I'm still socially anxious online: Offline relationship impairment characterizing social anxiety manifests and is accurately perceived in online social networking profiles

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ABSTRACT

Prior research has identified the offline thoughts, feelings, and behaviors that lead to impaired relationships for individuals high in social anxiety (HSA; e.g., fear of conversation; interpersonal aloofness). We tested whether social anxiety manifests through visible online signals of relationship impairment that mirror these known offline indicators, and whether observers use these signals when judging social anxiety online. Facebook profile owners ($n = 77$) reported social anxiety, their profiles were coded for objective features, and unacquainted observers ($n = 6$) rated profile owners' social anxiety after viewing their profiles. HSA individuals' Facebook profiles were shown to contain signs indicating relationship impairment across the domains of social inactivity (e.g., few friends and photographs), close relationship quality (e.g., relationship status of *single*), and self-disclosure (e.g., absence of status updates), and observers inferred high levels of social anxiety in individuals' whose profiles showed these signs. These findings suggest that offline relationship impairment experienced by HSA individuals carries over into online contexts, and that online relationship impairment can be accurately perceived by unacquainted observers. Discussion considers whether integrating this knowledge into existing treatments – most notably online, self-guided protocols – could improve the identification and treatment of social anxiety.

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1. Introduction

High social anxiety (HSA; a disposition characterized by feelings of nervousness over managing one's impression when anticipating and engaging in social interactions; Gilbert, 2001; Leary, 2010) is associated with impairment in and dissatisfaction with social relationships in several ways. First, HSA individuals show relative social inactivity, such that they are more likely than less socially anxious individuals to have no close friends (Erwin, Turk, Heimberg, Fresco, & Hantula, 2004; Whisman, Sheldon, & Goering, 2000), and to feel dissatisfaction with their existing friendships (Rodebaugh, 2009; Rodebaugh, Fernandez, & Levinson, 2012). Second, HSA individuals have poor close relationship quality, such that they are more likely than less socially anxious individuals to be unmarried or to have no romantic partner (Erwin et al., 2004; Lampe, Slade, Issakidis, & Andrews, 2003),

and, when they do have a romantic partner, to feel dissatisfied with that relationship (Whisman et al., 2000). Third, HSA individuals have trouble self-disclosing, which can lead them to achieve less emotional intimacy in personal relationships (Sparrevohn & Rapee, 2009), and to be viewed as less pleasant individuals with whom to interact (Baker & Edelmann, 2002; Meleshko & Alden, 1993).

Given the undesirable effects of high social anxiety on individuals' interpersonal relationships, an important research endeavor is to identify the specific thoughts, feelings, and behaviors that cause HSA individuals to experience relationship impairment and dissatisfaction. To date, researchers have made great progress in identifying three main classes of thoughts, feelings, and behaviors that affect HSA individuals' face-to-face relationships. First, HSA individuals adopt unpleasant beliefs about social interactions; they fear that others will evaluate them negatively during conversations (Mansell & Clark, 1999), leading them to ruminate and to overestimate the potential negative impressions that their conversational behavior may cause others to form (Alden & Wallace, 1995; Moscovitch, Rodebaugh, & Hesch, 2012; Norton & Hope, 2001). Second, HSA individuals adopt

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self-protective goals when conversing (e.g., trying not to draw attention to themselves; Wallace & Alden, 1997), due to a conflict between their desire to project a favorable social impression on others and their belief that they are unable to do so (Catalino, Furr, & Bellis, 2012). Third, HSA individuals engage in reticent behaviors during social interactions, such as displaying non-verbal signals that mark their conversational nervousness (e.g., increased physiological arousal, less fluent speaking styles; Baker & Edelmann, 2002; Mansell & Clark, 1999; Meleshko & Alden, 1993; Wallace & Alden, 1997), and showing signs that convey an underlying aloofness toward their interaction partner (e.g., decreased eye contact, low levels of warmth and generosity, less frequent self-disclosure; Baker & Edelmann, 2002; Fernandez & Rodebaugh, 2011; Rodebaugh et al., 2013; Wallace & Alden, 1997).

HSA individuals' thoughts, feelings, and behaviors in face-to-face social interactions, however, may represent only part of the reason why these individuals struggle to form meaningful relationships. Given that people spend an increasingly large proportion of their lives socializing through online media (of which Facebook is the most prominent; Wilson, Gosling, & Graham, 2012), a comprehensive understanding of the reasons for HSA individuals' relationship impairment and dissatisfaction must include online signs of social inactivity, poor close relationship quality, and lack of self-disclosure. The purpose of the present study was therefore to test whether HSA individuals' offline relationship impairment carries over into online contexts in the form of visible signs on Facebook profiles, and whether unacquainted observers use signs of online relationship impairment to identify HSA individuals.

Identifying online signs of social anxiety may help improve the relationship quality of HSA individuals for two reasons. First, pinpointing the visible signs of social anxiety online could lead to improvements in the identification of HSA individuals, which could be a useful tool to refer HSA individuals to treatment they would not otherwise seek. Although self-guided, internet-based treatment protocols for social anxiety have begun to garner empirical support as a way to help HSA individuals who would otherwise not seek treatment (e.g., Berger et al., 2011), nationally representative survey research has suggested that rates of treatment-seeking among individuals diagnosed with social anxiety disorder may be as low as 20% (Grant et al., 2005). This may be due in part to HSA individuals' not recognizing that they have social anxiety symptoms that could be alleviated by treatment (Olfson et al., 2000), or to the fact that HSA individuals may fear the interpersonal interactions that inevitably arise during treatment (Griffiths, 2013). As a result, means of identifying HSA individuals through online mediums may improve treatment rates.

Second, identifying the manifestations of social anxiety online could further the development of treatment protocols that may help HSA individuals improve their online relationships. Prior work has shown that observers form somewhat negative impressions of HSA individuals during face-to-face conversations (Alden & Wallace, 1995; Norton & Hope, 2001), in part due to the visible behavioral signs characteristic of social anxiety (Baker & Edelmann, 2002; Meleshko & Alden, 1993), and it seems plausible that similar online signs may cause observers to form negative impressions. Treatments that help eliminate online signs of social anxiety may therefore help improve the impressions that HSA individuals give off to others, thereby helping facilitate the initiation of quality relationships.

1.1. Will relationship impairment inherent to social anxiety manifest and be perceived online?

We anticipated that the offline relationship impairment inherent to social anxiety would translate into visible online signs, given that individuals' online environments reflect their offline dispositions (Gosling, Gaddis, & Vazire, 2008). We further anticipated that observers would infer relationship impairment from visible online signs of social anxiety, given that offline relationship impairment inherent to social anxiety should manifest in visible Facebook signs, and that observers often link similar offline signs to social anxiety (Baker & Edelmann, 2002; Mansell & Clark, 1999). One prior study provided initial clues regarding the potential similarities between online and offline manifestations of social anxiety; Fernandez, Levinson, and Rodebaugh (2012) found that Facebook profiles contain some visible signs indicative of online social anxiety (e.g., fewer Facebook friends) that are similar to offline manifestations of social anxiety (e.g., lack of and dissatisfaction with offline friendships). However, no prior research, has examined whether observers use Facebook signals in specific domains related to offline relationship impairment to form judgements of a profile owner's social anxiety. Notably, Fernandez and colleagues (2012) did find that unacquainted observers achieved moderate levels of accuracy when judging social anxiety levels of Facebook profile owners, simply from viewing the owners' profiles, suggesting that observers may be able to correctly use Facebook signals to infer social anxiety. We endeavored to build upon this research by examining manifestations and perceptions of social anxiety across three distinct domains relevant to HSA individuals' offline functioning: *social inactivity*, *close relationship quality*, and *self-disclosure*. We also examined whether the presence of signs of relationship impairment across these three domains allowed observers to accurately judge Facebook users' levels of social anxiety.

1.1.1. Social inactivity

Offline relationship impairment inherent to social anxiety may lead online signs of social inactivity to emerge for multiple reasons. First, HSA individuals may experience a similar reticence about engaging in interpersonal interactions online as they do offline (Mansell & Clark, 1999; Moscovitch et al., 2012), and therefore may act in a reclusive, passive manner when navigating social media (Erwin et al., 2004). Second, HSA individuals tend to report a lack of quality friendships offline (Erwin et al., 2004; Whisman et al., 2000), and prior work has suggested that online media may facilitate socialization primarily among individuals who have existing, offline relationships (Valkenburg & Peter, 2009). As a result of these factors, HSA individuals' Facebook profiles may not accumulate the markers of social activity that accrue from engagement in active online socialization with existing friends (e.g., Facebook friends and photographs).

Additionally, prior work examining perceptions of HSA individuals in offline settings suggests that observers may be able to infer high social anxiety by observing Facebook profiles which lack signs of social activity. In offline conversational settings, observers who interact with HSA individuals are known to use signals of anxiousness and fear of negative evaluation to infer social anxiety (e.g., Baker & Edelmann, 2002; Mansell & Clark, 1999). This knowledge may lead observers to infer that HSA individuals have few offline friends with which to socialize online, and that they will experience the same reticence when attempting to interact with others online as they do offline; observers may in turn infer that Facebook signs indicating social inactivity reflect a profile owner's high level of underlying social anxiety. In line with the expectation that HSA individuals' will socialize relatively infrequently online, and that observers will use signals of this social inactivity to infer high social anxiety, we predicted that HSA individuals' Facebook profiles would show fewer friends, photos, photo albums, and videos, and that these signs would lead observers to rate profile owners as higher in social anxiety.

1.1.2. Close relationship quality

HSA individuals engage in several interpersonal behaviors that may cause them to be perceived as less warm, pleasant, and friendly in social interactions (Fernandez & Rodebaugh, 2011; Rodebaugh et al., 2013); they may lack assertiveness, suppress their emotions, show disinterest in conversational partners, and avoid engaging in intimate conversations with close others (Davila & Beck, 2002; Kashdan & Steger, 2006; Meleshko & Alden, 1993; Sparrevohn & Rapee, 2009; Wallace & Alden, 1997). These behaviors contribute to HSA individuals' poor close relationship quality offline (e.g., Lampe et al., 2003; Sparrevohn & Rapee, 2009; Whisman et al., 2000), and their Facebook profiles may contain signs indicating this lack of relationship quality. For example, a relationship status of *single* (as opposed to one involving others; e.g., *married to*) should be one such sign, given that Facebook users who actively seek a romantic relationship more frequently post their relationship status (i.e., as opposed to not disclosing it; Young, Dutta, & Dommety, 2009), and HSA individuals are more likely to actively seek a romantic relationship, given that they are unlikely to be involved in one. The number of individuals in a user's profile picture should be a second sign of social anxiety. A profile picture containing close friends has been shown to represent individuals' satisfaction with close relationships (Saslow, Muise, Impett, & Dubin, 2013), and given that HSA individuals are less likely to form intimate offline relationships, their profile pictures are likely to contain fewer individuals with whom they have close relationships.

Importantly, these same signs of poor close relationship quality may also signal high social anxiety to observers. Observers are known to perceive signs of HSA individuals' aloofness and reticence during offline social interactions, and these perceptions influence observers' judgments of their conversational partners' social anxiety (Baker & Edelmann, 2002; Fernandez & Rodebaugh, 2011; Rodebaugh et al., 2013; Wallace & Alden, 1997). If observers link these behaviors during a single conversation to a more general emotional aloofness and reticence in close relationships, they may infer that an individual whose Facebook profile shows signs of poor close relationship quality has a relatively high level of social anxiety. In line with the expectation that HSA individuals would show signs of poor relationship quality online, and that observers would use these signs to infer social anxiety, we predicted that HSA individuals would be more likely to post a relationship status of *single* (compared to any other status, or posting no status), and would post profile pictures that contain fewer other people, and that observers would use these signs to infer high social anxiety.

1.1.3. Self-disclosure

Just as HSA individuals engage in relatively little offline self-disclosure (Fernandez & Rodebaugh, 2011; Meleshko & Alden, 1993; Wallace & Alden, 1997), they tend behave passively online (e.g., surfing the web), rather than actively socializing (Caplan, 2007; Erwin et al., 2004). Given that self-disclosure over Facebook represents an active form of socialization, and requires comfort with sharing personal information in a public forum, HSA individuals' Facebook profiles are likely to contain signs that signal low self-disclosure. However, fear of negative evaluation and self-presentational protectiveness – two features of social anxiety that may most strongly drive a lack of self-disclosure (Catalino et al., 2012; Mansell & Clark, 1999; Moscovitch et al., 2012; Wallace & Alden, 1997) – are often the most difficult for observers to detect in offline settings (Alden & Wallace, 1995; Norton & Hope, 2001). As a result, observers may not link visible Facebook signs of decreased self-disclosure to these internal characteristics of social anxiety. In line with the expectation that HSA individuals would self-disclose less on Facebook, we therefore predicted that HSA individuals would be less likely to post a status

update (i.e., news regarding one's current activities) or a quote (i.e., thoughts reflecting one's current world views) – both of which pieces of self-disclosing information which many users post each day – and that, among individuals who did post a status update or a quote, HSA individuals' posts would be briefer, indicating lower self-disclosure. However, given that observers may not be able to detect signs of self-disclosure on Facebook, we predicted that presence and length of a status update or quote would not influence observer-reported social anxiety.

1.2. The current study

In the current study, we tested the hypotheses that a) the offline features of social anxiety would manifest in visible signs of relationship impairment in Facebook profiles across the domains of social inactivity, close relationship quality, and self-disclosure; b) that observers would use signs from these three domains to infer a profile owner's level of social anxiety; and c) that the availability and use of valid social anxiety signals in Facebook profiles would allow observers to form accurate judgments of social anxiety merely from viewing an individuals' profile. We made several predictions with respect to Facebook signs of relationship impairment and social anxiety: (a) signs of social inactivity (e.g., friend count) would negatively predict both self- and observer-reported social anxiety; (b) signs of close relationship quality would relate to social anxiety, such that listing one's relationship status as *single* would positively predict, whereas the number of people in a user's profile picture would negatively predict, both self- and observer-reports of social anxiety, and (c) signs of self-disclosure would relate to self-reported social anxiety, such that posting a status update or quote, as well as longer status update and quote length, would predict lower self-reported social anxiety, but that signs of self-disclosure would not predict observer-rated social anxiety. Finally, given our predictions that social anxiety would manifest and be perceived through multiple Facebook signs of relationship impairment, we predicted that observers would be able to form moderately accurate impressions of profile owners' social anxiety.

2. Method

2.1. Participants

Participants were 77 students from a Midwestern university, who participated for course credit (*M* age = 18.91, *SD* = 1.05; 77% female). Observers were six students from the same university who were unacquainted with the targets (*M* age = 19.83, *SD* = 0.75; 50% female).

2.2. Measures

2.2.1. Social anxiety

Participants completed the 17 straightforward items of the Social Interaction Anxiety Scale (S-SIAS; Mattick & Clarke, 1998) using a five-point scale (1 = "strongly disagree"; 5 = "strongly agree"; *M* = 2.29, *SD* = .62, α = .88; see Rodebaugh et al., 2011, for a discussion of the advantages of using the straightforward scale). The items describe anxiety-related reactions to a variety of social interaction situations (e.g., *I have difficulty talking with other people*; *I am tense mixing in a group*).

Observers completed an observer-report version of the same scale for each participant based on an appraisal of participants' Facebook profiles (*M* = 2.28, *SD* = .67; α = .95). Observers showed strong consensus in their ratings of social anxiety (ICC (2, *k*) = .85).

2.3. Procedure

Participants reported social anxiety and consented to have the front page of their Facebook profile saved for future use. Facebook profiles were saved before participants left the lab, to ensure that they were in their normal, unaltered form, though identifying information (e.g., participant name) was hidden to ensure confidentiality. Profiles were coded for objective indicators of social inactivity (i.e., number of friends, photos, photo albums, and videos), close relationship quality (i.e., relationship status, number of people in profile picture), and self-disclosure (i.e., presence or absence of a status update or quote, length of status update or quote).

Observers viewed participants' Facebook profiles and assessed each profile owner's social anxiety based solely on information provided in the profile. Observers skipped profiles for which they were previously acquainted with the owner; due to this restriction, between three and six observers rated each profile owner.

3. Results

3.1. Analyses

We examined three questions regarding manifestations and perceptions of relationship impairment inherent to social anxiety on Facebook profiles. First, to examine which Facebook signs of relationship impairment are indicators of social anxiety, we examined the relations between participants' self-report social anxiety and scores on objective Facebook signs (e.g., number of friends, number of people in profile picture, presence of status update). Second, to examine which signs of relationship impairment observers use when assessing profile owners' social anxiety, we regressed observer-reported social anxiety onto participants' scores on each Facebook sign; when signs were dichotomous (e.g., presence or absence of a quote), we entered a dummy-coded predictor in our model. Separate models were run using each Facebook sign as a predictor (i.e., one predictor per model). Third, to examine whether observers can accurately judge social anxiety from Facebook profiles, we regressed observer-reported social anxiety onto self-reported social anxiety.

For the latter two analyses, examining perceptions of social anxiety and judgmental accuracy, each unique observer rating of social anxiety was nested within one participant; observer ratings were therefore a level one unit, whereas each participant was a level two unit. To account for the dependency among observer ratings at level one, we performed multilevel modeling using the lme 4 package in R, and using maximum likelihood estimation. The mean social anxiety rating received by each participant was treated as a level 2 intercept, and was allowed to vary randomly. Participants' self-reported social anxiety and their scores on each Facebook sign were treated as a level 2 predictor of judges' ratings of participant social anxiety, with an associated fixed slope.

3.2. Social activity composite

Given that our four social activity indices were positively correlated (average $r = .53$), we tested whether number of friends, photographs, photo albums, and videos formed one social activity factor. We conducted a confirmatory factor analysis using the MLM estimator (i.e., the Satorra–Bentler chi-square), which corrects for non-normality, in Mplus Version 6.1 (Muthén & Muthén, 1998–2012). A one-factor model fit the data well ($\chi^2(2) = 2.10$, $p = .35$, CFI = .99, TLI = .99; RMSEA = .03, SRMR = .03; see Kline, 2011, for guidelines on interpreting fit indices). We created a social activity composite by averaging the standardized scores on each of

Table 1
Relations between self-reported social anxiety and objective Facebook signs.

Sign	Correlation with S-SIAS	Mean (SD) S-SIAS Score
Social activity composite	−.21[†]	–
Number of friends	−.36[*]	–
Number of photos	−.12	–
Number of videos	−.15	–
Number of photo albums	−.18	–
Relationship status		
Single	–	2.73 (.55)[a]
Not single	–	2.22 (.50)[b]
Not listed	–	2.21 (.67)[b]
People in profile picture	.06	–
Status update		
Posted	–	2.11 (.62)[a]
Not posted	–	2.41 (.60)[b]
Length	−.04	–
Quote		
Posted	–	2.13 (.52)[a]
Not posted	–	2.39 (.66)[b]
Length	−.38[*]	–

Correlation with S-SIAS: Correlation between sign score and self-reported S-SIAS score.
Mean (SD) S-SIAS score: Mean (standard deviation) self-reported S-SIAS score for individuals falling under a given sign category. Means with different superscripts that appear under the same heading differ from one another.
[†] $p = .11$.
[*] $p < .05$.

the four social activity signs, such that low scores indicated social inactivity.

3.3. What signs indicate a Facebook profile owner's social anxiety?

We first tested our prediction that Facebook signs related to social inactivity, relationship quality, and self-disclosure would predict participant self-reported social anxiety (see Table 1).

3.3.1. Social inactivity

Social inactivity signaled social anxiety; the social activity composite negatively predicted self-reported social anxiety ($r = −.21$, $p = .11$), though this did not reach the traditional level of statistical significance, suggesting that HSA individuals showed greater evidence of social inactivity on Facebook than less socially anxious individuals. Among individual signs, number of friends strongly, negatively predicted social anxiety ($r = −.36$, $p = .002$), whereas number of photos, videos, and photo albums showed weaker, negative, relations with social anxiety (rs = −.12 to −.18, ps = .15 to .34), that did not reach significance.

3.3.2. Close relationship quality

Relationship status signaled social anxiety; participants who listed their relationship status as *single* reported higher levels of social anxiety ($n = 11$; $M = 2.73$, $SD = .55$) than those who listed a relationship status involving other people (e.g., *married to*, *in a relationship with*; $n = 26$; $M = 2.22$, $SD = .50$; $t(35) = 2.78$, $p = .009$; $d = .99$). Notably, participants who did not list their relationship status on their Facebook profile reported nearly identical levels of social anxiety as those who listed a relationship status involving other people ($n = 40$; $M = 2.21$, $SD = .67$), but lower levels than those who listed their relationship status as *single* ($t(49) = 2.38$, $p = .021$, $d = .80$). In contrast, the number of individuals in participants' profile picture did not predict self-reported social anxiety ($r = .06$, $p = .58$).

3.3.3. Self-disclosure

Self-disclosure signaled social anxiety; participants whose profiles did not display a status update reported higher levels of social

anxiety ($n = 46$, $M = 2.41$, $SD = .60$) than those whose profiles displayed a status update ($n = 31$; $M = 2.11$, $SD = .62$; $t(75) = 2.10$, $p = .039$; $d = .49$), and participants whose profiles did not display a quote reported higher levels of social anxiety ($n = 47$, $M = 2.39$, $SD = .66$) than those whose profiles displayed a quote ($n = 30$, $M = 2.13$, $SD = .52$; $t(75) = 1.79$, $p = .078$; $d = .43$), though the latter effect did not reach the traditional statistical significance threshold. Additionally, among participants who did post a quote, the length of that quote negatively predicted self-reported social anxiety ($r = -.38$, $p = .044$), though status update length did not predict social anxiety ($r = -.04$, $p = .83$).

3.4. What signs do observers use to infer a Facebook profile owner's social anxiety?

We next tested whether unacquainted observers use Facebook signs related to social inactivity, close relationship quality, and self-disclosure, to infer profile owners' levels of social anxiety (see Table 2).

3.4.1. Social inactivity

Observers inferred social anxiety from social inactivity signs; participants' scores on the social activity composite negatively predicted observer-reported social anxiety ($b = -.36$, $t(74) = -6.39$, $p < .001$), suggesting that Facebook users who showed signs of social inactivity were judged to be more socially anxious than those who showed signs of social activity. Among individual signs, number of friends ($b = -.0007$, $t(74) = -7.04$, $p < .001$), photos ($b = -.0004$, $t(74) = -4.27$, $p < .001$), videos ($b = -.02$, $t(74) = -3.88$, $p < .001$), and photo albums ($b = -.008$, $t(74) = -3.00$, $p < .01$) all negatively predicted observer-reported social anxiety. These effects indicate that an additional 240 friends, 415 photos, 8 videos, or 21 additional photo albums would be associated with a profile owner being seen as one-quarter of a standard deviation lower on the S-SIAS.

Table 2
Relations between observer-rated social anxiety and objective Facebook signs.

Sign	Relation (SE) with S-SIAS	Mean (SD) S-SIAS score
Social activity composite	$-.36$ (.06)[**]	–
Number of friends	$-.0007$ (.0001)[***]	–
Number of photographs	$-.0004$ (.00009)[***]	–
Number of videos	$-.02$ (.006)[***]	–
Number of photo albums	$-.008$ (.003)[**]	–
Relationship Status		
Single	–	2.20 (.65)[a]
Not single	–	2.17 (.56)[a]
Not listed	–	2.36 (.73)[a]
People in profile picture	$-.08$ (.04)[*]	–
Status update		
Posted	–	2.19 (.60)[a]
Not posted	–	2.34 (.71)[a]
Length	.002 (.007)	–
Quote		
Posted	–	2.23 (.65)[a]
Not posted	–	2.31 (.68)[a]
Length	$-.005$ (.008)	–

Relation (SE) with S-SIAS: Unstandardized regression coefficient (standard error), estimated using multilevel modeling, between sign score and observer-reported S-SIAS score.
Mean (SD) S-SIAS score: Mean (standard deviation) observer-reported S-SIAS score for individuals falling under a given sign category. Means with different superscripts that appear under the same heading differ from one another.
[*] $p < .05$.
[**] $p < .01$.
[***] $p < .001$.

3.4.2. Close relationship quality

Observers did not infer social anxiety from relationship status; participants who listed their relationship status as *single* ($M = 2.20$, $SD = .65$) were seen as equivalently socially anxious as those who listed a relationship status involving other people ($M = 2.17$, $SD = .56$; $b = .05$, $p = .69$), and as those who did not list a relationship status ($M = 2.36$, $SD = .73$, $b = .11$, $p = .55$).

In contrast, observers inferred social anxiety from profile pictures; the number of people in one's profile picture negatively predicted observer-rated social anxiety ($b = -.08$, $t(74) = 2.18$, $p = .032$); this effect indicates that, for example, a participant whose profile picture contains only herself would be viewed as approximately one-quarter of a standard deviation higher on the S-SIAS than a participant whose profile picture contains herself and two friends.

3.4.3. Self-disclosure

Observers did not infer social anxiety from self-disclosure signs; participants whose profiles did not display a status update were seen as equivalently socially anxious ($n = 46$, $M = 2.34$, $SD = .71$) as those whose profiles displayed one ($n = 31$; $M = 2.19$, $SD = .60$; $b = .12$, $p = .25$), and participants whose profiles did not display a quote were seen as equivalently socially anxious ($n = 47$, $M = 2.31$, $SD = .68$) as those whose profiles displayed one ($n = 30$, $M = 2.23$, $SD = .65$; $b = .06$, $p = .57$). Likewise, among participants who had posted a status update or quote, neither length of status update ($b = .002$, $p = .77$) nor length of quote ($b = .005$, $p = .50$) predicted observer-reported social anxiety.

3.5. Can observers accurately judge a Facebook profile owner's social anxiety?

Finally, we tested whether observers can accurately judge a Facebook profile owner's social anxiety based on information provided in the profile. In support of this prediction, participants' self-reported social anxiety positively predicted observer-rated social anxiety ($b = .21$, $t(74) = 2.57$, $p = .012$).

4. Discussion

In the present study, we demonstrated that (a) social anxiety manifests in visible signs of relationship impairment through Facebook (b) unacquainted observers use many of these signs to infer Facebook profile owners' levels of social anxiety, and (c) observers can reach moderately accurate judgments of an individual's social anxiety merely by viewing his or her Facebook profile. Social anxiety manifested and was perceived in the domains of social inactivity, close relationship quality, and self-disclosure, all of which are related to offline relationship impairment of HSA individuals. First, Facebook users whose profiles displayed evidence of social inactivity – most notably a low friend count – reported higher levels of social anxiety, and were seen by observers as more socially anxious. Second, in the domain of close relationship quality, Facebook users who listed their relationship status as *single* reported higher levels of social anxiety than those who listed a relationship status involving another person (e.g., *married to*) or those who did not list a relationship status, though observers did not use this sign to infer social anxiety. In this same domain, observers rated Facebook users whose profile pictures contained fewer other people as more socially anxious, though this sign did not relate to self-reported social anxiety. Third, in the domain of self-disclosure, profile owners whose profiles contained a status update or quote reported higher levels of social anxiety than those whose profiles did not contain one, and, among those whose profiles contained a quote, the length of that quote negatively predicted social

anxiety; in contrast, observers did not use these signs of self-disclosure to infer social anxiety.

4.1. Relationship impairment characteristic of offline social anxiety leaves traces online

The present findings have two primary implications for our understanding of how social anxiety manifests in online contexts. First, they suggest that the offline behavioral signs leading to relationship impairment among HSA individuals, may cause HSA individuals' online environments to display features that reflect social inactivity, impaired close relationship quality, and lack of self-disclosure. Despite the fact that HSA individuals view the internet as a more comfortable medium than face-to-face conversations through which to communicate with others (Valkenburg & Peter, 2009; Weidman et al., 2012), social anxiety appears to be displayed similarly across online and offline settings, consistent with the notion that online environments reflect individuals' offline personalities (Gosling et al., 2008). For example, given that HSA individuals exhibit a number of interpersonal tendencies that lead to diminished friendship quality (e.g., lack of assertiveness, emotional suppression interpersonal coldness; Davila & Beck, 2002; Fernandez & Rodebaugh, 2011; Kashdan & Steger, 2006; Meleshko & Alden, 1993), they likely experience less success in meeting new people, and have fewer opportunities to attend social events, which may help explain the finding that their Facebook profiles contain less evidence of social activity. Similarly, the fact that sharing personal information causes HSA individuals to experience fear of negative evaluation and interpersonal rejection (Mansell & Clark, 1999; Meleshko & Alden, 1993; Moscovitch et al., 2012; Wallace & Alden, 1997), helps explain the finding that their Facebook profiles are less likely to contain status updates or quotes, and the fact that the quotes they do post tend to be relatively brief.

Second, the present findings suggest that observers infer social anxiety among individuals whose online profiles display evidence of relationship impairment. Observers can infer social anxiety from HSA individuals' conversational reticence and aloofness (Alden & Wallace, 1995; Baker & Edelmann, 2002; Mansell & Clark, 1999; Norton & Hope, 2001), and observers in the present study similarly appear to have equated signs of online relationship impairment with social anxiety. For example, observers may infer that HSA individuals' conversational aloofness leads them to engage in fewer satisfying social interactions offline, or that HSA individuals' fear of negative evaluation leads them to avoid online social interactions, and therefore that HSA individuals' Facebook profiles should contain fewer friends, photos, and videos, as well as profile pictures containing no people other than the profile owner. Our finding regarding perceptions of online self-disclosure signs supports this line of reasoning; observers are often unable to accurately perceive the fear of negative evaluation characterizing offline social anxiety (Alden & Wallace, 1995; Norton & Hope, 2001), suggesting that they may not understand the link between social anxiety and reduced self-disclosure. Similarly, in the present study, observers did not link the absence of status updates or quotes, or brevity of quotes, to a Facebook profile owner's high levels of underlying social anxiety, even though these signs characterized HSA individuals' profiles.

4.2. Implications for identification and treatment

By establishing links between Facebook users' social anxiety and signs of social inactivity, impaired close relationship quality, and reduced self-disclosure, the present research could improve the efficiency and accuracy with which social anxiety is identified through online mediums, and lead to the development of improved treatment protocols. With respect to identification, Facebook profiles can be viewed with little cost beyond the consent of the owner, and therefore allowing a clinician to view a patient's profile could provide a cost-effective way to identify signs and symptoms of social anxiety in addition to those identified through more formal procedures (e.g., clinical interview). For example, in light of the present findings, a clinician could use a low Facebook friend count, a relationship status of *single*, or the absence of any status updates, as indicators that a patient who presents for treatment may indeed have a high level of social anxiety.

With respect to treatment, the present findings point to the need to increase these individuals' online social activity, given that an increasingly large proportion of socialization occurs on Facebook (Wilson et al., 2012), and that HSA individuals may derive more social support from online relationships than less socially anxious individuals (Indian & Grieve, 2014). Importantly, given prior work showing that a short internet chat may attenuate HSA individuals' anxiety in subsequent face-to-face interaction (Markovitsky, Anholt, & Lipsitz, 2012), and that HSA individuals view the internet as a less-threatening medium than face-to-face interactions through which to self-disclose (Valkenburg & Peter, 2009; Weidman et al., 2012), treatment protocols aimed at forcing HSA individuals to reach out to others through online media may be used as a first step in an exposure hierarchy aimed at helping HSA individuals to establish acquaintanceships and become more comfortable self-disclosing.

Similarly, identifying which signs of relationship impairment observers use to infer social anxiety could help shape treatment protocols aimed at improving HSA individuals' relationships. Just as the face-to-face conversational awkwardness exhibited by HSA individuals causes others to form less positive impressions of these individuals (Alden & Wallace, 1995; Baker & Edelmann, 2002; Mansell & Clark, 1999; Norton & Hope, 2001), giving off signs of social anxiety through online media may prevent HSA individuals from making favorable first impressions on others, which may hinder their ability to form meaningful relationships. It may therefore prove beneficial to craft treatment protocols aimed at reducing the frequency with which HSA individuals give off signs of social anxiety online. For example, if observers are shown to use signs of social inactivity (e.g., friend and photo count) and poor close relationship quality (e.g., few people in profile picture) to infer social anxiety, HSA individuals may benefit from interventions aimed at forcing them to befriend more individuals on Facebook, post more photos of themselves, and to choose a profile picture that depicts them in the presence of others, all of which might cause observers to view HSA individuals more positively as potential friends. In sum, our findings suggest that it may be important to incorporate Facebook or other social media outlets as tools to complete exposures as utilized in current treatment protocols (e.g., Hope, Heimburg, & Turk, 2010).

4.3. Future directions

The present research leaves open several questions for future work. First, it remains unclear why social anxiety did not relate to several theoretically relevant Facebook signs. For example, the number of other people in one's profile picture did not relate to self-reported social anxiety. This may be due in part to the fact that individuals high in social anxiety – due to their consistent preoccupation with impression management (Catalino et al., 2012) – attempt to project a socially desirable image of intimacy and relationship closeness by selecting a profile picture in which they are accompanied by others; future research should therefore directly test how self-presentational strategies of HSA individuals on Facebook relate to profile content. Similarly, observers used the number of people in a profile picture – but not profile owner

relationship status – to infer social anxiety. When evaluating Facebook profiles, observers may attend most to visually obvious signs of close relationship quality (e.g., a profile picture), even if more subtle signs (e.g., relationship status) may be more valid; future research could test this by manipulating the Facebook signs to which observers attend.

Second, future work could examine whether the manifestation of social anxiety in online signals occurs through intentional or incidental processes. Researchers have proposed that offline personality features manifest in online environments due to both intentional identity claims (e.g., an individual posts a photo of him or herself with a romantic partner to broadcast the importance of that relationship) and incidental behavioral residue (e.g., a talkative individual ends up with a many posts on his or her Facebook wall due to frequent interaction with friends; Gosling et al., 2008). In the case of social anxiety, researchers have argued both (a) that HSA individuals intentionally give off subtle signs signaling their social anxiety (e.g., averted eye gaze, slumped posture), as a means of communicating submissive motives to onlookers, and thereby eliciting acceptance into a social group (Gilbert, 2001); and (b) that HSA individuals incidentally give off signs of their social anxiety as a result of their attempts to project a more favorable, *less* socially anxious impression to others (Leary, 2010). Both of these accounts may help explain some of the present findings. For example, the intentional perspective suggests that HSA individuals may view the act of posting a relationship status of *single* as a way to actively elicit prosocial attention and companionship from other online users. In contrast, the incidental perspective suggests that signs such as posting fewer status updates and quotes, as well as shorter quotes, may ironically result from HSA individuals attempt to hide their socially anxious thoughts and feelings from others.

Third, future research might examine how social anxiety manifests and is perceived in a broader range of signs. For example, although coding the linguistic content of individuals' Facebook wall posts, status updates, and quotes was beyond the scope of the present research, linguistic content (e.g., emotion words, first-person pronouns, profanity) has been shown to relate to manifestations and impressions of personality characteristics in digital contexts (e.g., Küfner, Back, Nestler, & Egloff, 2010; Rodriguez, Holleran, & Mehl, 2010; Weidman, Cheng, Chisholm, & Tracy, 2015). Building off this research, as well as work examining linguistic manifestations of social anxiety in offline contexts (e.g., Hofmann, Moore, Gutner, & Weeks, 2012), future work could examine how linguistic content on Facebook relates to social anxiety. Additionally, although we coded a comprehensive selection of signs that are visible in a momentary snapshot of an individual's Facebook profile (e.g., number of friends, relationship status, presence of a quote), we did not code more dynamic signs that emerge over time. For example, given that HSA individuals often do not reciprocate intimate disclosure in conversations (Meleshko & Alden, 1993; Sparrevohn & Rapee, 2009), it is possible that they are less likely to respond when others post messages on their Facebook wall (i.e., a forum for open communication between users). Similarly, recent work employing daily sampling methods has shown that individuals who feel insecure about their romantic relationships on any given day may try to assuage those feelings by posting publicly about that relationship on Facebook (e.g., a photograph or status update; Emery, Muise, Dix, & Le, 2014). Given that HSA individuals tend to experience insecurity about their close relationships, one might predict that HSA individuals who are involved in a relationship would be likely to frequently post publicly about that relationship, to quell their own internal anxieties. A rigorous longitudinal design examining this question would be a fruitful direction for future work.

5. Conclusion

In the present study, we demonstrated that signs of offline relationship impairment characteristic of social anxiety appear online, and that unacquainted observers use these signs to infer and accurately judge social anxiety in online users. Facebook profiles of HSA individuals contained signs of social inactivity, close relationship impairment, and lack of self-disclosure, and observers used many of these signs to form moderately accurate impressions of social anxiety. These findings provide the first comprehensive examination of the signs of offline relationship impairment that characterize social anxiety in the online world – in which Facebook represents an increasingly popular socialization medium – and as a result may represent a first step in developing identification and treatment protocols for social anxiety that rely on online information. In sum, if an individual exhibits socially anxious tendencies and experiences relationship impairment offline, his or her online environment will likely show similar signs, and observers will likely be able to use some of these signs to tell that he or she is socially anxious.

Author notes

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