Registered Report

Trapped Between Goal Conflict and Availability Norm?

How Users' Mobile Messaging Behavior During Task Engagement Influences Negative Self-Conscious Emotions

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Abstract: An increasing number of studies indicate that individuals have difficulties in exerting self-control over media use, such as mobile messaging. Specifically, individuals frequently experience that their messenger use conflicts with primary goals (e.g., work tasks), which may cause negative self-conscious emotions such as guilt. At the same time, *not* checking and answering messages violates a now widely established availability norm, which may trigger negative self-conscious emotions as well. The current study, therefore, tests how goal conflicts and *connection cues* interact in influencing users' negative self-conscious emotions about their messenger usage behavior. Drawing on self-control research in conjunction with self-determination theory and theoretical approaches to social norms, we derived hypotheses on the boundary conditions under which the frequency of messenger use causes negative self-conscious emotions. We thereby significantly extend previous research on the self-regulation of mobile media use, which largely assumes that self-control failure results from users' *intrinsic* motivation to experience need satisfaction and pleasure and tends to overlook the fact that mediated communication is often *extrinsically* motivated due to the availability norm. The hypotheses were tested based on a preregistered laboratory experiment.

Keywords: messenger use, availability, task engagement, self-control, self-conscious emotions

In many respects, using mobile messengers has enriched people's everyday lives. Messengers enable users to be permanently connected with others (Vorderer et al., 2018), which has, for instance, facilitated relationship maintenance (for an overview, see Ling, 2018). However, messenger use is often tempting in situations when individuals want to pursue a primary goal. It has been shown, for example, that individuals are willing to interrupt important tasks such as exam preparation to engage in texting (Rosen et al., 2013). Following the impulse to use messengers although this stands in conflict with one's current goals reflects a self-control failure (Du et al., 2018; Hofmann et al., 2009). Exerting self-control over messenger use appears to be difficult: Prior research revealed that messaging frequently conflicts with other tasks at hand (A. Meier, 2022; Panek et al., 2015), which may cause negative self-conscious emotions such as guilt and shame (Tracy & Robins, 2004). Negative self-conscious emotions can be harmful to users' well-being (Kim et al., 2011). Guilt is the most frequently investigated self-conscious emotion in the context of media-related goal conflicts (e.g., Panek, 2014; Reinecke et al., 2014). It has been shown that guilt about various media uses is negatively related to vitality, recovery experiences, and media enjoyment (for an overview, see Reinecke & Meier, 2020).

Why, though, is it so difficult for users to exert self-control over media use? To answer this question, researchers have focused on the role of the immediate pleasure that individuals experience because media use satisfies intrinsic needs (e.g., relatedness; Ryan & Deci, 2000a). The assumption here is that users often unconsciously favor a short-term gain in pleasure over the pursuit of long-term goals (e.g., Hofmann et al., 2017; van Koningsbruggen et al., 2018). However, research on users' motivation to engage in mediated communication suggests that they are not only *intrinsically* motivated in the sense that they seek need satisfaction, but also *extrinsically* motivated because they feel pressured to respond to calls and messages quickly (e.g., Hall, 2017; Ryan & Deci, 2000a). This social norm to

be available entails that users regularly check their phones for new notifications and answer messages quickly (Bayer et al., 2016). Indeed, one current study found that social pressure to be available triggers self-control failure (Halfmann & Rieger, 2019), supporting the notion that extrinsic motivation challenges users' self-control. Paradoxically, the availability norm may cause negative self-conscious emotions about *not* using messengers (Hall, 2017; Thomée et al., 2011). Users who want to work on a primary task thus face a dilemma: No matter which option they choose – using or not using messengers – they might feel bad about their behavior.

We aimed to investigate this dilemma systematically. Prior studies show how self-control failure affects guilt about entertainment media (e.g., Reinecke et al., 2014) and social network site use (Panek, 2014). Because using messengers tends to be a considerably shorter interruption of primary goals, it needs to be explored whether messenger use while working on a primary task triggers negative self-conscious emotions as well. Furthermore, very limited consideration has been given to the fact that both "too frequent" *and* "too little" media use can lead to negative self-conscious emotions. On a theoretical level, this reflects that research on self-control and media use (e.g., Hofmann et al., 2017) and theoretical discussions on availability norms (e.g., Bayer et al., 2016) have belonged to separate research areas. To gain a deeper understanding of negative self-conscious emotions about messenger usage behavior, the current study combines these two strands of research and adds a self-determination theory lens (Ryan & Deci, 2000b).

In the following, we explain the boundary conditions under which both using messengers more frequently and less frequently leads to negative self-conscious emotions. That is, we elucidate how goal conflicts and the availability norm interact in influencing how users feel about their messaging behavior. We thereby significantly extend theory and empirical research on (mobile) media effects and self-regulation, which has largely overlooked the role of extrinsic motivation. Overall, this study thus aims to extend prior research on media use and self-conscious emotions by jointly considering three potential predictors of self-conscious emotions – frequency of messenger use, goal conflict, and availability norm salience. Hypotheses derived from this literature review were tested based on a preregistered laboratory experiment.

How Goal Conflicts and Norm Salience Cause Negative Self-Conscious Emotions About Messenger Usage Behavior

Whether and how strongly the frequency of messenger use causes negative self-conscious emotions depends on situational conditions. Firstly, the way individuals handle conflicts between primary goals and the desire to use messengers is crucial. The motivation and capacity to exert self-control enable individuals to resist conflicting impulses, also referred to as *temptations* (Hofmann et al., 2009). Negative self-conscious emotions arise when individuals recognize that their behavior is not consistent with their goals, including compliance with personally relevant norms (Tracy & Robins, 2004). Stable, global attributions ("I'm a bad friend") trigger feelings of *shame*, whereas unstable, specific attributions ("I didn't do enough") cause *guilt* reactions. *Embarrassment* differs from shame and guilt in that it involves negative feelings about one's public behavior or appearance (Tracy & Robins, 2004). Following Brehaut et al. (2003), we define the more specific negative emotion of *regret* "as remorse or distress over a decision" (p. 282). The positive emotion of *pride* arises when individuals recognize that their behavior is consistent with their goals (Tracy & Robins, 2004).

Results from Hofmann et al. (2013) indicate that individuals tend to feel guilty and less proud when they give in to temptations in various life domains (e.g., eating, media use). It thus seems likely that users experience negative self-conscious emotions due to messenger use when this activity causes them to interrupt or delay personally important activities. We, therefore, hypothesize that the strength of goal conflict moderates the influence of the frequency of messenger use on negative self-conscious emotions in such a way that when goal conflict is high, using messengers more frequently will lead to higher levels of negative self-conscious emotions than when goal conflict is low (Hypothesis 1, H1).

Beyond successfully applying self-control over their own impulses, however, users face a second challenge of regulating their messenger use. The prevalence of mobile devices has led to a social norm of constant availability, which means that users feel that they have to reply to messages and calls immediately and stay "in the loop" through checking behaviors (Bayer et al., 2016; Hall, 2017). Especially with close friends, individuals feel they need to respond quickly (Atchley & Warden, 2012). As mentioned above, the predominant explanation for users' difficulties in resisting media temptations refers to their *intrinsic* motivation to experience need satisfaction and the resulting pleasure (e.g., van Koningsbruggen et al., 2018). However, the *extrinsic* motivation to comply with the availability norm should influence self-control behavior and negative self-conscious emotions as well. The distinction between intrinsic and extrinsic types of motivation is made by self-determination theory (SDT; Ryan & Deci, 2000b). While the former means "doing an activity for the inherent satisfaction of the activity itself" (Ryan & Deci, 2000b, p. 71), the latter refers to situations when individuals perform a

behavior to attain a separable outcome, for example, to avoid social sanctions.

SDT classifies several types of extrinsic motivation that vary in their degree of autonomy (Ryan & Deci, 2000a). This study focuses on two specific types, referred to as *external regulation* and *introjected regulation*, which are likely to underlie media users' compliance with the availability norm and should be related to self-conscious emotions. Firstly, *external regulation* represents the least autonomous behavior and is caused by social pressure (Ryan & Deci, 2000a). Availability should be externally regulated because users are aware that their interaction partners may sanction a delayed response (Kalman & Rafaeli, 2011). Research on compliance (for an overview, see Boster et al., 2016) suggests that social norms inform individuals about their own interpersonal transgressions, triggering negative self-conscious emotions. Hence, individuals are likely to experience negative self-conscious emotions when they notice that they might have inflicted harm on or violated the expectations of a communication partner by not answering quickly enough. Secondly, the term *introjected regulation* denotes that individuals have started to take in an extrinsic demand, but do not completely accept it as their own (Ryan & Deci, 2000b). In the context of messenger use, this means that individuals pressure themselves to answer messages quickly (Ling, 2016). Deci and Ryan (2008) argue that internal pressure to fulfill certain demands results from "implicit offers of pride and self-aggrandizement after success, as well as implicit threats of guilt, shame, and self-derogation after failure" (p. 16). Accordingly, when users do not comply with the availability norm even though they have partially internalized it, they will probably experience negative self-conscious emotions. In the following, "extrinsic motivation" is used as an umbrella term for external and introjected regulation.

However, these effects on negative self-conscious emotions should depend on the salience of the availability norm. Based on the focus theory of norms (Kallgren et al., 2000), Bayer and colleagues (2016) argue that the availability norm only influences users' behavior if it is in focus, that is to say, cognitively salient. One important factor is the perception of time-lapse. Users have a temporal expectation of when to check their phones to comply with the norm: "For each perceived moment that an individual delays checking, the norm violation becomes more severe and more salient" (Bayer et al., 2016, p. 140). In addition, Bayer and colleagues (2016) assume that *connection cues* moderate sensitivity to the availability norm. They outline different types of these cues, such as technical (e.g., notification sound) and spatial cues (e.g., seeing others using their smartphone). Following this reasoning, when the availability norm is in users' focus, but they do not use messengers for a certain period, they perceive a norm violation, which should cause negative self-conscious emotions (Tracy & Robins, 2004). Results from prior studies support the notion that users feel bad about not checking messengers and not answering quickly enough (e.g., Hall, 2017; Thomée et al., 2010). Hence, we assume that the salience of the availability norm moderates the influence of the frequency of messenger use on negative self-conscious emotions in such a way that when norm salience is high, using messengers less frequently will lead to higher levels of negative self-conscious emotions, than when norm salience is low (Hypothesis 2, H2).

Excusing Messenger Usage Behavior With Primary Goals or the Availability Norm

In some situations, however, goal conflicts or norm salience may also *reduce* negative self-conscious emotions. According to Tracy and Robins (2004), individuals experience self-conscious emotions if they attribute their behavior to internal causes. This means that users only feel bad about violating the availability norm or interrupting a primary task with messenger use if they feel responsible for their behavior. Individuals use various strategies to avoid negative self-conscious emotions, such as "pointing to external causes" (Baumeister et al., 1994, p. 259). It is therefore possible that messenger users point to external causes to justify their usage behavior.

Firstly, users may evaluate messenger use although they are working on a primary task as more legitimate if they experienced high availability norm salience. Today, media users often think about their personal online sphere even if they are not using their mobile devices (Reinecke et al., 2018). Thus, when reflecting on media-related goal conflicts, users might not only assess the consequences for their primary goal "offline," but also evaluate the expectations of their online interaction partners. When individuals use the availability norm as an external cause for their messenger use, they may feel less responsible for the experienced goal conflict. Similarly, Sonnentag et al. (2018) suspect that individuals invoke the demand to quickly respond to incoming messages as an excuse to delay aversive work tasks. Secondly, individuals can adduce the pursuit of an important goal as an external cause for not using messengers and for delayed responses, which reduces their perceived responsibility for violating the availability norm. Users can communicate such excuses to their online interaction partners. It has been shown that users often feel obliged to give plausible reasons (e.g., work tasks) for why they were not available to their communication partners (Salovaara et al., 2011; Thomée et al., 2010).

Thus, it seems likely that users try to reduce negative self-conscious emotions by excusing their messenger usage

behavior in the above-described ways. We, therefore, hypothesize that there is a three-way interaction between the frequency of messenger use, goal conflict, and availability norm salience: When norm salience is high, experiencing high goal conflict and using messengers more frequently will lead to lower levels of negative self-conscious emotions than when norm salience is low (Hypothesis 3a, H3a). When goal conflict is high, experiencing high norm salience and using messengers less frequently will lead to lower levels of negative self-conscious emotions than when goal conflict is low (Hypothesis 3b, H3b).

Pretest

To lay the groundwork for a laboratory experimental paradigm, we conducted a preregistered online vignette experiment among students (N = 312). Readers can find study materials on the Open Science Framework (OSF; https://osf.io/c8q9n/). The results demonstrated that perceived goal conflict while using messengers was significantly higher when studying for an important exam than when reading a book during leisure time, $t(308) = 8.23$, $p < .001$. The data also indicated that individuals who do not check messengers for a certain period of time rate their compliance with the availability norm significantly lower when they receive versus not receive smartphone notifications, $t(594) = 3.73$, $p = .002$. To implement the connection cues manipulation in the laboratory, we also measured *how quickly* connection cues cause checking desires and behaviors. Most participants stated that they experience a desire to check (86%) and actually check messengers (76%) within 10 min of receiving a notification. However, when they do not receive a notification, the majority of participants stated they experience a desire to check (63%) and actually check messengers (67%) after more than 30 min.

Main Study

A laboratory experiment with a mixed 2 (low vs. high goal conflict) × 2 (connection cues absent vs. present) design was conducted. Connection cues were manipulated between subjects, while goal conflict was manipulated within subjects using two different activities (reading, studying). We chose the within-subjects design to be able to achieve good statistical power while keeping the data collection effort feasible. Participants' actual messenger use was measured, but not manipulated because, as explained above, self-conscious emotions may only arise if individuals feel responsible for their behavior, rendering experimentally imposed usage behavior unsuited in this context. We pilot-tested the experimental paradigm among 12 undergraduate students and optimized some of the instructions as a result.

Sample

Because messenger use is particularly common among the younger population (Beisch & Koch, 2021), students appear to be a suitable target group. Student smartphone owners from the University of Mannheim were invited to participate in a laboratory study that took approximately 45 min. Before they participated in the laboratory study, they were asked to fill out a pre-laboratory questionnaire that contained trait measures. They were told that the purpose of the study is to investigate personality, mood, and the use of TV series. To make this appear credible, the pre-laboratory questionnaire also included a few questions on the use of series. We started the data collection in March 2020 but had to interrupt it after 2 weeks because of the COVID-19 pandemic. Due to physical contact restriction measures, we were prohibited from continuing data collection for over 1 year. The second phase of data collection lasted from October 2021 to May 2022. It took a long time at this stage to reach the preregistered sample size because the university where we were conducting the study had switched to online courses, which made it difficult to find students who wanted to participate in an in-person laboratory study. To account for possible distortions, we included the participation date as control variable.

To determine optimal sample size, we performed an a priori power analysis with G*Power. Based on the pretest data, we expected to find a medium effect size (f = .25). The analysis revealed that 100 participants are needed to achieve a power level of 95% (four groups, two repeated measures correlated at r = .50, using a Bonferroni-corrected α-level of $p < .01$). Some participants were likely to be removed from the sample according to the exclusion criteria. We, therefore, intended to collect data from 110 participants. We stopped data collection on the day we reached 111 participants. After applying the exclusion criteria (see next section), a final sample of 96 participants (59 females, 61%; age: M = 21.56, SD = 2.15) remained.

Exclusion Criteria

We applied the following predefined exclusion criteria. Participants who reported not using messengers, did not bring a smartphone, or did not complete the survey were excluded during the data collection process. No participant received relevant information about the study before participation. However, 11 participants were excluded because they guessed the real purpose of the study and their

manipulation check ratings and self-conscious emotions significantly differed from other participants. Finally, four participants in the "connection cues present" condition were excluded because they reported that they did not hear the notification sounds.

Procedure and Manipulation

Before participants arrived, the laboratory manager started an online questionnaire that randomly assigned participants to a connection cues condition and an order of reading and studying. In the beginning, participants were informed that they would *study* and *read* for 15 min, respectively, before they take an intelligence test. They were told that they would need their smartphones later as part of the experiment but were asked to put their phones in silent mode for the moment. To ensure that the location of their smartphones did not affect their messenger use, participants were asked to place their smartphones face down in the corner of the table they were sitting at. When individuals do not hear or see incoming notifications, they may still feel a strong urge to check their phones for new messages (A. Meier, 2022). This is because they have a subjective perception of when they last checked the phone and when they need to check it again to make sure they have not missed anything important (Bayer et al., 2016).

The studying session consisted of self-directed exam preparation (for the full description of this procedure, see Tice et al., 2001, p. 62). Participants were told that they would take an intelligence test at the end of the study that has proven to be highly predictive of later study and career success and that they would receive feedback on their performance. Participants had 15 min to prepare for the intelligence test with anagram exercises provided by the laboratory manager. They were told that individuals significantly improve their performance in the test if they practice these anagrams for 10–15 min. In the reading session, by contrast, participants were provided with reading material, which they could freely read as they pleased. They were informed that the reading session is unrelated to the intelligence test and should allow them to recover before or after the exam preparation session, respectively, depending on the randomized order. In total, 25 participants reported having used the smartphone during the reading session, compared to 20 during the studying session.

Before and after the first session, an affect questionnaire was presented, which contained items measuring negative self-conscious emotions, among others. After the second session, participants were asked to complete the questionnaire. Within the questionnaire, they were informed that they did not have to complete the announced intelligence test. When data collection was completed, all participants were fully debriefed.

Manipulation of Goal Conflict

Impulses only turn into temptation if giving in to this impulse would conflict with an individual's own goals (Hofmann et al., 2009). This does not mean that individuals must be intrinsically motivated, but that the goal is relevant to them. Findings from the pretest revealed that using messengers conflicted more strongly with studying for an important exam than with reading in leisure time. Therefore, to manipulate the strength of potential goal conflict in the laboratory, participants studied for the alleged intelligence test (high conflict) and read (low conflict). Studying for the test should have been a specific and personally important goal for participants because they expected that their performance reflects later study and career success. Research on goal setting demonstrated that specific, difficult goals lead to greater effort and persistence (for an overview, see Locke & Latham, 2006). Six of the overall 18 anagrams were unsolvable, which is why the exercise should have appeared particularly difficult. By contrast, the reading session was not linked with a specific, difficult goal. The studying session thus should have caused greater effort, persistence, and goal conflict with using messengers than the reading session.

Manipulation of Connection Cues

Findings from the pretest indicated that noticing smartphone notifications increases perceived expectations to be available. In the "connection cues present" condition (n = 43), the laboratory manager left his or her smartphone in the laboratory when leaving the participant alone for the reading and studying sessions. Participants were told that this is because a smartphone alarm clock would ring after 15 min. However, in addition to the alarm, the smartphone vibrated and made notification sounds after 3 and 6 min in the first session and after 4 and 8 min in the second session. As noted above, the pretest data revealed that when individuals receive a notification, they tend to experience a desire to check and actually check messengers within the first 10 min. This is in line with results from Pielot et al. (2014), who found that users attend to messages from mobile messengers with a median delay of 6.15 min. In both 15-min sessions, participants were thus likely to perceive the need to attend to mobile messages. Hearing a phone notification in one's immediate surroundings represents a combination of technical and spatial connection cues, as described by Bayer and colleagues (2016). Although it would be more externally valid if participants were to receive notifications on their own smartphones, the manipulation described above prioritizes internal validity and experimenter control. In the "connection cues absent" condition (n = 53), there was a black notebook instead of a phone placed in the laboratory. Because participants had set their phones to silent mode, they did not hear

any notifications from their own phones, keeping connection cues stable across participants.

Measurement

Smartphone Use

Participants were asked to report the frequencies of checking mobile messengers, reading and replying to mobile messages, and several further smartphone activities during the reading and studying session, respectively, on a 5-point scale ranging from 1 (= *not at all*) to 5 (= *very often*). The first two items were combined to form an index of messenger use (r = .93). Participants also estimated the number of checked, read, and answered mobile messages during the sessions. In addition, their general frequency of messenger use was measured on a 7-point scale ranging from 1 (= *rarely*) to 7 (= *very often*).

Goal Conflict and Norm Salience

Participants in the "connection cues present" condition were asked whether the laboratory manager's smartphone made notification sounds. To be able to test the success of the manipulation, participants were asked to rate their agreement with single items measuring perceived intrinsic and extrinsic availability norm salience (e.g., "During the reading session, I had the feeling that I had to be available to others") and potential goal conflict (e.g., "Using the smartphone would have conflicted with learning for the intelligence test") during the reading and studying session, respectively.

Outcomes

We used two different measures for each negative self-conscious emotion. First, single items measuring guilt (M = 1.21, SD = 0.56), shame (M = 1.65, SD = 0.74), embarrassment (M = 1.60, SD = 0.77), and regret (M = 1.40, SD = 0.57) were added to the 10-item short version of the Positive and Negative Affect Schedule (PANAS; Mackinnon et al., 1999). Pride was added to the scale to investigate potentially reduced levels of this positive self-conscious emotion (M = 1.80, SD = 0.79). The affect scale assessed how participants felt "right now" before and after the reading and studying sessions, using a scale from 1 (= *not at all*) to 5 (= *extremely*). The purpose of this very general measurement was to ensure that participants would not notice during these sessions that the study was about self-conscious emotions and their messenger use. Second, after the two sessions, the State Shame and Guilt Scale (SSGS; Marschall et al., 1994) asked in more detail about participants' feelings of guilt (α = .82, M = 1.27, SD = 0.48), shame (α = .82, M = 1.21, SD = 0.40), and pride (α = .85, M = 3.61, SD = 0.86) concerning the frequency of their messenger use (e.g., "I feel like apologizing"). The scale included four to five items per emotion. A single item measuring embarrassment was added to this scale (M = 1.26, SD = 0.57). Furthermore, a 5-item scale was used to measure decision regret (Brehaut et al., 2003) concerning messenger use (e.g., "I regret the way I used messengers"; α = .85, M = 1.47, SD = 0.65). Regret is conceptually and statistically distinct from guilt (Zeelenberg & Pieters, 2007). Therefore, before data collection, we removed one item from the guilt scale, which referred to regret. Respondents were asked to rate their agreement with each statement on a 5-point scale.

Controls

We controlled for individual differences that are likely to affect negative self-conscious emotions. Several days before participating in the experiment, participants filled out an online survey that included a 9-item scale of trait empathy (Früh & Wünsch, 2009; e.g., "I am concerned with the feelings of other people"; α = .70, M = 4.03, SD = 0.52), a 10-item scale of trait need to belong (Leary et al., 2013; e.g., "I want other people to accept me"; α = .83, M = 3.44, SD = 0.69), an 8-item scale of trait self-control (Maloney et al., 2012; Tangney et al., 2004; e.g., "I am good at resisting temptation"; α = .82, M = 2.66, SD = 0.83), and a 9-item scale of conscientiousness (Soto & John, 2009; e.g., "I tend to be lazy"; α = .80, M = 3.45, SD = 0.70). Respondents rated their agreement with each statement on a 5-point scale. In addition, the questionnaire participants filled out in the laboratory encompassed two items measuring general availability norm salience on a 7-point scale. Because these were only moderately correlated, we used a single item for the analysis (i.e., "I have the feeling that I have to be available to others"; M = 4.92, SD = 1.57).

The complete questionnaire, including measurements not included in this paper, data, and data analyses are available on the OSF.

Results

Manipulation Check

The success of the manipulation was tested by conducting t-tests comparing differences in extrinsic and intrinsic availability norm salience and potential goal conflict between the connection cues and goal conflict conditions, respectively. Participants' perception of having to be available did not differ significantly between the connection cues absent (M = 1.78, SD = 1.56) and present (M = 1.63, SD = 1.37) conditions, $t(190) = 0.72$, p = .470. This was also the case for *wanting* to be available. Hence, the connection cues manipulation was not successful. However, participants in the low goal conflict condition reported significantly lower potential goal conflict (M = 5.18, SD = 2.00) than those in the high goal conflict (M = 5.74, SD = 1.70) condition,

$t(95) = -3.02$, $p = .003$, $d = -0.31$, indicating that goal conflict was successfully induced, albeit with a small effect size.

Preregistered Analyses

Descriptive Results

Participants reported using messengers quite frequently in general ($M = 4.89$, $SD = 3.79$). However, during the study, they rarely used messengers ($M = 1.36$, $SD = 0.71$) or engaged in other smartphone activities. The estimated number of messages checked ranged from 0 to 20, and those read and replied to ranged from 0 to 10.

Confirmatory Analyses

Importantly, after data collection, we noticed a mistake. We had preregistered to conduct mixed analyses of covariance (ANCOVAs). In mixed ANCOVAs, only between-subjects covariates can be included (Hoffman & Rovine, 2007; Singmann et al., 2022). However, our key covariate messenger use is a within-subjects variable. That is, messenger use is a repeated measurement: Participants reported how frequently they used messengers during the reading and studying session. To test our goal conflict hypotheses (H1, H3), it is necessary to consider the actual and possibly varying messenger use frequency in both sessions. Multilevel analyses are proposed as an alternative to ANCOVAs because they allow for the inclusion of continuous predictors with repeated measures and the testing of interactions between categorical experimental factors and continuous predictors (Field & Wright, 2011; Hoffman & Rovine, 2007; Quené & van den Bergh, 2004). For reasons of transparency, we ran the preregistered analyses and present the results in the supplementary material on the OSF (Halfmann et al., 2023). However, we consider these analyses to be statistically incorrect and thus meaningless.

A further adaption of our analysis strategy was needed: Because the connection cues manipulation was not successful, we cannot adequately test our hypotheses on the effect of norm salience (H2, H3) by comparing connection cues conditions. To be able to test these hypotheses nonetheless, we investigated the impact of *perceived* extrinsic availability norm salience ($M = 1.71$, $SD = 1.27$) and controlled for the influence of the connection cues manipulation.

Non-Preregistered Analyses

Multilevel analyses were performed to account for the nested data structure (e.g., two observations for each participant), using the R-package lme4 (Bates et al., 2022; Hox et al., 2018). Person-level predictors (Level 2) were grand-mean centered and situation-level predictors (Level 1) were group-mean centered. To test significance, Satterthwaite approximations for degrees of freedom were applied. We computed random-intercept models that included all preregistered predictors and the SSGS measures as outcomes. Table 1 summarizes the results.

Supporting H1, when goal conflict was high, using messengers more frequently led to higher levels of guilt and shame, than when goal conflict was low. This interaction effect did not occur for embarrassment, regret, and pride. In contrast to H2, when norm salience was high, using messengers less frequently was linked with lower levels of guilt, shame, and regret, and higher levels of pride, than when norm salience was low.

Furthermore, there were significant three-way interactions for all outcomes except pride. In contrast to H3a, when norm salience was high, experiencing high goal conflict and using messengers more frequently led to higher levels of guilt, shame, embarrassment, and regret, than when norm salience was low. In line with H3b, when goal conflict was high, experiencing high norm salience and using messengers less frequently led to lower levels of guilt, shame, embarrassment, and regret, than when goal conflict was low. Figure 1 shows the two-way interactions and Figure 2 the three-way interaction for guilt. Figures for the other outcome variables can be found in the supplementary material. Overall, the calculated models accounted for a substantial amount of the situational variance in all outcome variables (between 16% and 33%) except for embarrassment (8%).

In line with our preregistration, we primarily analyzed the SSGS measures. However, we also computed the analyses for the PANAS measures because they did not strongly correlate with the SSGS measures and regret scale. Results revealed that there were no significant interaction effects between messenger use and goal conflict and/or norm salience, which is probably due to the fact that the PANAS did not specifically address messenger use. This may indicate that messenger use did not strongly influence participants' overall mood during the reading and studying sessions, and fits with the reported low levels of negative self-conscious emotions regarding messenger use (SSGS measure). The full reporting of these analyses can be found in the supplementary material. We also preregistered to conduct exploratory analyses for the effects of the experimental conditions and messenger use on the additional PANAS measures recovery, competence, anxiety, and stress, and to explore the interplay between general availability norm salience and connection cues in predicting situationally experienced norm salience. Due to space limitations, these analyses are included in the supplementary material as well.

Discussion

Our aim was to investigate the conditions under which individuals experience negative self-conscious emotions about their messenger usage behavior. It should first be noted

Table 1. Multilevel analyses for guilt, shame, embarrassment, regret, and pride

	Guilt		Shame		Embarrassment		Regret		Pride	
	b (*SE*)	*t*	*b* (*SE*)	*t*	*b* (*SE*)	*t*	*b* (*SE*)	*t*	*b* (SE)	*t*
Goal conflict	0.08*** (0.02)	3.80	0.09*** (0.02)	3.96	0.06 (0.04)	1.52	0.04 (0.03)	1.42	−0.15*** (0.03)	−4.85
Availability norm salience	0.11*** (0.03)	3.46	0.07* (0.03)	2.05	0.13* (0.06)	2.23	0.09* (0.04)	2.21	−0.03 (0.05)	−0.61
Messenger use	0.07 (0.05)	1.54	0.06 (0.05)	1.24	−0.03 (0.08)	−0.34	0.04 (0.06)	0.00	−0.05 (0.07)	−0.81
Goal conflict × messenger use	0.36*** (0.10)	3.49	0.21* (0.09)	2.36	0.23 (0.15)	1.56	0.20 (0.14)	1.43	0.17 (0.19)	0.90
Availability norm salience × messenger use	0.32*** (0.07)	4.62	0.20** (0.06)	3.23	0.09 (0.10)	0.92	0.52*** (0.09)	5.34	−0.31* (0.13)	−2.38
Goal conflict × Availability norm salience × Messenger use	0.09** (0.03)	2.73	0.10** (0.03)	2.89	0.11* (0.05)	1.99	0.14*** (0.04)	3.53	−0.08 (0.04)	−1.90
Control variables										
Trait self-control	0.11 (0.07)	1.47	0.10 (0.06)	1.64	0.05 (0.10)	0.50	0.21* (0.10)	2.10	−0.20 (0.14)	−1.49
Conscientiousness	−0.15 (0.08)	−1.76	−0.17* (0.07)	−2.28	−0.08 (0.12)	−0.68	−0.28* (0.12)	−2.43	0.63*** (0.16)	3.96
State boredom	0.10 (0.05)	1.97	0.10* (0.05)	2.02	0.02 (0.08)	0.22	0.07 (0.06)	1.19	−0.12 (0.07)	−1.77
ICC	0.58		0.43		0.44		0.71		0.76	
Pseudo R^2 for Level 1 (Situation)	0.33		0.27		0.08		0.16		0.25	
Pseudo R^2 for Level 2 (Person)	0.25		0.11		−0.08		0.29		0.19	

Note. Unstandardized multilevel regression coefficients based on N_{Person} = 96 and $N_{Situation}$ = 192. Trait measures, date and time of data collection, and state boredom were included as covariates. For clarity, only the covariates that had a significant effect are depicted. ICC = intraclass correlation coefficient. *p < .05; **p < .01; ***p < .001.

Figure 1. The two-way interaction effects of (A) goal conflict and messenger use as well as of (B) availability norm salience and messenger use in predicting guilt. Regressions lines are shown for one standard deviation below (−0.75) and above (+0.75) the mean for availability norm salience and for the goal conflict conditions (−1 = low conflict, +1 = high conflict).

that we had to deviate from our preregistered analyses and that our results cannot provide causal evidence for the effect of availability norm salience because of the failed experimental manipulation. Our findings confirm some of our hypotheses, but also raise questions. As hypothesized, when using messengers more frequently, high goal conflict triggered feelings of guilt and shame. We did not find this effect for embarrassment, regret, and pride. However, because there was a significant three-way interaction, it needs to be considered that the interaction between goal conflict and messenger use varies across levels of availability norm salience. Unexpectedly, high availability norm salience increased the effect of high goal conflict and more frequent messenger use on guilt, shame, embarrassment, and regret. Hence, availability did not serve as an excuse for messenger use (cf. Sonnentag et al., 2018). Relatedly, when participants engaged in little messenger use, high availability norm salience was associated with lower instead of higher feelings of guilt, shame, and regret, and with increased instead of reduced pride. Here, too, we found a

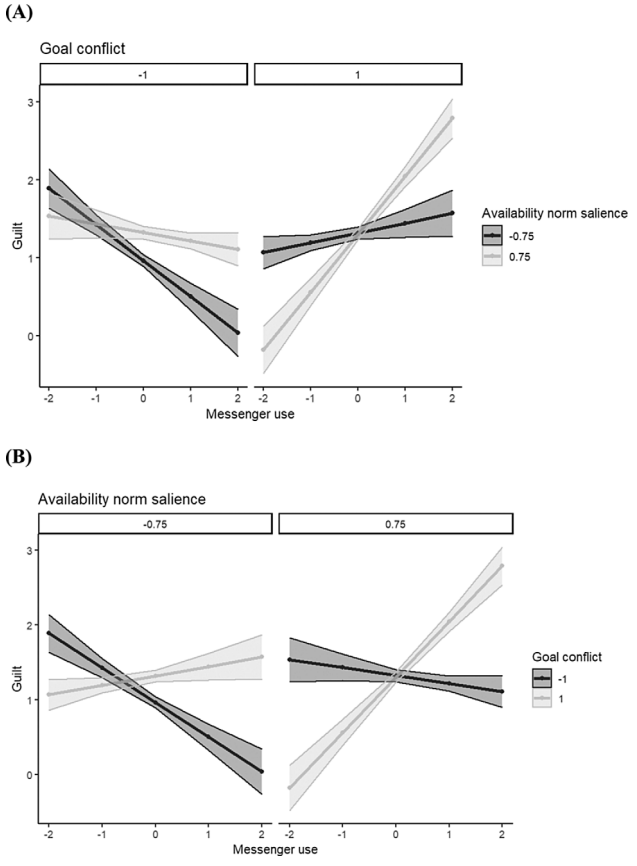

Figure 2. The three-way interaction effects of availability norm salience, goal conflict, and messenger use frequency in predicting guilt shown in both directions (A, B). Regressions lines are shown for one standard deviation below (−0.75) and above (+0.75) the mean for availability norm salience and for the goal conflict conditions (−1 = low conflict, +1 = high conflict).

three-way interaction. As hypothesized, high goal conflict reduced feelings of guilt, shame, embarrassment, and regret when participants engaged in little messenger use and experienced high availability norm salience. This might suggest that task engagement served as an excuse for not using messengers frequently, although it must be considered that availability norm salience did not show the hypothesized effect.

Three considerations help interpret the contradictory findings regarding availability norm salience. First, the availability norm may apply less in the laboratory, meaning that participants expected and consented to be less available. On the other hand, secondly, participants may have felt that they could not be as freely available as they wished during study participation. Supporting this notion, availability norm salience was related to stronger feelings of guilt, shame, embarrassment, and regret, independent of messenger use (see Table 1). Third, availability norm salience may have given participants the impression that they yielded to or resisted an *extrinsic* temptation, that is, an impulse to use messengers that is based on perceived pressure to be available instead of their own intrinsic needs (Halfmann, 2021; Ryan & Deci, 2000a). This consideration is illustrated by the finding that participants felt least guilty when they did not use messengers frequently and experienced both high goal conflict and high availability norm salience, or when they used messengers more frequently and experienced both low goal conflict and low availability norm salience (see Figure 2). In the first case, participants may have felt good about themselves for resisting an extrinsic temptation; in the second case, they may have evaluated their messenger use as legitimate because they were not pressured into this behavior and did not compromise an important goal.

Despite the partly unexpected findings, the three-way interactions showed a rather consistent pattern across all negative self-conscious emotions. However, only minor variance was explained for embarrassment. Unlike the other emotions, embarrassment arises when individuals' behavior takes place in public (Tracy & Robins, 2004). The use of messengers was probably not public enough in the laboratory but is public in many everyday situations (Dogruel & Schnauber-Stockmann, 2021). Regarding pride, we found only one significant interaction between availability norm salience and messenger use. Again, this could be attributed to the explanation that individuals evaluate their behavior particularly positively when they resist extrinsic temptations.

Overall, participants rarely used messengers and experienced low levels of availability norm salience, guilt, shame, embarrassment, and regret. This is likely because it is difficult to examine smartphone use, availability, and self-conscious emotions in the laboratory, where other norms apply, such as complying with the instructions and expectations of the laboratory manager (Fleming & Zizzo, 2015; Halfmann et al., 2021). Unexpectedly, even in the reading condition, participants experienced a relatively high potential goal conflict. The reason could be that they were asked to follow instructions and did not decide on their own to read. Furthermore, participants may have felt little responsibility for their behavior, which probably reduced the likelihood that negative self-conscious feelings would occur (Tracy & Robins, 2004). Also, people in artificial laboratory situations are probably not inclined to use their smartphones. Even in previous laboratory experiments in which participants were in an alleged waiting situation "outside" of the laboratory, they rarely used mobile messengers (Halfmann et al., 2021; Rieger et al., 2017). In our study, the fact that participants were asked to put their smartphones on silent may have contributed to a mental

detachment from their online world during study participation (Reinecke et al., 2018). On the basis of these methodological limitations, we suggest that future studies should investigate smartphone use and negative self-conscious emotions in everyday life, for example, using experience sampling methods. Furthermore, it would be interesting to investigate how messenger users actually perceive self-control failure. In this study, we explored a typical self-control dilemma: messenger use while working on a primary task. Another reason for the overall low level of negative self-conscious emotions might be that individuals do not perceive messenger use as a strong temptation they have to resist, for instance, because it is usually a rather short activity or because it is very important for them to stay in touch with family and friends (Dogruel & Schnauber-Stockmann, 2021; Hall & Baym, 2012).

Notably, in the period between the preregistration and publication of this study, we conducted another study in which we investigated the interplay between availability, goal conflict, and messenger use based on a different methodological design and only for the self-conscious emotion of guilt (Halfmann et al., 2021). While the laboratory experiment reported in that paper showed no significant interaction effects, a vignette experiment in which participants immersed themselves in messenger use situations indicated that goal conflicts trigger guilt about using messengers and that guilt about not using messengers arises if the availability norm is salient. This underlines that it may be difficult to study self-conscious emotions, and in particular the influence of the availability norm, in a laboratory setting. Regarding our failed manipulation of availability norm salience, further studies need to clarify whether this was due to participants not receiving connection cues on their own smartphones, the artificial laboratory setting, or whether connection cues per se have ambiguous effects not just in but also outside the laboratory (Bayer et al., 2016; Halfmann et al., 2021; Schneider et al., 2022).

In addition to the already mentioned limitations, it needs to be stated that our research is based on a sample of young messenger users and is limited to this population. The relatively low number of participants and resulting low statistical power may have reduced the likelihood of obtaining statistically significant effects. Furthermore, our measures relied on self-reports and might be impacted by social desirability and recall bias. In particular, the low use of mobile messengers in the laboratory could be due to participants feeling they were being observed (i.e., Hawthorne effect). Finally, the COVID-19 pandemic may have influenced the data collection. For example, it could be that participants used messengers more frequently and evaluated staying in contact with others (digitally) more positively due to the experience of physical contact restrictions (J. V. Meier et al., 2021).

Conclusion

Our research connects to discussions about how mediated communication influences the well-being of users. Because previous findings have been contradictory, researchers have concluded that the effects are complex and depend more on the conditions of technology use than on the frequency of use, which has been studied predominantly in previous work (Liu et al., 2019; A. Meier & Reinecke, 2021). Against this background, our study sheds light on when and how specifically messenger (non-)use leads to negative self-conscious emotions. By clearly distinguishing between the frequency of messenger use, goal conflict, and availability norm salience, and exploring how these three factors interact with each other, our study paints a much sharper picture of how and when harmful effects may occur. Crucially, we found no evidence that users face a dilemma when they are engaged in an important task and feel pressured to be available. Instead, it is possible that giving in to messenger temptations elicits negative self-conscious emotions most strongly when users are extrinsically motivated. Hence, our research makes an important theoretical contribution by demonstrating the need to better integrate the research fields on self-control, availability, and self-determination to understand how users evaluate and feel about their messenger use. Not least because of the methodological limitations of our work, more research is needed that considers the complexity of users' media selection decisions in everyday life associated with the need to manage goals, media usage norms, and their own intrinsic and extrinsic motivations for mobile media use.

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History
Received March 13, 2019
Revision received February 23, 2023
Accepted February 27, 2023
Published online May 2, 2023

Open Data
The authors are willing to share their data, analytics methods, and study materials with other researchers. Preregistered analyses and results in the supplementary material on the OSF (https://osf.io/c8q9n/; Halfmann et al., 2023). Study materials, the complete questionnaire (including measurements not included in the currently published study), data, and data analyses are also available here.

Funding
Open access publication enabled by University of Mannheim.

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