Increased Internet use and poorer ability to manage emotions in youth at high-risk for psychosis

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ABSTRACT

The relationship between Internet use and social behavior remains unknown. However, research indicates that Internet use (IU) may have some causal role in certain types of psychopathology and overall functioning. In contrast, other work suggests that IU may be protective and buffer against social isolation. Poorer emotional processing (EP) is characteristic of schizophrenia, and these deficits are present prior to illness onset (the ultra high-risk period (UHR)). UHR adolescents/young adults also fall within an age demographic characterized by extensive IU, which suggests that evaluating a link between IU and social behavior in this population may be especially informative. The present study examined the relationship between IU and emotional processing in 98 adolescents/young adults (52 UHR youth and 46 controls). UHR youth exhibited greater problematic IU ($\beta = -6.49$, $F(1,95) = 8.79$, $p = 0.002$) and social withdrawal/problems resulting from this use ($\beta = -3.23$, $F(1,95) = 11.43$, $p < 0.001$), as well deficits in emotional processing in comparison to healthy peers ($\beta = 4.59$, $F(1,94) = 5.52$, $p = 0.011$). Furthermore, the social problems resulting from IU were significantly related to the ability to process emotional information in the UHR group ($\beta = -0.51$, $t(1,48) = -2.10$, $p = 0.021$). UHR youth showed evidence of problematic IU relative to controls, and the social problems resulting from IU related to poorer EP. Findings replicate extant research involving other psychosis risk populations, while adding information regarding how social processes may relate to IU.

1. Introduction

Internet use (IU) rates continue to rise, with the past decade seeing a 152% increase in time spent online among Americans (Miniwatts Marketing Group, 2001-2015). Specifically, adolescents and young adults use the Internet roughly 17 h per week (Derbyshire et al., 2013; Harris Interactive and Teenage Research Unlimited, 2015). Due to this overall rise in usage, investigators have begun to carefully question the impact of spending time on the Internet. One rising area of concern involves the relationship between IU and mental or physical health. Although our understanding of this association remains limited, findings indicate that increased IU is associated with higher rates of anxiety, depression, negative social interactions/relationships, increased headaches, and impaired sleep (Anderson, 2001; Coniglio et al., 2006; Ko et al., 2012). Further, one study examined the causal nature of IU (assessing participants before and after increases in time spent online), and discovered higher rates of hostility, psychoticism,

interpersonal difficulty, anxiety, and depression resulting from greater use (Dong et al., 2011). These findings highlight the need for continued examination of how IU is related to overall well-being.

Contrary to these findings, which suggest associated risk with IU, some studies propose that IU may serve as a buffer against social isolation, particularly for individuals with a diagnosis of schizophrenia who may exhibit impaired social behavior (Highton-Williamson et al., 2015; Miller et al., 2015; Spinzy et al., 2012). One study evaluated the Internet habits of psychotic patients, non-psychotic patients, and healthy controls and found that the individuals with psychosis create a greater amount of online relationships; the authors surmised that IU aids in bypassing the real-life social challenges that exist for individuals with psychosis (Spinzy et al., 2012). Another investigation surveyed individuals diagnosed with psychosis and showed that the majority of their sample reported that IU aided in their ability to interact socially and did not lead to worsening of psychotic symptoms (Miller et al., 2015). However, in this same study, of those who reported using the computer, email, and/or social media, roughly 16%–27% did not believe that these IU modalities aided in interactions with friends, family, or others, and around 35% endorsed believing that IU made them aware of increases in paranoia or suspiciousness (Miller et al., 2015). The available literature examining psychosis and IU is scarce, methodologies are variable, and studies are most often

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observational in nature (Highton-Williamson et al., 2015), making conclusions surrounding IU and psychosis difficult. In summary, the relationship between psychosis, social behavior and IU remains unclear — for individuals with psychosis, does IU relate to poorer clinical outcome or improved social connection? The answer to such a question would aid in clarifying whether chat rooms, social media, etc. would be useful as treatment interventions in their own right, as opposed to a risk factor for increased psychopathology.

One method that may aid in clarifying the relationship between IU and psychosis would be to empirically examine how time spent online relates to social behavior. Evaluating this relationship in a sample at clinical risk for psychosis may be especially enlightening, as these individuals are particularly helpful in aiding our understanding of how symptoms associated with schizophrenia arise (Insel, 2010). Youth at clinical risk for psychosis (termed being at ultra high-risk (UHR)) are individuals who exhibit symptoms indicative of having a greater likelihood of developing psychosis (e.g., experiencing sub-clinical levels of delusions, perceptual abnormalities, etc.). Roughly 10%–30% of UHR individuals will go on to develop a psychotic disorder in as little as 24 months (Cannon et al., 2008; Fusar-Poli et al., 2012; Woods et al., 2009). UHR youth also represent a putative prodromal stage to psychosis and often do not have confounds associated with schizophrenia such as neurotoxicity and long-term use of antipsychotic medication. The evaluation of IU and social behavior in UHR individuals may lend insight into the overall relationship between going online, social processes, and psychopathology.

Despite the potential value in examining IU and social behavior in the UHR period, there are no studies evaluating these areas in this critical group. This gap in the literature is noteworthy, as UHR individuals primarily fall into the adolescent and young adult age range. IU in this age range is almost universal, and there are growing concerns regarding Internet addiction and detrimental consequences of use in this particular age demographic (Moreno et al., 2011). This demographic also represents formative years whereby social and psychological development is pronounced and necessary for future success. Determining the impact of IU for this age group is particularly important, as any risks to healthy development are particularly concerning and deserve attention (Kaltiala-Heino et al., 2004). Of note, some studies suggest that IU confers some potential benefits for the psychosis spectrum individuals (Miller et al., 2015; Spinzy et al., 2012). As such, it is important to evaluate any promising new avenues for interventions, as the treatment options for UHR youth are currently limited (Kaur and Cadenhead, 2010). In sum, UHR youth represent a population where IU, social processes, and risk for psychopathology are at an important developmental point in time, and the relationship among these variables warrants investigation.

In regard to social behavior in UHR youth, these individuals tend to exhibit deficits in social processes (e.g., social communication, perception of others) (National Institue of Mental Health, 2013) relative to their unaffected peers (Cornblatt et al., 2012; Tarbox et al., 2014). Such impairment is similar to individuals with schizophrenia, albeit to a lesser extent (Fusar-Poli et al., 2012; Thompson et al., 2012). For example, research suggests that UHR youth exhibit deficits in their emotional processing (Fett et al., 2011; Phillips and Seidman, 2008). Emotional processing subsumes a wide experience of emotion, expression, and recognition and generally encompasses the neural processes necessary to take in, interpret, and respond to social and emotional information (Kohler and Martin, 2006; Ochsner, 2008). In particular, the domain of managing emotions (e.g., how an individual responds in emotional contexts) encompasses all of these areas of receiving social information, understanding it, and making a choice within this social framework. Research shows that the ability to manage emotions in regards to oneself and others is impaired in UHR youth relative to controls (Green et al., 2012). Therefore, examining

the link between IU and social domains such as emotional processing in UHR youth may help to unravel how this relationship functions (i.e., whether going online corresponds to a potential avenue for intervention or risk for increased impairment).

Finally, UHR youth represent a clinical sample, and investigation into this group would aid in our ability to further hone in on the relationship between IU and psychopathology. One previous study from our group, which examined a distinct sample of youth diagnosed with schizotypal personality disorder (a group with psychosis vulnerability), showed that higher IU in this sample was linked to greater rates of depression (Mittal et al., 2007). Furthermore, another study from our team evaluated a distinct sample comprised of college students who experience very low levels of psychotic like experiences (e.g., fleeting auditory hallucinations such as one's name being called), and we showed elevated rates of addictive behavior and problematic usage in this group (Mittal et al., 2013). Other research shows a link between IU and mood and anxiety disorders (Dong et al., 2011; Ko et al., 2012; Shapira et al., 2003), and these symptoms also occur at elevated rates in UHR individuals (Fusar-Poli et al., 2014). Studies evaluating IU in psychosis risk samples are scarce, and there are none looking at UHR youth specifically. It would be beneficial to know whether UHR youth also show greater problematic IU and whether that is linked with comorbid increases in psychopathology. In summary, the investigation of IU and symptoms in an UHR sample would aid in clarifying how IU may relate to clinical symptoms of anxiety, depression and in particular, attenuated psychosis symptoms.

1.1. Aims of the study

The current investigation recruited a sizeable sample of UHR youth and age-matched controls (n = 98) to investigate IU and emotional processing. The aims of the study were to 1) determine whether IU was elevated and problematic, 2) if emotional processing was impaired in UHR youth relative to control peers, and 3) if problematic IU related to emotional processing.

2. Methods

2.1. Participants

Participants included 98 adolescents/young adults (52 UHR youth and 46 controls) (age range 12–21, mean age = 18.27, SD = 2.26), who were recruited at the University of Colorado Boulder's Adolescent Development and Preventive Treatment research program. Email, newspaper advertisements, Craigslist, and community referrals were used to recruit UHR participants. Control participants were recruited through flyers and newspaper announcements. Exclusion criteria for both groups included a history of head injury, neurological disorders and having a DSM-IV-TR Axis I psychotic disorder or current substance dependence. The presence of a psychotic disorder in a first-degree relative was exclusionary criteria for controls. The University of Colorado Boulder Institutional Review Board (IRB) approved the protocol and written informed consent procedures for the investigation. Parents/legal guardians provided written informed consent on behalf of participants under the age of 18, while the participants provided written assent for their participation in the study. A thorough discussion of study procedures and the voluntary nature of the study was provided to parents/legal guardians and participants to ensure a full understanding of the nature of the study before enrollment began. Study participants were either healthy controls or individuals at risk for a psychotic disorder who showed no fully psychotic symptoms or loss of touch with reality; therefore, all participants were determined to be fully competent to consent to