



## Social networking profile correlates of schizotypy

Elizabeth A. Martin<sup>a</sup>, Drew H. Bailey<sup>a</sup>, David C. Cicero<sup>b</sup>, John G. Kerns<sup>a,\*</sup>

<sup>a</sup> Department of Psychological Sciences, University of Missouri, 210 McAlester Hall, Columbia, MO 65211-2500, USA

<sup>b</sup> Department of Psychology, University of Hawaii-Manoa, 2530 Dole St., Sakamaki Hall C 400, Honolulu, HI 96822-2294, USA

### ARTICLE INFO

#### Article history:

Received 7 October 2011

Received in revised form

1 May 2012

Accepted 22 June 2012

#### Keywords:

Social networking  
Social anhedonia  
Extraversion  
Perceptual aberration  
Magical ideation

### ABSTRACT

Social networking sites, such as Facebook, are extremely popular and have become a primary method for socialization and communication. Despite a report of increased use among those on the schizophrenia-spectrum, few details are known about their actual practices. In the current research, undergraduate participants completed measures of schizotypy and personality, and provided access to their Facebook profiles. Information from the profiles were then systematically coded and compared to the questionnaire data. As predicted, social anhedonia (SocAnh) was associated with a decrease in social participation variables, including a decrease in number of friends and number of photos, and an increase in length of time since communication with a friend, but SocAnh was also associated with an increase in profile length. Also, SocAnh was highly correlated with extraversion. Relatedly, extraversion uniquely predicted the number of friends and photos and length of time since communication with a friend. In addition, perceptual aberration/magical ideation (PerMag) was associated with an increased number of “black outs” on Facebook profile print-outs, a measure of paranoia. Overall, results from this naturalistic-like study show that SocAnh and extraversion are associated with decreased social participation and PerMag with increased paranoia related to information on social networking sites.

© 2012 Elsevier Ireland Ltd. All rights reserved.

### 1. Introduction

Using questionnaire measures, psychopathologists have identified social anhedonia and psychotic-like experiences as predictors of later schizophrenia-spectrum disorders, including schizoid and schizotypal personality disorders (e.g., Kwapil, 1998; Gooding et al., 2005; Chapman et al., 1994; Kwapil et al., 1997). Social anhedonia (SocAnh) is the diminished experience of positive emotion for social stimuli (e.g., Wolf, 2006) and is negatively correlated with extraversion (e.g.,  $r = -0.36$ ; Kerns, 2006). Anhedonia appears to be a stable, enduring trait in schizophrenia-spectrum disorders, and anhedonic-like symptoms arguably account for five of the seven Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition (DSM-IV) criteria for schizoid personality disorder (American Psychiatric Association (APA), 2000). Similarly, psychotic-like experiences, such as perceptual distortions and unusual beliefs, comprise many of the diagnostic criteria for schizotypal personality disorder (APA, 2000). Some have argued that the personality of individuals with psychotic-like experiences is not well captured by the Big five and have called for a new factor, “oddity” (e.g., Watson et al., 2008).

Previous research has consistently found that self-reports of SocAnh and elevated perceptual aberration and/or magical ideation (PerMag) load on different schizophrenia-spectrum factors

(Cicero and Kerns, 2010; Kwapil et al., 2008), specifically the negative and positive schizotypy factors respectively. Among the differences between these factors include social variables. For example, results indicate that both dimensions were associated with self-reports of poorer social functioning, but only negative schizotypy was associated with a reduced likelihood of intimate relationships (Kwapil et al., 2008). In addition, a group of individuals with elevated levels of SocAnh reported having fewer social supports and less satisfaction with social supports than a group of individuals with elevated magical ideation and a control group, which did not differ from each other (Horan et al., 2007).

One potential limitation to these studies is the reliance on self-report questionnaire measures. Self-report questionnaire measures can be prone to memory biases and inaccuracies due to carelessness or misinterpretation of item content (Schwarz, 1999). One possible way to increase the validity of such findings is to use more naturalistic observations. Recently, researchers have employed experiential sampling methods to investigate correlates of social anhedonia. For example, Brown et al. (2007) reported that social anhedonia in college students was associated with decreased positive affect. Although experiential sampling provides an “online” measure of variables of interest, it can also be affected by self-report biases because it also requires participants to subjectively report their feelings or behaviors.

A way to reduce the limitations of self-report measures is to objectively measure variables of interest. By objectively and systematically rating information from a more naturalistic environment, such as social networking sites, important information can be

\* Corresponding author. Tel.: +1 573 882 6860; fax: +1 573 882 7710.  
E-mail address: kernsj@missouri.edu (J.G. Kerns).

obtained that might otherwise be missed. In addition, considering naturalistic-like behavior in conjunction with traditional pencil and paper psychological measures can help us understand how these measures relate to meaningful, real-world, and easily understood outcomes (Mehl and Robbins, 2011).

### 1.1. Social networking

Social networking sites, such as Facebook, are highly and increasingly popular. For example, it is estimated that approximately 75% of young adults (ages 18–29) utilized these sites (Lenhart et al., 2010). They have quickly become widely used as a means of communication, social interaction, and entertainment (boyd and Ellison, 2007; Valkenburg and Peter, 2009). In fact, adolescents with schizotypal personality disorder traits reported significantly more time spent participating in online gaming and chat rooms than control participants but significantly less via face-to-face social interaction (Mittal et al., 2007).

In the current study, our main aim was to characterize the associations between schizotypy, specifically social anhedonia and perceptual aberration/magical ideation, and social networking practices. To do so, individuals' ratings of SocAnh and PerMag were compared to dimensions of their Facebook profiles. To our knowledge, this is the first study that aimed to compare self-reports of schizotypy to objectively coded Facebook profiles. Because extraversion has been associated with SocAnh (e.g., Kerns, 2006), we included extraversion in this study to see if it accounted for any association between SocAnh and Facebook profile variables. We hypothesized that SocAnh and extraversion, but not PerMag, would be associated with a decrease in social participation variables that involve others' reciprocal, social behaviors. In addition, based on previous research (Mittal et al., 2007), we hypothesized that both SocAnh and PerMag, but not extraversion, would be associated with a longer profile length, a proxy measure for the length of time spent on Facebook. In addition, we hypothesized that PerMag would be associated with increased suspiciousness or paranoia, measured by the amount of information they chose to "black out" on print-outs of their profiles before leaving the study.

## 2. Methods

### 2.1. Participants

Participants were 211 college students (39% male, 85.6% Caucasian, mean age 18.64, S.D.=0.95) attending a large, Midwestern, public university who received credit for an Introduction to Psychology course for their participation. Any student enrolled in the course had the opportunity to volunteer for the study (i.e. there was no selection criteria or active recruitment of certain people).

### 2.2. Materials

#### 2.2.1. Schizotypy scales

Participants completed the Revised Social Anhedonia Scale (SocAnh; Eckblad et al., 1982), which is designed to measure lack of relationships and lack of pleasure from relationships (e.g., "Having close friends is not as important as many people say."). They also completed the Perceptual Aberration Scale (PerAb; Chapman et al., 1978) and the Magical Ideation Scale (MagicId; Eckblad and Chapman, 1983), which are designed to measure psychotic-like distortions and unusual beliefs respectively. Because of the high correlation between the PerAb and MagicId scales, following previous research (Chapman et al., 1994), we created a "PerMag" score based on the standardized, summed totals from these scales. In addition, participants completed the Chapman Infrequency Scale (Chapman and Chapman, 1983) to screen for careless or invalid responses. Based on previous research (Chapman et al., 1994), those who endorsed three or more items on this 13-item, true-false scale were eliminated from analyses ( $n=9$ ). The 118-items from these four scales were presented to participants in random order. Individuals who score high on SocAnh are at an increased risk of developing a schizophrenia-spectrum disorder (Gooding et al., 2005; Kwapiel, 1998), and those

who score high on PerAb and MagicId have an increased risk of developing psychosis (Chapman et al., 1994). In the current study, we found internal consistencies for these schizotypy scales comparable with previous reports (all Cronbach's  $\alpha > 0.85$ ).

#### 2.2.2. Extraversion

To measure extraversion, participants completed the 10-item extraversion scale from the International Personality Item Pool (IPIP; Goldberg et al., 2006). Responses were made on a five-point scale, indicating amount of agreement (in the current study, Cronbach's  $\alpha=0.77$ ). Because previous research has suggested that social anhedonia is moderately correlated with extraversion (Kerns, 2006), we included this measure to test whether social anhedonia predicted any of the social participation variables after statistically removing variance shared with scores on the IPIP.

#### 2.2.3. Paranoia

Paranoia was measured with the Paranoia and Suspiciousness Questionnaire (PSQ; Rawlings and Freeman, 1996). The PSQ is a 47-item true-false questionnaire that was developed specifically for use in non-psychiatric samples as a measure of subclinical paranoid ideation (in the current study, Cronbach's  $\alpha=0.86$ ).

We included a self-report measure of paranoia for two reasons. First, factor-analytic studies have found that paranoia and perceptual aberration/magical ideation are distinct but highly correlated (see Stefanis et al., 2004, for a review). Thus, by including it in the current study, we would be able to test if PerMag predicted black-outs after statistically removing variance shared with scores on the PSQ. Second, its inclusion was a way to validate our behavioral measure of paranoia, "black-outs" (as discussed in Section 2.4). If scores on the PSQ positively correlated with the number black-outs, this would support the hypothesis that black-outs may be a behavioral measure of paranoia. Descriptive information about questionnaire data can be found in Table 1.

#### 2.2.4. Facebook.com information

Facebook.com is a free, online networking website in which members can create a profile of personal information, including a "Bio" (e.g., demographic information) and "Info" sections (e.g., lists of their Favorite Quotes, Books, Movies, Music, and Television shows). An individual user can send a "friend request" to another user, and if accepted, these two users become "Facebook friends". Users can post information (e.g., "Status updates") on their own "wall," akin to a message board, or on other users' walls, which are visible to other Facebook users. In addition, users can upload photos, and then "tag" themselves and others in the photos. The total number of photos in which someone is tagged is listed on each profile. The extensiveness, or length, of a profile is at the user's discretion.

After completion of the questionnaires, participants were directed to a separate, private room with a computer and printer. They were asked to log-on to Facebook. Participants were told that some information from their Facebook profiles would be printed out and that they would have the opportunity to "black out" any information they wished on the print-outs. The experimenter then printed out different sections of the participant's Facebook profile, including the

**Table 1**

Descriptive statistics for questionnaire data and Facebook profile variables.

Variable	Mean (S.D.)	Range
<i>Schizotypy scales</i>		
Social anhedonia scale	6.78 (5.76)	0–36
Perceptual aberration scale	4.35 (4.56)	0–27
Magical ideation scale	8.00 (5.47)	0–24
Paranoia and suspiciousness questionnaire	19.82 (8.01)	4–41
<i>Social participation</i>		
Number of friends	740.50 (462.35)	
Length of time since communication with a friend (i.e. hours since 5th most recent wall post)	175.40 (504.2)	
Number of wall posts by others	7.15 (3.73)	
Number of photos of self	653.20 (561.7)	
<i>Profile length</i>		
Bio lines	2.57 (5.83)	
Activities	4.68 (24.74)	
Interests lines	0.66 (0.92)	
Music lines	3.23 (4.27)	
Book lines	0.74 (1.28)	
Movie lines	2.33 (4.49)	
TV lines	1.66 (2.41)	
Other	17.44 (51.42)	
<i>Black-outs</i>		
Number of lines blacked out	5.60 (16.79)	

“Wall”, “Info”, “Photos”, and “Friends” sections. To standardized data collection, all viewable information from these sections was printed. Two participants declined to log-on to Facebook, and two participants reported that they did not have Facebook profiles.

### 2.3. Procedure

After informed consent was obtained, participants completed the IPIP, schizotypy scales, and PSQ administered through Direct RT computer software (Jarvis, 2008). After completion of the questionnaires, participants printed out the requested information from their Facebook profiles and were given the opportunity to “black out” any information they wished. This research project was approved by the University’s institutional review board, and all procedures were consistent with the principles of ethical conduct of human research.

### 2.4. Coding Facebook profiles

Three independent raters each coded approximately 65% of the Facebook profiles collected, and each acted as a consensus rater for approximately 35% of Facebook profiles (i.e. the profiles they did not code). That is, two raters coded each profile and a third rater settled any discrepancies. The average of the three intra-class correlations (i.e. between raters one and two, between raters one and three, and between raters two and three) was ICC=0.95. Information coded fell into three general categories which included (a) social participation (number of friends, length of time since communication with a friend,<sup>1</sup> number of posts by others on the participant’s wall, number of photos of self [which could be posted by either the participant or others]), (b) profile length (number of lines of text of Bio, Activities, Music, Books, Movies, and Television) and (c) black-outs (number of lines that were blacked out). Descriptive information about participants’ Facebook profiles can be found in Table 1.

### 2.5. Data reduction

To assess the amount of unique information contained in the Facebook profile line count variables (number of lines of text of Bio, Activities, Music, Books, Movies, and Television), we performed a principal component analysis on these variables. To determine the appropriate number of components to retain, we used Horn’s Parallel Analysis (Horn, 1965), using the “paran” function (Dinno, 2009) in R (Ihaka and Gentleman, 1996). Based on the results from this analysis, only one component was retained. Therefore, the numbers of lines for the profile variables were summed to create a profile length composite variable, “Profile length”.

### 2.6. Data analysis

Our primary focus was to examine five associations, specifically whether (a) SocAnh and extraversion would be associated with social participation variables, (b) SocAnh would significantly predict social participation variables after statistically removing variance shared with extraversion, (c) SocAnh and PerMag would be associated with increased profile length, (d) PerMag and PSQ would be associated with black-outs, a behavior measure of paranoia, and (e) PerMag would significantly predict the number of black-outs after statistically removing variance shared with PSQ scores.

## 3. Results

First, before examining our main hypotheses, we performed preliminary analyses on both the questionnaire data and Facebook variables to find converging evidence for past findings. Consistent with previous research, SocAnh was significantly, negatively correlated with level of extraversion,  $r = -0.52$ ,  $P < 0.001$ . At the same time, SocAnh was positively correlated with PerMag,  $r = 0.40$ ,  $P < 0.001$ . PerMag was also significantly, positively correlated with scores on the PSQ,  $r = 0.67$ ,  $P < 0.001$ .

We also examined the relationship between the Facebook variables. The variables related to social participation were significantly correlated to each other ( $r = 0.15 - 0.59$ , all  $P$ s  $< 0.05$ ), with the exception of the number of wall posts by others and length of time since communication with a friend ( $r = -0.08$ ,

$P = 0.26$ ). Profile length and black-outs were uncorrelated with the social participation variables and with each other.

### 3.1. Social participation

Next, we examined whether SocAnh was associated with a number of social participation variables from Facebook profiles. As can be seen in Table 2, there was a significant, negative correlation between SocAnh and number of Facebook friends (such that an increase of one S.D. in SocAnh was associated with a decrease of 97 Facebook friends;  $r = -0.21$ ,  $P < 0.01$ ) and numbers of photos of oneself ( $r = -0.19$ ,  $P < 0.01$ ). Also, there was a significant, positive correlation between SocAnh and length of time since communication with a friend ( $r = 0.2$ ,  $P < 0.01$ ). That is, higher levels of SocAnh were associated with an increased length of time since a social interaction on Facebook. In addition, there was a non-significant trend between SocAnh and the number of wall posts by others ( $r = -0.14$ ,  $P = 0.06$ ).

Also, extraversion was positively associated with number of Facebook friends ( $r = 0.44$ ;  $P < 0.001$ ), such that an increase of one S.D. in extraversion was associated with an increase of 205 Facebook friends. Extraversion was also positively associated with numbers of Facebook photos of oneself ( $r = 0.31$ ;  $P < 0.001$ ), and wall posts by others ( $r = 0.18$ ;  $P = 0.01$ ), and negatively correlated with length of time since communication with a friend ( $r = -0.28$ ;  $P < 0.001$ ).

In a follow-up analysis to examine whether either SocAnh or extraversion predicted unique variance in these variables above and beyond each other, SocAnh and extraversion were entered simultaneously into separate regression models predicting each of the social participation variables mentioned above. As can be seen in Table 3, results indicate that neither predictor remained significant when predicting number of wall posts by others. In addition, as can also be seen in Table 3, extraversion remained significantly predictive of number of friends ( $f^2 = 0.19$ ), number of photos of oneself ( $f^2 = 0.06$ ), and length of time since communication with a friend ( $f^2 = 0.05$ ), while SocAnh did not (all  $f^2 < 0.006$ ). Thus, it appears that variations in extraversion can better account for the social participation variables. Also, neither PerMag nor PSQ was significantly related to, or predictive of, any of the social participation variables.

### 3.2. Profile length

Next, we examined whether two aspects of schizotypy, SocAnh and PerMag, were associated with profile length. Results revealed that SocAnh ( $r = 0.15$ ,  $P < 0.05$ ), but not PerMag ( $r = 0.05$ ,  $P = 0.53$ ), was significantly correlated with profile length. That is, a standard

**Table 2**

Correlations between questionnaire data and Facebook profile variables.

	Social participation				Profile length	Black-outs
	Friends	Photos	Posts	Wall		
SocAnh	-0.21**	-0.19**	-0.14 <sup>+</sup>	0.2**	0.15 <sup>+</sup>	0.07
Extraversion	0.44***	0.31***	0.18**	-0.28***	-0.09	0.00
PerMag	-0.05	-0.09	-0.01	0.03	0.05	0.15 <sup>+</sup>
PSQ	0.04	0.06	-0.02	-0.09	-0.01	0.17

Note: friends=number of friends, photos=number of photos of self, posts=number of posts by others on Facebook wall, wall=length of time since communication with a friend, profile length=number of profile variable lines, black-outs=number of lines “blacked out” on Facebook profile print-out by participant.

<sup>+</sup>  $P < 0.1$ .

\*  $P < 0.05$ .

\*\*  $P < 0.01$ .

\*\*\*  $P < 0.0013$ .

<sup>1</sup> A review of participant profiles revealed that 86.7% of the profiles had at least five wall posts. Thus, we chose to use time since the 5th most recent wall post as the measure of “time since last communication with a friend”.

**Table 3**  
Regression analyses of SocAnh and extraversion predicting Facebook variables and profile length.

	B	SE B	$\beta$	$f^2$
<i>Friends</i>				
SocAnh	2.24	6.07	0.03	0.001
Extraversion	32.83	5.46	0.46**	0.19
$R^2=0.20$ ( $P < 0.001$ )				
<i>Photos</i>				
SocAnh	-4.52	7.74	-0.05	0.002
Extraversion	24.38	6.97	0.28**	0.06
$R^2=0.10$ ( $P < 0.001$ )				
<i>Posts</i>				
SocAnh	-0.04	0.05	-0.06	0.003
Extraversion	0.09	0.05	0.15 <sup>+</sup>	0.02
$R^2=0.03$ ( $P < 0.05$ )				
<i>Wall</i>				
SocAnh	7.84	7.34	0.09	0.006
Extraversion	-19.51	6.51	-0.24 <sup>+</sup>	0.05
$R^2=0.09$ ( $P < 0.001$ )				
<i>Profile length</i>				
SocAnh	0.30	0.19	0.14 <sup>+</sup>	0.01
Extraversion	-0.03	0.17	-0.02	0.0002
$R^2=0.02$ ( $P=0.14$ )				

Note: friends=number of friends, photos=number of photos of self, posts=number of posts by others on Facebook wall, wall=length of time since communication with a friend, profile length=number of profile variable lines.

<sup>+</sup>  $P=0.12$ .

\*  $P < 0.01$ .

\*\*  $P < 0.001$ .

deviation increase in SocAnh was associated with an increase of approximately two lines in one's Facebook profile. In addition, neither extraversion nor PSQ was significantly related to profile length (all  $|r| < 0.10$ ,  $P > 0.22$ ).

In addition, we entered SocAnh and extraversion simultaneously into the model predicting profile length. As can be seen in Table 3, extraversion was not significant ( $f^2=0.0002$ ), but there was a trend towards significance for social anhedonia ( $f^2=0.01$ ). That is, although neither SocAnh nor extraversion accounted for variance over the other, SocAnh showed a small effect as a predictor of profile length (Cohen, 1992) while extraversion did not. Thus, it appears that SocAnh has a modest, but potentially valuable, contribution to the prediction of profile length.

### 3.3. Black-outs

Last, we examined whether PerMag and paranoia, as measured by the PSQ, were associated with the number of black-outs on Facebook profiles. As can be seen in Table 2, results revealed that both PerMag ( $r=0.15$ ,  $P < 0.05$ ) and PSQ ( $r=0.17$ ,  $P < 0.05$ ) were significantly related to number of black-outs. Participants' black-outs were unrelated to SocAnh or extraversion (all  $|r| < 0.09$ ,  $P > 0.25$ ).

Next for black-outs, we examined whether the variance accounted for by PerMag was associated with PSQ scores. Both PerMag and PSQ were entered simultaneously into a regression model predicting black-outs. As can be seen in Table 4, neither PerMag ( $f^2=0.006$ ) nor PSQ ( $f^2=0.011$ ) remained significantly predictive of black-outs although the PSQ showed a small effect (Cohen, 1992). Hence, it appears that for black-outs, the variance accounted for by PerMag is redundant with the variance accounted for by PSQ scores. This is consistent with the substantial association between PerMag and PSQ scores as found in the current study, which indicates multicollinearity between these predictors and can lead

**Table 4**  
Regression analysis of PerMag and PSQ predicting black-outs.

	B	SE B	$\beta$	$f^2$
<i>Black-outs</i>				
PerMag	0.81	0.76	0.09	0.006
PSQ	0.26	0.18	0.12	0.011
$R^2=0.03$ ( $P < 0.05$ )				

Note: black-outs=number of lines "blacked out" on Facebook profile print-out by participant.

to instability of the model and problems with coefficient estimates (Cohen et al., 2003).

## 4. Discussion

To our knowledge, this is the first study that aimed to link facets of schizotypy to specific aspects of social networking site profiles. Based on its relatively new birth, the Internet has a short history as a tool in psychological research. That is, examining areas of the Internet, such as social networking sites, is a novel way to study psychological variables. Objectively coding information from these websites can help ameliorate some of the self-report biases associated with paper-and-pencil self-reports. In addition, because of the real or imagined perception of anonymity, use of the Internet may interact with psychopathology allowing for a more unbiased measure of social behavior. Overall, our result indicate that personality variation (i.e. levels of extraversion) may better account for some social participation variables on Facebook but that measures of aspects of schizotypy might contribute additional information regarding Internet usage.

The current finding that SocAnh was negatively associated with the number of Facebook friends is consistent with other research that found individuals with elevated levels of SocAnh reported having fewer social supports than a group of individuals with elevated magical ideation and a control group (Horan et al., 2007). In addition, the finding of a relationship between SocAnh and length of time since communication with a friend is also consistent with the finding of a lack of social interest and fewer and less frequent social interaction (e.g., Silva and Kwapil, 2011). We also found that SocAnh was negatively related to the number of photos of the self. Given the fact that self photos can be uploaded to the website by the participant or other Facebook users, this may help explain the relationship between number of friends and number of photos of self ( $r=0.59$ ,  $P < 0.001$ ).

We also found that extraversion uniquely predicted some social participation variables over and above SocAnh, including number of friends, number of photos of oneself, and length of time since last communication with a friend. Thus, it appears that variation in this personality dimension provides more information than levels of SocAnh. Importantly, some particular aspect or aspects of extraversion may be accounting for its prediction ability. Previous research has reported that in both women and men, SocAnh is negatively associated with the extraversion facets of warmth, gregariousness, and positive emotion measured by the NEO-PI-R (Ross et al., 2002). Thus, it is possible that one, or a combination, of these facets could account for the unique prediction ability of extraversion. Future research could examine if certain aspects of extraversion are associated with social involvement on social networking sites.

At the same time, there was some evidence that SocAnh might be uniquely related to Facebook variables in this study. Although extraversion uniquely predicted some social participation variables, only SocAnh was significantly correlated with profile length, and there was a trend (albeit  $P=0.12$ ) for SocAnh to predict profile



length over and above variance shared with extraversion. Hence, although on the whole the current study provides evidence that research attempting to understand social participation in SocAnh should consider the influence of extraversion, there is also some evidence suggesting that SocAnh could be uniquely related to some Facebook variables.

Although we found that SocAnh was associated with profile length as hypothesized, we found no similar association with PerMag and profile length. One possible explanation for an association with profile length is the way in which individuals with higher SocAnh vs. higher PerMag use social networking sites. For example, individuals with higher levels of SocAnh may use it in ways that do not require active social interaction. Adding information to one's profile requires no reciprocal, social behavior as profile length is completely dependent on the individual user. Thus, people with higher levels of SocAnh may use Facebook to list their favorite books and movies, but not to socially interact with others (e.g., number of Facebook friends) or share information with friends (e.g., number of photos). These findings converge with the results of Mittal et al. (2007), who reported that adolescents with schizotypal personality disorder traits reported significantly more time spent participating in online gaming and chat rooms but significantly less time in face-to-face social interaction than control participants. Currently, there is no way to objectively determine the length of time one spends per day on Facebook. Future studies could attempt to measure this by asking participants to estimate the length of time they spend on Facebook daily or by assigning participants an electronic device (e.g., a smart phone) that could monitor data usage.

In the current research, we found that both PerMag and the PSQ were positively associated with the number of pieces of information participants chose to black out on the print-outs of their Facebook information. Interestingly, when PerMag and PSQ were simultaneously entered as predictors into a regression equation, neither PerMag nor PSQ remained significantly predictive of black-outs. Furthermore, this model explained only 3.7% of the variance in black-outs, which is much less than the sum of the variances from the single predictor models. Although the PSQ had a larger effect size than PerMag, taken together, this suggests that the shared variance between PerMag and PSQ is related to black-outs, and we interpret this shared variance to be the extent to which they both measure paranoia.

The number of "black-outs" in the current study represents the amount of information participants chose not to share with the experimenter and may be a behavioral manifestation of mistrust or paranoia. This finding is consistent with previous research examining the association between self-reported paranoia and behavioral measures. For example, participants high on paranoia have been found to take longer to read informed consent forms, sit further away from the experimenter, and evaluate the experimenter more harshly (Combs and Penn, 2004), ask more questions during the informed consent process (Gay and Combs, 2005), and think it is more likely that they are being watched behind a two-way mirror (Fenigstein and Vanable, 1992). The current research extends these studies by examining the relation between paranoia and how much information a participant is willing to share with the experimenter.

One advantage of behavioral measures of paranoia is that it circumvents some methodological weaknesses of self-report measures. For example, previous research suggests that people tend to attempt to present themselves in as positive a way as possible (e.g., Snyder, 1974), and people with paranoia may be especially prone to this self-presentation strategy (Bentall et al., 2001). Participants with high paranoia may be wary of reporting their paranoia on self-report measures out of fear of being judged harshly (Martin and Penn, 2001). Although the current research

did not ask the participants for their motivation in blacking out content, it is likely that they did so out of concern about releasing personal information. However, it should be noted that participants higher on paranoia did not differ from participants lower in paranoia in terms of the amount of personal information shared with friends. This suggests that participants higher on paranoia may be more comfortable sharing information in an online setting than in the face-to-face interactions with the experimenter. Future research utilizing a behavioral measure of paranoia, as used here, could ask participants why they decided to shield certain information from the experimenters.

Future research could investigate whether participants high on paranoia report being more comfortable sharing information in an online setting than in the face-to-face interactions with the experimenter using a within-subjects design. In addition, future research could investigate whether individuals' privacy settings on Facebook relate to paranoia. Privacy settings can be set to limit what a person's Facebook friends and "non-friends" (i.e. people who are not Facebook friends) can view, which can range from allowing everything on the profile to be viewed by anyone else to preventing even your name from appearing in searches on Facebook. In the current study, black-outs were akin to "in-the-moment" privacy settings.

In the current study, we used a sample of individuals who were not selected based on schizotypy scores. It is possible that using a sample selected based on extreme scores on schizotypy scales would produce stronger relationships between schizotypy scores and social participation variables and paranoia. It is also possible that individuals with extreme social anhedonia might not use social networking sites. A future study could select a group of individuals with extreme scorers on the schizotypy scales to investigate their social networking practices. In addition, the current study involved of a relatively homogenous group of college-aged participants. It is possible that demographic factors, such as age, ethnicity and socioeconomic status, could influence the use of social networking sites. Future research could investigate whether the results reported here are applicable to a more diverse group of individuals.

Finally, although the current study aimed at reducing self-report biases by using a more naturalistic method to assess social functioning and personality, Facebook profiles are, by design, created and modified by the user. Hence, there may be an inherent bias that is unavoidable. Importantly though, this methodology helps to understand how self-report differences relate to some objective, real-world information and outcomes. For example, we can learn how many Facebook friends an individual who endorses an item from the social anhedonia scale (Eckblad et al., 1982) differs from someone who does not endorse that item. This information could potentially be used to inform diagnostic materials or intervention strategies.

## Acknowledgments

We would like to thank Christopher Mattix, Jenna McDonnell, and John Yanez for their help in coding the Facebook profiles. This work was supported by a National Research Service Award (F31MH090669) awarded to Elizabeth A. Martin.

## References

- American Psychiatric Association, 2000. Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision. American Psychiatric Association, Washington DC.
- Bentall, R.P., Corcoran, R., Howard, R., Blackwood, N., Kinderman, P., 2001. Persecutory delusions: a review and theoretical integration. *Clinical Psychology Review* 21, 1143–1192.

- boyd, d.m., Ellison, N.B., 2007. Social network sites: definition, history, and scholarship. *Journal of Computer-Mediated Communication* 13, 210–230.
- Brown, L.H., Silvia, P.J., Myin-Germeys, I., Kwapil, T.R., 2007. When the need to belong goes wrong: the expression of social anhedonia and social anxiety in daily life. *Psychological Science* 18, 778–782.
- Chapman, L.J., Chapman, J.P., Raulin, M.L., Edell, W.S., 1978. Schizotypy and thought disorder as a high risk approach to schizophrenia. Brunner/Mazel, New York.
- Chapman, L.J., Chapman, J.P., Kwapil, T.R., Eckblad, M., Zinser, M.C., 1994. Putatively psychosis-prone subjects 10 years later. *Journal of Abnormal Psychology* 103, 171–183.
- Chapman, J.P., Chapman, L.J., 1983. Reliability and the discrimination of normal and pathological groups. *The Journal of Nervous and Mental Disease* 171, 658–661.
- Cicero, D.C., Kerns, J.G., 2010. Multidimensional factor structure of positive schizotypy. *Journal of Personality Disorders* 24, 327–343.
- Cohen, J., 1992. A power primer. *Psychological Bulletin* 112, 155–159.
- Cohen, J., Cohen, P., West, S.G., Aiken, L.S., 2003. *Applied multiple regression/correlation analysis for the behavioral sciences*, third ed. Lawrence Erlbaum Associates, Inc., Mahwah, NJ.
- Combs, D.R., Penn, D.L., 2004. The role of subclinical paranoia on social perception and behavior. *Schizophrenia Research* 69, 93–104.
- Dinno, A., 2009. Implementing Horn's parallel analysis for principal component analysis and factor analysis. *Stata Journal* 9, 291–298.
- Eckblad, M., Chapman, L.J., 1983. Magical ideation as an indicator of schizotypy. *Journal of Consulting and Clinical Psychology* 51, 215–225.
- Eckblad, M., Chapman, L.J., Chapman, J.P., Mishlove, M., 1982. The Revised Social Anhedonia Scale, unpublished manuscript.
- Fenigstein, A., Vanable, P.A., 1992. Paranoia and self-consciousness. *Journal of Personality and Social Psychology* 62, 129–138.
- Gay, N.W., Combs, D.R., 2005. Social behaviors in persons with and without persecutory delusions. *Schizophrenia Research* 80, 361–362.
- Goldberg, L.R., Johnson, J.A., Eber, H.W., Hogan, R., Ashton, M.C., Cloninger, C.R., Gough, H.G., 2006. The international personality item pool and the future of public-domain personality measures. *Journal of Research in Personality* 40, 84–96.
- Gooding, D.C., Tallent, K.A., Matts, C.W., 2005. Clinical status of at-risk individuals 5 years later: further validation of the psychometric high-risk strategy. *Journal of Abnormal Psychology* 114, 170–175.
- Horan, W.P., Brown, S.A., Blanchard, J.J., 2007. Social anhedonia and schizotypy: the contribution of individual differences in affective traits, stress, and coping. *Psychiatry Research* 149, 147–156.
- Horn, J.L., 1965. A rationale and test for the number of factors in factor analysis. *Psychometrika* 32, 179–185.
- Ihaka, R., Gentleman, R., 1996. R: a language for data analysis and graphics. *Journal of Computational and Graphical Statistics* 5, 299–314.
- Jarvis, B.G., 2008. *DirectRT (version 2008)*. Empirisoft Corporation, New York.
- Kerns, J.G., 2006. Schizotypy facets, cognitive control, and emotion. *Journal of Abnormal Psychology* 115, 418–427.
- Kwapil, T.R., Miller, M.B., Zinser, M.C., Chapman, J., Chapman, L.J., 1997. Magical ideation and social anhedonia as predictors of psychosis proneness: a partial replication. *Journal of Abnormal Psychology* 106, 491–495.
- Kwapil, T.R., 1998. Social anhedonia as a predictor of the development of schizophrenia-spectrum disorders. *Journal of Abnormal Psychology* 107, 558–565.
- Kwapil, T.R., Barrantes-Vidal, N., Silva, P.J., 2008. The dimensional structure of the Wisconsin schizotypy scales: factor identification and construct validity. *Schizophrenia Bulletin* 34, 444–457.
- Lenhart, A., Purcell, K., Smith, A., Zickuhr, K., 2010, February 3. Social Media and Mobile Internet Use Among Teens and Young Adults. Pew Internet American Life Project. <[www.pewinternet.org/Reports/2010/Social-Media-and-Young-Adults.aspx](http://www.pewinternet.org/Reports/2010/Social-Media-and-Young-Adults.aspx)> (retrieved 06.06.11).
- Martin, J.A., Penn, D.L., 2001. Social cognition and subclinical paranoid ideation. *British Journal of Clinical Psychology* 40 (Pt. 3), 261–265.
- Mehl, M.R., Robbins, M.L., 2011. Naturalistic observation sampling: the Electronically Activated Recorder (EAR). In: Mehl, M.R., Conner, T.S. (Eds.), *Handbook of Research Methods for Studying Daily Life*. Guilford Press, New York, pp. 176–192.
- Mittal, V.A., Tessner, K.D., Walker, E.F., 2007. Elevated social Internet use and schizotypal personality disorder in adolescents. *Schizophrenia Research* 94, 50–57.
- Rawlings, D., Freeman, J.L., 1996. A questionnaire for the measurement of paranoia/suspiciousness. *British Journal of Clinical Psychology* 35 (Pt 3), 451–461.
- Ross, S.R., Lutz, C.J., Bailey, S.E., 2002. Positive and negative symptoms of schizotypy and the Five-Factor Model: a domain and facet level analysis. *Journal of Personality Assessment* 79, 53–72.
- Schwarz, N., 1999. Self-reports: how the questions shape the answers. *American Psychologist* 54, 93–105.
- Silva, P.J., Kwapil, T.R., 2011. Aberrant asociality: how individual differences in social anhedonia illuminate the need to belong. *Journal of Personality*, 1315–1332.
- Stefanis, N.C., Smyrnis, N., Avramopoulos, D., Evdokimidis, I., Ntzoufras, I., Stefanis, C.N., 2004. Factorial composition of self-rated schizotypal traits among young males undergoing military training. *Schizophrenia Bulletin* 30, 335–350.
- Snyder, M., 1974. Self-monitoring of expressive behavior. *Journal of Personality and Social Psychology* 30, 526–537.
- Valkenburg, P.M., Peter, J., 2009. The effects of instant messaging on the quality of adolescents' existing friendships: a longitudinal study. *Journal of Communication* 59, 79–97.
- Watson, D., Clark, L.A., Chmielewski, M., 2008. Structures of personality and their relevance to psychopathology: II. Further articulation of a comprehensive unified trait structure. *Journal of Personality* 76, 1545–1585.
- Wolf, D.H., 2006. Anhedonia in schizophrenia. *Current Psychiatry Reports* 8, 322–328.