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Narcissistic adolescents' attention-seeking following social rejection: Links with social media disclosure, problematic social media use, and smartphone stress

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ABSTRACT

In line with a Dynamic Self-Regulatory Processing Model of narcissism (Morf & Rhodewalt, 2001), the present study adopted a motivated self-construction perspective to examine longitudinal associations from adolescent narcissism to youth's social media disclosures, problematic social media use, and smartphone stress, respectively. Adolescents' attention-seeking motives were examined as a mediator of these over-time associations. In line with this model's account of self-image failure, we also expected that narcissistic youth's attention-seeking should increase following experiences of ego threat, such as social rejection. These hypotheses were tested with two waves of self-report data, spaced one year apart, among 307 adolescents aged 12–15 at T1 ($M_{\text{age}} = 12.87$, $SD = 0.75$). In line with predictions, earlier adolescent narcissism predicted later social media disclosure, problematic use, and smartphone stress, via increased attention-seeking. Furthermore, a significant interaction between narcissism and perceived social rejection at T1 predicted adolescents' outcomes at T2, via attention-seeking; Participants with a combination of higher narcissism and higher rejection at T1 reported higher levels of attention-seeking at T2. These longitudinal results suggest that narcissistic adolescents' attention-seeking on social media, particularly as a way to recover from social rejection, might backfire and ultimately contribute to an ongoing pattern of self-defeating behavior.

1. Introduction

Adolescents are heavy users of smartphones and smartphone-embedded technologies, including social media. Youth frequently use social media, defined here as encompassing both various Social Networking Sites (SNSs) and mobile messaging apps, in order to communicate with friends and family, as well as to share photos, videos, and updates about their lives. Surveys of American teens aged 13–17 years old indicate that smartphones are a highly common means of accessing social media (89%; Associated Press-NORC, 2017). A recent study by Pew Research Center (Lenhart, 2015) reported that nearly 70% of youth with smartphones opt for text messaging (including messaging apps) or SNSs as their primary means of initiating contact with close friends. Clearly, both social media and smartphone behaviors are strongly tied to social-relational goals (e.g., Ryan, Chester, Reece, & Xenos, 2014). Responsible use of these technologies can facilitate both identity expression and relationship formation and maintenance (e.g.,

Dumas, Maxwell-Smith, Davis, & Giulietti, 2017; Livingstone, 2008). However, adolescents must strike delicate balances between an appropriate amount of personal disclosure versus sharing “too much information” (Hawk, Ter Bogt, Van Den Eijnden, & Nelemans, 2015), and between staying connected to others versus becoming too dependent on the technologies that provide this access. In the present research, we examine whether experiences of social rejection and related needs for self-validation might promote both youth's social media disclosures and problematic use of both social media and smartphones, particularly among youth with narcissistic tendencies.

Smartphones provide adolescents with continuous social connectivity that, despite its utility, poses certain predicaments (Choi, 2016; Gao, Liu, Guo, & Li, 2018; Zheng & Lee, 2016). Self-expression in the form of sharing photos, thoughts, feelings, life events, and current whereabouts and activities has long been considered a major motivation for social media engagement (Livingstone, 2008; Thorkildsen & Xing, 2016), and many teens feel pressure to share self-enhancing or

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attention-grabbing content in order to increase their social appeal (Lenhart, 2015). Smartphones likely amplify such behavior, by creating opportunities to share any spontaneous musing or experience with one's entire social network. Additionally, posting "selfies" is a prevalent form of social media behavior that is almost exclusively smartphone-based. Generally speaking, smartphones are likely to increase adolescents' frequent use of social media for purposes of self-expression, interpersonal connection, and social validation.

This constant connectivity might also result in greater levels of stress and dependency related to these technologies. Adolescents who frequently use their smartphones for communication or social media sharing might experience discomfort and anxiety when they find themselves without access to their devices, and are therefore unable to post new content or immediately respond to friends' text messages and SNS feedback (a condition sometimes called "nomophobia"; e.g., Bivin, Matthew, Thulasi, & Philip, 2013; Gezgin, Cakir, & Yildirim, 2018; Yildirim & Correia, 2015). They can also become overwhelmed by the amount of social media information they might need to process in order to maintain connection and avoid missing out on important events (e.g., Beyens, Frison, & Eggermont, 2016; O'Keeffe & Clarke-Pearson, 2011). This "smartphone stress" has been linked with compulsive use of smartphones, more generally (e.g., Bragazzi & Del Puente, 2014; Elhai, Dvorak, Levine, & Hall, 2017; Sapacz, Rockman, & Clark, 2016), and might be more strongly associated with problematic outcomes than frequency of use (e.g., Van der Schuur, Baumgartner, & Sumter, 2018).

Finally, both self-disclosing and receiving positive feedback on social media posts are inherently rewarding experiences (Guedes et al., 2016; Ryan et al., 2014); Smartphones provide the opportunity for individuals to share new content and monitor its popularity more or less constantly, which might create a behavior-reward feedback loop that serves as a basis for addiction (Guedes et al., 2016). The clinical classification of social media and smartphone addiction are still debated (e.g., Billieux, Maurage, Lopez-Fernandez, Kuss, & Griffiths, 2015) and not currently classified as disorders in the DSM-V. However, numerous studies in recent years have linked compulsive or "addiction-like" social media and smartphone behaviors to myriad behavioral, emotional, social, and academic difficulties among adolescents in North America, Europe, and Asia (e.g., Andreassen, Pallesen, & Griffiths, 2017; Andreassen, Torsheim, Brunborg, & Pallesen, 2012; Lee, Chang, Cheng, & Lin, 2018; Lee, Sung et al., 2018; Liu et al., 2017; Ryan et al., 2014; Van den Eijnden, Lemmens, & Valkenburg, 2016). We use the term "problematic use" in the present research in order to draw parallels with other contemporary studies that might more freely use the term "addiction", without directly addressing the debate regarding clinical classification. Regardless of formal clinical recognition, it is clear that the problematic use of social media and smartphones, and adolescents' growing reliance on these technologies for needs gratification, are interrelated issues that warrant further attention. Considering recent studies linking youth's psychosocial problems to increased time spent with new media (Twenge, Joiner, Rogers, & Martin, 2018; Twenge & Park, in press), there is a critical need for integrative models of the personality, interpersonal, and motivational factors that predict both normative and problematic forms of social media and smartphone use.

1.1. Narcissism, attention-seeking, and use of mobile technologies

Narcissism is one personality factor that might be connected to excessive or problematic use of social media and smartphones. Narcissism is often regarded as a personality trait that exists along a continuum in the general population, as opposed to a clinical diagnosis (e.g., Campbell & Campbell, 2009). Narcissists hold grandiose but unstable views of their talents, uniqueness, and social appeal, which they maintain through self-centered and exhibitionistic thoughts and actions (Buss & Chiodo, 1991; Morf & Rhodewalt, 2001; Pauletti, Menon, Menon, Tobin, & Perry, 2012). Morf and Rhodewalt's (2001) Dynamic Self-Regulatory Processing Model suggests that social interactions are

the primary avenue through which narcissists actively pursue and maintain these inflated aspects of their self-concepts. They attempt to manipulate their social environments in order to create opportunities for self-enhancement, to seek positive feedback from others, and to enact self-presentations that broadcast their supposed specialness. From this perspective, narcissists' social relationships can directly impact both their self-knowledge and self-enhancing behaviors, as well as act as a mediating force through which their behavior can affect their own self-evaluations. Thus, this perspective proposes a dynamic interplay between interpersonal interactions and intrapersonal (i.e., cognitive and emotional) processes that motivate their attempts at self-enhancement. The Dynamic Self-Regulatory Processing Model's emphasis on "strategic interpersonal attempts ... to bring about their desired identities" (Morf & Rhodewalt, 2001, p. 181) makes it an especially useful lens through which to view narcissistic youth's social media and mobile communication behaviors, because needs for attention, self-promotion, and validation benefit from the large audience and positive feedback that these platforms can provide (Bergman, Fearington, Davenport, & Bergman, 2011; Panek, Nardis, & Konrath, 2013).

In line with this interpersonal view of narcissistic self-regulation, prior studies have repeatedly shown narcissism to be reflected in social media behavior; for example, it is positively linked to having more "friends" on SNSs (Buffardi & Campbell, 2008; McKinney, Kelly, & Duran, 2012), spending more time on social media (Bibby, 2008; Mehdizadeh, 2010), and more frequently posting "selfies", status updates, and self-promotional content (Buffardi & Campbell, 2008; Carpenter, 2012; Hawk et al., 2015; McKinney et al., 2012; Mehdizadeh, 2010; Ong et al., 2011; Wang, Jackson, Zhang, & Su, 2012). Narcissism also shows relations with problematic use of both social media (Andreassen et al., 2017) and smartphones (Hussain, Griffiths, & Sheffield, 2017; Pearson & Hussain, 2015).

The Dynamic Self-Regulatory Processing Model interprets narcissists' exhibitionistic and excessive behaviors as outcomes of a motivated self-construction process, which entails (often misguided) efforts to garner attention and affirm self-views of being interesting, unique, and popular (Buffardi & Campbell, 2008; Carlson, Vazire, & Oltmanns, 2011; Panek et al., 2013; see also; Kim, Lee, Sung, & Choi, 2016). Indeed, narcissists hold inflated perceptions about others' interest in what they are doing (Bergman et al., 2011), supporting the notion that heightened social media use is attributable to a deliberate pursuit of popularity (Buffardi & Campbell, 2008; Wang et al., 2012). Recent cross-sectional studies have also found that overt desires for gaining social approval mediated links between narcissism and boasting about achievements on social media (Marshall, Lefringhausen, & Ferenczi, 2015), spending time editing photos for social media (Sheldon & Bryant, 2016), and attempting to maximize the number of "likes" on SNS posts (Dumas et al., 2017). Links between narcissism and problematic social media use have also been interpreted as deriving from wanting to acquire "likes" on one's posts (Andreassen et al., 2017). While such needs for attention are often assumed to be at the heart of the connection between narcissism and social media use, to date, the potential mediating role of specific motivations has only been investigated with cross-sectional designs (e.g., Dumas et al., 2017; Marshall et al., 2015; Sheldon & Bryant, 2016). In the present study, we explicitly examine indirect longitudinal associations from earlier narcissism to later SNS disclosures and problematic use of social media and smartphones, via adolescents' deliberate attention-seeking.

1.2. Ego threat and the exacerbation of narcissistic tendencies

Narcissistic individuals' needs for support and validation become more pronounced in periods of stress (Rhodewalt & Morf, 1995). Based on the Dynamic Self-Regulatory Processing Model (Morf & Rhodewalt, 2001), the present research adopts a self-image failure perspective to explain the link between narcissism and adolescents' social media and smartphone use. This viewpoint suggests that such behavior might be

exacerbated by narcissistic adolescents' experiences of “ego threat”, or challenges to their self-concepts in the form of social rejection, loss of influence, or criticism (Baumeister, Bushman, & Campbell, 2000; Twenge & Campbell, 2003). Narcissistic responses to such threats are often disproportionate, transparent, and ultimately self-defeating; Indeed, aggressive self-enhancement and excessive or addictive behaviors are main avenues through which narcissists' needs to sustain inflated self-concepts foster interpersonal difficulties (e.g., Morf & Rhodewalt, 2001; Vazire & Funder, 2006). In this way, a dynamic interplay exists between failures in social relationships and efforts to regulate one's desired image through further self-enhancement (Morf & Rhodewalt, 2001).

In the present study, we focused specifically on perceived social rejection as a form of ego threat that might exacerbate narcissistic youth's engagement with social media and related technologies. Although ego threats might take many forms, examining a socially related threat such as rejection holds a strong conceptual fit with youth's frequent use of social media and smartphones to fulfill relational goals. Difficulty in forming deeper relationships also fits with the proposal that narcissists exploit the “weak” or “loose” ties with others that are prevalent on social media (Bergman et al., 2011; Ellison, Steinfeld, & Lampe, 2007). Numerous prior studies have considered social rejection or ostracism as a potential ego threat (Bond, Ruaro, & Wingrove, 2006; Downes & Calvo, 2003; Lattimore & Maxwell, 2004; Waller & Meyer, 1997), because such experiences disrupt fundamental esteem and belongingness needs (Williams, 2007). Studies specifically examining narcissistic reactions to threat have also utilized operationalizations involving rejection (Rhodewalt & Eddings, 2002) and loss of social influence (Hawk et al., 2015), because these experiences challenge narcissists' core belief that they are worthy of popularity and admiration (Morf & Rhodewalt, 2001).

Narcissistic adolescents' self-enhancement behaviors on social media appear to increase following ego threat, potentially as a result of “calculated (but misguided) efforts to appear more interesting, exciting, and popular” (Hawk et al., 2015, p. 78), and to acquire validation from others (e.g., Andreassen et al., 2017; Dumas et al., 2017; Marshall et al., 2015; Sheldon & Bryant, 2016). For example, it is common for adolescents who are high in narcissism to hold below-average perceptions of their social status, and this combination is linked to more exhibitionistic social media disclosure (Hawk et al., 2015, Study 1). Recalling a personal experience of lost social influence also led higher-narcissism adolescents to ascribe lower risk to posting exhibitionistic content (Hawk et al., 2015, Study 2). Research by Toma and Hancock (2013) also showed that ego threat in the form of performance criticism increased participants' interest in browsing their own Facebook profile, but not in other, non-self-affirming online activities. Narcissistic individuals might hold particularly strong expectations that they can use immediately gratifying forms of communication (such as smartphone interactions) to regain social validation (Morf & Rhodewalt, 2001). Such findings suggest a potential exacerbating role for ego threat in the link between narcissism and heightened social media behavior or related difficulties. Additionally, it seems reasonable to assume that narcissistic youth experiencing a lack of social affirmation might become particularly anxious when they find themselves without access to their mobile devices, as this deprives them of a primary means of quickly restoring their threatened status.

To date, no studies have fully demonstrated this self-image failure process in the context of narcissistic youth's social media or smartphone use. Cross-sectional studies examining links between low social acceptance and social media use (Dumas et al., 2017; Pittman, 2015; Sheldon & Bryant, 2016; Strayhorn, 2012), and experimental research showing that ego-threat fuels social media behavior (Toma & Hancock, 2013), have not considered whether these effects might be stronger for narcissistic adolescents. Cross-sectional research suggesting that self-enhancement motives mediate the link between narcissism and both social media behavior (e.g., Dumas et al., 2017; Marshall et al., 2015;

Sheldon & Bryant, 2016) has not examined whether ego threat might intensify these effects. Experimental findings that ego threats lower narcissistic adolescents' estimations of hypothetical social media risks (Hawk et al., 2015, Study 2) also might not generalize to reports of actual behavior (but see Christofides, Muise, & Desmarais, 2012). Finally, despite the wide prevalence of mobile-based social media, we are not aware of any studies that have extended such investigations to problematic or stressful experiences related to smartphone use. The present research aimed to address these gaps in the literature.

Importantly, conscious decision-making processes entail a consideration of possible risks and anticipated benefits. Prior research demonstrating that ego threats in the form of lost social power affect narcissistic youth's social media risk judgments (Hawk et al., 2015, Study 2) did not indicate the specific benefits that might outweigh those potential risks. Particularly when considering more routine social media behaviors such as disclosing thoughts and feelings or posting selfies, it is possible that such actions are more guided by anticipated rewards than the avoidance of negative outcomes (e.g., Child, Pearson, & Petronio, 2009; Petronio, 2002). Only recently have studies included an explicit focus on the benefits that narcissistic individuals expect from engaging with social media (Dumas et al., 2017; Marshall et al., 2015; Sheldon & Bryant, 2016). Importantly, contemporary theoretical reviews have also specifically impugned the gratifying aspects of mobile social media as setting the stage for potential dependency (Ryan et al., 2014), particularly amongst narcissistic youth (Guedes et al., 2016). Indeed, narcissistic individuals are more strongly motivated to approach desirable outcomes than they are to avoid negative ones (e.g., Foster, Misra, & Reidy, 2009; Foster, Shenese, & Goff, 2009; Foster & Trimm, 2008). Thus, a further focus on anticipated rewards represents an important contribution to the extant literature on links between narcissism, ego threat, and use of social media and smartphones.

1.3. Overview and hypotheses

In light of these deficits, the present research utilized a longitudinal design to examine the contributions of narcissism, ego threat (in the form of social rejection), and attention-seeking in predicting early-to-middle adolescents' social media disclosures, problematic social media use, and problematic smartphone use (which we heretofore term “smartphone stress”). Based on previous findings, we advanced three main hypotheses. First, we predicted that youth scoring higher in narcissism would evidence greater levels of social media attention-seeking, social media disclosure, problematic social media use, and smartphone stress. Second, in line with studies demonstrating narcissists' needs for self-enhancement following experiences of socially-related ego threats, we predicted an interaction between narcissism and social rejection, in which higher rejection would amplify the associations between narcissism and attention-seeking. Third, we predicted indirect over-time associations from earlier narcissism and the narcissism \times rejection interaction, to later social media disclosure and problematic outcomes, respectively, via attention-seeking motives. Importantly, as other studies have found gender and/or age differences in SNS disclosures (e.g., Egan & Moreno, 2011; Karl, Peluchette, & Schlaegel, 2010; Mehdizadeh, 2010; Peluchette & Karl, 2008; Valkenburg, Sumter, & Peter, 2011), social media addiction symptoms (e.g., Takao, Takahashi, & Kitamura, 2009), and narcissism (e.g., Foster, Campbell, & Twenge, 2003; Grijalva et al., 2015), with findings sometimes contradicting one another, we additionally examined and controlled for these variables with no *a priori* hypotheses.

2. Method

2.1. Participants

Data for this study were collected as part of the Digital Youth (DiYo) Project, a longitudinal research project on online behaviors of Dutch

adolescents. Adolescents in the first and second year of two schools for secondary education (grades 7 and 8) participated in two measurement waves, with a one-year interval between waves. The first measurement (T1) was conducted in February 2015, and the second (T2) in February 2016.

Many popular SNSs impose age restrictions; for example, Facebook requires users to be a minimum of 13 years old to have an account, although it is not uncommon for younger individuals to obtain profiles with parents' permission. We set a minimum age of 12 years for our analyses, meaning restricting participants to those who would be able to independently obtain an account at some point over the course of the study. We also required participants to possess both an active SNS profile and a smartphone at both measurement points.

Of the 495 participants meeting these criteria at T1, 307 (62%) were also included at T2. The final sample included 160 girls and 147 boys aged 12–15 at T1 ($M_{\text{age}} = 12.87$, $SD = 0.75$). The majority (95.8%) was born in the Netherlands and reported mothers (88.6%) and fathers (87.6%) to also be born in the Netherlands. Participants were following University preparatory education (24.8%), vocational education (40.7%), or a mixed curriculum.

Non-response at T2 was mainly due to the dropout of complete classes, because some teachers were not able to schedule classroom time for the online measurement, and some teachers were absent during the measurement days. In addition, individual students dropped out because they had left school or were absent during the measurement day. Compared to participants who completed both questionnaires, participants who dropped out at the T2 measurement were somewhat older ($M = 13.06$ versus 12.85 ; $F(1,494) = 8.86$, $p < .01$), and had a higher education level ($M = 3.08$ versus 2.55 ; $F(1,494) = 20.33$, $p < .001$). No differences were found in ethnicity, narcissism, social rejection, attention seeking, social media disclosure, problematic social media use, or smartphone stress.

2.2. Procedure

Adolescents were recruited from two secondary schools in two medium-large cities in the Netherlands. Prior to the first measurement, parents received information describing the aims of the study, confidentiality safeguards, and procedures for declining or ending participation. If adolescents wished to participate, their parents could provide passive informed consent (> 99% of parents agreed upon participation). Adolescents also provided informed consent.

At both measurements, adolescents completed a computer-based questionnaire at school during regular school hours. Research assistants were present to supervise data collection, answer student questions, and ensure maximum privacy. The procedures were approved by the ethical review board at the University of the DiYo Project's main investigator.

2.3. Measures

For all measures, we report McDonald's omega (ω) in addition to Cronbach's alpha as an indicator of internal consistency. Although ω holds the same threshold of ≥ 0.70 as alpha for acceptable reliability, alpha is known to severely underestimate test reliability when item loadings are not all equivalent (e.g., [Revelle & Zinbarg, 2009](#)).

2.3.1. Narcissism was measured using the ten-item Childhood Narcissism Scale ([Thomaes, Stegge, Bushman, Olthof, & Denissen, 2008](#)) (e.g., "I like to think about how incredibly nice I am" and "Kids like me deserve something extra"); 1 = *not at all true*, 4 = *completely true*. A mean score of the items was calculated. The measure had good reliability at both measurement points, $\alpha = 0.83/.86$, $\omega = 0.86/.88$.

2.3.2. Social Rejection was measured using five items adapted from the Self-Perception Profile for adolescents (SPPA; [Harter, 1988](#)). This adaptation is a self-reported questionnaire developed for 12–18 year-olds Flemish and Dutch adolescents (CBSA; [Treffers et al., 2004](#)). The five items used in this study comprised the Social Acceptance subscale

of the measure; items were coded so that higher scores indicated greater levels of social rejection. Sample items are "I do not have a good friend with whom I could share a secret" and "I feel like it's hard to find friends whom I can really count on." Response categories ranged from 1 (*totally disagree*) to 5 (*totally agree*). A mean score of the items was calculated. The measure had acceptable reliability at both measurement points, $\alpha = 0.62/.66$, $\omega = 0.70/.75$.

2.3.3. Attention Seeking was measured with five self-developed items ("I post messages and pictures because I want to be better known among peers"; "I think it's important that I get as many comments as possible on my posts"; "I think it's important that I get as many 'likes' as possible on my posts"; "I post messages and pictures because I get attention from others"; "I post messages and pictures so that I can look cool to my peers"). Participants responded on a scale from 1 (*not at all true*) to 4 (*very true*). A mean score of the items was calculated. The measure had excellent reliability at both measurement points, $\alpha = 0.84/.88$, $\omega = 0.91/.93$.

2.3.4. Social Media Disclosure was measured with a four-item scale adapted from a previous study with Dutch early-adolescent participants ([Hawk et al., 2015](#)). Participants indicated on a 7-point scale (1 = *Never*, 2 = *1–2 times per year*, 3 = *3–5 times per year*, 4 = *6–10 times per year*, 5 = *11–20 times per year*, 6 = *20–40 times per year*, 7 = *40 + times per year*) the frequency with which they used social media sites such as Facebook, Twitter, Instagram, or Pinterest to 1) post a message about their thoughts, 2) post a message about their feelings, 3) post a message, photo, or film about an important event in their life, or 4) post a selfie. A mean score of the items was calculated. The measure had acceptable reliability at both measurement points, $\alpha = 0.73/.72$, $\omega = 0.78/.75$.

2.3.5. Problematic Social Media Use was measured with 9 dichotomous (0 = *no*, 1 = *yes*) items of the Social Media Disorder Scale ([Van den Eijnden et al., 2016](#)). These nine items parallel the nine addiction criteria that were formulated for Internet Gaming Disorder in the Appendix of the DSM-5, i.e., *Persistence, Tolerance, Withdrawal, Displacement, Escape, Problems, Deception, Displacement, and Conflict*. Adolescents were asked "During the past year, have you ..." e.g., "... tried to spend less time on social media, but failed?"; "... regularly neglected other activities (e.g. hobbies, sport) because you wanted to use social media?" As in prior studies using this measure (e.g., [Van den Eijnden et al., 2016](#)), a sum score of the items was calculated. Reliability was somewhat low at T1 ($\alpha = 0.57$, $\omega = 0.65$), which is a common issue for scales with dichotomous items, but it improved at T2 ($\alpha = 0.72$, $\omega = 0.80$).

2.3.6. Smartphone Stress was measured with five self-developed items that addressed participants' experience of "nomophobia" and feelings of being overwhelmed by incoming social media content. On a scale from 1 (*completely untrue*) to 5 (*completely true*), participants responded to the items: "If I forget my smartphone, I have to go back to get it right away"; "If I don't have my smartphone with me, I feel uncomfortable"; "I feel uncomfortable if I notice that I have an incoming message but can't immediately look at it"; "I feel stressed when I notice that I can't keep track of all the messages on my smartphone"; "I usually read messages on my smartphone superficially because I do not have enough time to read everything properly". A mean score of the items was calculated. The measure had good reliability at both measurement points, $\alpha = .79/.81$, $\omega = 0.84/.86$.

2.4. Strategy of analyses

2.4.1. Missing Data. The percentage of missingness by variable ranged from 0% to 18.24%, with an average of 1.05%. According to [Jamshidian and Jalal's \(2010\)](#) non-parametric MCAR test, data were missing completely at random ($p = .32$). We imputed missing data in R 3.3.3 using missForest ([Stekhoven & Bühlmann, 2011](#)), a single-imputation algorithm based on random forests, which tends to outperform multiple imputation. The advantages of this method are that (a) it

includes continuous and categorical variables simultaneously, (b) it is non-parametric, which means it easily handles (multivariate) non-normal data and complex interactions and non-linear relations amongst the data, and (c) the accuracy of the imputation procedure can be estimated, based on the algorithm's ability to correctly predict the values of data not part of the bootstrap sample in each iteration. The estimated explained variance, based on out-of-bag error, ranged from .87 to 1.00.

2.4.2. Cross-lagged panel models. All variables were standardized via z-transformation prior to analysis. The analyses were conducted using MPlus v.7.3 (Muthén & Muthén, 2014). Per the developers' recommendation, we used robust maximum-likelihood estimation. Three fully recursive path models respectively examined social media disclosure, problematic social media use, and smartphone stress. Each model included two waves of data, spaced one year apart. To examine the hypothesized interaction between narcissism and social rejection, we calculated the product of these variables at T1 and entered it into the model as an additional predictor of all T2 variables. We included cross-lagged effects and stability paths between the measurement points, as well as correlations within each measurement point, for all variables. The exception to this was that, following our theoretical model, the links from T2 attention-seeking to the dependent variables at T2 were specified as directional (regression) effects. We additionally regressed each variable at each time point on participants' age and biological sex (coded as 0 = female, 1 = male), in order to control for these factors. Models were considered to have acceptable model at comparative fit index (CFI) ≥ 0.90 , root mean square error of approximation (RMSEA) ≤ 0.05 , and standardized root mean square residual (SRMR) ≤ 0.08 (Kline, 2011). The full models are presented in Figs. 1–3.

In order to examine the hypothesized mediating role of attention-seeking, we examined indirect effects from narcissism, rejection, and narcissism x rejection at T1 to the dependent variables at T2, through attention-seeking at T2. Thus, the links between the T1 predictors and T2 attention-seeking were controlled for prior (T1) attention-seeking scores. Additionally, the links between T2 attention-seeking and T2 dependent variables were controlled for prior (T1) scores of the dependent variables. In order to test for the mediating role of attention-seeking, we examined whether the 95% confidence intervals of indirect effects included zero (which would indicate a nonsignificant indirect effect).

3. Results

The means, standard deviations, and bivariate correlations between all variables can be seen in Table 1. For the sake of parsimony, we first report the effects of the control variables age and sex on Narcissism and Rejection, and the effects of Narcissism, Rejection, and their interaction on Attention-Seeking across both models, followed by the other effects observed in each respective model.

3.1. Age and gender effects on narcissism and rejection

In each of the models, boys reported higher levels of social rejection at both T1 ($B_s = 0.292, SE_s = 0.111, \beta_s = 0.146, p_s = .008 - 0.039$) and T2 ($B_s = 0.271 - 0.283, SE_s = 0.105 - 0.107, \beta_s = 0.136 - 0.142, p_s = .008 - 0.010$). Boys also scored higher in Narcissism at both T1 ($B_s = 0.518, SE_s = 0.111, \beta_s = 0.259, p_s < .001$) and T2 ($B_s = 0.269 - 0.286, SE_s = 0.103 - 0.104, \beta_s = 0.135 - 0.143, p_s = .006 - 0.009$). Age showed no significant prediction on Narcissism or Rejection.

3.2. Prediction of attention-seeking

In each of the models (see Figs. 1–3), Narcissism and Attention-Seeking were significantly correlated at both T1 ($B_s = 0.292, SE_s = 0.061, p_s < .001$) and T2 ($B_s = 0.189 - 0.194, SE_s = 0.051 - 0.052, p_s < .001$). T2 Rejection and T2 Attention-Seeking were also significantly correlated ($B_s = 0.132 - 0.137, SE_s = 0.047 - 0.048, p_s = .004 - 0.006$). No other concurrent correlations between Narcissism, Attention-Seeking, and Rejection were significant.

In each of the models, we observed a positive link from T1 Narcissism to T2 Attention-Seeking ($B_s = 0.114 - 0.116, SE_s = 0.056, p_s = .039$). There was no longitudinal main effect of Rejection (all $p_s > .31$). However, the interaction between T1 Narcissism and T1 Rejection was significant ($B_s = 0.113 - 0.115, SE_s = 0.047, p_s = .014 - 0.017$). No other T1 variables predicted T2 Attention-Seeking. We examined the nature of the interaction using regions of significance (Preacher, Curran, & Bauer, 2006), which shows the size of the standardized effect at each level of the standardized moderator. Fig. 4 shows how the effect of narcissism on attention seeking changes as a function of social exclusion, along the entire standardized range of social exclusion observed in our sample. The dashed line indicates at what value of social exclusion the effect of narcissism on attention

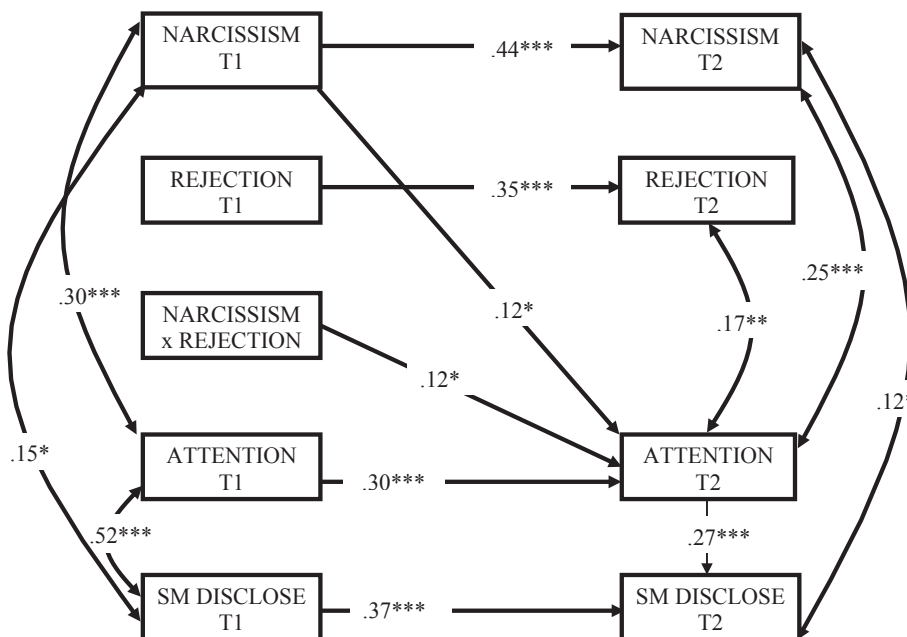


Fig. 1. Longitudinal path model of Narcissism, Attention-Seeking, and Social Media Disclosure, moderated by Social Rejection. Notes. $\chi^2(2) = 0.196$ (MLR = 0.986), $p = .906$, CFI = 1.000, RMSEA = 0.000 (90%CI 0.000 - 0.046), SRMR = 0.003. Indirect effects: Narcissism \rightarrow Attention \rightarrow Disclosure $\beta = 0.031, p = .038, 95\%CI 0.002$ to 0.060 . Narcissism x Rejection \rightarrow Attention \rightarrow Disclosure $\beta = 0.032, p = .045, 95\%CI 0.001$ to 0.063 .

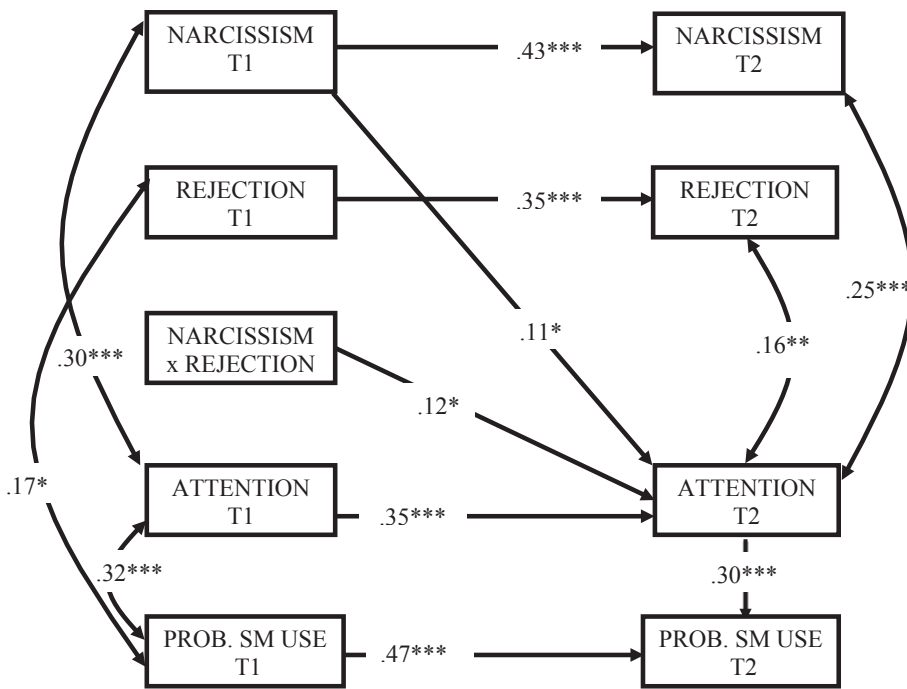


Fig. 2. Longitudinal path model of Narcissism, Attention-Seeking, and Problematic Social Media Use, moderated by Social Rejection. *Notes.* $\chi^2(2) = 0.196$ (MLR = 0.986), $p = .906$, CFI = 1.000, RMSEA = 0.000 (90%CI 0.000 - 0.046), SRMR = 0.003.

Indirect effects:
 Narcissism → Attention → Problematic Use $\beta = 0.034$, $p = .045$, 95%CI 0.001 to 0.068.
 Narcissism x Rejection → Attention → SM Problematic Use $\beta = 0.035$, $p = .046$, 95%CI 0.001 to 0.069.

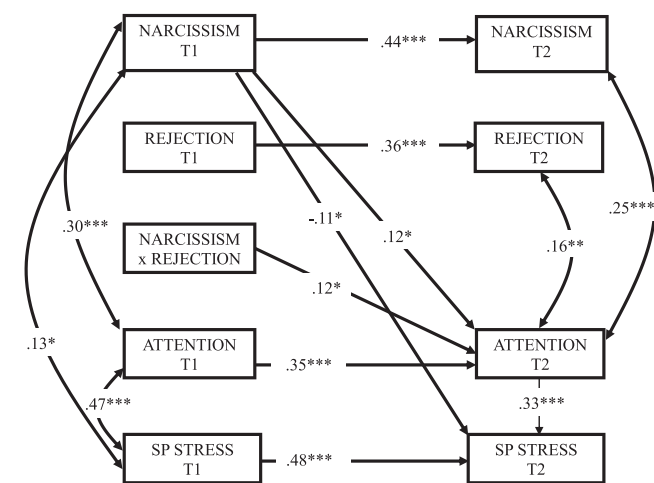


Fig. 3. Longitudinal path model of Narcissism, Attention-Seeking, and Smartphone Stress, moderated by Social Rejection. *Notes.* $\chi^2(2) = 0.196$ (MLR = 0.986), $p = .906$, CFI = 1.000, RMSEA = 0.000 (90%CI 0.000 - 0.046), SRMR = 0.003.

Indirect effects:
 Narcissism → Attention → Smartphone Stress $\beta = 0.037$, $p = .041$, 95%CI 0.002 to 0.073.
 Narcissism x Rejection → Attention → Smartphone Stress $\beta = 0.039$, $p = .033$, 95%CI 0.003 to 0.075.

seeking becomes significant. At lower levels of rejection, T1 Narcissism did not predict T2 Attention-Seeking. At higher levels of rejection (approximately the mean level of the sample or above), the effect of T1 Narcissism on T2 Attention-Seeking was significant; participants with a combination of higher Narcissism and higher Rejection reported higher levels of Attention-Seeking. A graphical representation of this interaction can be seen in Fig. 4.

3.3. Social media disclosure

Social Media Disclosure exhibited moderate stability from T1 to T2 ($B = 0.371$, $SE = 0.062$, $p < .001$). At T1, Disclosure was linked to

both age ($B = -0.111$, $SE = 0.056$, $\beta = 0.111$, $p = .044$) and gender ($B = -0.348$, $SE = 0.115$, $\beta = -0.174$, $p = .002$), with younger adolescents and girls evidencing higher scores. Girls again scored higher in Disclosure at T2 ($B = -0.379$, $SE = 0.097$, $\beta = -0.189$, $p < .001$). However, the effect of age in T2 was now reversed ($B = 0.127$, $SE = 0.047$, $\beta = 0.127$, $p = .007$), with older adolescents evidencing higher scores. Additionally, Attention-Seeking at T2 predicted Disclosure at T2 ($B = 0.265$, $SE = 0.067$, $p < .001$). No other variables predicted T2 Disclosure, and T1 Disclosure was not a predictor of any scores at T2. T1 Disclosure was correlated with T1 Narcissism ($B = 0.144$, $SE = 0.067$, $p = .032$) and T1 Attention-Seeking ($B = 0.505$, $SE = 0.065$, $p < .001$). T2 Disclosure was also correlated with T2 Narcissism ($B = 0.082$, $SE = 0.041$, $p = .047$). No other concurrent correlations involving Social Media Disclosure were significant (see Fig. 3).

We observed a positive indirect effect from T1 Narcissism to T2 Disclosure, via T2 Attention-Seeking ($\beta = 0.031$, $p = .038$; 95% CI [0.002, 0.060]). We also observed an indirect effect from the T1 Narcissism × Rejection interaction to T2 Disclosure, via T2 Attention-Seeking ($\beta = 0.032$, $p = .045$; 95% CI [0.001, 0.063]). As neither sets of confidence intervals included zero, both indirect effects were considered to be significant.

3.4. Problematic social media use

Problematic Social Media Use exhibited moderate stability from T1 to T2 ($B = 0.468$, $SE = 0.069$, $p < .001$). Problematic Use showed no links with age or gender at either time point. Additionally, T2 Attention-Seeking predicted Problematic Use at T2 ($B = 0.302$, $SE = 0.066$, $p < .001$). No other variables predicted T2 Problematic Use, and T1 Problematic Use was not a predictor of any scores at T2. T1 Problematic Use was correlated with T1 Rejection ($B = 0.167$, $SE = 0.084$, $p = .047$) and T1 Problematic Use ($B = 0.167$, $SE = 0.084$, $p = .047$). No other concurrent correlations involving Problematic Use were significant (Fig. 2).

We observed a positive indirect effect from T1 Narcissism to T2 Problematic Use, via T2 Attention-Seeking ($\beta = 0.034$, $p = .045$; 95% CI [0.001, 0.068]). We also observed an indirect effect from the T1 Narcissism × Rejection interaction to T2 Problematic Use, via T2

Table 1
Means, standard deviations, and bivariate correlations.

	M	SD	1	2	3	4	5	6	7	8	9	10	11	12
1. Narc. T1	2.178	.539	–											
2. Narc. T2	2.161	.584	.493***	–										
3. Reject T1	1.571	.599	.050	.062	–									
4. Reject T2	1.561	.654	.004	.083	.369***	–								
5. Attention T1	1.914	.634	.239***	.206***	.105	.063	–							
6. Attention T2	1.803	.674	.203***	.296***	.055	.164**	.370***	–						
7. SM Disc. T1	2.910	1.370	.088	.070	-.084	-.105	.463***	.220***	–					
8. SM Disc. T2	1.964	.988	.089	.155**	-.070	-.025	.193***	.327***	.374***	–				
9. SP Stress T1	2.326	.846	.083	.060	.014	-.052	.450***	.182***	.435***	.209***	–			
10. SP Stress T2	2.321	.845	-.029	.113*	.019	.008	.274***	.391***	.317***	.347***	.568***	–		
11. Prob. SM Use T1	.889	1.258	.023	.032	.167**	.084	.310***	.086	.391***	.114*	.486***	.245***	–	
12. Prob. SM Use T2	1.013	1.549	.043	.152**	.113	.156**	.236***	.337***	.191**	.231***	.372***	.453***	.496***	–

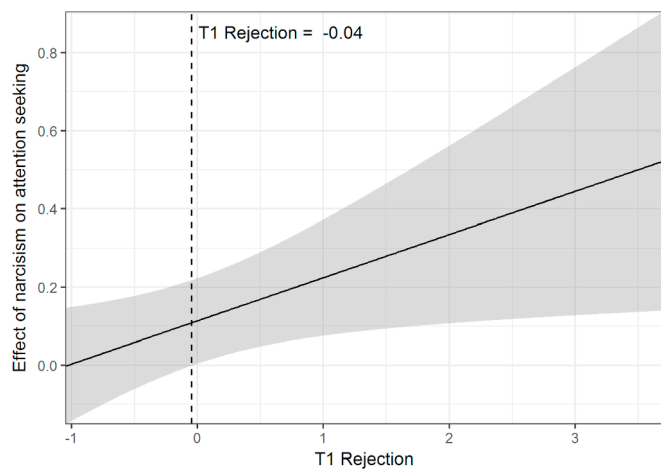


Fig. 4. Region of significance plot depicting interaction effect between T1 Narcissism and T1 Social Rejection on T2 Attention-Seeking.

Attention-Seeking ($\beta = 0.035, p = .046$; 95% CI [0.001, 0.069]). As neither sets of confidence intervals included zero, both indirect effects were considered to be significant.

3.5. Smartphone stress

Smartphone Stress exhibited moderate stability from T1 to T2 ($B = 0.479, SE = 0.048, p < .001$). At T1, Smartphone Stress was linked to gender ($B = -0.258, SE = 0.112, \beta = -0.129, p = .021$), with girls reporting higher scores. At T2, Smartphone Stress was again linked to gender ($B = -0.207, SE = 0.102, \beta = 0.104, p = .042$), as well as to age ($B = 0.144, SE = 0.047, \beta = 0.144, p = .002$), with girls and older adolescents reporting higher scores. Additionally, T1 Narcissism was a negative predictor of T2 Smartphone Stress ($B = -0.109, SE = 0.053, p = .038$). Attention-Seeking at T2 positively predicted Smartphone Stress at T2 ($B = 0.18, SE = 0.059, p = .002$). No other variables predicted T2 Smartphone Stress, and T1 Smartphone Stress was not a predictor of any scores at T2. At T1, Smartphone Stress was correlated with Narcissism ($B = 0.127, SE = 0.058, p = .029$) and Attention-Seeking ($B = 0.458, SE = 0.059, p < .001$). No other concurrent correlations involving Smartphone Stress were significant (see Fig. 3).

We observed a positive indirect effect from T1 Narcissism to T2 Smartphone Stress, via T2 Attention-Seeking ($\beta = 0.037, p = .041$; 95% CI [0.002, 0.073]). We also observed an indirect effect from the T1 Narcissism \times Rejection interaction to T2 Smartphone Stress, via T2 Attention-Seeking ($\beta = 0.039, p = .033$; 95% CI [0.003 to 0.075]). As neither sets of confidence intervals included zero, both indirect effects were considered to be significant.

4. Discussion

Adolescents are faced with the complex task of developing healthy online habits and relationships in the context of a near-ubiquitous accessibility to mobile social media platforms. Smartphones and related applications allow youth to spontaneously share a range of experiences, thoughts, and online content with a broader and potentially global audience. These platforms can support adolescents' ongoing development of peer relationships and identity formation (e.g., Thorkildsen & Xing, 2016), but might also encourage the more problematic foci on acquiring attention and shallow relationship formation that are linked to decreased well-being. Whether social media ultimately benefit or impede adolescents' social development is likely a result of a complex interplay between dispositional, motivational, and environmental factors. The present research explored these dynamics in the context of adolescent narcissism, a personality construct consistently linked to social media behavior in prior literature. While numerous studies have shown connections between narcissism and both social media and smartphone use, the present research went further by examining the interplay between this personality characteristic and the social and motivational processes that might account for such associations.

Our results support the notion that links between narcissism and social media experiences stem from a process in which individuals capitalize on social environments in order to validate their desired self-image. In line with predictions, adolescents scoring higher in narcissism reported more attention-seeking motives for their social media use at each time point. Earlier narcissism also predicted greater attention-seeking one year later. At T1, youth higher in narcissism also reported more social media disclosure (also observed at T2), problematic social media use, and smartphone stress. Furthermore, even when controlling for earlier levels of attention-seeking, a combination of higher initial narcissism and higher initial social rejection predicted more attention-seeking one year later. Finally, we found the expected indirect associations from earlier narcissism and the narcissism \times rejection interaction to all three social media outcomes one year later, via increased attention-seeking. Thus, the present study found support for an integrative model of the process by which personality and social factors might combine to predict several different outcomes related to early-adolescents' social media behavior. Considering that these outcomes are typically investigated in isolation, our findings highlight the possibility for both relatively benign and more problematic forms of social media use to share a common etiology.

4.1. Narcissism and attention-seeking on social media

To our knowledge, our study is the first longitudinal demonstration that desires for validation and attention account for associations between narcissism and social media behavior (for cross-sectional evidence, see Dumas et al., 2017; Marshall et al., 2015; Sheldon & Bryant, 2016). The Dynamic Self-Regulatory Processing Model (Morf &

Rhodewalt, 2001) would suggest that when needs for attention are met, social media environments likely function to externally maintain narcissists' inflated self-concepts; this fits with narcissists' preference for interpersonal (as opposed to intrapersonal) forms of self-regulation (Campbell, 1999). However, narcissistic self-enhancement can also create intrapersonal and interpersonal difficulties (Back, Schmukle, & Egloff, 2010; Campbell & Campbell, 2009; Morf & Rhodewalt, 2001; Vazire & Funder, 2006). This process was apparent in the present study, which provided longitudinal evidence of links between narcissism and behavioral, emotional, and social difficulties linked to social media and smartphone use (for cross-sectional evidence, see Andreassen et al., 2017; Hussain et al., 2017; Pearson & Hussain, 2015).

Our focus on the benefits that youths anticipate from social media fits with motivational accounts of narcissistic self-promotion, which typically emphasize the acquisition of desired rewards over avoidance of risks (Foster, Misra, et al., 2009; Foster, Shenese, et al., 2009; Foster & Trimm, 2008; Morf & Rhodewalt, 2001). Recent empirical studies and theoretical reviews have specifically suggested that heightened reward sensitivity might explain narcissistic youth's excessive or inappropriate engagement with social media (Andreassen et al., 2017; Dumas et al., 2017; Guedes et al., 2016; Marshall et al., 2015; Ryan et al., 2014; Sheldon & Bryant, 2016). This more compatible reward focus stands in contrast to earlier research examining narcissistic youth's underestimation of hypothetical social media risks (Hawk et al., 2015, Study 2), or on risk-related studies that did not consider the differential emphasis on approach-related motivation that might coincide with personality traits, including narcissism, that heighten the risk for problematic social media outcomes (e.g., Christofides et al., 2012; Youn, 2009). Nevertheless, the unique contributions of anticipated benefits and risks (see, e.g., Petronio, 2002) to these youth's social media behavior still require explicit comparison in future research.

4.2. Narcissistic attention-seeking following ego threat

The present results suggest that connections between narcissism, attention-seeking, and social media outcomes are stronger when youth experience ego threat (i.e., social rejection). In contrast, when needs for validation are met, adolescents with narcissistic tendencies might not categorically show heightened levels of problematic behavior, and indeed might even thrive in social media environments. For example, while concurrent associations showed that greater narcissism was linked with higher levels of smartphone stress at both time points, youth higher in narcissism experienced *reduced* social media stress over time after controlling for those pre-existing associations. However, this modest longitudinal benefit appeared to be undone when narcissistic youth more strongly valued social media as a way to gain attention, as attention-seeking was linked to higher stress. Narcissists' higher attention-seeking increased even further when these participants experienced greater social rejection.

The Dynamic Self-Regulatory Processing Model would suggest that failures to cultivate a desired self-image, particularly with regard to asserting one's uniqueness and popularity, should provoke narcissistic attempts at self-enhancement that are highly likely to play out in social environments (Morf & Rhodewalt, 2001). Daily diary studies have previously shown that narcissists' self-esteem is tied to perceptions of social acceptance (Geukes et al., 2017; Rhodewalt, Madrian, & Cheney, 1998), and experiences of social rejection might prompt narcissistic youth to seek immediate relief. The continuous interpersonal connectivity provided by smartphones and mobile social media platforms suggests that they might be highly valued avenues for pursuing external validation. Such responses can manifest as fairly normative social media behaviors, or, as shown in prior research, more exhibitionistic disclosures about substance use and sexual behavior (Hawk et al., 2015). These needs for affirmation might also foster greater social media dependency that manifests as anxiety (i.e. smartphone stress) or other signs of behavioral or interpersonal difficulties (e.g., neglect of

other interests, interpersonal conflict). In this sense, use of social media to recover from ego threats represents the trade-off between short-term gratifications and long-term costs that often characterizes narcissism. Our study provides a bridge between prior experimental work detailing narcissists' self-enhancing and self-destructive behavior following ego threat (Baumeister et al., 2000; Hawk et al., 2015, Study 2; Horvath & Morf, 2009; Jones & Paulhus, 2010; Stucke & Sporer, 2002; Twenge & Campbell, 2003), and recent experiments showing the effect of ego threats on increased social media engagement, but did not consider narcissism (Toma & Hancock, 2013). Importantly, our findings extend both of these research lines by demonstrating similar effects over a more extended timeframe, and on behaviors occurring outside of laboratory settings.

4.3. Implications of research

Many prior studies on social media use have examined narcissism alongside a plethora of other personality factors, but have failed to consider environmental or interpersonal events that might trigger core narcissistic behaviors. In contrast, the motivated self-construction perspective adopted in this study acknowledges the potential interplay between stable features of narcissistic personality and individuals' social experiences (Morf & Rhodewalt, 2001). In this sense, our research supports studies of narcissism that highlight individuals' active attempts to align social interactions with their goals for self-image enhancement and maintenance (e.g., Back et al., 2010; Campbell & Campbell, 2009; Hawk et al., 2015; Morf & Rhodewalt, 2001). Instead of merely assuming that narcissists will show heightened (and potentially problematic) engagement with social media *because* they are narcissistic, it is crucial for researchers and educators to recognize the social and motivational forces that might guide this behavior.

Our findings are of practical use for education and intervention programs, in that they highlight a potential social-relational factor that might trigger problematic behavior among (narcissistic) youth already at risk for interpersonal difficulties. Boys scored higher in both narcissism and rejection, indicating that they might be especially important targets of related intervention efforts. Individuals who score high in narcissism are typically quite aware of fluctuations in their social standing (Campbell, Rudich, & Sedikides, 2002; Carlson et al., 2011). Indeed, the effect of narcissism on attention-seeking became significant even before rejection reached the mean level of the sample, as a whole. Interventions that teach appropriate ways to cope with feelings of isolation might be a promising avenue for reducing narcissistic youth's social media attention-seeking. Additionally, educational programs aiming to reduce problematic use should consider explicitly addressing desires for attention and validation as potential motivators of social media behavior. It is noteworthy that many interventions focusing on encouraging youth to consider social media risks have shown only modest or fleeting effects (Vanderhoven, Schellens, & Valcke, 2013, 2014; Moreno et al., 2009); this is potentially because an emphasis on risk does not fully align with the psychological, emotional, and relational needs driving engagement with this technology (Hawk, 2014; Safer Internet Programme, 2009). Acknowledging benefits that youth anticipate from SNS- and smartphone-based interactions, and encouraging consideration of whether these forms of social contact can provide long-term needs fulfillment, might help adolescents build realistic expectations and achieve a healthy balance between online and offline relationships.

4.4. Strengths, limitations, and future directions

Our study had notable methodological strengths. First, in contrast to the majority of social media research examining late-adolescents or emerging adults (i.e., college students), we focused on an early-adolescent population who were only just becoming eligible to independently open accounts on some of the most popular social media

platforms, and beginning to form related habits and expectations. The fact that we found the hypothesized pattern of associations among these youngsters indicates a need for research on how social media and smartphone use evolve in concert with personality characteristics and youth's interpersonal relationships. Second, our two-wave longitudinal design offers potential insight into the over-time relationships between narcissism and social rejection, on the one hand, and attention-seeking, social media disclosure, and social media- and smartphone-related difficulties, on the other hand. Controlling for earlier levels of all dependent variables in our model provided a clearer picture of these over-time effects. While only experimental research can truly establish causality, insight into over-time processes can offer guidance regarding the risk markers that precede problematic behaviors.

Our study also contains limitations that could be improved or expanded upon in future research. Despite controlling for earlier levels of all variables, this two-wave analysis relied on concurrent associations of attention-seeking and social media outcomes to demonstrate indirect effects. A three-wave model examining T2 attention-seeking as a mediator between T1 narcissism and rejection and T3 social media outcomes could provide additional evidence for developmental order. Including more measurement waves, and at shorter intervals, would also yield interesting data regarding the extent to which the effects might deteriorate over time. Indeed, the modest longitudinal effects found in this study could be attributable to a yearly measurement interval, whereas these processes might typically play out on a shorter time scale (e.g., Morf & Rhodewalt, 2001).

Furthermore, all measures in this study were based on adolescents' self-reports, which might be subject to reporting biases. Related to the aforementioned issue of time intervals, for example, asking participants to report on the frequency of their disclosures over a one-year period could lead to incorrect estimations of such behavior (see, e.g., Andrews, Ellis, Shaw, & Piwek, 2015, for an example of this issue with regard to smartphone use frequency). Although the one-year period did correspond to the time interval between data collection waves in our study, future research should consider utilizing narrower time windows for reporting (e.g., the previous month), or more general estimations of frequency that might lead participants to tap into memories of their more recent behavior (e.g., Hawk et al., 2015). Numerous studies have also utilized observational coding of actual social media profiles as a way to circumvent memory- or social desirability-based reporting biases. While such analyses could be a useful supplement, it is important to note that they typically require researchers to concentrate on a single social media platform, which might limit generalizability. Observations also might not easily capture problematic experiences such as addiction or stress, but other methods including peer and parental reports, or event sampling of daily social media use, could prove useful in this respect. Such methods could also help to protect against reporting biases linked to participants' personality characteristics. For example, several accounts of narcissists' self-defensive and self-enhancing actions characterize these responses as potentially unconscious or non-reflective (e.g., Morf & Rhodewalt, 2001; Vazire & Funder, 2006), and thus perceptions of their own behavior might differ from those of neutral observers or interaction partners. In this sense, an exclusive focus on conscious motives is also likely to only partially account for links between narcissism and social media use. Future research should directly compare both reflective and non-reflective processes in explaining these associations.

Finally, adolescents utilize various social media platforms for different purposes and activities. Different types of interpersonal interactions and disclosures likely vary across different social media platforms. For example, the image-based nature of Instagram makes the sharing of photo-based content especially likely. Additionally, contemporary teens might be more likely to use Snapchat than other platforms for the purposes of communicating with close friends, as opposed to acquaintances or extended family members (e.g., Associated Press-NORC, 2017; Vaterlaus, Barnett, Roche, & Young, 2016). Importantly, however, the

popularity of specific services for meeting youth's particular needs can be quite fluid (Hawk, 2014), and this led us to examine social media behavior in a more generic sense. Future studies might consider extending our findings by establishing these relationships on specific platforms. It is likely more important, however, to connect particular motives to particular types of social media behavior, regardless of platform, because specific motivations will likely continue to exist regardless of which platforms are more or less popular for fulfilling those needs at any given moment in time. Aside from attention-seeking, other social media motivations including creativity, surveillance of others, and documenting one's life have also shown to be linked to narcissism in recent cross-sectional research (Dumas et al., 2017; Sheldon & Bryant, 2016). These additional motives should be investigated further in the context of dynamic person-environment interaction models that might indicate whether such needs are similarly heightened by ego threat.

5. Conclusions

Early-adolescents' narcissistic tendencies predict their later use of social media platforms as a method for acquiring attention and validation. These inclinations toward attention-seeking are further intensified when experiences such as social rejection threaten narcissistic youth's desired self-image, and are ultimately linked to increases in both active social media behaviors and indices of problematic use. Our longitudinal approach provides novel information on how this process unfolds over time, and offers useful guidance for both the individual and social motivations that might be targeted in interventions. Narcissistic adolescents' use of social media in an attempt to increase their sense of well-being following ego threat might backfire, and ultimately contribute to ongoing patterns of self-defeating behavior.

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