signaling function might be especially threatening to individuals with a higher need to belong, because it could threaten other relationships as well (i.e., relationships with the users seeing the untagged post).

Future studies may wish to further complement the present results by including trait measures of the other three needs proposed in Williams' temporal need threat model of ostracism (2009), that is, the need for self-esteem, the need for control, and the need for meaningful existence. Alternatively, future studies may make the different needs more or less salient within social media ostracism experiences to investigate whether this differentially affects reactions to social media ostracism.

8.3. Methodological considerations

A methodological challenge in social media research is that, more often than not, it is neither possible nor ethical to conduct experimental manipulations on the platforms of interest (e.g., Instagram). To overcome this obstacle, in Studies 4a and 4b we mimicked the underlying processes of not being tagged outside of social media using a randomized in-vivo experimental manipulation. Similar procedures that allow for gaining insights without having to rely on fictional vignettes might be an interesting approach for studying social media experiences beyond ostracism phenomena.

As a potential caveat regarding generalization, our samples all came from Western cultures (USA and Europe) and thus do not allow for consideration of cultural differences. Future research might wish to investigate if individuals from interdependent (vs. independent)

cultures care more about (not) being represented in others' social media posts, as being tagged may demonstrate belongingness. Alternatively, because interdependent cultures place less emphasis on the self and more on the group, individuals from interdependent cultures may care less about social media ostracism, in line with research that individuals with an interdependent self-construal recover faster from ostracism (Ren et al., 2013). Moreover, it would be interesting to investigate whether our results hold in cultures in which smartphones and social media are less prevalent and/or have less impact on individuals' social life.

8.4. Practical implications

The ubiquity of social media and being permanently online (e.g., Reinecke et al., 2018) renders the topic of ostracism by not being tagged highly relevant for a wide range of practitioners and policy makers. We find that, although not being tagged is a very brief act of exclusion that may often even occur unintentionally, it affects individuals' need satisfaction. This is alarming given that previous research links experiencing ostracism and developing clinical depression (Rudert et al., 2021), suicidal ideation (Chen et al., 2020), and even associates previous exclusion experiences and school shootings (Leary et al., 2003). With the surge of social media use, online and offline experiences increasingly intertwine. It is thus of utmost importance to be aware of the potential consequences of even short and seemingly harmless incidents of social media ostracism.

Importantly, consequences may be severe for the users of social media platforms which largely consist of adolescents and young adults. Although adolescents were out of the scope of this investigation, they make up a large number of social media users and use social media very frequently (e.g., Anderson & Jiang, 2018; Plaisime et al., 2020). Being online more frequently may expose them to more frequent experiences of social media ostracism. At the same time, adolescents and young adults may be more vulnerable to suffering after exclusion than older individuals (e.g., Pharo et al., 2011; Sebastian et al., 2010) because they place a higher value on social connectedness and acceptance (e.g., Blakemore, 2018; Knoll et al., 2015).

Important implications follow from the present findings. First and foremost, social media users may be well-advised to think carefully how they can make their posts inclusive to avoid hurting the feelings and needs of others. Within peer groups, it may help to establish and agree on a norm of who would like to be tagged in which posts, as research showed that situational norms may affect if one feels excluded or not (e.g., Rudert & Greifeneder, 2016). Given that adolescents make up a large proportion of social media users and likely represent a highly vulnerable risk group, it could further be a fruitful approach to implement social media interventions in schools. Such interventions could for instance assist students in reattributing and dealing with exclusion experiences on social media. At the same time, students should be made aware that social media ostracism, such as being the only person that is not tagged in a post, can be very hurtful. Students could be advised to be just as mindful about their behavior on social media as about their behavior in real life, for instance by asking anyone who is represented in a post if they would like to be tagged. Another approach to prevent tagging ostracism may be to adjust the design of social media apps. For example, social media apps could implement mechanisms that prevent users from forgetting to tag their friends, such as reminding them to tag anyone that wants to be tagged before uploading. This may put a stop to unintentional incidents of tagging ostracism.

9. Conclusion

In a set of five studies, we examined a novel form of social media ostracism, not being tagged in others' content. Comparable to effects of being excluded in the real-world and other forms of social media ostracism, not being tagged strongly threatens psychological needs. The effects were stronger for those with a higher need to belong. The present

contribution demonstrates how threatening even seemingly minimal incidences of social media ostracism are to individuals' well-being.

Credit author statement

Christiane M. Büttner: Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing – original draft, Project administration. Selma C. Rudert: Conceptualization, Methodology, Formal analysis, Writing – review & editing.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.chb.2021.107062>.

References

- Alhabash, S., & Ma, M. (2017). A tale of four platforms: Motivations and uses of Facebook, Twitter, Instagram, and Snapchat among College students? *Social Media + Society*, 3(1), 1–13. <https://doi.org/10.1177/2056305117691544>
- Anderson, M., & Jiang, J. (2018). Teens, social media & technology 2018. *Pew Research Center*, 31(2018), 1673–1689.
- Andreassen, C. S., Pallesen, S., & Grif, M. D. (2017). The relationship between addictive use of social media, narcissism, and self-esteem: Findings from a large national survey. *Addictive Behaviors*, 64, 287–293. <https://doi.org/10.1016/j.addbeh.2016.03.006>
- Baumeister, R. F., Bratslavsky, E., Finkenauer, C., & Vohs, K. D. (2001). Bad is stronger than good. *Review of General Psychology*, 5(4), 323–370. <https://doi.org/10.1037/1089-2680.5.4.323>
- Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, 117(3), 497–529. <https://doi.org/10.1037/0033-2909.117.3.497>
- van Beest, I., & Williams, K. D. (2006). When inclusion costs and ostracism pays, ostracism still hurts. *Journal of Personality and Social Psychology*, 91(5), 918–928. <https://doi.org/10.1037/0022-3514.91.5.918>
- Bevan, J. L., Pfyf, J., & Barclay, B. (2012). Negative emotional and cognitive responses to being unfriended on Facebook: An exploratory study. *Computers in Human Behavior*, 28(4), 1458–1464. <https://doi.org/10.1016/j.chb.2012.03.008>
- Birnholtz, J., Burke, M., & Steele, A. (2017). Untagging on social media: Who untags, what do they untag, and why? *Computers in Human Behavior*, 69, 166–173. <https://doi.org/10.1016/j.chb.2016.12.008>
- Blakemore, S.-J. (2018). Avoiding social risk in adolescence. *Current Directions in Psychological Science*, 27(2), 116–122. <https://doi.org/10.1177/0963721417738144>
- Boothby, E. J., Cooney, G., Sandstrom, G. M., & Clark, M. S. (2018). The liking gap in conversations: Do people like us more than we think? *Psychological Science*, 29(11), 1742–1756. <https://doi.org/10.1177/0956797618783714>
- Burke, M., & Kraut, R. E. (2014). Growing closer on Facebook: Changes in tie strength through social network site use. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 4187–4196. <https://doi.org/10.1145/2556288.2557094>
- Burke, M., Kraut, R., & Marlow, C. (2011). Social capital on Facebook: Differentiating uses and users. In *Proceedings of the 2011 annual conference on human factors in computing systems - CHI*, '11 pp. 571–580. <https://doi.org/10.1145/1978942.1979023>
- Büttner, C. M., Rudert, S. C., & Greifeneder, R. (2021). Depressed and excluded: Do depressive symptoms moderate recovery from ostracism? *Journal of Affective Disorders*, 294, 730–736. <http://doi.org/10.1016/j.jad.2021.07.075>
- Chen, Z., Law, A. T., & Williams, K. D. (2010). The uncertainty surrounding ostracism: Threat amplifier or protector? In R. M. Arkin, K. C. Oleson, & P. J. Carroll (Eds.), *Handbook of the uncertain self* (pp. 291–302). Psychology Press.
- Chen, Z., Poon, K.-T., DeWall, C. N., & Jiang, T. (2020). Life lacks meaning without acceptance: Ostracism triggers suicidal thoughts. *Journal of Personality and Social Psychology*, 119(6), 1423–1443. <https://doi.org/10.1037/pspi000238>

- Cohen, J. (1992). Statistical power analysis. *Current Directions in Psychological Science*, 1(3), 98–101. <https://doi.org/10.1111/1467-8721.ep10768783>
- Covert, J. M., & Stefanone, M. A. (2020). Does rejection still hurt? Examining the effects of network attention and exposure to online social exclusion. *Social Science Computer Review*, 38(2), 170–186. <https://doi.org/10.1177/0894439318795128>
- Curran, P. J., & Hussong, A. M. (2009). Integrative data analysis: The simultaneous analysis of multiple data sets. *Psychological Methods*, 14(2), 81–100. <https://doi.org/10.1037/a0015914>
- Dahir, I. (2020). January 24). A Ugandan climate activist was cropped out of a news agency photo of Greta Thunberg at Davos. Buzz Feed News. <https://www.buzzfeednews.com/article/ikrd/vanessa-nakate-greta-thunberg-davos>.
- De Veirman, M., Cauberghe, V., & Hudders, L. (2017). Marketing through Instagram influencers: The impact of number of followers and product divergence on brand attitude. *International Journal of Advertising*, 36(5), 798–828. <https://doi.org/10.1080/02650487.2017.1348035>
- Dhir, A., & Torsheim, T. (2016). Age and gender differences in photo tagging gratifications. *Computers in Human Behavior*, 63, 630–638. <https://doi.org/10.1016/j.chb.2016.05.044>
- Dvir, M., Kelly, J. R., & Williams, K. D. (2019). Is inclusion a valid control for ostracism? *The Journal of Social Psychology*, 159(1), 106–111. <https://doi.org/10.1080/00224545.2018.1460301>
- Eck, J., Schoel, C., & Greifeneder, R. (2017). Belonging to a majority reduces the immediate need threat from ostracism in individuals with a high need to belong. *European Journal of Social Psychology*, 47, 273–288. <https://doi.org/10.1002/ejsp.2233>
- Ellison, N. B., Vitak, J., Gray, R., & Lampe, C. (2014). Cultivating social resources on social network sites: Facebook relationship maintenance behaviors and their role in social capital processes. *Journal of Computer-Mediated Communication*, 19(4), 855–870. <https://doi.org/10.1111/jcc4.12078>
- Evelyn, K. (2020). January 25). Outrage at whites-only image as Ugandan climate activist cropped from photo. The Guardian <https://www.theguardian.com/world/2020/jan/24/whites-only-photo-uganda-climate-activist-vanessa-nakate>.
- Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, 39(2), 175–191. <https://doi.org/10.3758/BF03193146>
- Fayant, M.-P., Muller, D., Hartgerink, C. H. J., & Lantian, A. (2014). Is ostracism by a despised outgroup really hurtful? A replication and extension of Gonsalkorale and Williams (2007). *Social Psychology*, 45(6), 489–494. <https://doi.org/10.1027/1864-9335/a000209>
- Fiset, J., Al Hajji, R., & Vongas, J. G. (2017). Workplace ostracism seen through the lens of power. *Frontiers in Psychology*, 8, 1528. <https://doi.org/10.3389/fpsyg.2017.01528>
- Fossati, A., Somma, A., & Borroni, S. (2017). The multidimensionality of pathological narcissism from the perspective of social ostracism: A study in a sample of Italian university students. *Personality and Individual Differences*, 116, 309–313. <https://doi.org/10.1016/j.paid.2017.05.009>
- Gangadharbatla, H. (2008). Facebook and me: Collective self-esteem, need to belong, and internet self-efficacy as predictors of the iGeneration's attitudes toward social networking sites. *Journal of Interactive Advertising*, 8(2), 5–15. <https://doi.org/10.1080/15252019.2008.10722138>
- Giner-Sorolla, R. (2018). January 28). Powering your interaction. Approaching significance: A methodology blog for social psychology. <https://approachingblog.wordpress.com/2018/01/24/powering-your-interaction-2/>.
- Godwin, V., MacNevin, G., Zadro, L., Iannuzzelli, R., Weston, S., Gonsalkorale, K., & Devine, P. (2014). Are all ostracism experiences equal? A comparison of the autobiographical recall, cyberball, and O-cam paradigms. *Behavior Research Methods*, 46(3), 660–667. <https://doi.org/10.3758/s13428-013-0408-0>
- Gonsalkorale, K., & Williams, K. D. (2007). The KKK won't let me play: Ostracism even by a despised outgroup hurts. *European Journal of Social Psychology*, 37(6), 1176–1186. <https://doi.org/10.1002/ejsp.392>
- Goodacre, R., & Zadro, L. (2010). O-cam: A new paradigm for investigating the effects of ostracism. *Behavior Research Methods*, 42(3), 768–774. <https://doi.org/10.3758/BRM.42.3.768>
- Greenberg, J., Pyszczynski, T., & Solomon, S. (1986). The causes and consequences of a need for self-esteem: A terror management theory. In R. F. Baumeister (Ed.), *Public self and private self* (pp. 189–213). Springer. https://doi.org/10.1007/978-1-4613-9564-5_10
- Greifeneder, R., & Rudert, S. C. (2019). About flames and boogymen: Social norms affect individuals' construal of social exclusion. In S. Rudert, R. Greifeneder, & K. D. Williams (Eds.), *Current directions in ostracism, social exclusion, and rejection research* (1st ed., pp. 32–48). Routledge. <https://doi.org/10.4324/9781351255912-3>
- Hales, A. H., McIntyre, M. M., Rudert, S. C., Williams, K. D., & Thomas, H. (2021). Ostracized and observed: The presence of an audience affects the experience of being excluded. *Self and Identity*, 20(1), 94–115. <https://doi.org/10.1080/15298868.2020.1807403>
- Hampton, K. N., Goulet, L. S., Marlow, C., & Rainie, L. (2012). *Why most Facebook users get more than they give* (Vol. 3, pp. 1–40). Pew Internet & American Life Project.
- Hartgerink, C. H. J., van Beest, I., Wicherts, J. M., & Williams, K. D. (2015). The ordinal effects of ostracism: A meta-analysis of 120 cyberball studies. *PLoS One*, 10(5), Article e0127002. <https://doi.org/10.1371/journal.pone.0127002>
- Hawi, N., & Samaha, M. (2019). Identifying commonalities and differences in personality characteristics of Internet and social media addiction profiles: Traits, self-esteem, and self-construal. *Behaviour & Information Technology*, 38(2), 110–119. <https://doi.org/10.1080/0144929X.2018.1515984>
- Hayes, R. A., Carr, C. T., & Wohn, D. Y. (2016). One click, many meanings: Interpreting paralinguistic digital affordances in social media. *Journal of Broadcasting & Electronic Media*, 60(1), 171–187. <https://doi.org/10.1080/08838151.2015.1127248>
- Hayes, R. A., Wesselmann, E. D., & Carr, C. T. (2018). When nobody “likes” you: Perceived ostracism through paralinguistic digital affordances within social media. *Social Media + Society*, 4(3). <https://doi.org/10.1177/2056305118800309>
- Hitlan, R. T., Kelly, K. M., Schepman, S., Schneider, K. T., & Zárate, M. A. (2006). Language exclusion and the consequences of perceived ostracism in the workplace. *Group Dynamics: Theory, Research, and Practice*, 10(1), 56–70. <https://doi.org/10.1037/1089-2699.10.1.56>
- Jauch, M., Rudert, S. C., & Greifeneder, R. (2021). *Social pain by non-social agents: Exclusion hurts and provokes punishment even if the excluding source is a computer* (Manuscript under Review).
- Karahanna, E., Xin Xu, S., Xu, Y., Zhang, N., & Andy. (2018). The needs-affordances-features perspective for the use of social media. *MIS Quarterly*, 42(3), 737–756. <https://doi.org/10.2530/MISQ/2018/11492>
- Klein, S., & Rudert, S. C. (2021). If they don't care, I won't share: Feeling unrelated to one's in-group increases selfishness instead of behavior for the greater good. *European Journal of Social Psychology*, ejsp, 2771. <https://doi.org/10.1002/ejsp.2771>
- Knausenberger, J., & Echterhoff, G. (2018a). Recovering from social exclusion: The interplay of subtle Facebook reminders and collectivistic orientation. *Computers in Human Behavior*, 78, 298–305. <https://doi.org/10.1016/j.chb.2017.10.012>
- Knausenberger, J., & Echterhoff, G. (2018b). I belong but I'm still sad: Reminders of Facebook increase feelings of belonging but do not facilitate coping with sadness. *PLoS One*, 13(12), Article e0209889. <https://doi.org/10.1371/journal.pone.0209889>
- Knausenberger, J., Hellmann, J. H., & Echterhoff, G. (2015). When virtual contact is all you need: Subtle reminders of Facebook preempt social-contact restoration after exclusion. *European Journal of Social Psychology*, 45(3), 279–284. <https://doi.org/10.1002/ejsp.2035>
- Knoll, L. J., Magis-Weinberg, L., Speekenbrink, M., & Blakemore, S.-J. (2015). Social influence on risk perception during adolescence. *Psychological Science*, 26(5), 583–592. <https://doi.org/10.1177/0956797615569578>
- Kuehn, M. M., Chen, S., & Gordon, A. M. (2015). Having a thicker skin: Social power buffers the negative effects of social rejection. *Social Psychological and Personality Science*, 6(6), 701–709. <https://doi.org/10.1177/194850615580170>
- Leary, M. R., Kelly, K. M., Cottrell, C. A., & Schreindorfer, L. S. (2013). Construct validity of the need to belong scale: Mapping the nomological network. *Journal of Personality Assessment*, 95(6), 610–624. <https://doi.org/10.1080/00223891.2013.819511>
- Leary, M. R., Kowalski, R. M., Smith, L., & Phillips, S. (2003). Teasing, rejection, and violence: Case studies of the school shootings. *Aggressive Behavior*, 29(3), 202–214. <https://doi.org/10.1002/ab.10061>
- Lee, E., Lee, J.-A., Moon, J. H., & Sung, Y. (2015). Pictures speak louder than words: Motivations for using Instagram. *Cyberpsychology, Behavior, and Social Networking*, 18(9), 552–556. <https://doi.org/10.1089/cyber.2015.0157>
- Lup, K., Trub, L., & Rosenthal, L. (2015). Instagram# instasad?: Exploring associations among Instagram use, depressive symptoms, negative social comparison, and strangers followed. *Cyberpsychology, Behavior, and Social Networking*, 18(5), 247–252. <https://doi.org/10.1089/cyber.2014.0560>
- Lutz, S., & Schneider, F. M. (2020). Is receiving dislikes in social media still better than being ignored? The effects of ostracism and rejection on need threat and coping responses online (Vols. 1–25). *Media Psychology*. <https://doi.org/10.1080/15213269.2020.1799409>
- Mai, L. M., Freudenthaler, R., Schneider, F. M., & Vorderer, P. (2015). “I know you've seen it!” Individual and social factors for users' chatting behavior on Facebook. *Computers in Human Behavior*, 49, 296–302. <https://doi.org/10.1016/j.chb.2015.01.074>
- Majchrzak, A., Faraj, S., Kane, G. C., & Azad, B. (2013). The contradictory influence of social media affordances on online communal knowledge sharing. *Journal of Computer-Mediated Communication*, 19(1), 38–55. <https://doi.org/10.1111/jcc4.12030>
- Mazinani, Z., Shakiba, S., Pourshahbaz, A., & Vahedi, M. (2021). Five Factor Narcissism and threat to fundamental needs following social exclusion engendered by the Cyberball game. *Personality and Individual Differences*, 168, 110279. <https://doi.org/10.1016/j.paid.2020.110279>
- Nadkarni, A., & Hofmann, S. G. (2012). Why do people use Facebook? *Personality and Individual Differences*, 52(3), 243–249. <https://doi.org/10.1016/j.paid.2011.11.007>
- Pharo, H., Gross, J., Richardson, R., & Hayne, H. (2011). Age-related changes in the effect of ostracism. *Social Influence*, 6(1), 22–38. <https://doi.org/10.1080/15534510.2010.525852>
- Pittman, M., & Reich, B. (2016). Social media and loneliness: Why an Instagram picture may be worth more than a thousand Twitter words. *Computers in Human Behavior*, 62, 155–167. <https://doi.org/10.1016/j.chb.2016.03.084>
- Plaisime, M., Robertson-James, C., Mejia, L., Núñez, A., Wolf, J., & Reels, S. (2020). Social media and teens: A needs assessment exploring the potential role of social media in promoting health. *Social Media + Society*, 6(1), 1–11. <https://doi.org/10.1177/2056305119886025>
- Reich, S., Schneider, F. M., & Heling, L. (2018). Zero Likes – symbolic interactions and need satisfaction online. *Computers in Human Behavior*, 80, 97–102. <https://doi.org/10.1016/j.chb.2017.10.043>
- Reich, S., & Vorderer, P. (2013). Individual differences in need to belong in users of social networking sites. In P. Moy (Ed.), *Communication and community* (pp. 129–148). Hampton Press.
- Reinecke, L., Klimmt, C., Meier, A., Reich, S., Hefner, D., Knop-Huels, K., Rieger, D., & Vorderer, P. (2018). Permanently online and permanently connected: Development and validation of the online vigilance scale. *PLoS One*, 13(10), Article e0205384. <https://doi.org/10.1371/journal.pone.0205384>

- Ren, D., Wesselmann, E. D., & Williams, K. D. (2013). Interdependent self-construal moderates coping with (but not the initial pain of) ostracism. *Asian Journal of Social Psychology, 16*(4), 320–326. <https://doi.org/10.1111/ajsp.12037>
- Robinson, S. L., O'Reilly, J., & Wang, W. (2013). Invisible at work: An integrated model of workplace ostracism. *Journal of Management, 39*(1), 203–231. <https://doi.org/10.1177/0149206312466141>
- RStudio Team. (2021). *RStudio*. Integrated Development Environment for R. <http://www.rstudio.com/>.
- Rudert, S. C., & Greifeneder, R. (2016). When it's okay that I don't play: Social norms and the situated construal of social exclusion. *Personality and Social Psychology Bulletin, 42*(7), 955–969. <https://doi.org/10.1177/0146167216649606>
- Rudert, S. C., & Greifeneder, R. (2019). Observing ostracism: How observers interpret and respond to ostracism situations. In S. C. Rudert, R. Greifeneder, & K. D. Williams (Eds.), *Current directions in ostracism, social exclusion, and rejection research* (1st ed., pp. 136–154). Routledge.
- Rudert, S. C., Janke, S., & Greifeneder, R. (2021). Ostracism breeds depression: Longitudinal associations between ostracism and depression over a three-year-period. *Journal of Affective Disorders Reports, 4*, 100118. <https://doi.org/10.1016/j.jadr.2021.100118>
- Rudert, S. C., Ruf, S., & Greifeneder, R. (2020). Whom to punish? How observers sanction norm-violating behavior in ostracism situations. *European Journal of Social Psychology, 50*(2), 376–391. <https://doi.org/10.1002/ejsp.2606>
- Rudert, S. C., Sutter, D., Corrodi, V. C., & Greifeneder, R. (2018). Who's to blame? Dissimilarity as a cue in moral judgments of observed ostracism episodes. *Journal of Personality and Social Psychology, 115*(1), 31–53. <https://doi.org/10.1037/pspa0000122>
- Sandstrom, M. J., Deutz, M. H. F., Lansu, T. A. M., Karremans, J. C., & Cillessen, A. H. N. (2017). Unanimous versus partial rejection: How the number of excluders influences the impact of ostracism in children. *Aggressive Behavior, 43*, 190–203. <https://doi.org/10.1002/ab.21674>
- Santor, D. A., Messervey, D., & Kusumakar, V. (2000). Measuring peer pressure, popularity, and conformity in adolescent boys and girls: Predicting school performance, sexual attitudes, and substance abuse. *Journal of Youth and Adolescence, 29*(2), 163–182. <https://doi.org/10.1023/A:1005152515264>
- Schneider, F. M., Zwillich, B., Bindl, M. J., Hopp, F. R., Reich, S., & Vorderer, P. (2017). Social media ostracism: The effects of being excluded online. *Computers in Human Behavior, 73*, 385–393. <https://doi.org/10.1016/j.chb.2017.03.052>
- Sebastian, C., Viding, E., Williams, K. D., & Blakemore, S.-J. (2010). Social brain development and the affective consequences of ostracism in adolescence. *Brain and Cognition, 72*(1), 134–145. <https://doi.org/10.1016/j.bandc.2009.06.008>
- Simonsohn, U. (2014). *March 12*. No-way interactions. *Data colada*. <http://datacolada.org/17>.
- Smith, R., Morgan, J., & Monks, C. (2017). Students' perceptions of the effect of social media ostracism on wellbeing. *Computers in Human Behavior, 68*, 276–285. <https://doi.org/10.1016/j.chb.2016.11.041>
- Tobin, S. J., Vanman, E. J., Verreyne, M., & Saeri, A. K. (2015). Threats to belonging on Facebook: Lurking and ostracism. *Social Influence, 10*(1), 31–42. <https://doi.org/10.1080/15534510.2014.893924>
- Uskul, A. K., & Over, H. (2014). Responses to social exclusion in cultural context: Evidence from farming and herding communities. *Journal of Personality and Social Psychology, 106*(5), 752–771. <https://doi.org/10.1037/a0035810>
- Wesselmann, E. D., Michels, C., & Slaughter, A. (2019). Understanding common and diverse forms of social exclusion. In S. C. Rudert, R. Greifeneder, & K. D. Williams (Eds.), *Current directions in ostracism, social exclusion, and rejection research* (1st ed., pp. 1–18). Routledge.
- Williams, K. D. (2009). Ostracism: A temporal need-threat model. *Advances in Experimental Social Psychology, 41*, 275–314. [https://doi.org/10.1016/S0065-2601\(08\)00406-1](https://doi.org/10.1016/S0065-2601(08)00406-1)
- Williams, K. D., Govan, C. L., Croker, V., Tynan, D., Cruickshank, M., & Lam, A. (2002). Investigations into differences between social- and cyberostracism. *Group Dynamics: Theory, Research, and Practice, 6*(1), 65–77. <https://doi.org/10.1037/1089-2699.6.1.65>
- Williams, K. D., & Zadro, L. (2005). Ostracism: The indiscriminate early detection system. In K. D. Williams, J. P. Forgas, & W. von Hippel (Eds.), *The social outcast* (pp. 19–34). Psychology Press.
- Wirth, J. H. (2016). Methods for investigating social exclusion. In P. Riva (Ed.), *Social exclusion: Psychological approaches to understanding and reducing its impact* (pp. 25–47). Springer. https://doi.org/10.1007/978-3-319-33033-4_2
- Wolf, W., Levordashka, A., Ruff, J. R., Kraaijeveld, S., Lueckmann, J.-M., & Williams, K. D. (2015). Ostracism online: A social media ostracism paradigm. *Behavior Research Methods, 47*(2), 361–373. <https://doi.org/10.3758/s13428-014-0475-x>
- Wong, D., Amon, K. L., & Keep, M. (2019). Desire to belong affects Instagram behavior and perceived social support. *Cyberpsychology, Behavior, and Social Networking, 22* (7), 465–471. <https://doi.org/10.1089/cyber.2018.0533>
- Yaakobi, E. (2021). Personality as a moderator of immediate and delayed ostracism distress. *British Journal of Social Psychology, bjso*, 12484. <https://doi.org/10.1111/bjso.12484>
- Zadro, L., Williams, K. D., & Richardson, R. (2004). How low can you go? Ostracism by a computer is sufficient to lower self-reported levels of belonging, control, self-esteem, and meaningful existence. *Journal of Experimental Social Psychology, 40*(4), 560–567. <https://doi.org/10.1016/j.jesp.2003.11.006>