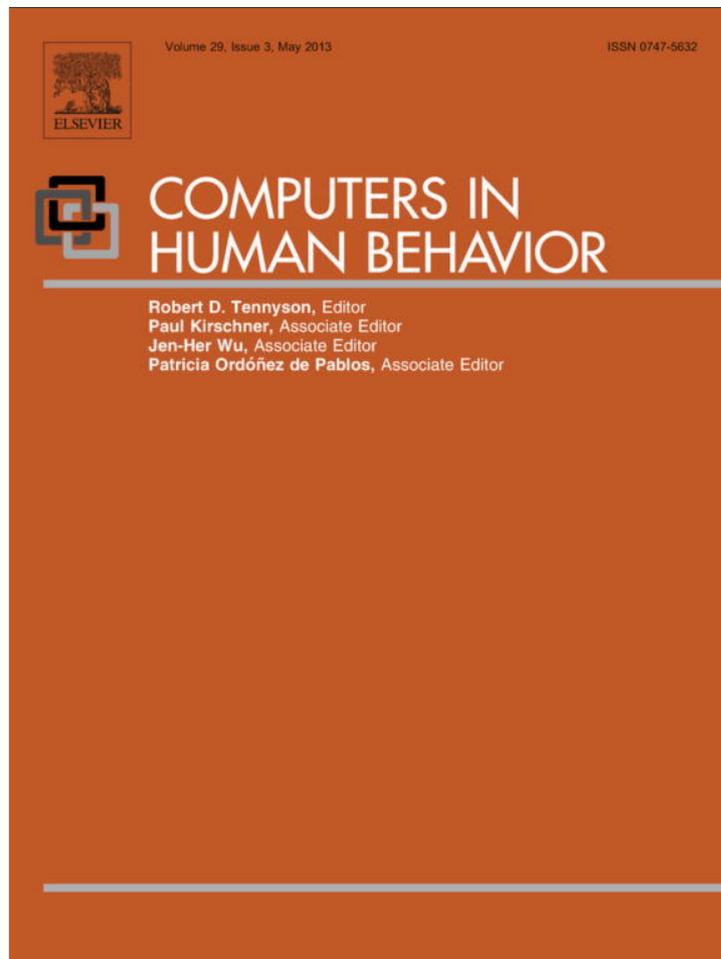


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Is Facebook creating “iDisorders”? The link between clinical symptoms of psychiatric disorders and technology use, attitudes and anxiety

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ABSTRACT

This study systematically tested whether the use of specific technologies or media (including certain types of Facebook use), technology-related anxieties, and technology-related attitudes (including multitasking preference) would predict clinical symptoms of six personality disorders (schizoid, narcissistic, antisocial, compulsive, paranoid and histrionic) and three mood disorders (major depression, dysthymia and bipolar-mania). In addition, the study examined the unique contributions of technology uses after factoring out demographics, anxiety and attitudes. Teens, young adults and adults ($N = 1143$) completed an anonymous, online questionnaire that assessed these variables. Each disorder had a unique set of predictors with 17 of the 22 significant predictors being Facebook general use, impression management and friendship. More Facebook friends predicted more clinical symptoms of bipolar-mania, narcissism and histrionic personality disorder but fewer symptoms of dysthymia and schizoid personality disorder. Technology-related attitudes and anxieties significantly predicted clinical symptoms of the disorders. After factoring out attitudes and anxiety, Facebook and selected technology uses predicted clinical symptoms with Facebook use, impression management and friendship being the best predictors. The results showed both positive and negative aspects of technology including social media as well as apparently detrimental effects of a preference for multitasking.

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1. Introduction

In 1995, Robert Kraut and his colleagues provided Internet access and a computer to 93 households who had no Internet experience and tracked their psychological health over several years in the HomeNet Project (Kraut et al., 2002). After the initial year of Internet use the researchers concluded that greater use of the Internet was associated with more signs of loneliness and depression. Although this study later showed that the negative influence dissipated over time and experience, concern over the impact of technology on psychological health has escalated to the extent that 16 years later the American Pediatric Association's Council on Communications and Media reported that “Facebook depression” was a potential problem for tweens and teens (O’Keeffe & Clarke-Pearson, 2011). Further, Rosen, Cheever, and Carrier (2012) reported on a new psychological malady referred to as an “iDisorder” which was defined as the negative relationship between technology usage and psychological health. The current study examines the impact of the use of specific technologies and media on clinical symptoms of mood disorders such as major

depression, dysthymia and mania, as well as personality disorders including narcissism, antisocial personality disorder, OCD, paranoia, histrionic personality disorder and schizoid personality disorder. In addition to looking at media usage, the study examines the impact of attitudes toward technology and multitasking as well as technology-related anxiety about not being able to check technological devices as often as one would like.

1.1. Mood disorders

There is now extensive evidence documenting a relationship between depression and excessive texting, viewing video clips, video gaming, chatting, e-mailing, listening to music and other media uses (Allam, 2010; Amichai-Hamburger & Ben-Artzi, 2009; Augner & Hacker, 2012; Chen & Tzeng, 2010; Cristakis, Moreno, Jelenchick, Myaing, & Zhou, 2011; de Wit, van Straten, Lamers, Cuijpers, & Penninx, 2011; Dong, Lu, Zhou, & Zhao, 2011; Farb, Anderson, Block, & Segal, 2011; Huang, 2010; Kalpidou, Costin, & Morris, 2011; Katsumata, Matsumoto, Kitani, & Takeshima, 2008; Lu et al., 2011; Morrison & Gore, 2010; Primack, Swanier, Georgiopoulos, Land, & Fine, 2009; Primack et al., 2011; Van der Aa et al., 2009). Further, studies have linked dysthymia with Internet addiction (Ko, Yen, Chen, Chen, & Yen, 2008). In one study, Lu et al. (2011) found depression to be associated with both Internet and text message dependency. In addition, a study by de Wit et al.

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(2011) found that adults with major depressive disorder spent excessive amounts of leisure time on the computer, while those with dysthymia, panic disorder, and agoraphobia spent more time watching television than the control group and those with other disorders.

Depression appears to be transmittable through technological interaction via “emotional contagion” (Hancock, Gee, Ciaccio, & Mae-Hwah Lin, 2008). Hancock et al. (2008) found that depressing media, particularly movies and music, induced negative affect. Taking this phenomenon one step further, in a controlled laboratory study, Hancock et al. (2008) found that not only did the viewers and listeners become depressed, but when they had a subsequent instant message conversation, their partners used fewer words, more sad terms, and exchanged messages at slower rates indicating that they, too, tended to experience negative affect, albeit secondhand. With a large number of negative thoughts evidenced in blogs (Goh & Huang, 2009) and through social networking (Davila et al., 2012; Holleran, 2010; Moreno et al., 2011; Okamoto et al., 2011) emotional contagion theory could predict signs of depression spreading through social networking sites and online communication.

Some research has indicated significant positive associations between social networking activities and depressive symptoms while other recent studies have shown no relationship or even, in one condition, a negative relationship, between Facebook use and depression. According to Davila et al. (2012), “depressive symptoms were associated with quality of social networking interactions, not quantity” (p. 72). Davila et al.’s study, which examined the social networking behaviors of 334 undergraduate students, found that more negative and less positive interactions on social networking sites were associated with greater depressive symptoms. One social networking act—unfriending—has been shown to be related to strong negative emotional responses (Bevan, Pfyl, & Barclay, 2012) while a Croatian study (Pantic et al., 2012) found that time spent on Facebook by high school students was positively correlated with depression. A study of American university students found that more intense Facebook use predicted increased loneliness (Lou, Yan, Nickerson, & McMorris, 2012) and a study of Swedish young adults found that more mobile phone use predicted increased symptoms of depression a year later (Thomee, Harenstam, & Hagberg, 2011).

A longitudinal study concluded that Facebook use led to a gain in bridging social ties and those with low self-esteem reported more gains in their social ties via Facebook (Steinfeld, Ellison, & Lampe, 2008). Social ties and building one’s relationship with others has been related to measures of well-being, self-esteem and life satisfaction (Bargh, McKenna, & Fitzsimons, 2002; Helliwell & Putnam, 2004; Subramanyam & Smahel, 2011). Additionally, Kalpidou et al. (2011) found that those college students who reported having Facebook friends experienced lower emotional adjustment to college life. Further, those who were depressed were more likely to have low self-esteem and post depressing status updates and college students who spent more time on Facebook reported having lower self-esteem than those who spent less time (Kalpidou et al., 2011).

In contrast, recent work (Jelenchick, Eickhoff, & Moreno, *in press*) found no relationship between social networking and depression with a sample of 190 older adolescents, while a recent doctoral dissertation (Simoncic, 2012) found that not only were there no negative correlations between Facebook activity and depression but for females with high levels of neuroticism, high levels of Facebook activity were associated with lower levels of depression. These negative relationships were corroborated by additional studies of Dutch adolescents with low friendship quality who spent more hours surfing the Internet (Selfhout, Brantje, Delsing, ter Bogt, & Meeus, 2009), of American adolescents

(Ohannessian, 2009), and of older Americans (Cotton, Ford, Ford, & Hale, 2012).

Rapid task switching, also known as multitasking, may be one root cause of depression (Rosen et al., 2012). In the only empirical study to examine this relationship, Kotikalapudi, Chellappan, Montgomery, Wunsch, and Lutzen (2012) observed students’ Internet use through multiple measures taken from the university server and detected that those students who showed more “flow duration entropy”—likely the result of task switching—had more depressive symptoms than those with less entropy. A large-scale, cross-national survey (Mieczakowski, Goldhaber, & Clarkson, 2011) reported negative correlations between being distracted from work and well-being in the UK, Australia and China and being distracted from personal life by work communications and well-being in only the UK and China although they do report that the correlations were small.

1.2. Personality disorders

1.2.1. Narcissism

The relationship between social networking sites and narcissistic personality disorder is garnering attention in both popular media and in scientific research (Buffardi & Campbell, 2008). According to the DSM-IV-TR (American Psychiatric Association, 2000), narcissistic personality disorder is an Axis II disorder marked by a grandiose sense of self-importance, fantasies of unlimited power, self-promotion, vanity, and superficial relationships. Twenge and Campbell (2009) argued that narcissism is an “epidemic” that has escalated in the past two decades. Using a cross-sectional study of more than 16,000 college students, Twenge and Campbell found that today’s college students score substantially higher on the Narcissism Personality Inventory than their cohorts just 20 years ago. In fact, two-thirds of recent college students scored above the average (Raskin & Shaw, 1988) compared to half of the college students who took the same test in the late 1970s and early 1980s. Bergman, Fearington, Davenport, and Bergman (2011) suggested that narcissism is increasing due to generational values. He posits that younger generations—including the Net Generation, born in the 1980s, and the iGeneration, born in the 1990s (Rosen, Carrier, & Cheever, 2010)—show a strong urge to report their activities and believe that their social media audience cares about them, two symptoms central to the diagnostic criteria of narcissistic personality disorder.

Further studies suggest that narcissism is exacerbated, and even encouraged, by social networking sites (Bergman et al., 2011; Buffardi & Campbell, 2008; Carpenter, 2012; McKinney, Kelly, & Duran, 2012; Ryan & Xenos, 2011) perhaps due to the rapid rise in social networking sites that encourage users to post status updates and photos and comment on others’ posts and photos. For example, on these sites, people often report the existence of superficial friendships, self-promotion by way of customizable pages, and vanity by way of photo albums capable of carrying thousands of pictures (Bergman et al., 2011). Mehdizadeh (2010) proposed that it is the controlled environment of these webpages that appeals to the narcissist; users of social networking sites may contort their profile pictures, status updates, biographies, and even lists of friends in order to appear more attractive.

Mehdizadeh’s hypothesis is supported by research demonstrating that higher scores on the Narcissistic Personality Inventory predicted higher self-promotion on social networking sites (Buffardi & Campbell, 2008) as well as more use of personal pronouns such as *I* and *me* along with more self-promoting photos on Facebook pages (DeWall, Buffardi, Bonser, & Campbell, 2011). Other research has shown that more time spent on Facebook and a higher frequency of checking Facebook predicted higher narcissism scores (Mehdizadeh, 2010; Ryan & Xenos, 2011). In another study,

Naaman, Boase, and Lai (2010) discovered that 80% of a large sample of Twitter users were “meformers”—those who posted about themselves and their thoughts, feelings and accomplishments—compared to only 20% who were classified as “informers”—those who shared information about others. Finally, recent neuropsychological research has shown that self-disclosure activates the intrinsic reward system of the brain in much the same way as powerful primary rewards such as food and sex (Tamir & Mitchell, 2012) and, in addition, Sheng, Gheyanchi, and Aziz-Zadeh (2010) have shown that narcissists have more activity in the medial prefrontal cortex (MPFC)—a brain area associated with the interface between the cognitive and emotional system—while Amati and his associates (Amati, Oh, Kwan, Jordan, & Keenan, 2010) showed that stimulating the MPFC actually reduces “false claiming” by narcissists, a common trait of those with narcissistic personality disorder.

1.2.2. Other personality disorders

While clinical symptoms of many disorders are correlated with Internet use, antisocial personality disorder has been more often linked to viewing television and pornography. Paul (2009) found that both men and women with higher levels of antisocial personality disorder traits were more likely to be drawn to on-line pornography while Ferguson, San Miguel, and Hartley (2009) demonstrated that playing violent video games was a significant predictor of bullying in adolescents. Along the same lines, Coyne, Nelson, Graham-Kevan, Keister, and Grant (2010) showed a link between characteristics of antisocial personality disorder and television watching. A key feature of antisocial personality disorder is violence and aggression, which Coyne et al. found to be correlated with television viewing. In addition, a study by Carpenter (2012) tested the impact of Facebook activity on antisocial behaviors and found that entitlement/exhibitionism were related to certain antisocial behaviors such as retaliating against negative comments about oneself, reading others' status updates to see if they are talking about you and seeking more social support than one provides to others. Finally, a study of Hong Kong secondary school students (Ma, Li, & Pow, 2011) showed that more time on the Internet was related to more antisocial behavior.

Obsessive and compulsive behaviors have been observed in pathological Internet users. Obsessive–compulsive disorder is an anxiety disorder characterized by obsessive thoughts and compulsive behaviors to reduce the anxiety caused by these obsessive thoughts, while obsessive–compulsive personality disorder is a lifelong pattern of perfectionism and control (American Psychiatric Association, 2000). In a cross-national survey, Mieczkowski et al. (2011) reported that being overwhelmed by communications technology was negatively related to well being. Billieux, Gay, Rochat, and Van der Linden (2010) assessed the relationship between problematic media use and compulsion, looking at compulsive buying, compulsive Internet use, and compulsive mobile phone use. This study supported the hypothesis that these behaviors are not experienced to feel pleasure, but to relieve anxiety. Another study by the same research team (Billieux, Van Der Linden, & Rochat, 2008) found that mobile phone use was related to impulsivity while Billieux, Rochat, Rebetez, and Van der Linden (2008) found that the three aforementioned obsessive–compulsive behaviors—occur commonly in non-clinical individuals and concluded that this compulsive use of media serves as maladaptive emotion regulation. In corroboration, Khang, Woo, and Kim (2012) identified compulsive anxiety as a factor in mobile phone addiction. Further, individuals with high levels of Internet addiction disorder also have significantly greater obsessive–compulsive behavior than normal controls, suggesting a relationship between these two maladaptive disorders

(Dong et al., 2011). Finally, in a recent study, Steelman, Soror, Limayem, and Worrell (2012) found that dangerous mobile phone use (e.g., while driving) is similar to obsessive–compulsive checking behaviors reflecting anxiety and stress in attempting to manage our role responsibilities.

One object of obsession is the smartphone. Ahonen (2011) quoted research by Nokia that the average person looks at their phone 150 times a day. That's once every 6.5 min while they are awake. As corroboration, a survey research study found that 45% of British adults indicated they feel worried or uncomfortable when they cannot access their email or social network sites (Anxiety UK, 2012) and a Mobile Mindset Study (Lockout Mobile Security, 2012) found that: (1) 58% of adult smartphone users—and 68% of young adults—do not go 1 h without checking their phones; (2) 73% of American smartphone owners (84% of women) feel panicked when they misplace their device, another 14% feel desperate and 7% feel sick when their smartphone is missing; and (3) 54% check their phone while lying in bed, 39% check it while using the bathroom and 30% check their phone while dining with others. Facebook addiction, based on criteria for other addictions, is related to sleep disturbances (Andreassen, Torsheim, Brunborg, & Pallesen, 2012) as is excessive mobile phone use (Thomee et al., 2011).

A relatively new phenomenon, “phantom vibration syndrome”—perceived vibration from a cell phone that is not vibrating—has been reported to occur with large numbers of people (Drouin, Kaiser, & Miller, 2012; Rothberg, Arora, Hermann, St. Marie & Visintainer, 2010) and may reflect a manifestation of the anxiety that cell phones elicit in those who are obsessed. Drouin et al. (2012) reflect that, “Thus, text messaging addiction and phantom vibrations may just be contemporary versions of social sensitivity or social anxiety” (p. 1496).

The diagnostic criteria for paranoid personality disorder include extreme distrust of others, persecutory thoughts and suspicions, and extreme sensitivity and combativeness (American Psychiatric Association, 2000). In a study of adolescent males, Xiuqin et al. (2010) found that those individuals with heavy Internet use demonstrated higher scores for paranoid ideation than healthy controls. Also, individuals who text message excessively were found to present symptoms of paranoid personality disorder, as they were reported to experience abnormal perceptions of reality (Hogg, 2009) as well as those who were identified as being addicted to the Internet (Alavi et al., 2012).

Text messaging has recently been implicated in signs of histrionic personality disorder, as a result of the current phenomenon known as “sexting” (sending text messages with sexual content). Weisskirch and Delevi (2011) concluded through a study on texting, attachment styles, and relationships, that sexting could be considered “a new manifestation of reassurance-seeking behavior” (p. 1700), the primary diagnostic criterion for histrionic personality disorder. Further, Ferguson (2011) indicated that sexting was not associated with typical risky sexual behaviors, but with high scores on a scale comprised of histrionic personality disorder diagnostic criteria and suggested that sexting was associated with the disorder because of the need for sensuality and attention that typify histrionic personality disorder.

Schizoid personality disorder is the pervasive apathy toward social interaction and disinterest in social relationships (American Psychiatric Association, 2000). One study found that specific traits associated with schizoid personality disorder were correlated with Internet gaming addiction (Kuss & Griffiths, 2011). Further, it has been posited that computer addicts show symptoms of schizoid personality disorder, as they relate to computers in lieu of human interactions. According to computer addicts, computers, unlike human beings, are rational and non-judgmental (Shotton, 1989).

1.3. Hypotheses

Based on the literature the following hypotheses are proposed:

H1. Adults who use more technology and media—particularly social media—will show increased clinical symptoms of psychiatric disorders.

H2. Adults who show more negative attitudes toward technology—particularly those with a preference for multitasking—will show increased clinical symptoms of psychiatric disorders.

H3. Adults who show more anxiety about checking in with their technologies will show increased clinical symptoms of psychiatric disorders.

H4. Regardless of the level of anxiety or negative attitudes, adults who use more technology and media, particularly social media, will show increased clinical symptoms of psychiatric disorders.

2. Methods

2.1. Participants

Adult participants ($N = 1335$) were recruited by students in an upper-division general education course from the Southern California area to participate in an anonymous, online study of “Media/Technology Use and Feelings.” One hundred ninety-two participants were eliminated based on incomplete answers or invalid scores on the MCMI-III (see below). Overall, the participants ($N = 1143$) ranged in age from 18 to 65 years ($M = 30.74$, $SD = 12.34$). Participants included 460 males and 683 females who represented the Southern California area's diversity of ethnic backgrounds: Asian/Asian-American/Pacific Islander (15%), Black/African-American (17%), Caucasian (24%), Hispanic/Latino/Spanish Descent (40%) and other (4%). Participants were generally well educated with 48% having some college education and 40% possessing a college degree. Participants supplied additional demographic information including residence ZIP code, which was transformed into estimated median income ($M = \$44,418$; $SD = \$15,998$) based on U.S. Census figures (U.S. Census Bureau, 2000).

2.2. Materials

This study included four types of instruments measuring (1) clinical symptoms of psychological disorders, (2) daily technology and media use, (3) technology-related attitudes, and (4) technology-related anxiety. In addition, demographic data were collected including: gender, birth year, ethnic/cultural background, highest level of education, and home zip code.

2.2.1. Clinical symptoms of psychological disorders

These were measured with the Millon Multiaxial Clinical Inventory (MCMI-III; Millon, Millon, Davis, & Grossman, 2009). The MCMI-III is a psychological assessment tool that can be used to provide information on the clinical symptoms of psychological disorders. It is composed of 175 true-false questions and yields data on a variety of Axis I mood disorders and Axis II personality disorders. For this study only a subset of nine MCMI subscales were selected representing those disorders previously linked to technology or media influences: six personality disorder scales (schizoid, narcissistic, antisocial, compulsive, paranoid and histrionic) and three mood disorder scales (major depression, dysthymia, bipolar-mania). The MCMI-III includes two additional

scales—validity and disclosure—that were used to eliminate 11 subjects with invalid scores. Participants' raw scores were converted to base rate scores for use in all analyses. A caveat to this study is that the MCMI-III is intended as a diagnostic tool for use with individual adults who are seeking mental health services and not specifically intended for administration and scoring for the general population. However, research has been performed with the general population using the base rate scores (c.f., Blood, 2008; Hesse, Guldager, & Holm Linneberg, 2012; Kauffman, 2012; Knabb & Vogt, 2011; Saulsman, 2011) supporting the efficacy of using these scale scores independently without combining them to designate a clinical syndrome.

2.2.2. Daily media, technology and Facebook usage

Participants were asked nine questions concerning their typical daily media and technology usage (going online, using a computer for purposes other than being online, e-mailing, IMing/chatting, telephoning, texting, playing video games, and listening to music) and one additional question on their pleasure reading behavior each on a scale including: not at all, 1–30 min, 31 min to 1 h, 1–2 h, 3 h, 4–5 h, 6–8 h, and more than 8 h per day. Responses were transformed into hours of use by converting each response including not at all (0), 1–30 min (.25 h), 31 min to 1 h (.75), 1–2 h (1.5), 4–5 h (4.5 h), 6–8 h (7 h), and more than 8 (9). Participants were asked to estimate the number of text messages sent and received per month as well as the number of cell phone minutes used per month. Any estimates more than three standard deviations above the mean were scaled to exactly three standard deviations above the mean.

Participants were first asked if they had a Facebook account and if they answered in the affirmative they were also asked how often they used Facebook as well as how often they did 15 different Facebook activities including: read postings, post status updates, post photos, comment on posts or status updates, comment on photos, check in, change or update profile, browse profiles, browse photos, click “like,” add or request to add new friends, use Facebook chat, join or create events, play games, and join or create groups. The frequency of each Facebook activity was rated on a seven-point scale (never, once a month, several times a month, once a week, several times a week, daily, several times a day). Finally, participants were asked to indicate how many friends they had on Facebook, how many of those Facebook friends they had met face to face and how many of those Facebook friends they had never met but considered to have a close, personal relationship. For the latter variables, estimates more than three standard deviations above the mean were scaled to exactly three standard deviations above the mean.

2.2.3. Technology-related attitudes

These were measured with a series of 26 items. Four items were taken from the Multitasking Preference Inventory (Poposki & Oswald, 2010), each on a five-point Likert scale (e.g., “I prefer to work on several projects in a day rather than completing one project and then switching to another”). Items were selected from the original 14-question inventory by using those with the top four loadings in a factor analysis where the entire scale had a Cronbach's alpha reliability coefficient of .88 (Poposki & Oswald, 2010). Twenty-two additional items were developed to assess various attitudes toward technology use, each assessed on a five-point Likert scale. Questions assessed negative views about technology (e.g., technology makes life more complicated, technology makes people waste too much time, technology makes people more isolated), positive views about technology (e.g., technology makes people closer to their friends and family, technology allows people to use their time more efficiently), ease of using technology (e.g., technology allows

more efficient use of time, technology is easy to use), ability to personalize technology (e.g., importance of personalizing cell phone and computer), and ability to gain emotional support online (e.g., it is okay to talk about personal problems with people you know only online, people can get emotional support from people they know only online).

2.2.4. Technology-related anxiety

A set of six items were included that asked, “If you can’t check in with the following technologies as often as you’d like, how anxious do you feel?” The list of technologies included: text messages, cell phone calls, Facebook and other social networks, personal e-mail, work e-mail and voice mail and each was assessed on a four-point scale (not anxious at all, a little anxious, moderately anxious, and highly anxious).

2.3. Procedure

Students in an upper-division, general education course were allowed, for extra credit, to distribute a web address for adults (18 and over) to access in order to complete the survey. IRB approval was given for the study.

3. Results

3.1. Preliminary analyses

An initial exploratory factor analysis was performed to assess an underlying structure to the 19 Facebook usage items. Table 1 displays the results of that factor analysis using an eigenvalue of 1.00 for factor inclusion and .50 as the acceptable factor loading cutoff score for variable inclusion. Four factors accounted for 66% of the variance with items grouping into: (1) general Facebook use, (2) Facebook social use, (3) Facebook impression management and (4) Facebook friends. These four factors were used to represent Facebook usage in subsequent analyses. The four multitasking items were subjected to a factor analysis, which yielded a single multitasking preference factor accounting for 64% of the variance. A similar analysis was performed with the attitudinal items and five distinct factors accounting for 59% of the variance emerged: (1) positive views of technology, (2) negative views of technology, (3) ease of using technology, (4) importance of personalizing technology and (5) ability to get online emotional support. These five

factors were used in all subsequent analyses. Both factor structures remained consistent across age groupings.

Similar factor analyses were not performed for the daily media usage items or the technology-related anxiety items because it was determined that the factor structures were not consistent across age groupings and thus, the individual items were used in subsequent analyses run across age groups.

3.2. Hypothesis testing

Hypothesis 1 asserted that technology and media use, particularly social networking (Facebook) would predict clinical symptoms of psychological disorders while Hypotheses 2 and 3 made the same prediction for technology-related attitudes and technology-related anxiety, respectively. To test each hypothesis a hierarchical multiple regression was performed by first factoring out gender, age, educational level, median income, and ethnic/cultural background and then determining which hypothesized variables provided significant prediction in a simultaneous regression. The results of these regressions are presented in Tables 2 and 3. Table 2 presents regression results for the three mood disorders while Table 3 presents the regression results for the six personality disorders. The numbers in the table reflect significant beta weights. Note that only those who indicated that they had a Facebook account were used to test Hypothesis 1. All participants were used to test Hypotheses 2 and 3.

3.2.1. Hypothesis 1: Daily media, technology and Facebook usage

The top half of Table 2 and the top half of Table 3 indicate that Hypothesis 1 was partially supported. Interestingly, different predictors emerged for different mood disorders. Those participants who spent *more* time online and those who performed *more* Facebook impression management evidenced more clinical symptoms of major depression. In contrast, those participants who had *more* Facebook friends showed *fewer* clinical symptoms of dysthymia although the addition of the media, technology and Facebook predictors was not significant [F -Change (13,754) = 1.32, $p > .05$]. Additionally, clinical symptoms of bipolar-mania were quite different evidencing four significant predictors of increased signs of mania: *more* general Facebook use, *more* Facebook impression management, *more* daily hours listening to music and *more* Facebook friends.

The top section of Table 3 indicates that personality disorder clinical symptoms showed similar patterns with all six being signif-

Table 1
Factor loadings for Facebook (FB) usage items (factor loadings > .50).

Facebook usage item	Factor 1 General FB use	Factor 2 Social FB use	Factor 3 FB impression management	Factor 4 FB friends
Read postings	.86			
Comment on posts or status updates	.85			
Use Facebook	.84			
Click “like”	.83			
Comment on photos	.77			
Post status updates	.74			
Browse photos	.64			
Browse profiles	.59			
Post photos	.54			
Join/create groups		.85		
Join/create events		.78		
Play games		.69		
Add/request new friends		.50		
Friends never met			.68	
Change/update profile			.63	
Check in			.59	
Total FB friends know face to face				.92
Total FB friends				.90

Table 2
Significant predictors and beta weights predicting mood disorders from daily media, technology and Facebook usage (Hypothesis 1), technology-related attitudes (Hypothesis 2) and technology-related anxiety (Hypothesis 3).

Media/technology variables	Major depression	Dysthymia	Bipolar-mania
<i>Hypothesis 1: Daily media, technology and Facebook usage</i>			
General media-tech usage			
Online hours/day	.111*		
Music hours/day			.106**
Facebook usage			
Facebook general use			.160***
Facebook friends		−.093*	.102**
Facebook impression management	.092*		.115**
F-Change (13,754) ^a	2.26**	1.32	4.94***
<i>Hypothesis 2: Technology-related attitudes</i>			
Technology positive	−.123*	−.110*	−.223***
Technology negative	.070*	.079*	
Multitasking preference	.113***		.093**
F-Change (6,973) ^a	6.63***	4.28***	8.43***
<i>Hypothesis 3: Technology-related anxiety</i>			
Anxiety about not checking text messages	.088*	.143***	.134**
Anxiety about not checking Facebook/social networking	.098**	.026*	.095**
F-Change (6,1003) ^a	8.05***	6.15***	6.50***

^a F-test for significant addition of predicted variance following first hierarchy of demographics.
* p < .05.
** p < .01.
*** p < .001.

Table 3
Significant predictors and beta weights predicting personality disorders from daily media, technology and Facebook usage (Hypothesis 1), technology-related attitudes (Hypothesis 2) and technology-related anxiety (Hypothesis 3).

Media/technology variables	Narcissism	Antisocial	Compulsive	Paranoid	Histrionic	Schizoid
<i>Hypothesis 1: Daily media, technology and Facebook usage</i>						
General media-tech usage						
Online hours/day						.109*
Music hours/day		.121**		.139***		
Texting hours/day						
Facebook usage						
Facebook general use	.127***	.160***	.088*	.080*	.161***	
Facebook friends	.153***				.243***	−.200***
Facebook impression management	.143***	.103**	.072*		.077*	
F-Change (13,754) ^a	6.01***	4.44***	3.15***	2.82**	6.66***	2.97***
<i>Hypothesis 2: Technology-related attitudes</i>						
Technology positive		−.121*		−.181***		
Technology negative						
Technology is easy					−.079*	
Emotional support online			.096**		.079*	
Multitasking preference	.096***	.100**	.106***	.089**		
F-Change (6,973) ^a	5.56***	8.12***	5.18***	6.99***	3.82***	1.84
<i>Hypothesis 3: Technology-related anxiety</i>						
Anxiety about not checking text messages		.166***		.132***		
Anxiety about not checking Facebook/social network	.090*	.083*	.093**			
Anxiety about not checking personal e-mail		−.082*				
Anxiety about not checking work e-mail			.076*			
F-Change (6,1003) ^a	2.87**	7.49***	3.54**	7.37***	0.91	1.39

^a F-test for significant addition of predicted variance following first hierarchy of demographics.
* p < .05.
** p < .01.
*** p < .001.

icantly predicted by one or more Facebook usage variables with clinical signs of narcissism and histrionic personality disorder predicted by three Facebook variables with *more* friends, *more* impression management and *more* general use all predicting more signs of those disorders except for schizoid disorder. *More* Facebook general use and impression management predicted more signs of antisocial and compulsive disorders while *more* Facebook general use and *fewer* Facebook friends predicted paranoid disorder and schizoid

disorder, respectively. In addition, listening to *more* hours of music predicted *more* signs of antisocial and paranoid disorders and being online *more* hours per day predicted signs of schizoid disorder.

3.2.2. Hypothesis 2: Technology-related attitudes

The middle sections of Tables 2 and 3 present the significant attitudinal predictors of clinical symptoms of the nine disorders. First, clinical symptoms of all disorders were significantly

predicted by one or more attitudinal variables with the exception of schizoid disorder [F -Change (6,973) = 1.84, $p > .05$]. Second, the more people preferred to multitask or task switch, the more clinical symptoms they demonstrated for six of the nine disorders. Having a positive attitude toward technology was related to fewer clinical symptoms of five disorders while having a negative attitude only predicted more signs of major depression and dysthymia. Believing that emotional support was available online predicted more signs of compulsive disorder and histrionic disorder and believing that technology was easy predicted more signs of histrionic disorder.

3.2.3. Hypothesis 3: Technology-related anxiety

The bottom sections of Tables 2 and 3 display the predictive ability of anxiety related to specific technologies for clinical symptoms of psychological disorders. Signs of all three mood disorders were only significantly predicted by anxiety about checking text messages and Facebook, while for personality disorders the pattern varied. First, neither histrionic disorder nor schizoid disorder had any significant predictors in the second hierarchy of anxiety variables. Second, anxiety about checking text messages predicted only antisocial and paranoid disorders while anxiety about not checking Facebook predicted narcissism, antisocial and compulsive disorders. Finally, anxiety about checking personal e-mail predicted antisocial disorder while anxiety about checking work email predicted compulsive disorder.

To further investigate anxiety, Table 4 presents a cross-generational view of how anxious people get when they cannot check in with their technologies. As can be seen in Table 4, generations differ with their anxiety levels for all technologies except personal e-mail. In every case, the younger generations are more anxious than the older ones and the most anxiety (summing up moderate and high anxiety) appears to be promoted by not being able to check text messages, followed by cell phone calls, and then personal email

and social networks. Some understanding of the source of this anxiety might be gained by the data presented in Table 5 showing how often people check in with their technologies. There are clear generational differences with younger generations checking in far more frequently than older generations. What is particularly interesting is the younger generations—particularly the iGeneration and Net Generation—are checking in very often (defined as every hour, every 15 min or all the time) with their messages, social networks and cell phone calls while older generations check in more often with older technologies such as e-mail and voice mail. The fact that 75% of iGeners and 74% of Net Geners check their text messages more than once an hour may be caused by their anxiety about not checking in with those same technologies.

3.2.4. Hypothesis 4

Hypothesis 4 predicted that even after factoring out the demographic information used in previous hypothesis testing and factoring out technology-related attitudinal scales and technology-related anxiety scales, media and technology use would still predict clinical symptoms of psychiatric disorders. Each of the hierarchical regressions used presented in the top sections of Tables 2 and 3 were rerun with a second hierarchy to remove the predictors listed in the lower two sections of those tables. As seen in Table 6, the results were quite similar to those presented earlier although some are slightly different. The bottom line is that higher scores on at least one Facebook measure—use, impression management and friends—predicted increased clinical symptoms of every psychological disorder although having more Facebook friends predicted fewer clinical symptoms of major depression, dysthymia and schizoid personality disorder and more general Facebook use predicted fewer clinical symptoms of compulsive disorder. In addition, a new predictor—telephone use—was a negative predictor of signs of major depression, dysthymia, and schizoid personality disorder and a positive predictor of signs of compulsive disorder.

Table 4
Anxiety about not checking in with technologies by generation.

Technology by generation	Not anxious (%)	Little anxious (%)	Moderately anxious (%)	Highly anxious (%)	χ^2 score
Facebook/social networks					
iGeneration	47	29	12	11	73.23***
Net Generation	58	25	10	8	
Generation X	73	18	8	2	
Baby Boomers	86	11	4	0	
Text messages					
iGeneration	23	33	24	20	123.10***
Net Generation	24	36	25	16	
Generation X	40	37	13	10	
Baby Boomers	65	25	9	1	
Cell phone calls					
iGeneration	41	35	15	9	19.62*
Net Generation	34	36	20	10	
Generation X	42	31	18	9	
Baby Boomers	45	42	9	4	
Personal e-mail					
iGeneration	57	24	13	6	14.38
Net Generation	48	34	12	5	
Generation X	57	27	13	3	
Baby Boomers	56	31	11	2	
Voice mail					
iGeneration	75	20	3	2	25.43**
Net Generation	67	23	5	4	
Generation X	58	29	7	5	
Baby Boomers	55	32	10	4	

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 5
How often people check in with technologies by generation.

Technology by generation	Never/infrequently ^a (%)	Moderately often ^b (%)	Very often ^c (%)	χ^2 score
Facebook/social networks				
iGeneration	16	44	41	185.32***
Net Generation	21	44	35	
Generation X	43	39	18	
Baby Boomers	71	23	6	
Text messages				
iGeneration	7	18	75	123.10***
Net Generation	5	21	74	
Generation X	12	36	53	
Baby Boomers	28	42	31	
Cell phone calls				
iGeneration	15	46	38	24.43***
Net Generation	8	40	52	
Generation X	9	43	48	
Baby Boomers	16	47	37	
Personal e-mail				
iGeneration	25	54	21	16.86 [†]
Net Generation	18	49	33	
Generation X	20	49	23	
Baby Boomers	28	49	23	
Voice mail				
iGeneration	68	20	11	92.11***
Net Generation	51	35	14	
Generation X	32	45	23	
Baby Boomers	23	53	23	

^a Includes responses of never, couple times a month, couple times a week.

^b Once a day, every few hours.

^c Every hour, every 15 min, all the time.

[†] $p < .05$.

** $p < .01$.

*** $p < .001$.

4. Discussion

The purpose of this study was to examine whether (1) use of technology and media, (2) attitudes toward technology and media and (3) anxiety about not being able to check in with technology and media would predict clinical symptoms of psychiatric disorders in a sample of 1143 adults living in the Southern California area. Based on past research nine disorders were examined including three mood disorders and six personality disorders through three separate hierarchical multiple regressions. In each analysis, the impact of one of the three predictor sets was evaluated after first removing relevant demographics that had been shown to relate to both technology use, attitudes and anxieties as well as to signs of psychiatric disorders including gender, age, educational level, median income and ethnic/cultural background.

Prior to the multiple regression analyses the technology use, attitude and anxiety items were factor analyzed to reduce the number of potential predictors. In terms of technology usage, the predictor set included daily hours of nine activities: being online, using a computer but not online, emailing, IMing, chatting, telephoning, texting, playing video games and listening to music. In addition, 15 unique Facebook activities were factor analyzed to produce four distinct factors: general Facebook use, Facebook social use, Facebook impression management and Facebook friends. Similarly, the technology-related attitudes items produced five factors: positive views, negative views, ease of using, importance of personalizing and ability to gain online emotional support as well as a separate, independent factor of multitasking preference. Finally, the technology-related anxiety items were not factor analyzed but considered independently due to age-related differences in the factor structures.

Table 6
Significant predictors of mood disorders and personality disorders after first factoring out technology-related attitudes and technology-related anxiety.

Psychiatric disorder	Significant predictors	Beta weight
Major depression	Online hours/day	.111 [*]
	Telephone hours/day	-.096 [†]
	Facebook friends	-.078 [†]
Dysthymia	Facebook friends	-.107 ^{**}
	Telephone hours/day	-.094 [†]
Bipolar-mania	Facebook general use	.124 ^{***}
	Music hours/day	.097 [†]
	Facebook friends	.085 [†]
	Facebook impression mgmt	.082 [†]
Narcissism	Facebook friends	.160 ^{***}
	Facebook impression mgmt	.137 ^{***}
	Facebook general use	.128 ^{***}
Antisocial	Facebook general use	.137 ^{***}
	Music hours/day	.126 ^{**}
Compulsive	Telephone hours/day	.107 ^{**}
	Facebook general use	-.084 [†]
Paranoid Histrionic	Music hours/day	.138 ^{***}
	Facebook friends	.254 ^{***}
	Facebook general use	.162 ^{**}
	Facebook impression mgmt	.099 [†]
	Texting hours/day	.084 [†]
Schizoid	Facebook friends	-.222 ^{***}
	Telephone hours/day	-.107 ^{**}
	Online hours/day	.095 [†]

^{*} $p < .05$.

^{**} $p < .01$.

^{***} $p < .001$.

4.1. Hypothesis testing

4.1.1. The impact of Facebook

Hypothesis 1 received partial support. Interestingly, different predictors emerged for the nine disorders but for the most part the significant predictors involved mostly Facebook use. Overall, 17 of the 22 significant predictors were Facebook use. For the mood disorders, for example, while more Facebook impression management predicted more signs of major depression, more general Facebook use, more Facebook impression management and more Facebook friends predicted mania. In contrast, having more Facebook friends actually predicted *less* dysthymia. A similar situation emerged with the personality disorders where, with the exception of paranoid personality disorder, the top predictor of each involved a Facebook use factor. In fact, among the nine technology and media daily uses, only listening to music—which predicted signs of antisocial disorder and paranoid disorder—and surfing the Internet—which predicted signs of schizoid disorder—contributed to the regression equations.

4.1.2. The impact of attitudes and anxiety

These independent sets of analyses found both positive and negative predictors of disorder signs. For example, having a more positive attitude toward technology predicted fewer signs of all three mood disorders but only two of the six personality disorders while having negative attitudes toward technology only predicted signs of two mood disorders. Finally, multitasking preference was a strong predictor of two mood disorders and four of the six personality disorders. In terms of anxiety, all three mood disorders were predicted by anxiety about not checking in with text messages and Facebook, while the pattern for personality disorders was more complex. Anxiety about missing text messages predicted two disorders (antisocial and paranoid), anxiety about not checking Facebook predicted three (narcissism, antisocial and compulsive), and anxiety about not checking personal e-mail predicted reduced signs of antisocial disorder but anxiety about not checking work or school e-mail predicted more signs of compulsive disorder.

4.1.3. Overall impact of media use

In order to determine the direct impact of actual media and technology use, Hypothesis 4 assessed the predictive power of daily use of the nine technologies (Internet, computer, e-mail, IM/chat, phone, texting, video games, television and music) plus the four Facebook factors after first factoring out the influence of attitudes (including multitasking preferences) and anxiety. The results strongly support the impact of technology on indicators of mental health. For mood disorders, Facebook use accounted for five of the nine significant predictors with general use, impression management and friends negatively predicting mania while having more friends predicted fewer signs of major depression and dysthymia.

For personality disorders, nine of the 15 significant predictors involved Facebook use. For two of those disorders—narcissism and histrionic disorder—more general Facebook use, more Facebook use for impression management and more Facebook friends predicted more signs of the disorder. This corroborates the many studies showing how social media provide a platform for narcissists and extends that view to those showing signs of histrionic disorder (which may explain why Facebook wars often erupt). Of the remaining disorders, Facebook played a large role with more general use predicting more signs of antisocial disorder but fewer signs of compulsive disorder. More Facebook friends also predicted fewer signs of schizoid disorder. In addition, more daily use of other media predicted signs of some disorders including: more time spent online (more signs of major depression and schizoid disorder), talking on the telephone (fewer signs of major depression, dysthymia and schizoid disorder but more signs of compul-

sive disorder), listening to music (more signs of mania, antisocial disorder, and paranoid disorder). This complex pattern reflects the nature of the disorders and supports the first three hypotheses. The fact that different technology and media uses, attitudes and anxieties predict different disorders is important. Mood disorders are often seen as situational and short term and not due to underlying personality characteristics whereas personality disorders are considered long-term, chronic conditions. The complex pattern of how Facebook impacts these disorders is striking and bears further study.

One result of note is the positive impact of having more friends on diminished signs of major depression and dysthymia. What is it about having more friends on a social network that can ameliorate signs of depression? Is it the fact that there is always someone to talk to when you are feeling down and need empathy and understanding? If so, this would suggest that the ability to be empathic can be actualized in either a face-to-face environment or a virtual environment. This most certainly supports the psychological value of social networking and electronic connection although some psychologists (cf., [Turkle, 2011](#)) do not agree.

Another important result is the vastly negative impact of multitasking—or preference for multitasking as assessed in this study—on signs of nearly all disorders. More inclination to multitask appeared to provide a major boost in clinical symptoms of depression, mania, narcissism, antisocial disorder, compulsive disorder and paranoid disorder. While multitasking is inherently a human trait, technology has perhaps overly encouraged and promoted it by our multi-window computer environments, multi-app smartphone screens and the wide-ranging sensory stimulation (and distraction) offered by high definition, customizable visual and auditory signals coupled with tactile stimulation through vibrations. The fact that multitasking predicted more signs of compulsive disorder, coupled with the result that anxiety about not checking in with social media predicted more signs of compulsive disorder supports the notion of phantom vibration syndrome ([Drouin et al., 2012](#); [Rothberg, et al., 2010](#)) stemming from anxiety and concern about not missing out on all-important smartphone communications.

Spending more time watching television, playing video games, using a computer as a tool for work or school, IMing or chatting, sending and receiving e-mail did not predict signs of any psychiatric disorders. Although there is little research on the psychiatric impact of some of these activities, past research has touted the negative impacts of both video gaming and watching television on our psychological health. The current study appears to dispute those claims. It is possible, however, that the survey items used to assess these activities may have not been detailed enough to capture the variety of environments where these activities take place. Neither gaming nor television viewing is constrained to specific devices and perhaps the participants' activities took place on their mobile devices or even on their computer within the Facebook environment, which would confound the results.

4.2. Contributions of this study

This study adds to the literature on the psychological impact of technology by expanding the assessment of Facebook usage from a small number of items simply reflecting overall use of the social media platform to a four-factor structure capturing general use, impression management use, friendship and social uses. While the latter did not turn out to be a predictor of signs of any disorder, the first three Facebook factors were instrumental in predicting both positive and negative aspects of psychological health. As new social media platforms arrive and penetrate society it will be important to partition the activities into interpretable subsets

to aid in determining exactly what about social media promotes mental health and what promotes signs of psychiatric disorders.

A second methodological contribution of this study is its independent assessments of technology and media use, attitudes and anxieties on signs of psychiatric disorders as well as a detailed examination of those uses after removing the effects of attitudes and anxieties. This provides a solid picture of the important role played by social media and, to a lesser extent, other daily technology uses (general online surfing, listening to music and talking on the telephone) in predicting clinical symptoms of mood disorders and personality disorders.

4.3. Limitations

This study does have several limitations. First, the sample was drawn from the Southern California area, which perhaps does not represent all areas of the United States. It is possible that technology is used differently in more urban areas than in rural areas but this is unlikely given the ubiquity of these devices. It is also possible that sampling teenagers and children would provide a different view, as they are part of a generation that has grown up with technology. Second, this study did not provide demographic explanations for signs of psychiatric disorders but chose to treat those variables (gender, age, median income, cultural background, and educational level) as covariates and removed their impact. Future studies may opt to reverse this process and consider those demographic characteristics as viable contenders in predicting depression, narcissism and other mood and personality disorders.

Third, the MMCI-III, which generated the psychiatric disorder signs, is designed as a tool for individual adults who are using or seeking mental health or psychiatric services. It is not intended for the general population. However, other research has been reported using this measure with a non-clinical population and there is no reason to believe that the measure would systematically distort someone's results in a way that could impact the results of the hypothesis tests. A future study might consider using separate research measures that have been normed on non-clinical populations for specific disorders such as depression and narcissism as a way to replicate and extend these findings.

This study also leaves open the question of cause and effect. Does technology use *cause* the signs of a disorder or does having the signs of a disorder *cause* a person to seek out and use a specific technology? This study does not answer that question. Perhaps a longitudinal study, examining media and technology usage and psychological health would help in disentangling the causal arrow. Along those lines, a recent longitudinal study (Feinstein, Bhatia, Hershenberg, & Davila, 2012) concluded that, "These findings suggest that social networking mediums may, indeed, function as additional venues for people to enact their existing psychopathologies. Specifically, people who report greater depressive symptoms are not using social networking mediums more. Rather, they are engaging in more problematic social networking interactions and they are experiencing more negative affect following those interactions" (p. 372). In contrast, however, a 2-year prospective study of junior high school students in Taiwan found that psychiatric symptomatology predicted future Internet addiction (Ko, Yen, Chen, Yeh, & Yen, 2009).

4.4. Conclusions

This study has contributed to our understanding of the relationship between a variety of technology uses, attitudes and anxieties, and psychological health. In examining three mood disorders and six personality disorders, this study provided a view of how different technologies can impact clinical symptoms of an impending psychiatric disorder. Overall it appears that the main predictor is

not one's attitude toward technology, nor is it anxiety arising from not being able to access or use technology. Instead, it appears that the use of social media has a major impact on these clinical symptoms, sometimes in a negative way—such as when any use of Facebook predicted more signs of narcissism—and sometimes in a positive way—such as when having more Facebook friends predicted fewer signs of depression. With nearly one billion people using Facebook, and most being active users, it is important to continue to examine whether this ubiquitous social network is leading to positive or negative psychological health.

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