PERCEPTIONS OF OTHER INTERNET USERS IN DELUSIONAL BELIEFS: DEVELOPMENT AND VALIDATION OF A NEW MEASURE OF ONLINE SOCIAL COGNITION

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Abstract

Since the inception of the internet, research has attempted to describe its effects on a wide variety of psychological constructs, such as personality and psychopathology. Although studies have found associations between internet usage and different psychological disorders, few studies have investigated the relationship between internet use and psychosis. This is due, in part, to an absence of measures that target beliefs or behaviors of individuals with psychosis-spectrum disorders in an online context. The aim of the current study was to develop and establish psychometric properties of a questionnaire examining impressions of other internet users. This was accomplished in three studies. In Study 1, undergraduate participants responded to an online survey consisting of several open-ended questions regarding their impressions of other internet users and social media users. Responses were then coded into items to comprise a 71-item questionnaire termed the Impressions of Internet Users scale (IIUS). This scale was administered to a new sample in Study 2. Exploratory factor analysis suggested a three-factor model provided the best fit to the data and guided the removal of 37 items. In Study 3, a three-factor model with the remaining 34 items was supported via confirmatory factor analysis, with the three factors representing Internet/Reality Incongruency, Global Negative Impressions, and Global Positive Impressions. Convergent and divergent validity was demonstrated in correlations between the IIUS factors and additional measures of internet usage, personality, psychopathology, and social cognition. This program of research thus provides initial psychometric support for a new measure of online social cognition. This measure may have implications for understanding attitudes toward other internet users in the general population, as well as negative or distorted impressions that may shape the content of delusional thoughts in individuals with psychosis.

Table of Contents

List of Tables

List of Figures

List of Appendices

Background

Twenty years ago, home internet access in the United States was still the exception rather than the rule. Today, the internet is not only accessible, it is an integral component of the lives of millions of people. People can access the internet from anywhere using a myriad of devices, from smartphones to tablets to laptops to televisions. According to the Pew Research Center (2018a), 89% of American adults can be classified as "internet users." This number jumps to 98% when considering strictly the 18-29-year-old age range and to 97% among 30-49-year-olds. Social media use – defined by Merriam-Webster as the use of websites through which users can create online communities to share information, ideas, personal messages, and other content – receives its own special consideration. Estimates of social media usage stand at 69% of all adults and 88% of those aged 18-29, with Facebook being far and away the most popular platform for the general sample (Pew Research Center, 2018b). Since the internet became available to the mass market, researchers recognized that this phenomenon would have tremendous implications for change in how Americans live, work, and connect to each other socially.

Many researchers have studied the ways in which internet use affects people across domains such as mood, social functioning, and development of psychopathology, among others. A mere 10 years after the inception of the internet, Bargh (2002) wrote an introduction piece for a special issue of *Journal of Social Issues* summarizing early research on the influence of internet use at the person, group, and community levels. Already, researchers were documenting how internet use affected social behavior by contributing to the development of online relationships (McKenna, Green, & Gleason, 2002), by "depersonalizing" behavior and activating group norms (Spears, Postmes, Lea, & Wolbert, 2002), and through differences in use by communities with different social and political agendas (e.g., facilitation of the spread of

information in democratic societies versus tight control over access to outside sources of information in communist societies; Deibert, 2002). As the popularity of the internet continues to grow, so too has the number of published articles describing the complex interaction between humans and the internet. For example, one of the most prominent journals in this field, *Computers in Human Behavior*, has demonstrated a nearly three-fold increase in published articles from 2013 (743 articles) to 2017 (2116 articles). Internet culture is truly the zeitgeist of the modern age and it is crucial to understand its impact on the way humans think and interact.

Problematic Internet Usage, Psychopathology, and Personality Traits

Although internet access is associated with many benefits, such as facilitated communication and access to diverse information, there are as many – if not more – negative consequences to excessive use. To collectively describe these consequences, problematic internet use (PIU) has become an umbrella term for internet-associated behaviors that adversely affect a person's social, occupational, or psychological functioning. Individuals exhibiting PIU behaviors may be inclined to neglect school or work responsibilities in favor of staying online, may feel a sense of loss of control over internet use, or may be willing to sacrifice in-person relationships in order to continue use (Young, 1998). When taken to the extreme, these behaviors might constitute a form of behavioral addiction, similar to a gambling or sex addiction. Although internet addiction is not a formally-recognized disorder in the most recent iteration of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association [APA], 2013a), criteria for an "internet gaming disorder" have been proposed and included in Section III as a condition necessitating further study. As well, "persistent or recurrent gaming behavior" characterizes the "gaming disorder, predominantly online" subcategory of "disorders due to addictive behaviors" in the available draft of the International Classification of

Diseases (ICD-11; World Health Organization, 2018). Merely by considering internet-related disorders for inclusion in these diagnostic handbooks, the scientific community has indicated that PIU is enough of a concern to warrant clinical attention. One major relevant area of research concerns whether and how internet usage (and PIU more specifically) contributes to or accelerates the process of development of psychopathology.

The surge of research on the intersection of internet use and psychopathology in recent decades, coming not only from the United States but also from a wide array of countries, indicates a global recognition that PIU is playing an increasingly important role in the manifestation and maintenance of psychological disorders. Excessive internet usage has clear theoretical ties to numerous psychological disorders. For example, attention-deficit/hyperactivity disorder (ADHD), a condition in which individuals typically present with high impulsivity and low self-regulation, has been found to be significantly positively correlated with PIU in clinical samples of children, college students, and adults (see Ko, Yen, Yen, Chen, & Chen, 2012, for a review). PIU has also been studied extensively in the field of depression. A recent review illustrated that, when compared with other disorders, depression had the strongest association with PIU, with 12 of 16 studies demonstrating significant correlations in both males and females (Carli et al., 2012). Moreover, PIU has been significantly linked to social anxiety disorder, even after partialing out the effects of general anxiety, stress, and depression (Lee & Stapinski, 2012).

Previous research has investigated the psychological and personality variables that are associated with PIU and shows that PIU is associated with a host of maladaptive traits. For example, PIU has been found to be positively correlated with impulsivity (Yau, Potenza, & White, 2013), procrastination (Odaci, 2011), and hostility (Xiuqin et al., 2010). Negative correlations have been found between PIU and self-esteem (Aydin & Sari, 2011), self-efficacy

(Odaci, 2011), psychological resilience (Hou et al., 2017), extraversion (Mottram & Fleming, 2009), and self-regulation skills (Sebena, Orosova, & Benka, 2013). Studies on PIU and the Big 5 personality traits (i.e., neuroticism, openness, conscientiousness, extraversion, and agreeableness) have generated mixed results. However, the literature is generally in agreement that neuroticism is positively associated with PIU, while the other four domains show negative correlations, with the strongest negative association found between PIU and conscientiousness (Kayiş et al., 2016). Researchers have suggested that conscientiousness manifests behaviorally as self-discipline, orderliness, and striving for achievement (Costa & McCrae, 1992), which may serve to protect highly conscientious individuals from succumbing to PIU behaviors. Neuroticism, on the other hand, may contribute to increased PIU not only by leading individuals to prefer online rather than face-to-face interactions but also to engage in maladaptive coping strategies, such as spending time playing games or shopping on the internet, as a means of avoiding anxiety (Hamburger & Ben-Artzi, 2000; Hardie & Tee, 2007).

Internet Usage and Psychosis-Spectrum Disorders

Although there has been substantial literature building around the interaction of different personality variables with internet use and the consequent functional impact, little attention has been paid to the ways in which internet use affects individuals with schizophrenia or other psychosis-spectrum disorders (PSDs). Schizophrenia is a thought disorder that typically presents with "positive symptoms" (behavioral phenomena that may be present in individuals with schizophrenia that are not present in those without schizophrenia) and "negative symptoms" (phenomena that are typically present in healthy individuals that are not present in schizophrenia), as well as deficits in several domains of neurocognition such as attention and executive functioning (Heinrichs & Zakzanis, 1998). Positive symptoms include hallucinations,

which are abnormal perceptual experiences in the absence of actual perceptual stimuli, such as hearing voices or feeling crawling sensations on one's skin, and delusions, which are false beliefs held tenaciously despite substantial evidence to the contrary (for example, believing one's hospital food has been poisoned). Negative symptoms may manifest as a lack of motivation, flat or blunted affect and emotional experiences, or a lack of pleasure from interactions with others known as social anhedonia. PSDs are also characterized by deficits in social functioning, cognitive functioning, and self-regulation, and are frequently comorbid with anxiety and depressive symptoms (Buckley, Miller, Lehrer, & Castle, 2009; Pokos & Castle, 2006).

Schizophrenia has a prevalence rate of roughly 1%, with the typical age of onset being in the early- to mid-20s for males and late-20s for females according to the DSM-5 (APA, 2013a). Schizophrenia is known to progress in phases beginning with the premorbid phase, in which overt symptoms of psychosis are largely undetectable, but negative symptoms and cognitive deficits may be present. In the next phase, the prodromal phase, subclinical positive symptoms (e.g., having the notion that others might be able to hear one's thoughts being spoken out loud) become apparent and negative symptoms may become exacerbated. A person may then go on to experience a "break" (also known as a first episode of psychosis), in which one or more domains of functioning, such as social or occupational functioning, are adversely impacted and positive symptoms are pronounced (Addington & Heinssen, 2012). As a result, the individual may require psychological treatment or hospitalization. Unfortunately, the nature of a PSD is typically chronic and cycles between active phases and remission phases. Whereas positive symptoms are often responsive to pharmacological and therapeutic treatment, negative symptoms are more refractory (Kirkpatrick, Fenton, Carpenter, & Marder, 2006) and tend to contribute to greater

impairment in social and occupational functioning (Blanchard, Horan, & Collins, 2005; Milev, Ho, Arndt, & Andreasen, 2005; Rosenheck et al., 2006).

Researchers often take one of two approaches to identifying people at risk for psychosis: the psychometric schizotypy approach or the clinical high-risk approach. In the psychometric schizotypy approach, at-risk participants (usually undergraduate college students) are identified via self-report measures as experiencing subclinical psychotic-like experiences (PLEs; Chapman, Chapman, & Raulin, 1978; Lenzenweger, 1994) at a level that is greater than two standard deviations above the sample mean. These people are usually not significantly impaired and tend not to be receiving any sort of psychological treatment. The clinical high risk approach, on the other hand, aims to identify people who are already experiencing clinically-significant attenuated psychosis symptoms (APS), with resulting functional impairment (Addington & Heinssen, 2012; Cannon et al., 2008; McGlashan et al., 2007; Miller et al., 2003). This approach typically uses interview measures and draws from help-seeking samples, though "attenuated" in this context does imply that the symptoms are less severe, more transient, and accompanied by a greater degree of insight than full psychosis symptoms tend to be (Tsuang et al., 2013). Some research has shown that psychometric schizotypy scores are correlated with clinical high risk assessments, but it is unclear if the symptoms measured by the psychometric approach represent earlier premorbid symptoms on the psychotic spectrum (Cicero, Martin, Becker, Docherty, & Kerns, 2014). Regardless of how it is assessed, the concept of "schizotypy" does not itself refer to a specific diagnosis, but rather an underlying diathesis for psychosis that may or may not manifest into a PSD (Docherty et al., 2018). Identifying someone as at-risk based on either the psychometric schizotypy approach or clinical high-risk approach does not mean that the person

is guaranteed to develop a PSD; it is instead used as a means of statistically quantifying risk for psychosis relative to the general population.

Research has shown that, although individuals who show early, subclinical signs of psychosis are considered to be at a higher risk of developing a PSD when compared to the general population (Brucato et al., 2017; Cannon et al., 2008; Fusar-Poli et al., 2013; Ruhrmann et al., 2010; Yung et al., 2003), only one-quarter to one-third will go on to experience a full psychotic episode (Addington & Heinssen, 2012; Cannon et al., 2008; Fusar-Poli et al., 2013). In a meta-analysis of diagnostic outcomes for high-risk individuals, Fusar-Poli et al. (2013) demonstrated that 73% of subjects who had a psychotic episode were diagnosed with a PSD within the respective study's follow-up period. These figures indicate that, while the majority of individuals who present with high-risk for psychosis will sufficiently recover or achieve remission from their symptoms, those who progress further in the disorder are far more likely to suffer from serious impairment.

Social dysfunction is one of the most debilitating consequences of schizophrenia and is found across the different phases of the illness, as well as during periods of remission. Poor social functioning in schizophrenia is commonly attributable to passive social withdrawal stemming from negative symptoms (e.g., social anhedonia; Blanchard, Mueser, & Bellack, 1998; Meehl, 1990), though a person may also exhibit active social avoidance related to positive symptoms (e.g., fear or anxiety borne out of persecutory delusions; Highton-Williamson, Priebe, & Giacco, 2015). Social impairment is often observed in the premorbid phase, prior to the emergence of clinically-significant positive or negative symptoms (Addington & Addington, 2005; Bailer, Bräuer, & Rey, 1996; Hafner et al., 2003; Mueser & Bellack, 1998; Payá et al., 2013; Velthorst et al., 2017). In a recent study of predictive associations between premorbid

social adjustment and attenuated psychosis symptoms, Tarbox-Berry, Perkins, Woods, and Addington (2018) found that social withdrawal and poor peer relationships in early adolescence (ages 13-15) and late adolescence (ages 16-18) significantly predicted the severity of social anhedonia, diminished emotional expression, and total negative symptoms in a large sample of individuals with subclinical psychosis symptoms. This provides important insight into the possible developmental course of the illness in addition to potential functional outcome, as previous research has shown that high social anhedonia in the early stages of psychosis is associated with a higher rate of subsequent conversion to a schizophrenia-spectrum disorder (Gooding, Tallent, & Matts, 2005; Kwapil, 1998). In fact, Gooding and colleagues (2005) found that this conversion rate was three times higher than the conversion rate for a group identified as at-risk based primarily on elevated subclinical positive symptoms (e.g., perceptual aberrations or magical ideation).

Because many psychological disorders are characterized by deficits in social functioning, it follows logically that changes in how people interact socially would be accompanied by changes in how these deficits manifest. For individuals with social deficits, like many people with PSDs, the internet may seem to be a place of respite from the demands of face-to-face social interactions. Two explanations have been proposed regarding the effects of online social engagement. The "social compensation" hypothesis suggests that internet use may confer particular benefit to socially-withdrawn individuals by allowing them to connect to others in a lower-stress environment, develop social skills, and build confidence that can translate to offline settings (McKenna & Bargh, 2000; Morahan-Martin & Schumacher, 2003; Roberts, Smith, & Pollock, 2000). A competing explanation, the "rich-get-richer" hypothesis, posits that internet use primarily benefits those who are already socially "rich," with strong pre-existing social skills

and confidence in interactions (Kraut et al., 2002; Sheldon, 2008). This hypothesis suggests that internet use cannot ameliorate deficits in social abilities and can actually impede the development and refinement of social skills by depriving people of opportunities to engage with others in the offline world (Henderson & Zimbardo, 1998). However, there is evidence to suggest that neither hypothesis sufficiently accounts for all of the many different variables and motivations that guide the behavior of individuals who are socially withdrawn.

As an example, Nelson and colleagues have studied the relationship of internet use with different subtypes of social withdrawal (Nelson, Coyne, Howard, & Clifford, 2016). These subtypes of social withdrawal have been identified via the approach-avoidance model of social interaction (Asendorpf, 1990; Nelson, 2013) and conceptually overlap with the active social avoidance (high-avoidance, low-approach; avoidant subtype) and passive social avoidance (low-avoidance, low-approach; unsociable subtype) common in PSDs. The researchers demonstrated that participants who were characterized by avoidant social behaviors engaged in more problematic media use than shy, unsociable, or non-withdrawn participants (Nelson et al., 2016). Unsociable individuals did not show any significant issues related to internet use in comparison to non-withdrawn peers, indicating that active social avoidance (perhaps as a means of reducing fear or anxiety associated with social interaction) may correspond with a higher risk of developing internet use problems. Furthermore, at a year follow-up, the researchers found that higher levels of problematic internet use at T1 – and not higher levels of general internet use – predicted withdrawn behaviors and mediated the relationship between avoidant social withdrawal and externalizing behaviors (e.g., illegal drug use, shoplifting; Nelson et al., 2016). This suggests an unfortunate trajectory for the avoidant subtype that is in line with the "rich-get-richer" hypothesis: socially avoidant individuals, deficient in the requisite skills to successfully

navigate in-person social interactions, are more likely to engage in PIU. This, in turn, continues to exacerbate social dysfunction in such a way that translates to delinquent social behavior in the real world. Due to the similarity between these broader subtypes of social withdrawal and the patterns of social withdrawal in PSDs, we could speculate that these results also have implications for the study of internet use in psychosis. However, these researchers did not collect information on mental health history of their participants. Thus, it is important to first consider literature on the intersection of PSDs and internet use.

How do Individuals with PSDs Use the Internet?

An obvious consideration with regard to studying internet usage in PSDs is whether a substantial number of these individuals have regular access to the internet, as people with serious mental illness (SMI) constitute a significant portion of lower socioeconomic statuses and homeless populations (Hudson, 2005; The US Department of Housing and Urban Development [HUD], 2016). Few studies have been able to capture internet usage rates in large samples of individuals with SMI, and even fewer have examined rates in PSDs specifically. One study of internet use in an adult SMI sample with mixed psychopathology reported rates commensurate with the general population at the time (79.5%) and social media use among 49% of participants (Trefflich, Kalckreuth, Mergl, & Rummel-Kluge, 2015). Other recent studies with SMI adults have reported social media use in anywhere from 33.2% (Brusilovskiy, Townley, Snethen, & Salzer, 2016) to 71% of participants (Naslund, Aschbrenner, & Bartels, 2016). Among studies with PSD samples specifically, rates of internet usage range from 48% to 81.2% (Aref-Adib et al., 2016; Miller, Stewart, Schrimsher, Peeples, & Buckley, 2015; Spinzy, Nitzan, Becker, Bloch, & Fennig, 2012). Research with individuals receiving treatment for a first episode of psychosis found that the majority had access to a cell phone (88%), home laptop (70%), or home desktop

(52%; Lal, Dell'Elce, & Malla, 2015). Furthermore, Birnbaum and colleagues (2017) found that 100% of their adolescent and young adult participants diagnosed with a PSD regularly used social media. Collectively, these studies indicate that individuals with psychosis symptoms, particularly those in the 18-29-year-old demographic, are indeed using the internet. This demographic is particularly important to the current research because it encompasses the period of development at which psychosis symptoms begin to emerge for both males and females.

Several problems arise in trying to analyze these studies in aggregate, however. First, there is very little consistency across these samples in terms of: 1) the overarching research questions (e.g., patterns of social media use versus internet use in general); 2) the means of assessment and questions asked (e.g., semi-structured interviews versus self-report questionnaires); and 3) the sample characteristics (e.g., inpatients versus outpatients). Second, rapid advances in technology and the exponential increase of internet access would suggest that a gap of even one or two years between studies may not allow for meaningful quantitative comparisons, due to the ever-changing definition of internet access and associated variables. Because research on internet usage is still in the relatively early stages, few assessments exist that have demonstrated psychometric validity and reliability. Development of standardized measures that can quantify different facets of internet usage would be helpful as psychological science attempts to capture a moving target.

With a rough idea of the statistics on how many and how often individuals with PSDs use the internet, another area of research has attempted to qualitatively describe the ways in which this population uses the internet, or their online behaviors. For example, a study involving phenomenological interviews with 26 people diagnosed with schizophrenia or schizoaffective disorder identified significant themes in participants' reasons for internet use (Schrank, Sibitz,

Unger, & Amering, 2010). These included searching for specific topics of interest, using information from the internet to discuss treatment options with doctors at in-person appointments, and interacting with other users about the illness. Within the third theme, Schrank et al. (2010) noted that participants who had engaged with others regarding their experience with mental illness reported positive effects in the form of receiving help coping with the illness, boosting self-esteem by helping others, and feeling empowered by sharing their story. A systematic review of studies related to social networking found that, compared to healthy controls, people with psychosis (inclusive of bipolar disorder with psychotic features) tend to spend more time in chat rooms and online games for the purposes of establishing new relationships, connecting with existing relationships, and engaging in online peer support (Highton-Williamson, Priebe, & Giacco, 2015). Having these supportive and beneficial experiences may therefore incline many individuals with PSDs toward forming positive impressions of other internet users.

Problematic Internet Usage and PSDs

As indicated by the results of these qualitative studies, many individuals with PSDs use the internet in a functional way and report benefits in being able to connect with others and find support. However, these individuals may be at higher risk for developing problems with internet addiction, as several studies have documented a relationship between PIU and psychosis symptom severity. In samples of college students (e.g., Truzoli, Osborne, Romano, & Reed, 2016), scores on the Internet Addiction Test (IAT; Young, 1998) were positively correlated with schizotypal personality traits, specifically introverted anhedonia and impulsive nonconformity. Similarly, a recent study by Taymur et al. (2016) revealed that levels of subclinical psychotic symptoms among college students were significantly positively correlated with self-reported

internet addiction symptoms. Using a measure of broadband psychopathology, Taymur et al. (2016) also found higher levels in all other domains of psychopathology according to internet addiction severity, suggesting that PIU may not be related to psychosis specifically, but rather to general psychological dysfunction.

Mittal and colleagues (2007; 2013) is one of the few research teams to lead an investigation into the association between PIU and symptoms in samples of individuals exhibiting psychosis. Among adolescents with schizotypal personality disorder (STPD), individuals with bipolar disorder (BD), and healthy controls, the researchers found that daily time spent engaging in online chat rooms and gaming was significantly positively correlated with psychosis symptom severity, especially ideas of reference, unusual perceptual experiences, and odd/eccentric behavior (Mittal, Tessner, & Walker, 2007). In a subsequent, longitudinal study, individuals exhibiting subclinical psychosis symptoms (i.e., PLEs) provided ratings of their PIU behaviors at baseline, then at a two-month follow-up (Mittal, Dean, & Pelletier, 2013). At T2, the sample was split into those whose PLE scores improved or stayed the same and those whose scores increased. Individuals whose PLEs improved or remained unchanged over time showed significant reduction in PIU scores at T2, whereas the PIU scores of those whose PLEs worsened within the 2-month span remained the same (Mittal et al., 2013).

Taken together, these results suggest a positive association between PIU and psychosis symptoms. However, because these studies are largely correlational, the directionality of the effect cannot be ascertained. By illuminating connections between both general and problematic internet usage and aspects of psychosis symptoms, these authors have laid the groundwork for further investigation into the ways in which internet usage may be changing the clinical picture of schizophrenia. If research can establish connections between aspects of internet usage and the

development of particular symptoms, this information could be used to facilitate case conceptualization and treatment of schizophrenia or other PSDs.

Theories of Delusion Formation

One way in which the internet may be affecting the clinical picture of PSDs has to do with the impressions these individuals form about other internet users, and whether those thoughts lead to mistaken conclusions that could transform into delusional beliefs. Previous authors have raised the concern that exposure to social media may pose a risk of exacerbating symptoms in schizophrenia (Torous & Keshavan, 2016), though this discussion concluded with an acknowledgement that there simply has not been enough research conducted on internet use in PSDs. Theoretically, it would seem plausible that a vague or ambiguous post by another internet user (e.g., "people suck") could prompt someone with psychosis to develop a paranoid belief about the relevance of that post to his/her life (e.g., "this person thinks I suck?"). This belief could then grow into a crystallized delusion as the person attempted to explain the reasons for this occurrence (e.g., "why would this person think that about me? Maybe they can access my negative thoughts"). In order to consider the possibility that internet use may be changing the nature of psychosis, it is important to examine existing theories on how delusional beliefs originate.

Prominent theories of delusion formation postulate that delusions arise due to a malfunction in the circuit underlying normal belief evaluation. According to an influential cognitive model of normal belief development, three steps are involved in generating new explanations or evaluating existing beliefs for incoming sensory stimuli (Langdon & Coltheart, 2000). First, the sensory information is detected and judged to be in need of explanation either because it is a) personally relevant or b) incongruent with information in an existing belief

system. Second, a myriad of external and internal biases leads one to generate an assortment of potential causal explanations. Third, higher-order evaluation processes become active so that the natural proclivity to assign immediate validity to information from the senses is suspended and all possible hypotheses can be critically evaluated. Evaluation processes then guide selection of the most plausible and likely explanation for the initial stimulus, based on the degree of consistency with one's past experiences and the identification of any potential irregularities in the environment that may account for discrepancies between the initial stimulus and one's past experiences (Fischhoff & Beyth-Marom, 1983; Langdon & Coltheart, 2000; Stone & Young, 1997). A broad conceptualization of the mechanism of delusions suggests that something has gone awry at one of the steps in the process of normal belief evaluation. This could be due to several factors, such as assigning too much importance to an otherwise mundane stimulus (also known as aberrant salience; Kapur, 2003) at step one, or arriving at a conclusion based largely on sensory information. In these ways, delusional individuals do not maintain all potential explanations on an equal playing field, and some research has shown that a majority of acutely symptomatic people with PSDs may not be able to generate alternative explanations beyond the delusional interpretation (Freeman et al., 2004). Instead, they may show a tendency to circumvent the processes of critical evaluation and assign higher validity to less plausible interpretations of the initial stimulus, perhaps due to an inability to separate the external event from internal experiences or due to errors in the data-gathering process. Several theories have attempted to clarify the nature of this mechanism by linking empirical evidence for cognitive deficits in PSDs to the phenomenon of delusion formation (Bentall, Kinderman, & Kaney, 1994; Frith, 1992; Garety & Freeman, 1999). These theories may provide a foundation for further consideration of how internet use could affect psychosis symptom development.

Originally, it was proposed that delusions are the result of intact cognitive processes that serve to provide an explanation for abnormal perceptual experiences (Maher, 1974). In the described model of normal belief evaluation (i.e., Langdon & Coltheart, 2000), this would indicate a malfunction in the first step of the process. According to this line of reasoning, schizophrenia is not a disorder characterized by any sort of cognitive impairment, but rather by perceptual disturbance. Several problems arise with this interpretation (Garety & Freeman, 1999). First, research has shown that an individual can exhibit delusional thinking without endorsing anomalous perceptual experiences (Chapman & Chapman, 1988). As well, a growing body of research has contributed substantial evidence that individuals with schizophrenia do have cognitive impairment across many different domains (see Green, Kern, Braff, & Mintz, 2000), particularly when it comes to making attributions about situations (So et al., 2012). For example, a long line of work by Garety and colleagues has repeatedly demonstrated that individuals with schizophrenia have a tendency to make conclusions based on fewer pieces of evidence than do healthy controls (e.g., Garety, Hemsley, & Wessely, 1991), such as in a probabilistic reasoning task. This phenomenon has been termed the Jumping to Conclusions (JTC) bias (Garety & Freeman, 1999). Because perceptual anomalies are present in certain medical or neurological disorders without any delusional interpretation (e.g., phantom limb syndrome), it is thought that there must be a concomitant cognitive abnormality in psychosis that inhibits one's ability to gauge the implausibility of a delusional belief (Gold & Gold, 2012). The JTC bias implies that deluded individuals may be focusing excessively on present evidence and less on conclusions drawn from past experiences and patterns. As a result, they put more weight on a hypothesis that is consistent with input from their senses, emotional state, and/or other heuristics, rather than the one that fits into a logical narrative of how the world is most likely to

exist (Garety & Hemsley, 1994). Interestingly, there is evidence to suggest that individuals with PSDs who are able to generate alternative explanations for their delusional beliefs perform better on a probabilistic reasoning task than those who are unable to account for the cause of an event beyond the delusion (Freeman et al., 2004).

It is clear to see how an increased tendency to jump to conclusions may contribute to delusional beliefs involving the internet, where language is often nuanced and information can be subject to personal interpretation. This may be further exacerbated by the well-replicated confirmation bias which suggests that people in general have a tendency to positively evaluate information that is consistent with their existing beliefs, and to discredit incongruent evidence. Recent research has demonstrated that the confirmation bias can lead individuals to differentially interact with information on the internet depending on the circumstances in which they view that information (Buttliere & Buder, 2017). For example, when participants were afforded the opportunity to read more from or respond to authors of online posts, they more often chose to read more from authors with whom they agreed and reply back to authors with whom they disagreed (Buttliere & Buder, 2017). Cognitive biases may therefore have a role to play in the formation and maintenance of internet-related delusions by leading a person with psychosis to make conclusions based on insufficient evidence, and subsequently attend more to information in support of that conclusion. These biases may also lead a person to primarily seek and consume media that reinforces his or her existing beliefs, which is easier to do in an online context where one has greater control over the sources of external information.

Biases and deficits in social cognition have also been implicated in models of delusion formation, particularly in regard to delusions of reference (belief that mundane stimuli have personal meaning, relevance, or importance for the individual) and persecution (belief that other

entities intend physical or emotional harm toward the individual). Social cognition is a term for the mental processes underlying the human ability to understand different aspects of social interactions, and typically encompasses four domains: (1) facial emotion recognition, (2) nonverbal social cue perception, (3) theory of mind (ToM), and (4) attributional style (Fiske & Taylor, 1991). A second theory of delusion formation, proposed by Frith (1992), focuses primarily on the construct known as theory of mind (ToM), which is defined as the ability to infer and reason about another person's mental state in terms of thoughts, beliefs, or intentions (Brüne, 2005). ToM deficits have been documented in chronic schizophrenia, both during the acute phase and after remission, (Bora, Yucel, & Pantelis, 2009). Meta-analyses have also shown medium effect sizes for ToM deficits in unaffected first-degree relatives of schizophrenia and individuals identified as ultra-high risk (UHR), as well as a large effect size for first-episode psychosis patients, when compared with controls (Bora & Pantelis, 2013). Frith argued that ToM impairment directly contributes to delusions of reference and delusions of persecution because these beliefs necessarily involve the misinterpretation of another's mental state (Frith, 1992). Despite a theoretical connection between impaired ToM and delusion formation, empirical evidence for Frith's theory has been inconclusive. In a recent critical review of the literature on ToM in schizophrenia, only three of the reviewed studies demonstrated a clear link between ToM deficit and persecutory delusions (see Harrington, Siegert, & McClure, 2005). This suggests that the ToM theory of delusion formation probably does not fully account for the mechanism of abnormal thought development, though it is likely to be a significant explanatory factor for certain presentations of the illness and has clear implications for delusions stemming from inaccurate impressions of others on the internet. For example, deficits in ToM may make it

more difficult for an individual with psychosis to detect sarcasm, acknowledge another person's situational factors, and interpret abstract language in online posts.

A third theory of delusion formation centers on the idea that, in particular, persecutory delusions stem from an externalizing attributional bias, meaning that individuals are more likely to attribute the causes of negative events to entities other than the self (Bentall et al., 1994). This theory builds on an early model of self-concept (Higgins, 1987) in which higher or lower self-esteem is related to the level of discrepancy among three domains – actual self, ideal self, and "ought" self – and two perspectives – the perspective of the self and the perspective of another. According to this conceptualization, persecutory delusions stem from the desire to protect self-esteem by serving to minimize the discrepancies between the actual self and the ideal self, as one attributes the origins of threats to self-esteem to failings of others rather than one's own personal failings (Bentall et al., 1994). As a consequence, we would expect to find higher levels of self-esteem among individuals with persecutory delusions.

There has been empirical support for the presence of the externalizing bias in individuals with delusions, especially when one is specifically considering self-referential information (Young & Bentall, 1997), though some studies have found that this bias is not exclusive to individuals with persecutory delusions (Martin & Penn, 2002). Contrary to the theory that persecutory delusions act in defense of self-esteem, however, research has not strongly supported the notion that delusional individuals have higher self-esteem than healthy controls. In fact, quite the opposite has been documented among individuals with paranoia such that 100% of studies in a recent review found paranoia to be associated with stronger negative self-concept (Tiernan, Tracey, & Shannon, 2014).

In 2001, the attributional bias theory of delusion formation was revised to deemphasize the supposition that delusions serve to protect self-esteem, and instead proposed that causal attributions affect one's personal self-concept, which in turn shapes the way one makes causal attributions, thus establishing an "attribution—self-representation cycle" (Bentall, Corcoran, Howard, Blackwood, & Kinderman, 2001). Abnormal causal attributions have indeed been widely documented in the schizophrenia and PSD literature. What is less definitive is the field's impression of whether these biases represent a fundamental trait of PSDs, as they have traditionally been considered, or if they are state-dependent. If the characteristic externalizing attributional bias (EB) is an integral feature of delusional thinking, we would expect to find evidence of this bias even in patients who were previously, but are not actively, delusional. However, in a more fine-grained analysis of EB, Diez-Alegría and colleagues (2006) found that, although both acute and remitted delusional groups showed an EB for the causes of negative events, only acutely deluded participants showed an increased tendency to attribute these causes to other people rather than to other situational factors. This personalizing bias (PB), as it was termed by the authors, is arguably more important to understand than the global EB, as it may better represent a mechanism for persecutory delusions and social cognitive impairments, both of which have a greater potential for negative functional impact. This finding was replicated in a more recent study (Lincoln, Mehl, Exner, Lindenmeyer, & Rief, 2010) that defined the acute and remitted groups as having experienced persecutory delusions specifically. Mixed results were found in a study that compared attributional biases according to delusion type, holding constant the presence of active positive symptoms (Mehl et al., 2014). Relative to a healthy control group, patients with and patients without persecutory delusions actually showed a reduced EB for negative events, with no significant difference between the groups on PB. In spite of this finding,

a cluster analysis of scores on the attributional style measure used in the study (IPSAQ-R; Kinderman & Bentall, 1996) revealed a subgroup of patients (n=70; study N=258) with more pronounced PB in conjunction with more severe persecutory delusional beliefs (Mehl et al., 2014). Together, the conclusions of these studies suggest some consistency in the presence of attributional biases in PSDs, though the particular form may depend on an individual's present psychological state. These findings would therefore argue more strongly for the theory that externalizing bias is not a trait of PSDs, but rather a tendency that is subject to change based on situational factors.

In sum, it appears that each of the three theories of delusion formation can supply some pieces of the puzzle; however, no one theory has sufficient empirical support to conclusively account for the mechanism of delusion formation. The JTC bias proffers that individuals with PSDs may be hasty in accepting an implausible causal explanation for an event based on insufficient evidence. Research on ToM shows that the ability to understand another person's mental state is impaired in PSDs, leading to misinterpretation of others' thoughts or intentions. Attributional biases may incline those in the active phases of PSDs to mistakenly infer that the cause of a negative event is due to the fault of another person, rather than to the self or to a situation. Whether one of these theories will pull forward as the primary mechanism for delusion formation remains to be seen. However, in many ways, these constructs all function together to maintain delusions, particularly since the attribution bias and ToM deficits may facilitate an initial misinterpretation that is quickly accepted as reality due to the JTC bias. Likewise, each may be responsible for driving a different manifestation of positive symptoms, with the specific features of those symptoms supplied by context.

For many years, these theories have played a critical role in shaping the field's understanding of the potential cognitive mechanisms for delusion formation. Yet, even recent studies attempting to explain aspects of delusion formation have failed to consider the influence of the internet. This is not to say that real-world studies on delusion formation are becoming irrelevant or unimportant; rather, it serves to underscore the necessity for further research to move the field forward. Despite its growing ubiquity, we currently know very little about the role of the internet in the development and maintenance of psychosis symptoms. In order to more effectively assess and treat delusional thinking, it is crucial to understand the ways in which a person's surroundings can change the structure of these beliefs. As internet usage has become ingrained in the environment of so many different societies, it is worth exploring whether the internet's effect on psychosis symptomatology is merely changing the observable form of delusions or if it may actually play a role in the genesis of delusions.

The Role of Context in Delusions: Pathogenic or Pathoplastic?

In clinical practice with individuals with PSDs, it is not uncommon to hear references to popular celebrities, current events, or modern conspiracy theories incorporated into a patient's delusional belief system. An ongoing debate in the literature has deliberated as to whether one's surrounding context is directly pathogenic in the formation of delusions, or if context is pathoplastic, meaning that it flexibly changes the content and form of delusions according to the particular time and environment in which a person lives (Hirjack & Fuchs, 2010). According to Klosterkotter's three-phase model of symptom development (as described in Stompe, Ortwein-Swoboda, Ritter, & Schanda, 2003), a pathogenic role of context would imply that context exerts its influence during the initial "phase of irritation" by provoking the cognitive disturbances that lead to basic positive symptoms. If context is pathoplastic, on the other hand, it would be more

likely to influence the third phase of development ("phase of concretization") wherein a person fuses the basic positive symptom with some sort of personal meaning or past experience in an attempt to explain the abnormal perceptual experience.

Although there appears to be some evidence to support the idea that the internet is prompting the creation of new delusions (i.e., pathogenic), research in this domain has largely been limited to case studies. Bell and colleagues (2005) conducted a review of the number of mentions of the internet in a decade (1993-2003) of issues of the UK newspaper *The Times* and the number of reported cases of internet delusions. They found no cases of internet delusions existed prior to 1997 when mentions of the internet were slowly climbing by about 500 per year; however, cases began to appear more often as the number of mentions increased from 3000 to more than 9000 in the years 1998-2000 (Bell, Grech, Maiden, Halligan, & Ellis, 2005). Some case studies have described the particular influence of the internet on the content of delusions in individuals with schizophrenia (Catalano, Catalano, Embi, & Frankel, 1999; Compton, 2003; Heim, 2010), such that people believe their lives are being broadcast over the internet, that their body movements are dependent on hitting keyboard keys, or that they run online services for training new witches. Other case studies highlight the intersection of positive symptoms and internet themes with impaired social processing. For example, a male with first episode psychosis was described as concerned that his neighbor was putting details of his life online, and that women with whom he was communicating via the internet were plotting to kill him (Tan, Shea, & Kopala, 1997). Another young male used Facebook to communicate with a former high school classmate and began to overinterpret her general messages as evidence of her love for him, which led to stalking behavior and attempts to elope from a psychiatric hospital because of his belief that she was outside waiting for him (Krishna et al., 2013).

Proponents of the pathogenic explanation have suggested that internet-related delusions represent an entirely new subtype, and would theoretically be included alongside other subtypes, such as persecutory, grandiose, or delusions of reference (Bell et al., 2005; Catalano, Catalano, Embi, & Frankel, 1999; Eytan, Liberek, Graf, & Golaz, 2002). Including internet- or technology-themed delusions as a distinct category, it is argued, may help shape the therapeutic techniques that are used to address any resultant distress (Bell et al., 2005). In fact, some authors have already documented success in using cognitive-behavioral therapy for internet delusions, in part because these beliefs are often amenable and responsive to reality testing (e.g., Duggal, Jagadheeshan, & Nizamie, 2002). Although several authors have advocated for the pathogenic model of internet content, this model is based largely on speculation from case studies with no clear empirical evidence to support the notion that surrounding cultural context is directly responsible for the development of a delusion.

Perhaps the more likely explanation is that surrounding context has a pathoplastic effect on delusions, and that seemingly new varieties of symptomatology are no more than variants of existing symptomatology (Gold & Gold, 2012; Lerner, Libov, & Witztum, 2006; Stompe et al., 2003). Many of the case studies that have led to the suggestion of internet delusions as a separate subcategory can be traced back to one of the long-standing subtypes. For example, it could be argued that the young male who thought his high school classmate was confessing her romantic interest in him via her Facebook posts (Krishna et al., 2013) was simply experiencing a delusion of reference. Similarly, clinicians would likely categorize the man who believed his neighbor was posting intimate details of his life (Tan et al., 1997) as suffering from a persecutory delusion, rather than an internet delusion. In a review of cohort comparison studies, Stompe et al. (2003) demonstrated that many categories of delusions have not changed dramatically in the past

150 years, despite major societal events (e.g., world wars) that often lead to enduring shifts in cultural norms. Delusions of persecution and grandiosity have shown the most stability over time; whereas, the frequency of reports of delusions of religion and guilt has slowly decreased over time in response to secularization (Stompe et al., 2004). This analysis has significant limitations, such as an inability to account for fundamental changes in the state of mental health care across 150 years. It is helpful, though, in that it more clearly delineates the concept of delusion *content*, which may vary over time, from that of delusion *category*, which remains relatively stable. Indeed, many present-day PSD patients have grandiose delusions, but it is doubtful that any of them would claim to be Winston Churchill, despite this being a popular assertion at one point in history (Lerner et al., 2006).

It would therefore appear that the role of internet-related content is limited to shaping the surface features of delusions; however, few events in history have prompted such a tremendous shift in culture as the rise of the internet over the past several decades. Children born in the modern age are learning to think in a way that necessarily reflects the influence of technology, and this trend is likely to continue into the foreseeable future. As indicated by the cognitive models of delusion formation, delusions represent a malfunction in the normal cognitive processes of belief evaluation. With online information coming from any number of reputable or disreputable sources, it is possible that the internet could be somehow changing a person's ability to engage in the evaluation process. This may have important implications for people with psychosis-spectrum disorders, who often have specific difficulty evaluating the source and implication of information. Although previous research has been able to describe ways in which people with PSDs use the internet, there is insufficient data on the ways in which PSDs themselves are affecting or affected by the internet.

Thus, one of the broader goals of the current research program is to contribute to the scarce literature on this topic. In particular, the current research aims to gradually expand our understanding of the online behavior of individuals with PSDs by examining whether psychosis symptoms are manifesting in this environment. If an increasing number of individuals with PSDs are engaging with others online, rather than face-to-face, to avoid the often negative and sometimes stigmatizing feedback from in-person interaction (Torous & Keshavan, 2016), it is important to understand whether the symptoms of psychosis intersect with internet usage behaviors and/or attitudes. It would stand to reason that, in a population already more likely to misattribute the intentions of others in response to ambiguous situations (Combs et al., 2009), there would be increased misperception of online interactions, which are generally more ambiguous than in-person interactions due to the inability to collect information through body posture and tone of voice.

Existing Assessments of Internet Usage and Social Cognition

There is currently no direct way to assess whether positive symptoms, particularly paranoid beliefs, are associated with attitudes toward others on the internet in individuals with psychosis, or vice versa. Existing measures of social cognition designed to measure beliefs about others' intentions, such as the Attributional Style Questionnaire (ASQ; Peterson et al., 1982) or Ambiguous Intentions Hostility Questionnaire (AIHQ; Combs, Penn, Wicher, & Waldheter, 2007), are currently unable to serve this purpose because participants are instructed to visualize scenarios that are strongly tied to real-world situations (e.g., imagining that someone bumped past you in a hurry). The nature of these items is such that they would not easily be modified to capture beliefs about others' intentions in a virtual context without additional research and

psychometric validation of new scenarios to ensure that the measure continued to approximate the intended construct.

Similarly, measures that more directly investigate patterns of internet usage have focused primarily on addiction-like behaviors. For example, the Internet Addiction Test (IAT; Young, 1998) and the Problematic Internet Use Scale (PIUS; Morahan-Martin & Schumacher, 2000), closely following the existing behavioral addiction framework, were designed to assess a person's own perception of the consequences of his or her internet use behaviors. Aside from the negative impact of problematic internet usage on the person's own social relationships, these measures have no direct way to assess an individual's thoughts, beliefs, or attitudes regarding other people on the internet. Furthermore, concern has been levied against these measurements collectively, due to the lack of a unifying definition of what constitutes "problematic" internet usage (Laconi, Rodgers, & Chabrol, 2014).

Perhaps the most relevant candidate for measuring attitudes toward other internet users, although valenced in the opposite direction, is the Online Social Support Scale (OSSS; Nick et al., 2018). This scale asks participants to consider the amount of support they feel they receive from others on the internet in four domains: Esteem/Emotional Support (EE); Social Companionship (SC); Informational Support (INF); and Instrumental Support (INS). Two of these domains are especially relevant. The SC subscale provides information about the sense of belongingness the person perceives from others online and the INF scale allows insight into the individual's assessment of the quality and degree of assistance he/she receives from others. This measure maps closely on to prominent theories regarding domains of social support derived from experience with in-person interactions (Cohen & Willis, 1985) and may help assess a person's attitudes regarding other internet users. However, the OSSS is still very new, and not enough

research has been conducted with this measure to allow insight into the causal factors that could prompt a higher or lower perception of online social support. If levels of paranoia were found to be negatively associated with the OSSS, it may indicate that there is some relationship between persecutory beliefs and attitudes toward others on the internet.

Consequently, the current research aims to address these gaps in the literature by developing and validating a measure of social cognition that concerns perceptions of others exclusively in an online context. If the measure could help discriminate abnormal beliefs about others on the internet from otherwise normative beliefs among individuals with psychosis symptoms, it may be possible to subsequently establish an association between symptom development and internet usage. Because this area of research is still relatively new, a self-report questionnaire may be the most useful format for first exploring individuals' own conceptualizations, which could provide preliminary correlational data about the nature of this association.

Processes for Objective Scale Development

Guidelines for objective scale development have suggested a series of steps to increase the likelihood that the resultant measure will demonstrate good reliability and validity, thus serving as a reasonable approximation of the intended construct (Clark & Watson, 1995; DeVellis, 2012). First, it is important to clearly operationalize the construct of interest. For the current study, this construct is defined as perceptions of other people on the internet or, more specifically, perceptions of personality traits and behavioral intentions that are ascribed to other internet users as a collective. Second, an overinclusive item pool should be generated in order to include as many items related to the construct as possible. These items should then be administered to a development sample. Although there are no absolute rules regarding the size of

this development sample, many sources suggest including no fewer than 300 participants (Comrey, 1973; Guadagnoli & Velicer, 1988). This is due in large part to the nature of analyses that are used in psychometric evaluation of scale properties, such as factor analysis and item response theory. Once initial data are collected, the scale can then be subjected to these analyses, which aid the researcher in determining the scale's validity, dimensionality, and the functional utility of scale items.

In scale development, factor analysis is commonly a two-step procedure (Floyd & Widaman, 1995). Without a firm *a priori* theory as to a measure's underlying factor structure, a researcher may begin by conducting an exploratory factor analysis (EFA), which examines patterns of covariation among correlations between item scores within the sample. Each individual item score is correlated with the scale's total score to create an item-total coefficient. If a measure is composed of a single factor (i.e., unidimensional), the correlation between any two items can be computed by multiplying these coefficients because, theoretically, there is no other latent variable to account for the variance. Thus, the projected correlation obtained by multiplying these two path coefficients, when subtracted from the actual correlation between the two items, should be roughly equivalent, or not significantly different from zero. If significant residual covariance remains, however, this would suggest that more than one latent variable exists within the data set and the measure is multi-dimensional. EFA allows a researcher to see how many factors are needed to explain the majority of the covariation between items.

Different methods are used to decide on, or extract, the number of factors that account for the most meaningful variance. For example, a scree plot is a graphical representation of the portion of information captured by a particular factor, known as an eigenvalue. It has been suggested that one could extract the number of factors that corresponds with a point in the scree

plot where the line begins to asymptote, indicating that an increase in the number of factors is no longer translating to an increase in the amount of useful information explained. Because this method represents a relative comparison between factors, it is well-suited to EFA where the goal is to explain meaningful patterns in the data, rather than to reduce the number of variables, as in principal components analysis. In many cases, EFA will reveal items that are not strongly associated with any of the extracted factors, or may load equally strongly on more than one factor. Examining the factor loadings for each item can be helpful in this way to identify those items from the overinclusive pool that should be removed from the final version of the measure.

Confirmatory factor analysis (CFA) is the second step in the factor analysis procedure. This step allows a researcher to specify a model and impose a factor structure, either identified a priori or by the EFA, to an independent data set as a means of judging whether this model represents an acceptable way to conceptualize the data. Through CFA, the researcher can obtain specific statistical information regarding that model's "fit" to the new data set, which can then be compared with established benchmarks for determining the quality of model fit. Although fit statistics can be improved by including additional factors—since retaining more variables necessarily increases the amount of variance that is explained—it is preferable to work within the most parsimonious framework. This is to say that one should try to account for the most variance possible using the model with the fewest parameters.

The final step in the overarching process of developing a scale is to evaluate its psychometric properties against conventional standards in order to obtain estimates of the scale's validity and reliability. Additional measures that are theorized to be within and outside of the scale's nomological network can be utilized to establish convergent and divergent validity, respectively (Cronbach & Meehl, 1955). It is important to demonstrate that the current measure

is sufficiently different from measures of beliefs regarding other people in general, or other people in exclusively real-world contexts, so that the utility of this measure for studying internet-related social cognition is upheld. Thus, including scales such as the OSSS (a measure of perceived support from other internet users), the IAT (a measure of online behavior), and the AIHQ (a measure of real-world attribution of intention) can help quantify the nature of the relationship between the current measure and related constructs. Each of these measures tap into a separate, yet closely-related construct, and correlational analyses can be used to reveal the magnitude and direction of the relationships with the newly-developed scale.

Study Aims

The primary goal of the current research was to develop a measure of attitudes toward other internet users using the methods for objective scale development specified by Clark and Watson (1995), as outlined above. This was accomplished over the course of three studies with four overarching aims. As a theoretical basis for item generation, Aim 1 was to collect responses to questions targeting impressions of others on the internet and to format items into a self-report questionnaire. Aim 2 was to administer the questionnaire to a large ($N > 500$) sample of individuals in order to conduct an EFA and specify a candidate model by removing or retaining items based on factor loadings. Aim 3 was to administer the refined questionnaire to a sufficiently large, independent sample of individuals in order to examine model fit using CFA and make additional modifications to the final questionnaire if indicated. Aim 4 was to explore the construct validity of my questionnaire by examining correlations between the resultant factors and other measures of social cognition, personality, psychosis symptoms, and online impressions.

Study 1 – Measurement Development

To address Aim 1 related to item generation, I conducted an exploratory pilot study to gauge attitudes toward others on the internet and reasons for internet use in a large sample of college undergraduates. This population was targeted for several reasons. First, approximately 99% of college students have access to and regularly use the internet (Pew Research Center, 2018a). Second, college students are within the critical age range for the development of psychosis symptoms and thus are most likely to either experience symptoms directly or to be peers of individuals who develop psychosis. This population is therefore ideal for studying the influence of the internet on thinking and behavior, as well as the emergence of subthreshold psychotic-like experiences.

Study 1 - Methods

Procedure

Data were collected from undergraduate students enrolled in a psychology course at the University of Hawaii – Manoa (UHM) during the period of October 2015 through May 2016. This study was reviewed by the UHM Institutional Review Board and was found to qualify as exempt. Students were recruited via class announcement and participated in this research project either as part of course requirements or to gain extra credit. All study material was accessed at the participant's convenience on Qualtrics, an online survey platform. Credit for participating in the study was awarded through SONA, a system that facilitates undergraduate research at UHM. All participants proceeded through the study in the same order, beginning with acknowledging the consent form, then providing general demographic information, then responding to questionnaires related to internet usage, social cognition, and psychological experiences. The study took approximately 60 minutes to complete.

Participants

A total of 618 responses were collected by the Qualtrics system. After removing duplicate response entries, significant outliers on a measure of subclinical psychosis symptoms, and participants who were missing more than 2/3rds of their data, 503 total participants comprised the final sample. Table 1 presents demographic information for the sample. The mean age of the sample was 19.86 (SD = 2.54, *n* = 500). Data on gender and ethnicity were available for 501 participants. 67.1% of the sample was female, 33.5% identified as East Asian (*n* = 180), 22% identified as Southeast Asian (*n* =118), 19% identified as Caucasian (*n* = 110), 13.6% identified as biracial or multiracial (*n* = 76), 5.4% identified as Native Hawaiian (*n* = 30), and 6.6% indicated another ethnic background (African American, South Asian, Hispanic American, Pacific Islander, or American Indian; *n* =34).

Measures

Exploratory qualitative questionnaire. In order to assess participants' patterns of internet use, a questionnaire was designed for the study. Participants were asked to rate the frequency at which they engaged in a list of activities that people can do online, from *never* to *every day or almost every day* (see Appendix 1). Additionally, they were asked to provide free text responses to open-ended questions about their internet behaviors (e.g., "Please list the 5-10 websites you visit most frequently;" "Collectively, across all devices, about how many hours per day do you spend on the internet?") and their impressions of others on the internet (e.g., "What inferences can you make about others on the internet?" "What is your impression of people who post frequently on social media sites like Facebook?"). Participants were able to provide a maximum of 10 responses for each open-ended question. See Appendix 1 for a full list of questions.

Study 1 - Data Analysis

Impressions of other internet users were then examined for larger themes by myself and an undergraduate research assistant. Because participants were able to record as many as 10 responses, we began by analyzing the sample's first response to the questions regarding inferences about others on the internet and impressions of others who post frequently on social media sites. We then reviewed the sample's second response for the presence of new themes, then the third response, and so on. Among the themes we identified were (1) general positive/negative beliefs, (2) beliefs that others on the internet are excessively self-centered, (3) beliefs that people behave and communicate differently online than they do in real life, and (4) beliefs about the relative safety of interacting with others on the internet. After broad themes were identified, we pulled representative responses and coded them into items. We also pulled responses that did not necessarily fit into a theme, but described a theoretically interesting concept (e.g., "comments on the internet do not come from real people").

Study 1 – Results and Discussion

Responses related to impressions of others on the internet varied widely, from opinions such as "they're rude and mean," and "they cannot be trusted," to "they are normal people who have their own lives," and "very connected with people and what is going on in the world." These responses were compiled into a 71-item questionnaire rated on a 1 (*strongly disagree*) to 5 (*strongly agree*) Likert scale (see Appendix 2). Following the guidelines of Clark and Watson (1995) for objective scale development, this overinclusive item pool allowed for theoretical saturation of response content from the pilot study while striving for accessibility to participants. Additionally, caution was taken with the wording of items to eliminate instances of double-barreled language and to promote readability according to Flesch reading statistics, which take

into account the number of words in sentences as well as the number of syllables in words (Flesch, 1981). The preliminary 71-item version of the scale, named the Impressions of Internet Users (IIUS) scale demonstrated a Flesch reading ease quotient of 80.3 out of 100 (scores closer to 100 indicate that the writing is easier to read), and a Flesch-Kincaid grade level of 4.7.

The goal of Study 1 was to solicit general attitudes and beliefs regarding other internet users from a large sample of undergraduate students to serve as questionnaire items for further objective scale development. Importantly, the exploratory nature of this study in an undergraduate population made it possible to collect direct, anonymous opinions from individuals who are especially likely to use the internet for social communication. The large sample size of this study facilitated consideration of many broad themes – including beliefs about other internet users that were globally positive or globally negative – as well as more specific themes, such as the belief that other internet users are excessively self-involved. As such, the preliminary 71-item IIUS may be sufficiently comprehensive to allow for more fine-grained analysis of the presence and nature of an underlying factor structure. Moreover, readability statistics suggest that the IIUS is relatively easy to comprehend, which should increase its accessibility and enhance reflection of the intended construct. In line with Watson and Clark (1995)'s process for scale development, the next step was to administer the preliminary version of the IIUS to a sample large enough to assess unidimensionality and/or latent factor structure via exploratory factor analysis (Aim 2). This was accomplished in Study 2.

Study 2 – Exploratory Factor Analysis

Study 2 - Methods

Procedure

The procedure for this study was the same as in Study 1. Data collection for Study 2 occurred between October 2017 and May 2019. Responses were collected via a Qualtrics study entitled "Attitudes Toward Internet Usage." This study was reviewed by the UHM Institutional Review Board (IRB) and was found to qualify as expedited. Individuals were eligible to participate if they were registered UHM students with a SONA ID number. During this time period, 813 total responses were collected. Screening the responses for duplicate entries and participants who were missing more than 2/3rds of their data resulted in the elimination of 47 cases, leaving 766 cases from this study.

In order to ensure sufficiently large samples to conduct both exploratory and confirmatory factor analyses, IIUS data were pooled from a second Qualtrics study conducted in our lab ("Social Cognition and Violence"). This study was reviewed by the UHM IRB and was found to qualify as exempt. Participants from this sample were removed from the larger sample if the SONA ID number was identical to one reported in the Attitudes Toward Internet Usage study (indicating the same person completed both studies; $n = 6$). T-tests and chi-square testing revealed no differences between the two samples on age, gender, and ethnicity, suggesting it was appropriate to combine IIUS data. The Social Cognition and Violence study provided 403 additional cases; thus, 1169 total cases were available to be used for analysis.

These cases were then divided to create two subsamples, roughly in line with split-half procedures for the purposes of factor analysis. Subsample A ($n = 606$) was used for Study 2 and was composed of all 403 cases of the Social Cognition and Violence study and the first 203 cases of the Attitudes Toward Internet Usage study. Subsample B was used for Study 3 and is described in further detail below.

Participants

Participants in Subsample A (n = 606) ranged in age from 17 to 57 years old (M = 20.26, SD = 3.48; see Table 1), with 64% identifying as female (n = 384). Participants' self-reported ethnicities were: East Asian (n = 152, 25%), Caucasian (n = 147, 24%), Southeast Asian (n = 106, 18%), Hispanic American (n = 39, 6%), Native Hawaiian (n = 29, 5%), Pacific Islander (n = 17, 3%), African American (n = 11, 2%), American Indian or Alaska Native (n = 6, 1%), and South Asian (n = 3, <1%). The number of participants identifying as biracial or multiracial was 94 (16% of the sample).

Measures

This study included the preliminary 71-item version of the IIUS developed in Study 1. One item from the original questionnaire ("people on the internet are mean") was unintentionally omitted during the initial encoding of the questionnaire into the Qualtrics system. All subsequent analyses were therefore conducted using the remaining 70 items.

Study 2 - Data analysis

Exploratory Factor Analysis

As the next step in objective scale development, in accordance with the methods outlined by Clark and Watson (1995), exploratory factor analysis (EFA) was used to assess for the presence of an underlying factor structure. This process was warranted for the current study, as the nature of the study was exploratory and there is no existing literature to assist with the formation of firm a priori theories about the possible latent variables encompassed by the items on the IIUS. This analysis was conducted in Mplus version 8.1 (Muthén & Muthén, 2018) using a weighted least squares mean and variance adjusted (WLSMV) estimation as the means of specifying parameters within the model. WLSMV has been identified as a more appropriate estimation method for ordinal or Likert-style data considering that other methods, such as the

popular maximum likelihood (ML) method, assume that observed variables are normally distributed, which is unlikely when variables are not continuous (Li, 2016). Because I expected the factors to be at least moderately correlated with one another, I used geomin rotation – which is an oblique rather than orthogonal rotation – to transform the results into interpretable scores.

To decide on the number of factors to extract, I used parallel analysis, a method that involves conducting factor analyses on a series of random, computer-generated data sets and extracting the median eigenvalues (DeVellis, 2012; Hayton, Allen, & Scarpello, 2004). These eigenvalues represent the amount of variance that can be explained by chance. In many cases, the result of the parallel analysis can be superimposed onto a graph of the scree plot for the actual data set to facilitate comparison between the two sets of eigenvalues. Final determination of the factors involves retaining those with eigenvalues that fall above the random-data line, and should thus, theoretically, be explaining a significant amount of variance.

Once the number of factors was established, I examined factor loadings for each item. Items that loaded significantly onto more than one factor, or those with low loadings (conventionally, those that are less than 0.3; Floyd & Widaman, 1995) were dropped from the measure. Descriptive labels were then provided for each factor based on the theoretical nature of the association between items.

Study 2 - Hypotheses

I expected to find an underlying factor structure inherent in the IIUS questionnaire, suggesting that the measure can be considered multidimensional. In my best estimation from the themes identified in Study 1, I hypothesized that at least three factors would emerge, representing: 1) impressions that people on the internet are self-focused; 2) impressions that people on the internet are disingenuous; and 3) impressions that interacting with others on the

internet is safe. Other potential dimensions based on the themes of Study 1 included impressions about others' motivations for internet use, such as using the internet to create drama or to escape reality, and general or self-referential impressions of others (i.e., possible source beliefs for persecutory delusions and/or delusions of reference).

Study 2 – Results and Discussion

Exploratory Factor Analysis

All 70 items of the IIUS were included in an EFA using Subsample A (n = 606). Twelve of these cases were missing IIUS data; thus 594 observations were utilized for analysis. Prior to conducting the EFA, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's Test of Sphericity were requested in SPSS. The KMO statistic was well above the minimum criterion of .5 at .927, which is considered "marvelous" according to the guidelines of Hutcheson and Sofroniou (1999), and Bartlett's Test was significant ($\chi^2(2415) = 15491.48$, $p <$ .001), indicating that the sample size was sufficient for factor analysis and the data could be expected to yield interpretable factors.

The EFA identified 15 factors with eigenvalues greater than 1, and parallel analysis suggested that five of these factors should be retained for a candidate model (see Figure 1). Model fit statistics (shown in Table 2) suggested that a five-factor model provided a good fit to the data. However, upon dropping items with factor loadings <.3 or items that loaded significantly on two factors, examination of the remaining factor loadings revealed one factor with two items and one factor with no items. Therefore, this model was removed from consideration and a four-factor model was examined. Similarly, the four-factor model appeared to provide a good fit to the data, but one factor was left with zero items after drops were conducted as specified. This model was removed from consideration and a three-factor model

was examined. This model accounted for 33.27% of the total variance and model fit statistics suggested a good fit to the data, with the CFI falling only slightly below the "good" range (see Table 2). After dropping items accordingly, the three-factor model consisted of one factor with 28 items, one factor with 17 items, and one factor with 11 items. Factor loadings for the EFA-identified three-factor model, including those items that were removed due to cross loading or loading <.3, are displayed in Table 3.

Because the first factor contained substantially more items than either of the other two factors, a separate EFA was conducted in Mplus using only those 28 items. Analysis of eigenvalues supported the unidimensionality of this factor, as parallel analysis suggested that only one factor should be retained. In order to facilitate conceptualization of the first factor, JASP (version 0.11.1), a free, open-source statistical analysis program available through the University of Amsterdam, was used for calculating the McDonald's ω and Cronbach's α scores for the overall factor if each item were to be dropped. Items were dropped iteratively by examining these values in combination with factor loadings and modification indices suggested by Mplus. This process resulted in the removal of 15 items from the first factor. Independent examination of the dropped items suggested that many were theoretically vague (e.g., "You can tell a lot about a person based on the comments they leave online") or highly correlated with another item (e.g., "People on the internet are opinionated" with "People on the internet feel free to say whatever they want"), while others were not clearly reflective of impressions of other internet users (e.g., "There is such a thing as too much internet use"). JASP was then used to conduct another EFA on the remaining items (41 total items: 1st factor – 13; 2nd factor – 17; 3rd factor – 11). This analysis again provided support for a three-factor model, and suggested that seven items no longer loaded significantly onto any factor. As these items also represented

comparatively lower factor loadings in previous analyses, the decision was made to drop them from the measure. The final version of the IIUS measure consisted of 34 total items, and Cronbach's alpha suggested excellent internal consistency ($\alpha = .91$).

The final version of the measure is represented in Appendix 3. The first factor, composed of 13 items, conceptually appeared to represent a perceived distinction between self-expression on the internet and in reality, such that higher endorsement of items on this factor reflects stronger beliefs of incongruence between others' presentation on the internet versus their presentation in reality. As such, this factor was labeled Internet/Reality Incongruency. Internal consistency for the 13 items was strong, as evidenced by McDonald's $\omega = .9$ and Cronbach's $\alpha = .9$. As the second factor appeared to represent impressions of other internet users that were more broadly negative, this factor was termed Global Negative Impressions. Internal consistency for these 14 items fell within the "good" range (McDonald's $\omega = .87$; Cronbach's $\alpha = .86$). Seven items comprised the third factor, which was labeled Global Positive Impressions. Internal consistency for this factor was within the acceptable range, as evidenced by McDonald's $\omega = .72$ and Cronbach's $\alpha = .71$.

Study 2 aimed to determine the presence and explain the nature of an underlying factor structure in the IIUS via exploratory factor analysis. Hypotheses for this study were partially supported; specifically, the IIUS was found to be multidimensional, consisting of three factors, and interpretation of two of the factors (Global Negative Impressions and Global Positive Impressions) was as predicted based on overarching themes identified in Study 1. However, the theoretical explanation for one of the factors differed somewhat from what was predicted. Items on the first factor appeared to delineate a spectrum of congruency between one's online presentation or "self" and one's in-person presentation. Agreement with the items on this factor

seems to reflect endorsement of a separation between the online self and the real self, such that the online self is a more genuine representation of a person. Several of the items on this factor further suggest that other internet users may have hostile intentions ("people on the internet are judgmental"). Individuals who agree with these statements may therefore be more inclined to ascribe negative intentions to the behaviors of internet users, which could be interpreted as reflecting the other person's true feelings or character.

In summary, the EFA results suggested that this three-factor model offered an adequate initial understanding of the dimensions inherent in the IIUS. From this point, the next step was to determine whether this factor structure could be replicated and confirmed in a separate sample via confirmatory factor analysis. Should this model demonstrate good fit in an independent dataset, as determined by comparison with conventional model fit statistics, it would then be important to explore convergent and divergent validity in the given sample with other measures in the nomological network of the IIUS. This investigation would provide evidence for whether the factors of the IIUS are (a) related to, yet not overly redundant with theoretically similar constructs, and (b) sufficiently discrepant from measures of theoretically unrelated constructs. Consideration of CFA fit statistics and correlational indications of validity was of primary importance in Study 3.

Study 3 – Confirmatory Factor Analysis and Construct Validity

The purpose of Study 3 was to address Aim 3 by administering the IIUS to a sufficiently large sample to conduct confirmatory factor analysis (CFA) on the candidate model identified in Study 2. Additionally, this study addressed Aim 4 by analyzing construct validity of the IIUS via correlations with existing measures of internet use, social cognition, personality, and psychopathology.

Study 3 – Methods

Procedure

The procedure for Study 3 was the same as in Study 2 above. Subsample B, which consisted of cases 204-766 from the Attitudes Toward Internet Usage study (n = 563), was utilized in this study.

Participants

Participants in Subsample B (n = 563) ranged in age from 17 to 50 years old (M = 20.36, SD = 3.69), with 62% identifying as female (n = 349). Participants' self-reported ethnicities were: East Asian (n = 145, 26%), Caucasian (n = 137, 24%), Southeast Asian (n = 75, 13%), Hispanic American (n = 32, 6%), Native Hawaiian (n = 21, 4%), Pacific Islander (n = 16, 3%), African American (n = 11, 2%), American Indian or Alaska Native (n = 2, <1%), and South Asian (n = 1, <1%). The number of participants identifying as biracial or multiracial was 118 (21% of the sample).

Measures

IIUS questionnaire. This study included the 34-item version of the IIUS questionnaire, with the factor structure as specified in Study 2 (see Table 4).

Internet usage. To assess maladaptive internet usage behaviors, participants completed the Internet Addiction Test (IAT; Young et al., 1998), a widely-used and well-validated measure of general problematic internet usage. The measure consists of 20 items for which participants rate their level of engagement in different problematic internet behaviors (e.g., "how often does your job performance or productivity suffer because of the internet?") on a 1 (*rarely*) to 5 (*always*) scale, with an option for 0 (*does not apply*). Over 20 studies have demonstrated good to excellent internal consistency for the IAT (>.8), though some studies have found the internal

consistency to be in the acceptable range (see Laconi et al., 2014). As well, the IAT has satisfactory test-retest reliability (r = .73 to .88) and good to excellent concurrent validity (r = .46 to .90) with other measures of problematic internet use (Laconi et al., 2014). Although the IAT has been found to consist of as many as six factors, a two-factor structure has the most stability, with some authors applying the terms "dependent use" and "excessive use" for the two constructs (Jelenchick, Becker, & Moreno, 2012). Alphas for these factors have also been shown to be in the good to excellent range (.91 and .83, respectively) and can be used to differentiate problematic internet users from average internet users (Jelenchick et al., 2012).

As a potential indicator of discriminant validity, the Online Social Support Scale (OSSS; Nick et al., 2018) was included as the second measure of internet usage. This measure is a 40-item self-report questionnaire that covers four dimensions of online social support: (1) being held in high esteem by others (esteem/emotional support; EE); (2) a sense of belonging with others (social companionship; SC); (3) a mutual sharing of perspectives and advice (informational support; INF); and (4) sharing of resources or other material help (instrumental support; INS). These items are rated on a 5-point Likert scale reflecting frequency, from 0 (*never*) to 4 (*a lot*). Coefficient alphas were found to be excellent for each of the four subscales (Cronbach's αs = .94-.95). Because the OSSS is one of the only measures that can provide information about attitudes toward others in an online context, it provides perhaps the closest approximation to the intended construct.

Social cognition. A relevant measure of the attributional style domain of social cognition, the Ambiguous Intentions Hostility Questionnaire (AIHQ; Combs et al., 2007), was included to assess participants' attributional style in ambiguous real-world scenarios. The AIHQ was designed specifically to assess reactions to situations where the cause of another person's

actions is intentional, ambiguous, or accidental. Participants are instructed to read 15 vignettes, imagine that the scenario has happened to them (e.g., "you walk past a bunch of teenagers at a mall and you hear them start to laugh"), and write a reason why that situation may have happened. Participants then rate whether the action was intentional on a 1 (*definitely no*) to 6 (*definitely yes*) scale, as well as how angry it would make them feel (from 1 *not at all angry* to 5 *very angry*) and how much they would blame the other person (from 1 *not at all* to 5 *very much*). Finally, participants write their response for how they would react to the situation.

The AIHQ allows for independent raters to generate an "hostility index" for each participant by rating the written response for the cause of the situation on a 1 (*not at all hostile*) to 5 (*very hostile*) scale. Raters can also score the participant's reaction to the situation on a 1 (*not at all aggressive*) to 5 (*very aggressive*) scale to create an "aggression index." The three participant-rated questions regarding intentionality, blame, and anger, were found to be highly intercorrelated (*r*s > .70; Combs et al., 2007) and so can be collapsed into a "blame index." A recent study examining the psychometric validity of the AIHQ in participants with schizophrenia (Buck et al., 2017) found good internal consistency and test-retest reliability for the blame index. These scores were lower, however, for the aggression and hostility indices, suggesting that the information provided by these scales may not be particularly valuable in terms of the construct of attributional style (Buck et al., 2017). As such, the current study focused on the blame index as a measure of convergent validity for the hypothesized factors concerning negative impressions of others on the internet.

Personality. To understand more about the personality facets that could be contributing to attitudes toward other internet users, two measures of personality were included. First, I used a scale derived from the International Personality Item Pool (IPIP; Goldberg et al., 2006), which is

a large, open-source collection of thousands of items that can be adapted into countless separate measures of personality. One such measure, the IPIP-100 (Johnson, 2005) was compiled to assess facets of the traditional five-factor model of personality (i.e., neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness) using fewer items than many of the existing Big 5 measures. The IPIP-100 has demonstrated good reliability across samples of participants from the community (Cronbach's αs = .81-.88; Goldberg, 2008), as well as in large samples of internet participants (Cronbach's αs = .81-.90; Johnson, 2014). It has been used to address a large variety of research questions, including how people behave online and interact with technology (Eladhari & Mateas, 2008).

Whereas most measures of personality are keyed in the direction of adaptive personality traits, the Personality Inventory for the DSM-5-Brief Form (PID-5-BF; Krueger et al., 2012) provides an assessment of maladaptive personality according to the DSM-5 alternative trait model of personality pathology. The PID-5-BF was used as the second measure of personality for the current study. This measure is a self-report questionnaire consisting of 25 items rated on a 0 (*very false or often false*) to 3 (*very true or often true*) scale. Each item is associated with one of five domains: negative affect, detachment, antagonism, disinhibition, and psychoticism. The PID-5-BF shows good to excellent internal consistency for the five domains (Anderson, Sellbom, & Salekin, 2018). The PID-5-BF domains also tend to show strong associations with their hypothesized 5 Factor counterparts (i.e., negative affect-neuroticism, detachment-extraversion, antagonism-agreeableness, disinhibition-conscientiousness), though there has long been inconsistency in the literature with regard to the relationship between openness and psychoticism (Al-Dajani et al., 2016). Moreover, the domains show expected associations with clinical DSM-5 personality disorders, based on the alternative trait model (Fossati et al., 2013; Hopwood et al.,

2012; Wright et al., 2013), and have been implicated in research on problematic internet use (Gervasi et al., 2017).

Psychopathology. Four measures were used to assess general and PSD-specific psychopathology. First, I used the DSM-5 Level 1 Cross-Cutting Symptom Measure as a measure of broadband psychopathology (APA, 2013b). This measure is included in the DSM-5 and uses 23 self-report questions to assess 13 domains of psychiatric disability, including depression, anxiety, anger, mania, somatic symptoms, suicidal ideation, psychosis, sleep problems, memory problems, repetitive thoughts and behaviors, dissociation, personality functioning, and substance use. Participants are instructed to consider how often they have been affected by the symptom in the past two weeks and rate the frequency on a five-point scale from 0 (*none or not at all*) to 4 (*severe or nearly every day*). Among the domains that consist of two or more items, acceptable to good internal consistency was found in a sample of college students, with alphas ranging from $\alpha = .61$ (substance use) to .84 (anxiety; Bravo, Villarosa-Hurlocker, & Pearson, 2018). Furthermore, the domains of the Cross-Cutting Symptom Measure show strong convergent validity with existing measures of psychopathology (Bravo et al., 2018).

Second, in order to assess symptoms of PSDs specifically, I used the Schizotypal Personality Questionnaire (SPQ; Raine, 1991). This 74-item measure was designed to capture symptoms of STPD as outlined in the DSM-III-R (APA, 1987). The response format is yes/no and psychometric support via item-level factor analysis has been found for a five-factor model reflecting dimensions of Social Anhedonia, Unusual Beliefs and Experiences, Social Anxiety, Mistrust, and Eccentricity/Oddity (Chmielewski & Watson, 2008). Each of these factors has demonstrated excellent test-retest reliability (αs = .91-.95). Since a key component of the current study is to enhance understanding about the intersection of psychosis symptoms and perceptions

of other internet users, using the full version of this measure will allow for a fine-grained analysis of the relationship between the IIUS scale and five different facets of psychotic-like experiences.

The Peters Delusion Inventory (PDI; Peters, Joseph, & Garety, 1999) was included as an additional measure of psychotic-like experiences. The PDI is particularly relevant to the current study because this measure was specifically designed to assess delusional beliefs among the "normal," non-psychotic population. This questionnaire is presented as 40 yes/no items targeting a wide breadth of delusional beliefs including, for example, delusions of reference and delusions of persecution. The full version of the scale also asks participants to use a five-point Likert scale to rate associated levels of distress, preoccupation, and conviction, with lower scores indicating fewer problems. However, the current study focused only on the total PDI score as an index of general endorsement of aberrant beliefs. This scale demonstrates high internal consistency (α = .88) and good test-retest reliability (r = .82, p < .01; Peters et al., 1999).

Other psychological variables. The Self-Concept Clarity Scale (SCCS; Campbell et al., 1996) was used to measure explicit self-concept clarity. The SCCS is a 12-item self-report questionnaire designed to assess the degree to which one holds a stable and internally-consistent conception of himself or herself. Possible response options range on five-point Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*). Examples of items include, "In general, I have a clear sense of who I am and what I am," and "My beliefs about myself seem to change very frequently." The latter item is reverse-scored, along with nine other items on the scale.

Evidence for construct validity of the SCCS is derived from expected associations with other constructs in its nomological network. The SCCS shows convergent validity based on correlations between low levels of self-concept clarity and low levels of internal state awareness

(Campbell et al., 1996). Evidence for divergent validity comes from correlations between high levels of personality constructs that are theoretically opposite and low levels of self-concept clarity, including neuroticism, self-reflection, and public self-consciousness. The average alpha reliability coefficient of items on the SCCS is 0.86, indicating high internal consistency of the scale. The test-retest reliability of the SCCS is 0.79 and 0.70 for four- and five-month intervals, respectively (Campbell et al., 1996).

The Conspiracist Beliefs Rating Scale (CBRS; Brotherton, French, & Pickering, 2013), was used to measure another relevant construct of interest, namely levels of mistrust or suspiciousness that might be considered on the fringes of what is socially appropriate. Fifteen questions comprise the CBRS, all of which are rated on a five-point scale from *definitely not true* to *definitely true*. Excellent internal consistency was found for the overall scale (α = .93-.95). The scale's original development study found evidence of a five-factor structure (Brotherton et al., 2013); however, subsequent studies have failed to replicate this factor structure (Swami et al., 2017). Thus, the total CBRS score was used in the present study.

Study 3 – Data Analysis

Confirmatory Factor Analysis

A confirmatory factor analysis (CFA) was conducted in Mplus version 8.1 (Muthén & Muthén, 2018), again using a weighted least squares mean and variance (WLSMV) estimation. Prior to evaluating the fit of the candidate model identified by the EFA, I used CFA to test for unidimensionality by specifying a model where all items load on a single factor. I then compared the fit statistics of this model against conventional goodness-of-fit indices. Good model fit is represented by: Root Mean Squared Error of Approximation (RMSEA) < .05; Comparative Fit Index (CFI) > .95; Tucker-Lewis Index (TLI) > .95; and Standardized Root Mean Squared

Residual (SRMR) < .08. Standards for acceptable model fit are RMSEA < .10; CFI and TLI > .90; and SRMR < .10. In order to demonstrate that the candidate model provides a better fit to the data, I examined goodness-of-fit indices and conducted a chi-square difference test, which can be used to show that the difference in fit between two models is statistically significant.

Construct Validity

To assess construct validity, SPSS was used to review Cronbach's alpha for the total measure and each of the factors. Convergent and divergent validity with existing measures of internet usage, social cognition, personality, and psychopathology was ascertained in this college student sample using bivariate, two-tailed Pearson correlations with the subscales of the IIUS.

Study 3 – Hypotheses

I predicted a CFA would demonstrate that the model specified by the EFA provides a good fit to the data according to conventional values for fit indices. I also expected CFA would show that the candidate model fits the data better than a model in which all items load on a single factor, providing further evidence for multidimensionality. In regard to assessing construct validity, I hypothesized that each of the factors and the overall measure would show good internal consistency, as reflected in Cronbach's alpha > 0.8 for each. As the theoretical descriptions of the three factors was different from what was originally predicted, updated hypotheses regarding expected direction of the relationships between the three factors and validity measures appear in Table 5. Namely, I expected to find that the Global Negative Impressions factor would be associated with maladaptive personality traits (e.g., neuroticism, detachment), subclinical psychosis symptoms, hostile attributions, and broad-spectrum psychopathology (e.g., depression, anxiety symptoms). In contrast, I expected that the Global Positive Impressions factor would show relationships with adaptive personality traits such as

openness, as well as positive online experiences (as measured by the OSSS). I predicted that the Internet/Reality Incongruency factor would be associated with higher hostile attributions and subclinical psychosis symptoms.

Study 3 – Results and Discussion

Confirmatory Factor Analysis

To determine fit of the final candidate model, CFA was performed in Mplus using those cases of Subsample B with complete IIUS data (n = 496). First, to confirm multidimensionality of the IIUS measure, a model was specified where all items loaded on one factor. As shown in Table 6, goodness-of-fit statistics reflected poor model fit, suggesting that the measure can indeed be considered multidimensional. CFA results for the three-factor candidate model indicated that this structure provided an adequate fit to the data (see Table 6), and fit significantly better than the one-factor model as supported by chi-square difference testing. Model modification indices generated by Mplus suggested that some items may perform slightly better on other factors; however, each change resulted in worse model fit overall and the decision was made to preserve the item structure as specified above. Factor loadings for the 34-items included in the CFA can be found in Table 4. According to Flesch reading statistics, the readability of the final version of the IIUS measure was within acceptable standards, as the Flesch Reading Ease score was 60.8 and the Flesch-Kincaid grade level was 6.8.

Cronbach's alpha was calculated in SPSS for each of the factors. The resultant values indicated excellent internal consistency for the first factor (α = .91); good internal consistency for the second factor (α = .88); and good to acceptable internal consistency for the third factor (α = .79). As the final three-factor candidate model demonstrated an adequate fit to the data and internal consistency for each factor was in the acceptable to excellent range, this model was

retained for validity analyses. Correlations between each of the three factors were significant at the level of $p < .01$; the Internet/Reality Incongruency factor was moderately positively correlated with the Global Negative Impressions factor ($r = .57$), whereas the Global Positive Impressions factor was weakly positively correlated with the Internet/Reality Incongruency factor ($r = .22$) and the Global Negative Impressions factor ($r = .13$; see Table 7).

Validity analysis

Convergent and divergent validity of the IIUS scores in an undergraduate population was assessed by examining bivariate Pearson correlations between each of the three subscales (Internet/Reality Incongruency=INC; Global Negative Impressions=GNI; Global Positive Impressions=GPI) with other measures of internet use, social cognition, personality, and psychopathology as described above. Correlation coefficients, means, standard deviations, and estimates of skewness and kurtosis for each of the measures and associated subscales can be found in Table 7. Apart from a leptokurtotic and positively skewed distribution of the Substance Use domain from the Cross-Cutting Measure for the DSM-5, absolute values of the skewness and kurtosis z-scores were within 1.96 standard deviations from the mean of 0 and were therefore not statistically significant.

As can be seen in Table 7, there is a degree of variation in the number of participants who completed the measures utilized for validity analyses (i.e., sample size). This is due to the fact that IRB approval to introduce these measures into the study came relatively late in the data collection process, and these questionnaires were only available to participants who completed the study during the spring 2019 semester. Analyses with these measures are therefore underpowered, as power analysis suggests a sample of at least 138 participants is necessary to detect a small effect size (Cohen's $d = .3$) in bivariate correlations. As a result, there is an

increased likelihood of Type II error for IIUS subscale correlations with the Online Social Support Scale total and subscale scores, Self-Concept Clarity Scale total score, Schizotypal Personality Questionnaire subscale scores, and DSM-5 Cross-Cutting Measure subscale scores.

Internet Usage. Two measures of internet usage, the Internet Addiction Test and the Online Social Support Scale, were particularly important to establishing convergent and divergent validity for IIUS scores. The IIUS-GNI was weakly positively correlated with IAT total score ($r = .15$, $p < .01$), but correlations between IAT total and both the IIUS-INC and the IIUS-GPI subscale were not significant. No relationship was demonstrated between the IIUS subscales and the IAT-Dependent subscale, though positive correlations were found between the IAT-Excessive subscale and the IIUS-INC ($r = .22$, $p < .01$) and IIUS-GNI ($r = .21$, $p < .01$) subscales. As the IIUS is neither a measure of behavior nor a measure of problematic internet usage per se, these results would suggest that the IIUS is separate from, but related to, the construct of problematic internet usage behaviors.

Convergent and divergent validity in this sample was also supported through correlations with the OSSS, which is a measure of perceived positive and supportive interactions with other internet users. Despite the small sample size ($n = 50$) and consequent lack of power to detect strong effects in these correlations, the IIUS-GPI subscale was significantly positively associated with the OSSS total score ($r = .39$, $p < .01$), as well as the Social Companionship subscale ($r = .46$, $p < .01$) and the Informational Support subscale ($r = .49$, $p < .01$). Correlations between the other two IIUS subscales and the OSSS were non-significant, apart from a negative correlation between the IIUS-INC and OSSS Instrumental Social Support scale ($r = -.29$, $p < .05$).

Social Cognition. Consistent with hypotheses, correlations were found between the AIHQ blame index and the IIUS-INC ($r = .14$, $p < .01$) and IIUS-GNI ($r = .19$, $p < .01$), though it was

surprising that the magnitude of these relationships was not stronger. Because the associations were in the expected direction and the IIUS-GPI scale showed no significant correlation with negative attribution of intentions, these results again provided support for validity.

Personality. The subscales of the IIUS showed an interesting pattern of relationships with a measure of maladaptive personality traits (i.e., the Personality Inventory for the DSM-5; PID-5; $n = 458$) and a traditional five-factor measure of personality (i.e., the International Personality Item Pool; IPIP; $n = 462$). Specifically, the IIUS-GNI was positively associated with all five domains of the PID-5: Negative Affect ($r = .16$, $p < .01$); Detachment ($r = .13$, $p < .01$); Antagonism ($r = .16$, $p < .01$); Disinhibition ($r = .17$, $p < .01$); and Psychoticism ($r = .20$, $p < .01$). A very weak, albeit significant, correlation was found between the IIUS-INC and Negative Affect domain ($r = .11$, $p < .05$) and between IIUS-GPI and Disinhibition ($r = -.09$, $p < .05$).

Analysis of the IIUS and adaptive personality traits demonstrated that the domain of Agreeableness was positively correlated with both the INC ($r = .24$, $p < .01$) and GPI ($r = .21$, $p < .01$) factors. Moreover, the domain of Openness was also positively associated with both the INC ($r = .25$, $p < .01$) and GPI ($r = .15$, $p < .01$). GPI showed a positive association with Extraversion ($r = .13$, $p < .01$). Emotional Stability was negatively correlated with the GNI factor ($r = -.19$, $p < .01$), which can be interpreted as higher neuroticism among those who endorsed more global negative impressions of others on the internet. None of the IIUS factors were significantly associated with the Conscientiousness domain.

Psychopathology. Although only 41 cases were available to examine correlations with a broadband measure of different psychological disorders (DSM-5 Cross-Cutting Measure; CCM), several significant relationships emerged. Of note, the IIUS-GPI was negatively correlated with items reflecting psychosis ($r = -.57$, $p < .01$), memory problems ($r = -.44$, $p < .01$), dissociation (r

= -.38, $p < .01$), and substance use ($r = -.50$, $p < .01$). Items on the CCM related to repetitive behaviors commonly associated with obsessive-compulsive disorder were found to correlate positively with the IIUS-GNI subscale ($r = .32$, $p < .01$). Finally, and somewhat unexpectedly, the IIUS-INC was negatively related with the CCM domain of Mania ($r = -.35$, $p < .01$).

Four of the five factors of a measure of subclinical psychosis symptoms, the Schizotypal Personality Questionnaire (SPQ), were found to be significantly associated with subscales of the IIUS, again despite low sample sizes ($n = 46$). Moderate positive correlations emerged between the IIUS-GNI and SPQ-Social Anhedonia ($r = .34$, $p < .05$), SPQ-Social Anxiety ($r = .30$, $p < .05$), SPQ-Eccentricity/Oddity ($r = .44$, $p < .01$), and SPQ-Mistrust ($r = .34$, $p < .05$). Inconsistent with the original hypotheses, the IIUS-INC was only associated with SPQ-Mistrust subscale ($r = .31$, $p < .05$). No significant relationships were found between any of the SPQ scales and the IIUS-GPI.

The Peters Delusion Inventory (PDI; $n = 462$) total score was found to be only weakly associated with the IIUS-GNI ($r = .13$, $p < .01$) and no relationship was found between this variable and the IIUS-INC, which was inconsistent with expectations. As well, there was no association between the PDI and IIUS-GPI.

Other psychological variables. Among the 46 available participants, the IIUS-GPI was the only subscale to be significantly associated with self-concept clarity as measured by the Self-Concept Clarity Scale (SCCS; $r = .31$, $p < .05$). Although non-significant, the relationship between the SCCS and the IIUS-GNI was in the expected negative direction ($r = -.20$, $p = .17$).

Significant correlations emerged between the Generic Conspiracist Beliefs Rating Scale (CBRS; $n = 463$) and both the IIUS-INC ($r = .20$, $p < .01$) and the IIUS-GNI ($r = .25$, $p < .01$),

suggesting some meaningful relationship between these factors and common fringe beliefs (i.e., those beliefs that are largely unfounded, but commonly accepted).

The patterns of relationships between the three IIUS factors and these additional validity measures were generally in line with predictions and in many ways provided initial support for the construct validity of the IIUS in a sample of college undergraduates. Among the most proximal indications of convergent validity, the GPI factor of the IIUS showed relationships with the total OSSS score, as well as subscales reflecting social companionship and perceptions of informational support. The GPI was also positively related with three of the Big-5 personality domains (Agreeableness, Openness, and Extraversion) and self-concept clarity. Although it is encouraging that there were no correlations between the IIUS-GPI and subclinical psychosis symptoms, it is important to bear in mind the possibility of Type II error due to low sample sizes for the SPQ variables.

Convergent validity was also supported through positive correlations between the IIUS-GNI factor and a host of maladaptive personality traits, broad psychological symptoms, problematic internet usage behaviors, and subclinical positive and negative psychosis symptoms. Although there were overlapping correlation patterns between the GNI and the INC with some measures, the INC was not associated with most metrics of subclinical psychosis or psychopathology. Interestingly, the INC factor was positively correlated with the Agreeableness and Openness domains of the IPIP, possibly suggesting greater flexibility and acceptance of others' online presentations. Also, of note, neither the INC nor the GNI factor was related to subscales representing aberrant sensory or perceptual experiences, such as the SPQ-Unusual Beliefs and Experiences factor. This may indicate that, with regard to positive psychotic symptoms, the INC and GNI are only related to particular positive symptoms (delusional thought processes) and not

others (hallucinations). Again, issues related to low power are important to consider when interpreting these results.

General Discussion

The goal of the current research was to design and validate a measure of social cognition that is specific to an online context, and to ascertain whether this measure demonstrated meaningful relationships with experiences or symptoms common to psychosis-spectrum disorders (PSDs). As there are few existing measures that examine impressions of others on the internet and this medium is rapidly becoming a primary mode of social communication for many people, the current research program aimed to address a significant gap in the literature. This was accomplished over the course of three studies following the processes of objective scale development outlined by Clark and Watson (1995).

The aim of Study 1 (Aim 1) was to generate an over-inclusive item pool by collecting responses from a large sample of undergraduates to an open-ended questionnaire targeting impressions of other internet users. Several themes emerged from the items that were coded from the responses to form the Impressions of Internet Users Scale (IIUS). This indicated that impressions of other internet users are multi-faceted and could be expected to represent underlying conceptual factors. Thus, the aim of Study 2 (Aim 2) was to use exploratory factor analysis to determine dimensionality of the measure. Consistent with hypotheses, EFA confirmed the multidimensionality of the IIUS, and demonstrated that a three-factor model provided a good fit to the data. Removal of poorly-performing items resulted in a 34-item measure with factors labeled: Internet/Reality Incongruency (INC), Global Negative Impressions (GNI), and Global Positive Impressions (GPI). In Study 3, confirmatory factor analysis supported the fit of the three-factor model (Aim 3) and each of the factors showed good (GPI

Cronbach's α > .7; GNI Cronbach's α > .8) to excellent (INC Cronbach's α > .9) internal consistency. Convergent and divergent validity was demonstrated through bivariate correlations between each of the three factors and other measures of internet usage, social cognition, personality, and psychopathology (Aim 4). These correlations were generally in line with the expected nature and direction and are discussed in further detail below.

The Impressions of Internet Users Scale

One of the primary strengths of the current research is that items on the IIUS were generated directly by participants who were asked to provide their opinion on the primary construct of interest (i.e., impressions of other internet users). By collecting a large number of open-ended responses from participants in Study 1, I was able to examine a wide variety of themes and thereby maximize the possibility that all facets of the construct might be represented in the initial item pool. This helps to address one of the most crucial goals in measurement development, that is, increased confidence in the content validity of the IIUS. Moreover, this saturation of the different themes allowed for the psychometric determination that impressions of other internet users is a multidimensional construct, as supported by exploratory factor analysis in Study 2.

Factor Structure of the IIUS

As predicted, there was an underlying factor structure inherent in the items of the IIUS. The first identified factor (INC) accounted for 21.9% of the total variance in the EFA. Close inspection of the items that loaded significantly onto the INC factor revealed that they not only represented perceived discrepancy between a person's internet presentation and real-life presentation, but agreement with these items also reflected the opinion that a person's internet presentation is more genuine than their "real" self. Indeed, many of the items that were removed

from the first factor due to poor performance suggested the opposite, such as “the anonymity of the internet leads people to say things they do not mean” and “when people post on the internet, they are showing who they want to be rather than who they truly are.” As well, several items appeared at first to be consistent with more global negative impressions, but preferentially loaded onto the INC factor, including “people on the internet are judgmental” and “some people on the internet are just interested in getting others riled up.” These items imply some degree of intentionality, indicating that higher INC scores may be associated with a stronger attribution of negative intentions to others on the internet. If it is indeed the case that higher INC scores reflect both the idea that people are more genuine on the internet and the idea that people on the internet may have negative intentions, this could provide evidence that the INC factor approximates the construct of hostile attributions in an online context.

The second factor identified in Study 2 (GNI) accounted for 6% of the total variance in the EFA and consisted of items reflecting a range of negative attributions regarding others on the internet, from suggestions that they are “cowards” and “liars” to suggestions that they are “shallow” and “ignorant.” While these items seemed to be broadly reflective of negative impressions, some items also appeared to overlap conceptually with items on the INC factor. For example, “people on the internet are out to get others” and “people on the internet are bullies” would seem to be in line with negative intentionality, as described above. Although the INC and GNI factors reliably dissociated as two separate factors in factor analyses, both with good to excellent internal consistency, there was a moderate positive correlation between the factors (r = .57), suggesting a clear relationship. It is possible that the primary difference in the two factors comes from the internal response caused by these impressions, such that one leads to the

formation of negative cognitions about others (GNI), whereas the other may prompt a more accepting and/or neutral personal reaction (INC).

Finally, the third factor (GPI) accounted for 5% of the variance in the original EFA and represented a range of positive impressions of other internet users, including perceptions that they are "friendly" and "welcoming" as well as "intellectual" and "knowledgeable." Interestingly, these items closely mirrored two subscales of the Online Social Support Scale (OSSS; Nick et al., 2018): Social Companionship (SC) and Informational Support (INF), respectively. Per Nick et al. (2018), the SC domain of social support encompasses feelings of belonging and inclusivity, and the INF domain reflects a sense that others are willing offer advice or personal perspectives, including information and resources. The GPI factor therefore seems to be consistent with prominent existing subtypes of in-person social support identified in previous literature (Cohen & Willis, 1985), providing further support for the existence of this phenomenon in an online context.

A potential psychometric issue emerges, however, in that the GPI is composed of relatively fewer items and demonstrated a lower internal consistency in the EFA sample ($\alpha = .71$; "acceptable" range). Four items were dropped from the GPI factor during the model modification process, as they did not significantly promote internal consistency (Cronbach's alpha with 11 items was .73 versus .71 with 7 items) and did not enhance overall interpretation. Internal consistency statistics improved in the CFA sample ($\alpha = .79$), suggesting that these items do appropriately reflect a unitary construct. In line with the prediction that the IIUS factors would be correlated with each other, the GPI was significantly associated with the INC ($r = .22$) and the GNI ($r = .13$). Though positive correlations between this factor and the INC and GNI were unexpected, it is encouraging that the strength of the relationship is greater between the GPI and

INC. As well, it is likely that the grammatical similarity of the items accounts for some part of the relationship between the GPI and GNI (DeVellis, 2012).

Construct Validity of the IIUS

As originally outlined in Cronbach and Meehl's seminal work (1955), the construct validity of a measure in a given sample is established when the measure shows significant relationships with other variables in its nomological network, yet is sufficiently dissimilar from theoretically unrelated variables. For the current study, it was hypothesized that the construct of interest (impressions of people who use the internet) would be meaningfully related to certain measures of internet usage, social cognition, personality, and psychopathology, as outlined in Table 5. Analysis of bivariate correlations between the IIUS and these measures revealed that many relationships were as predicted, providing support for the convergent and divergent validity of the scale in college undergraduates. In particular, the GNI subscale was associated with domains of maladaptive personality traits, problematic internet usage, and positive and negative symptoms of psychosis. Conversely, the GPI subscale was associated with several adaptive personality traits, perceptions of online social support, and self-concept clarity. The pattern of associations between existing measures and the INC was more complex and may be a reflection of nuances in the items that loaded strongly onto this factor.

It is especially interesting that the INC and GNI factors showed similar patterns of association with some of the external measures. The INC and GNI were both positively associated with: (1) more hostile attributions in ambiguous situations (AIHQ blame index); (2) excessive internet use as measured by the IAT; (3) subclinical suspiciousness toward others (SPQ-Mistrust); (4) negative affect (PID-5); and (5) conspiracist beliefs (CBRS). Unlike the GNI, however, the INC was also positively associated with adaptive personality traits including

openness and agreeableness, though a significant negative correlation was found with the Instrumental Social Support scale of the OSSS. Surprisingly, a moderate negative correlation emerged between the INC and only the Mania domain of the Cross-Cutting Measure (CCM) for the DSM-5, suggesting that higher endorsement of internet/reality incongruency is inversely related to symptoms of decreased need for sleep and hyperactivity or increased risk-taking behavior. This relationship could indicate that a moderate, cautious approach to others on the internet is inconsistent with the immoderate, often reckless presentation in high mania. The lack of significant results between the INC and other broad psychopathological domains may primarily be a power issue, as there were only 41 cases available for analysis with the CCM. One avenue of future research would be to continue exploring the association of the INC with diverse psychological symptomatology.

In addition to the significant correlations between validity measures and the GNI described above, the GNI was positively associated with the IAT total score, all five domains of maladaptive personality traits (Negative Affect, Detachment, Antagonism, Disinhibition, and Psychoticism), four of the five domains of subclinical psychosis symptoms (Social Anhedonia, Social Anxiety, Eccentricity/Oddity, and Mistrust), and a general index of subclinical delusional beliefs (PDI). As well, a positive correlation was found with the Repetitive Thoughts and Behaviors domain of the CCM (reflecting common symptoms of obsessive-compulsive disorder). This pattern of correlations provides strong evidence in support of construct validity for the GNI, as significant relationships were demonstrated across measures of psychopathology and personality dysfunction, yet no associations were found with most domains of adaptive personality traits (IPIP). In fact, GNI was negatively correlated with the IPIP Emotional Stability subscale, suggesting higher levels of neuroticism in individuals with more severe negative

attitudes toward other internet users. No associations emerged between the GNI and perceived social support on the internet (OSSS); however, this analysis was underpowered and the lack of any significant result is interpreted with extreme caution.

Further scrutiny of the pattern of correlations among the INC and GNI factors reveals differences in associations with positive symptoms and negative symptoms of psychosis. The GNI factor was related to many facets of negative symptoms (e.g., social anhedonia) in addition to some positive symptoms, including delusional beliefs (SPQ subscales) and fringe beliefs (PDI and CBRS). Despite a relatively strong positive correlation with the GNI factor, the INC was only correlated with two indices of subclinical positive symptoms, suspiciousness toward others (SPQ-Mistrust) and fringe beliefs (CBRS Total). It is possible that the explanation for this discrepancy lies in the INC factor's correlations with adaptive personality traits, as higher levels of agreeableness and openness (reflecting higher levels of trust, cooperation, and behavioral flexibility; Costa 1992) may contribute to a more flexible, accepting attitude toward others in general, and internet users more specifically. Importantly, neither the INC nor the GNI showed a relationship with any scales measuring hallucinatory experiences (i.e., SPQ-Unusual Perceptual Beliefs; CCM-Psychosis), suggesting that among positive symptoms of psychosis, the IIUS may be primarily useful in explaining aspects of atypical thought patterns rather than unusual perceptual experiences. However, confidence in this notion is again limited by a lack of power with these measures.

Evidence of construct validity was also exhibited through correlations between the GPI factor and validity measures. Specifically, the GPI was associated with adaptive personality traits, including extraversion, agreeableness, and openness, in addition to perceptions of online social companionship and informational support. The latter finding is particularly compelling in

light of power issues with this measure. Moreover, this result shows consistency with established domains of social support, but the modest correlation indicates that the GPI is likely not redundant with subscales of the OSSS. Divergent validity for this factor was demonstrated through non-significant relationships with metrics of problematic internet usage behaviors, subclinical delusional thinking, and personality dysfunction. Additionally, negative relationships with diagnostic criteria for psychosis, memory issues, dissociation, and substance use suggest that an inclination toward positive impressions of other internet users may be inconsistent with underlying pathologies of several psychological disorders.

The IIUS as a Measure of Social Cognition

One of the primary goals of the current research program was to develop a measure that expanded the existing framework of social cognition to include interactions in an online context. It was further intended that this measure could be used as an early step toward connecting the construct of impressions of other internet users with cognitive models of delusion formation that are rooted in social-cognitive phenomena (e.g., Bentall et al., 2001; Frith, 1992; Garety et al., 2001). As such, it was important to determine which aspect of social cognition was most similar to the construct measured by the IIUS. The factors of the IIUS were found to encompass a broad spectrum of impressions of the intentions and personality traits of other internet users. These ranged from positive impressions of social support and safety (GPI), to a sense of discrepancy between online and real-life presentations that warrants caution in online interactions and a healthy skepticism toward other internet users (INC), to overall negative impressions of others online (GNI).

It was originally anticipated that the IIUS measure would be able to inform the domain of attributional style in an online context, and indeed the INC and GNI factors were positively

associated with the blame index of the AIHQ. These correlations were small, however (*r*s = .14 and .19, respectively), and perhaps indicate that the IIUS does not strongly reflect attributional style as it is operationalized by the AIHQ blame index. In order to consider this relationship more comprehensively, it would be prudent to conduct further analyses with the IIUS and other measures of attributional biases such as the Attributional Style Questionnaire (ASQ; Peterson et al., 1982). As another example, in their study of externalizing and personalizing bias in delusional thinking, Diez-Alegría et al. (2006) utilized the Internal, Personal, and Situational Attributions Questionnaire (IPSAQ; Kinderman & Bentall, 1996) to differentiate among three types of causal attributions, including intentionality ascribed to others. The Pragmatic Inference Test (PIT; Winters & Neale, 1985) could also be used to assess externalizing bias as well as self-serving bias. Comparing the IIUS to a variety of measures within this domain would be useful in determining whether correlations are low because the IIUS does not appropriately map on to the construct of attributional style, or if the distinction between the IIUS and existing measures is related to consideration of the online context.

Upon further examination of the resultant IIUS measure, it appears that the items more closely reflect inferences about the mental states of others, and thus seem most akin to the domain of theory of mind (ToM). ToM is particularly important in an online context where abstract language and tone may be difficult to detect. It will be important, therefore, to conduct further validity analyses with the IIUS factors and ToM measures in order to assess whether impaired ToM is associated with stronger negative impressions of other internet users. Additional measures of this construct could include the Hinting Task (Corcoran et al., 1995), which is a gold-standard measure of ToM and provides short vignettes wherein one character in a dyad makes a request via indirect speech; the participant is then asked to reason about the

action that was implied. This task requires a decision to be made based on abstract written language, which corresponds to the ability to interpret and respond to online social communication. The Awareness of Social Inferences Test (TASIT; McDonald, Flanagan, Rollins, & Kinch, 2003) could also be used to establish ToM construct validity. The TASIT uses short video vignettes to assess inferences about others' mental states in social interactions. The video-based test material approximates the experience of interfacing with video content in online social platforms. It would be particularly compelling to conduct a validity study with the IIUS scales by including both the TASIT and the Hinting Task, allowing for validation of ToM in both text- and video-based social communication. Positive correlations between the TASIT and Hinting Task have been documented in recent research (Morrison et al., 2019). If a strong relationship was demonstrated between the IIUS and both the Hinting Task and TASIT, this could indicate that the IIUS has good construct validity for ToM as it pertains to a variety of online communication modalities.

As described in detail above, the ToM theory of delusion formation posits that delusions of reference and persecution are borne out of misinterpretations of the mental states of others (Frith, 1992). However, studies with existing ToM tasks have demonstrated equivocal support for the connection between impaired ToM and severity of delusional beliefs (Harrington, Siegert, & McClure, 2005). Because online communication provides fewer social cues, and thus fewer avenues for disconfirmatory evidence, it can be easier to misinterpret the mental states of others online. This may facilitate the process of delusion formation by simultaneously activating the Jumping to Conclusions bias, in which beliefs and decisions are based largely on sensory input or emotional state (Garety & Hemsley, 1994). With further research into its relationship with

ToM measures, the IIUS may prove to be a useful tool for exploring the connection between ToM and delusional belief formation in an online context.

Limitations and Future Directions

Interpretations of the current findings are subject to some limitations. First, the present sample consisted primarily of a specific demographic, namely young undergraduate students enrolled in a psychology course. Although college students are a population of interest in this research due to an increased likelihood of developing psychosis symptoms at this age and/or having contact with individuals who do, the results of this study may have differed if the sample had been more representative of the population as a whole. For example, participants included in the current study were predominantly in the 18-24-year-old age range, suggesting that as much as 99% of the sample could be characterized as "internet users" according to data collected by Pew Research Center (2018a). Conducting this study in a sample with a more representative age distribution would likely have introduced greater variance related to both (a) reduced overall exposure the internet, and (b) reduced experience with passive or active online social communication (i.e., less engagement with social media websites; Pew Research Center, 2018b). Although quantitatively measuring internet usage has proven difficult in previous studies, questions regarding participants' patterns of internet usage – including frequency and duration – would enrich our understanding of impressions of other internet users according to level of engagement with the internet. Future studies could include these metrics of internet usage and examine differences in the IIUS among subsamples of "high-volume" internet users in comparison to those who use the internet more casually.

One of the strengths of the current research is the inclusion of a large sample of ethnically-diverse participants. Of interest, sample characteristics related to ethnicity and cultural

background may also have affected interpretation of the factors in a very important way that would merit further investigation in future studies with the IIUS. Previous research has demonstrated that consistency of behavior across contexts is not a universal value held by all cultural backgrounds (e.g., English & Chen, 2009; Suh, 2002). Rather, certain cultures, particularly East Asian cultures, emphasize a greater tolerance of uncertainty, change, and contradiction in human behavior (Peng & Nisbett, 1999). Owing to the inclusion of individuals from many different cultural backgrounds (Table 1), greater flexibility and acceptance with regard to inconsistent presentations of the self may have been highly represented in this sample. This could have had significant implications for the development of the IIUS factors, particularly the Internet/Reality Incongruency factor, and may help to explain the unexpected relationships between the INC and certain personality traits such as openness and agreeableness. As measures of self-concept clarity were underpowered in the current study, future research could attempt to clarify the nature of the relationship of IIUS factors with self-concept clarity across different ethnic groups, for example, through measurement invariance. This research could also be particularly important in guiding what would be considered "problematic" impressions of other internet users, as defined by one's culture, thus enhancing the potential utility of the IIUS in diverse clinical settings and populations.

A second limitation of the current study was the lack of power to detect a significant effect with several important measures of construct validity, due to low sample sizes. The fact that these analyses were underpowered restricts conclusions that can be made regarding how the IIUS relates to other variables in its nomological network. Interpretations of nonsignificant findings are especially constrained for the Online Social Support Scale, Schizotypal Personality Questionnaire, Cross-Cutting Measure for the DSM-5, and Self-Concept Clarity Scale, as there is

a high likelihood of committing Type II error when reviewing these results. Nevertheless, the significant patterns that emerged with these measures despite low power are encouraging, and several other measures were sufficiently powered to support conclusions regarding construct validity of the IIUS in college undergraduates. It will be important for future research to recruit larger sample sizes in order to replicate significant relationships demonstrated in the present study, as well as to reveal any relationships that remain undetected.

Another limitation of the current research concerns the potential for participants to have interpreted the language of the IIUS items differently than intended. For example, asking someone to consider their impressions of "people on the internet" may be interpreted concretely, as in a person who is using the internet, or abstractly, as in how a person presents on the internet. Moreover, disagreement with the statement "the anonymity of the internet leads people to say things they truly mean" could reflect a person's opinion that either people do not say things they truly mean, or that the things people say do not reflect what they truly mean. Subtle linguistic differences such as these may unintentionally affect interpretation of the factors.

On a related note, the final version of the measure was rated at a grade level of 6.8. This is somewhat higher than the convention of a sixth-grade reading level for questionnaires, though still within acceptable standards. During the measurement development process, conscious attempts were made to clarify and avoid ambiguous language. However, as the measure was developed with a sample of UH undergraduates from diverse cultural and linguistic backgrounds, there may be some difference in interpretation of the questions by individuals who are less familiar with the nuances of the English language. Future studies could use measurement invariance within an Item Response Theory framework to understand whether the functionality of different items varies across key demographic variables, such as generational status or ESL

status. Differential item functioning would provide information about difficulty and discrimination parameters for each item on the IIUS and would explain whether these parameters are invariant (i.e., functioning similarly) across groups. As an example, future research could analyze the function of IIUS items according to generational status and could determine whether certain items are more difficult to endorse among a group of first-generation immigrants to the United States, in comparison to second-generation samples. This could speak to whether the linguistic nuances of the IIUS items limit interpretation of the measure in particular groups. Measurement invariance analysis with the INC factor could also be used to provide information regarding the functionality of the questionnaire items in different ethnic groups, and could help to further clarify the influence of cultural values related to consistency of self-presentation.

A notable strength of the IIUS measure is that it provides information about attitudes toward other people in an online context, thereby addressing a crucial gap in the literature. However, another potential limitation of the current research is that items were developed using primarily a bottom-up, data-driven approach. It is possible that existing measures of social cognition could have been adapted to reflect online social interactions and could thus have guided a top-down approach to item development. A theory-driven approach would have increased confidence and control over the relationship this measure has to the construct of social cognition, and it will be important for future research to continue to clarify the placement of the IIUS among other measures of social cognition. One potential direction for this research, consistent with scale development suggestions found in DeVellis (2012), might be to identify additional items using a top-down approach (e.g., adapting AIHQ items to reflect online scenarios) and subsequently include those items in a factor analysis with the IIUS items to see if they load on separate factors.

Despite the limitations outlined above, the IIUS appears to have potential utility in both research and clinical settings, and the evidence for significant associations with different facets of psychopathology, specifically psychosis, suggests that it would be prudent to examine the function of this questionnaire in clinical samples. As such, one of the next steps in this program of research could be to validate the model and confirm the factor structure of the IIUS in samples of individuals with psychosis-spectrum disorders (PSDs). Particularly, the aim of a future study could be to administer the IIUS to a group of participants with significantly elevated subclinical psychosis symptoms (i.e., high schizotypy) and compare the resultant factor structure. Moreover, future research could examine differences on the IIUS factors between healthy, non-psychiatric control participants and high schizotypy samples, individuals experiencing a first episode of psychosis, and those with chronic schizophrenia. Based on the current results, this would be expected to yield significant differences for each of these groups as compared to healthy controls, particularly among different symptom presentations. It will be important for future research to clarify the utility of the IIUS in discriminating among different psychiatric disorders, as well as psychosis-spectrum disorders more specifically. Future research may clarify the sensitivity and specificity of the IIUS in clinical samples, with the aim of exploring its utility in predicting the development of clinically-significant symptoms.

As mentioned, predicting risk of conversion to full psychosis among individuals at clinical high risk is of critical importance and is an active undertaking in the field of psychosis research (Brucato et al., 2017; Cannon et al., 2008; Milev et al., 2005; Ruhrmann et al., 2010). Although tremendous and commendable efforts have been made to build risk-conversion calculators that strive to quantify a person's probability of eventually going on to develop a psychosis-spectrum disorder (Cannon et al., 2016; Fusar-Poli et al., 2019), psychosocial

predictor variables are often lacking. One of the primary barriers in this effort is a dearth of assessments that are (a) capable of capturing psychosocial endophenotypes for psychosis, and (b) validated in samples of adolescents and young adults (i.e., those in the most vulnerable developmental period). Through additional research, certain facets of internet usage, including negative impressions of other internet users, could prove to be associated with risk of conversion. As part of future longitudinal studies, administering the IIUS to high-risk individuals might further our understanding of how the internet is contributing to such vulnerabilities.

Although the present study was particularly interested in assessing online social cognition as a potential mechanism of delusion formation, the IIUS measure should not be considered specific to psychosis populations. As indicated, future research could use this measure to examine impressions of other internet users as a function of age, ethnicity, and internet use classification (i.e., "high-volume" user). One potential avenue of research that could shed light on the relationship between the IIUS factors and problematic internet usage would be to compare group differences according to cutoff scores on the Internet Addiction Test (IAT; Young, 1998) for mild, moderate, and severe functional impairment caused by internet use. Additionally, future research could examine the association between the IIUS factors and other facets of psychopathology, especially those with negative cognitive distortions as hallmark symptoms. As it appears the INC and GNI factors tap the construct of negative cognitions of other people, these factors could be particularly important to understanding socially-impairing cognitions in individuals with conditions such as major depression, social anxiety, or posttraumatic stress disorder. Examining the validation of the IIUS factors with measures such as the Beck Depression Inventory (BDI-II; Beck, Steer, & Brown, 1996) or the Cognitive Triad Inventory (a measure of negative cognitions about the self, world, and the future; Beckham, Leber, Watkins,

Boyer, & Cook, 1986) would aid in the understanding of how problematic cognitions may be contributing to social dysfunction in these conditions.

In terms of utility in a clinical setting, the IIUS may prove useful to clinicians who wish to understand whether and how internet usage could be affecting client functioning, particularly with regard to distorted cognitions. Higher endorsement of INC and GNI items could identify problematic perceptions of other internet users as an underlying source of distress and thus a potential treatment target, whereas endorsement of GPI items would suggest a possible source of additional social support that could be promoted in a psychotherapy setting. Previous research has provided support for a model in which negative beliefs about the self and others serve as a precursor to the development of clinically-significant paranoid symptoms (Fowler et al., 2012), which is in line with cognitive models of delusion formation as discussed (e.g., Garety et al., 2001). As well, there is evidence that internet-based delusional beliefs can be ameliorated with cognitive therapy (Duggal et al., 2002). The IIUS could be particularly useful to clinicians in detecting underlying negative beliefs in an online context. Targeting these beliefs early in the course of someone's treatment would allow for early training in reality testing and cognitive restructuring, which may aid in preventing escalation of these symptoms. Moreover, the consequences of social dysfunction in psychosis-spectrum disorders can be especially detrimental to symptom severity and overall functioning (Gooding et al., 2005; Tarbox-Berry et al., 2018). As such, it is particularly important to detect initial signs or manifestations of social impairment so that these can be addressed therapeutically.

Conclusions

The current study provides initial psychometric support for a newly-developed measure of online social cognition, the Impressions of Internet Users Scale (IIUS). The IIUS is a three-

factor questionnaire tapping perceptions of other internet users that are globally positive and globally negative, as well as the perception that a person's online presentation is incongruent with their in-person presentation. Validation of the IIUS with external measures provided support for construct validity, including convergent and divergent validity, though interpretations were somewhat limited by power issues for some measures. Nevertheless, the pattern of significant relationships suggests that further research with the IIUS could inform our understanding of how negative or positive cognitions about other internet users may be related to social dysfunction in different psychopathologies, particularly psychosis-spectrum disorders.

Table 1.

Demographic Characteristics of Participants

	Study 1 (*N = 503*)	Study 2 - Subsample A (*N = 606*)	Study 3 - Subsample B (*N = 563*)
	N(%)	*N(%)*	*N(%)*
Age			
Mean	19.86	20.26	20.36
Standard Deviation	2.54	3.48	3.69
Minimum	17	17	17
Maximum	36	57	50
Gender			
Male	167 (32.9)	220 (36)	214 (38)
Female	336 (67.1)	384 (64)	349 (62)
Ethnicity			
East Asian	180 (34)	152 (25)	145 (26)
Southeast Asian	118 (22)	106 (18)	75 (13)
Caucasian	110 (19)	147 (24)	137 (24)
Native Hawaiian	30 (5)	29 (5)	21 (4)
African American	9 (2)	11 (2)	11 (2)
South Asian	4 (<1)	3 (<1)	1 (<1)
Hispanic American	14 (3)	39 (6)	32 (6)
Pacific Islander	7 (1)	17 (3)	16 (3)
American Indian or Alaska Native	1 (<1)	6 (1)	2 (<1)
Biracial or Multiracial	76 (14)	94 (16)	118 (21)

Table 2.

Model Fit Results for EFA-Identified Candidate Models

Model name	χ^2 (df)	RMSEA	CFI/TLI	SRMR
EFA-identified 3 factor model	4147.059 (2208)	.038	.907/.899	.046
EFA-identified 4-factor model	3793.758 (2141)	.036	.921/.911	.043
EFA-identified 5-factor model	3559.894 (2075)	.035	.929/.917	.040
34-item questionnaire one-factor model	4935.578 (527)	.130	.595/.569	.104

Table 3.

Factor Loadings for the Exploratory Factor Analysis of the 3-factor IIUS

Item#		Factor 1	Factor 2	Factor 3
51	People use the internet to say things they wouldn't have the courage to say in person	0.806		
42	You shouldn't believe everything you read on the internet	0.779		
40	People on the internet feel free to say whatever they want	0.718		
8	People on the internet are opinionated	0.705		
61	People use the internet to get away from the real world	0.677		
9	Some people on the internet are just interested in getting other people riled up	0.666		
21	Using the internet gives people confidence to express themselves	0.659		
57	There is such a thing as too much internet use	0.65		
22	Other people will believe anything they read on the internet	0.634		
46	The anonymity of the internet leads people to say things they truly mean	0.605		
19	People are more likely to express their feelings on the internet than in person	0.599		
34	People on the internet are judgmental	0.565		
47	People on the internet act differently than they do in real life	0.558		
70	The internet has created a place for people to avoid reality	0.55		
65	People use the internet to talk about others behind their backs	0.544		
55	You can tell a lot about a person based on the comments they leave online	0.53		
33	You can tell a lot about a person based on the things they say on social media	0.515		
31	People on the internet care too much about what others think of them	0.513		
17	The internet is a dangerous place	0.493		
60	People on the internet are careless about what they put online	0.475		
4	People share too much of their personal lives on the internet	0.473		
30	People on the internet don't care about how their comments affect others	0.46		
45	When people post on the internet, they are showing what they want to be, rather than who they really are	0.434		
20	Some people only use the internet to create drama	0.39		
68	People on the internet are unpredictable	0.344		

Table 3 (cont.).

Item#		Factor 1	Factor 2	Factor 3
56	The anonymity of the internet leads people to say things they do not mean	0.328		
15	Some people are addicted to the internet	0.321		
66	You can tell a lot about a person based on the things they look up on the internet	0.304		
50	People on the internet are cowards		0.682	
67	People on the internet are narrow-minded		0.669	
7	People on the internet are angry		0.613	
54	People on the internet are ignorant		0.612	
35	People on the internet are lonely		0.601	
62	People on the internet are out to get others		0.598	
58	People on the internet are untrustworthy		0.579	
63	People on the internet are vain		0.534	
24	People on the internet are shallow		0.527	
25	People on the internet are liars		0.523	
44	People on the internet should not be taken seriously		0.516	
52	People on the internet are bullies		0.498	
37	People on the internet are scary		0.492	
1	People on the internet have too much time on their hands		0.481	
23	People on the internet are fake		0.46	
32	When I see someone being mean on the internet, I start to wonder if everyone is like that		0.429	
11	When people post on the internet, they are showing their true selves		0.33	
28	People on the internet are intellectual			0.608
16	People on the internet are welcoming			0.587
3	People on the internet are knowledgeable			0.57
14	People on the internet are willing to help others			0.554
53	People on the internet are genuine			0.543
13	People on the internet are friendly			0.525
27	The internet is a safe place to express your opinions			0.437
38	People on the internet are eager to learn new things			0.391
12	What people say on the internet influences the way I think about the world			0.348
48	People on the internet are just like people in real life			0.336
49	Just because someone posts something mean on the internet doesn't mean they're a bad person in real life			0.311

Removed Items		Factor 1	Factor 2	Factor 3
2	People on the internet feel there are no consequences to their actions	0.384	0.369	
5	What people say on the internet influences the way I think about people			

Table 3 (cont.).

Removed	Items	Factor 1	Factor 2	Factor 3
6	People on the internet are bored	0.33	0.305	
10	People on the internet are insecure	0.323	0.397	
18	People on the internet are creative	0.463		0.333
26	Comments on the internet do not all come from real people			
29	People on the internet are out to get me	-0.666	0.467	
36	People on the internet force their opinions on others	0.385	0.419	
39	People on the internet are credible	-0.373		0.538
41	People on the internet are polite	-0.32		0.441
43	People on the internet have no lives	-0.32	0.748	
59	It is easier to relate to people online than in real life			
64	The majority of what is said on the internet is true	-0.422		0.46
69	People on the internet seek attention	0.411	0.377	

Table 4.

Factor Loadings for the Confirmatory Factor Analysis of the 3-factor, 34-item IIUS

Item#		INC	GNI	GPI
51	People use the internet to say things they wouldn't have the courage to say in person	.768		
61	People use the internet to get away from the real world	.768		
47	People on the internet act differently than they do in real life	.765		
22	Other people will believe anything they read on the internet	.753		
70	The internet has created a place for people to avoid reality	.738		
40	People on the internet feel free to say whatever they want	.730		
34	People on the internet are judgmental	.720		
21	Using the internet gives people confidence to express themselves	.718		
65	People use the internet to talk about others behind their backs	.686		
42	You shouldn't believe everything you read on the internet	.675		
19	People are more likely to express their feelings on the internet than in person	.649		
46	The anonymity of the internet leads people to say things they truly mean	.641		
9	Some people on the internet are just interested in getting other people riled up	.637		
25	People on the internet are liars		.801	
52	People on the internet are bullies		.763	
54	People on the internet are ignorant		.751	
24	People on the internet are shallow		.749	
35	People on the internet are lonely		.715	
63	People on the internet are vain		.642	
58	People on the internet are untrustworthy		.634	
50	People on the internet are cowards		.626	
7	People on the internet are angry		.621	
67	People on the internet are narrow-minded		.584	
44	People on the internet should not be taken seriously		.500	
1	People on the internet have too much time on their hands		.454	
62	People on the internet are out to get others		.434	
37	People on the internet are scary		.414	
13	People on the internet are friendly			.784
14	People on the internet are willing to help others			.776
28	People on the internet are intellectual			.698
16	People on the internet are welcoming			.695
53	People on the internet are genuine			.631
3	People on the internet are knowledgeable			.544
27	The internet is a safe place to express your opinions			.385

Note. IIUS = Impressions of Internet Users Scale; INC = Internet/Reality Incongruency; GNI = Global Negative Impressions; GPI = Global Positive Impressions

Table 5.

Hypothesized Correlations with Validity Measures

	Internet Usage	**Internet Usage**	**Social Cognition**	**Personality**	**Personality**
	Maladaptive (IAT)	*Adaptive (OSSS)*	*Hostile Attributions (AIHQ)*	*Maladaptive (PID-5)*	*Adaptive (IPIP)*
IIUS-INC			+		
IIUS-NI		-	+	+	-
IIUS-PI		+	-	-	+
	Psychopathology	**Psychopathology**	**Psychopathology**	**Other**	**Other**
	Broadband diagnostic criteria (CCM)	*Subclinical psychotic symptoms (SPQ)*	*Delusional beliefs (PDI)*	*Self-concept clarity (SCCS)*	*Conspiracist beliefs (CBRS)*
IIUS-INC		+	+	-	
IIUS-NI	+	+	+	-	+
IIUS-PI				+	

Note. IIUS = Impressions of Internet Users Scale; INC = Internet/Reality Incongruency; GNI = Global Negative Impressions; GPI = Global Positive Impressions; IAT = Internet Addiction Test; OSSS = Online Social Support Scale; AIHQ = Ambiguous Intentions Hostility Questionnaire; IPIP = International Personality Item Pool; PID-5 = Personality Inventory for the DSM-5; CCM = DSM-5 Cross-Cutting Measure; SPQ = Schizotypal Personality Questionnaire; SCCS = Self-Concept Clarity Scale; PDI = Peters Delusion Inventory; CBRS = Conspiracist Beliefs Rating Scale. "+" = expected positive correlation, "-" = expected negative correlation, a blank cell indicates no predicted correlation.

Table 6.

Model Fit Results for Confirmatory Factor Analysis

Model name	χ^2 (df)	RMSEA	CFI/TLI	SRMR	χ^2 difference	Sig?
34-item questionnaire one-factor model	4935.578 (527)	.130	.595/.569	.104		
Final measurement model – 3 factors	1621.279 (524)	.065	.899/.892	.061	3314.299	Y

Table 7.

Validity Bivariate Correlations, Internal Consistency Coefficients, Means, and Standard Deviations

	1	2	3	4	5	6	7	8	9	10	11	12
1. IIUS Internet/Reality Incongruency	-											
2. IIUS Negative Impressions	.57**	-										
3. IIUS Positive Impressions	.22**	.13**	-									
4. IAT Total	.05	.15**	.04	-								
5. IAT Dependent	-.09	.08	.02	.93**	-							
6. IAT Excessive	.22**	.21**	.05	.87**	.64**	-						
7. OSSS Total	.04	-.04	.39**	.45**	.45**	.32*	-					
8. OSSS Esteem/Emotional	.14	-.07	.16	.17	.15	.16	.71**	-				
9. OSSS Social Companionship	.10	-.05	.46**	.40**	.44**	.24	.91**	.53**	-			
10. OSSS Informational	.15	-.06	.49**	.44**	.41**	.35*	.91**	.54**	.83**	-		
11. OSSS Instrumental Social Support	-.29*	.05	.09	.48**	.50**	.33**	.78**	.34**	.63**	.65**	-	
12. AIHQ Blame Index	.14**	.19**	.05	.22**	.18**	.23**	-.33	-.10	-.25	-.30	-.48**	-
Sample Size	496	496	496	460	460	460	50	50	50	50	50	453
Coefficient alpha	.91	.88	.79	.93	.92	.85	.96	.93	.94	.95	.91	.87
Skewness	-.64	.00	-.16	.24	.61	.06	-.27	-.55	.40	-.03	-.02	-.05
Kurtosis	.71	1.22	1.61	.19	.53	-.15	-.04	.28	-.18	.09	-1.01	.07
Mean	3.86	3.19	3.09	2.71	2.34	3.26	2.70	3.01	2.73	2.84	2.22	2.86
Standard Deviation	.61	.54	.54	.80	.84	.93	.74	.81	1.00	.89	.81	.60

Note. IIUS = Impressions of Internet Users Scale; IAT = Internet Addiction Test; OSSS = Online Social Support Scale; AIHQ = Ambiguous Intentions Hostility Questionnaire; Sample size indicates the number of cases available for correlation with IIUS factors

*p <. 05; **p < .01

Table 7 (cont.).

Validity Bivariate Correlations, Internal Consistency Coefficients, Means, and Standard Deviations

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. IIUS Internet/Reality Incongruency	-												
2. IIUS Negative Impressions	.57**	-											
3. IIUS Positive Impressions	.22**	.13**	-										
4. IPIP Extraversion	-.07	-.07	.13**	-									
5. IPIP Agreeableness	.24**	-.06	.21**	.41**	-								
6. IPIP Conscientiousness	.04	-.06	.05	.16**	.27**	-							
7. IPIP Emotional Stability	-.09	-.19**	-.09	.33**	.10*	.25**	-						
8. IPIP Openness	.25**	.04	.15**	.43**	.45**	.28**	.21**	-					
9. PID-5 Negative Affect	.11*	.16**	.03	-.33**	-.11*	-.20**	-.72**	-.18**	-				
10. PID-5 Detachment	-.02	.13**	-.09	-.44**	-.47**	-.34**	-.31**	-.20**	.48**	-			
11. PID-5 Antagonism	-.09	.16**	-.05	.02	-.38**	-.20**	-.16**	-.04	.36**	.53**	-		
12. PID-5 Disinhibition	.01	.17**	-.09*	-.11*	-.27**	-.51**	-.24**	-.13**	.40**	.50**	.51**	-	
13. PID-5 Psychoticism	.04	.20**	-.09	-.18**	-.22**	-.34**	-.29**	-.07	.47**	.63**	.57**	.64**	-
Sample Size	496	496	496	462	462	462	462	462	458	458	458	458	458
Coefficient alpha	.91	.88	.79	.91	.88	.88	.91	.88	.82	.78	.80	.84	.83
Skewness	-.64	.00	-.16	-.05	-.14	.07	.07	.32	.10	.62	.90	.42	.49
Kurtosis	.71	1.22	1.61	.14	.25	.39	-.08	-.09	-.63	-.05	.34	-.45	-.49
Mean	3.86	3.19	3.09	3.05	3.69	3.32	3.05	3.43	1.22	.79	.65	.89	.87
Standard Deviation	.61	.54	.54	.66	.52	.57	.67	.52	.72	.63	.61	.67	.69

Note. IIUS = Impressions of Internet Users Scale; IPIP = International Personality Item Pool; PID-5 = Personality Inventory for the DSM-5; Sample size indicates the number of cases available for correlation with IIUS factors

*$p < .05$. **$p < .01$

Table 7 (cont.).

Validity Bivariate Correlations, Internal Consistency Coefficients, Means, and Standard Deviations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. IIUS Internet/Reality Incongruency	-															
2. IIUS Negative Impressions	.57**	-														
3. IIUS Positive Impressions	.22**	.13**	-													
4. CCM Depression	-.01	.14	-.06	-												
5. CCM Irritability	-.15	.04	-.12	.75**	-											
6. CCM Mania	-.35*	-.05	-.18	.47**	.52**	-										
7. CCM Anxiety	-.06	.28	-.04	.71**	.76**	.53**	-									
8. CCM Somatic	-.24	-.01	-.17	.52**	.61**	.39**	.60**	-								
9. CCM Suicidal	.13	.20	-.25	.42**	.45**	.24	.38**	.44**	-							
10. CCM Psychosis	-.26	-.04	-.57**	.25*	.26*	.40**	.35**	.43**	.51**	-						
11. CCM Sleep	-.14	.26	-.11	.56**	.65**	.45**	.69**	.55**	.26*	.30*	-					
12. CCM Memory	-.15	.21	-.44**	.53**	.56**	.33**	.62**	.56**	.41**	.56**	.71**	-				
13. CCM Repetitive	.06	.32*	-.20	.51**	.60**	.36**	.69**	.60**	.66**	.57**	.54**	.73**	-			
14. CCM Dissociation	.01	.08	-.38*	.54**	.60**	.34**	.58**	.58**	.58**	.55**	.59**	.68**	.69**	-		
15. CCM Personality	.17	.29	-.21	.68**	.67**	.31*	.70**	.57**	.59**	.33**	.65**	.73**	.66**	.67**	-	
16. CCM Substance Use	.01	.02	-.50**	.36**	.31**	.35**	.32**	.52**	.58**	.71**	.41**	.55**	.58**	.70**	.51**	-
Sample Size	496	496	496	41	41	41	41	41	41	41	41	41	41	41	41	41
Skewness	-.64	.00	-.16	.05	.26	.64	.64	.95	1.58	2.33	.78	1.14	1.39	1.68	.82	1.80
Kurtosis	.71	1.22	1.61	-.82	-1.01	-.59	-.52	-.02	1.19	4.48	-.52	.42	1.34	1.51	-.51	2.85
Mean	3.86	3.19	3.09	2.63	2.71	2.11	2.25	1.99	1.52	1.31	2.29	1.92	1.77	1.74	2.14	1.56
Standard Deviation	.61	.54	.54	1.06	1.22	1.02	1.12	1.13	.93	.71	1.33	1.13	1.04	1.29	1.27	.89

Note. IIUS = Impressions of Internet Users Scale; CCM = Cross-Cutting Measure for the DSM-5; Sample size indicates the number of cases available for correlation with IIUS factors

*$p < .05$. **$p < .01$

Table 7 (cont.).

Validity Bivariate Correlations, Internal Consistency Coefficients, Means, and Standard Deviations

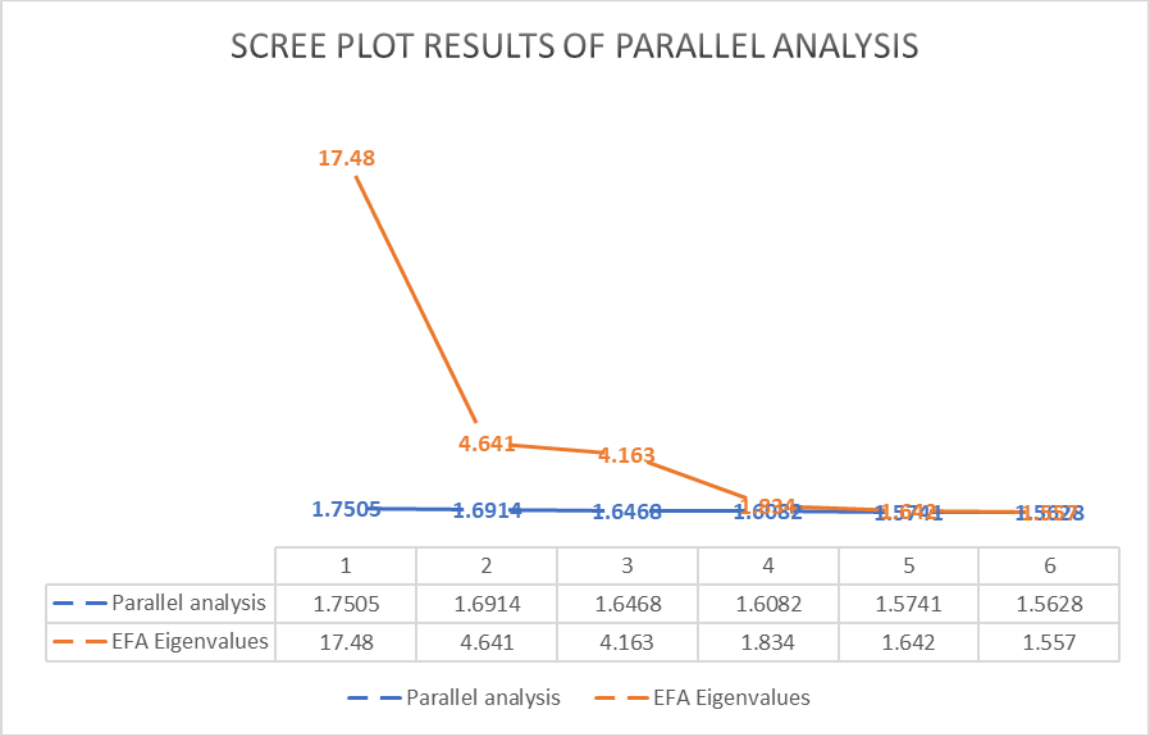
	1	2	3	4	5	6	7	8	9	10	11
1. IIUS Internet/Reality Incongruency	-										
2. IIUS Negative Impressions	.57**	-									
3. IIUS Positive Impressions	.22**	.13**	-								
4. SPQ Social Anhedonia	.09	.34*	.16	-							
5. SPQ Social Anxiety	.22	.30*	.04	.62**	-						
6. SPQ Eccentricity/Oddity	.28	.44**	.14	.73**	.61**	-					
7. SPQ Mistrust	.31*	.34*	.25	.62**	.61**	.79**	-				
8. SPQ Unusual Beliefs and Experiences	.10	.17	.08	.59**	.30*	.67**	.72**	-			
9. SCCS Total	-.05	-.20	.31*	-.56**	-.44**	-.68**	-.53**	-.37*	-		
10. PDI Total	.08	.13**	.06	.68**	.47**	.79**	.81**	.73**	-.55**	-	
11. CBRS Total	.20**	.25**	-.00	.23	.10	.25	.34*	.22	-.31*	.32**	-
Sample Size	496	496	496	46	46	46	46	46	46	463	464
Coefficient alpha	.91	.88	.79	.85	.90	.90	.85	.82	.90	.93	.94
Skewness	-.64	.00	-.16	.94	-.04	.73	.72	.88	.04	1.19	-.15
Kurtosis	.71	1.22	1.61	-.35	-1.33	-.63	-.35	.34	-.34	1.22	.18
Mean	3.86	3.19	3.09	3.15	2.34	2.05	2.61	2.99	2.95	9.38	2.84
Standard Deviation	.61	.54	.54	2.74	2.27	2.41	2.40	2.09	.82	8.50	.82

Note. IIUS = Impressions of Internet Users Scale; SPQ = Schizotypal Personality Questionnaire; SCCS = Self-Concept Clarity Scale; PDI = Peters Delusion Inventory; CBRS = Conspiracist Beliefs Rating Scale; Sample size indicates the number of cases available for correlation with IIUS factors

*$p < .05$, **$p < .01$

Figure 1.

Scree Plot of Parallel Analysis with EFA Eigenvalues



	1	2	3	4	5	6
Parallel analysis	1.7505	1.6914	1.6468	1.6082	1.5741	1.5628
EFA Eigenvalues	17.48	4.641	4.163	1.834	1.642	1.557

Appendix 1.

Exploratory Qualitative Questionnaire on Internet Usage

In this survey, we are going to be asking you some questions about how you typically use the internet. Please respond as accurately and honestly as possible.

Collectively, across all devices (smartphones, laptops, tablets, etc.), about how many hours per day do you spend on the internet?

How many hours per day do you spend on the internet for school or work purposes?

How many hours per day do you spend on the internet for leisure or recreational purposes?

Please list the 5-10 websites you visit most frequently.

Please list at least 5 of the major reasons you log on to the internet.

	Never	Once a month or less	A few times a month	Once or twice a week	Every day or almost every day
How often do you use the internet to watch TV or movies? How often do you watch TV or movies on a television? How often do you visit social media websites, such as Facebook or Twitter? How often do you comment on others' social media pages?					
What are some reasons why you comment on others' social media pages?					
How often do you visit photo sharing websites, such as Instagram? How often do you comment on others' photos on these sites?					
What are some reasons why you comment on others' photos?					
How often do you visit forum websites, such as Reddit? How often do you contribute to forum websites?					
What are some reasons why you contribute to forum websites?					
How often do you read user comments on postings such as YouTube videos or news articles?					

How often do you post comments on postings such as YouTube videos or news articles?
What are some reasons why you post comments on postings such as YouTube videos or news articles?
How often do you read reviews left by other users on products, services, or businesses? How often do you post reviews on products, services, or businesses?
What are some reasons why you post reviews on products, services, or businesses?
How often do you visit chat rooms? How often do you chat with friends online? How often do you chat with people you don't know in person online? How often do you video chat with people online? How often do you engage in Internet gambling? How often do you use the internet for playing online multiplayer games? How often do you use the internet for playing single-player games? How often do you listen to music on the internet? How often do you access pornography sites or sexual material online? How often do you use the internet for shopping? How often do you use the internet to check the weather? How often do you visit news websites, such as CNN.com? How often do you visit alternative news websites? How often do you surf the internet for information related to: health or medicine? Technology?

Financial issues?

Sports?

Science?

Travel?

Art/music?

Politics/government?

Environmental Issues?

Online stock trading or tracking?

What inferences can you make about people on the internet?

What is your impression of people who post on forum websites?

What is your impression of people who post comments on news articles or YouTube videos?

What is your impression of people who post frequently on social media sites like Facebook or Twitter?

What is your impression of people who post frequently on photo sharing sites like Instagram?

Appendix 2.

Preliminary Impressions of Internet Users Scale

1. People on the internet are unpredictable
2. People on the internet act differently than they do in real life
3. People on the internet are just like people in real life.
4. You can tell a lot about a person based on the things they look up on the internet
5. You can tell a lot about a person based on the things they say on social media
6. People on the internet are shallow
7. People on the internet are friendly
8. Some people only use the internet to create drama
9. People on the internet are fake
10. People share too much of their personal lives on the internet
11. People on the internet are out to get me
12. People on the internet are out to get others
13. People on the internet are opinionated
14. People on the internet feel free to say whatever they want
15. The anonymity of the internet leads people to say things they do NOT mean
16. The anonymity of the internet leads people to say things they truly mean
17. People on the internet don't care about how their comments affect others
18. When people post on the internet, they are showing their true selves
19. When people post on the internet, they are showing what they want to be, rather than who they really are
20. People on the internet are liars
21. The internet is a safe place to express your opinions
22. People on the internet are bullies
23. People on the internet are narrow-minded
24. People on the internet have no lives
25. People on the internet are credible
26. Some people are addicted to the internet
27. People on the internet are ignorant
28. People on the internet are knowledgeable
29. People on the internet are creative
30. People on the internet are eager to learn new things
31. The internet has created a place for people to avoid reality
32. People on the internet are willing to help others
33. People on the internet are bored
34. It is easier to relate to people online than in real life
35. People are more likely to express their feelings on the internet than in person
36. People on the internet seek attention
37. The majority of what is said on the internet is true
38. People on the internet are cowards
39. People on the internet are untrustworthy
40. People on the internet are genuine
41. People on the internet are scary
42. People on the internet have too much time on their hands

43. People on the internet feel there are no consequences to their actions
44. People on the internet are angry
45. People on the internet should not be taken seriously
46. People on the internet are lonely
47. People on the internet are mean
48. Just because someone posts something mean on the internet doesn't mean they're a bad person in real life
49. People use the internet to talk about others behind their backs
50. People use the internet to say things they wouldn't have the courage to say in person
51. People use the internet to get away from the real world
52. People on the internet are judgmental
53. People on the internet force their opinions on others
54. People on the internet care too much about what others think of them
55. People on the internet are intellectual
56. People on the internet are polite
57. You shouldn't believe everything you read on the internet
58. Other people will believe anything they read on the internet
59. What people say on the internet influences the way I think about the world
60. What people say on the internet influences the way I think about people
61. The internet is a dangerous place
62. When I see someone being mean on the internet, I start to wonder if everyone is like that
63. You can tell a lot about a person based on the comments they leave online
64. Some people on the internet are just interested in getting other people riled up
65. There is such a thing as too much internet use
66. People on the internet are vain
67. Using the internet gives people confidence to express themselves
68. People on the internet are careless about what they put online
69. People on the internet are welcoming
70. Comments on the internet do not all come from real people.
71. People on the internet are insecure

Appendix 3.

Final Version of Impressions of Internet Users Scale

1. People on the internet have too much time on their hands
2. People on the internet are knowledgeable
3. People on the internet are angry
4. Some people on the internet are just interested in getting other people riled up
5. People on the internet are friendly
6. People on the internet are willing to help others
7. People on the internet are welcoming
8. People are more likely to express their feelings on the internet than in person
9. Using the internet gives people confidence to express themselves
10. Other people will believe anything they read on the internet
11. People on the internet are shallow
12. People on the internet are liars
13. The internet is a safe place to express your opinions
14. People on the internet are intellectual
15. People on the internet are judgmental
16. People on the internet are lonely
17. People on the internet are scary
18. People on the internet feel free to say whatever they want
19. You shouldn't believe everything you read on the internet
20. People on the internet should not be taken seriously
21. The anonymity of the internet leads people to say things they truly mean
22. People on the internet act differently than they do in real life
23. People on the internet are cowards
24. People use the internet to say things they wouldn't have the courage to say in person
25. People on the internet are bullies
26. People on the internet are genuine
27. People on the internet are ignorant
28. People on the internet are untrustworthy
29. People use the internet to get away from the real world
30. People on the internet are out to get others
31. People on the internet are vain
32. People use the internet to talk about others behind their backs
33. People on the internet are narrow-minded
34. The internet has created a place for people to avoid reality

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