HAIGAZIAN UNIVERSITY

An Individualized Approach to Conceptualizing Problematic Internet Use, In the Context of the Pre-existing Psychopathology

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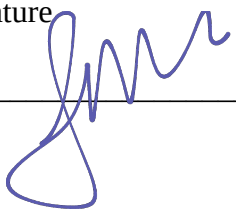

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Abstract

Background: Internet Addiction (IA), a rapidly growing clinical phenomenon in mental health with detrimental consequences, is yet to be deemed a new independent disorder, due to speculation around it being an extension of a pre-existing Psychiatric disorder. This impacts the development of treatment modalities for this addiction, and the way in which it can best be incorporated into the DSM-5. This study attempts to search for signs of differentiation in this disorder across different Psychiatric diagnoses. Method: The prevalence rate of Internet Addiction across five major diagnostic groups was checked, using the Internet Addiction Test, while controlling for age, through Binomial Logistic Regression; and the Updated Cognitive Behavioral Model of Generalized Problematic Internet Use (PIU) was tested within each group, using the Generalized Problematic Internet Use Scale 2, through Multi-group Structural Equation Modeling. Results: There's a significant difference in the comorbidity with IA across the disorders, and the highest is with Bipolar Disorders; however, the Obsessive-Compulsive group has more severe cases and a higher mean score on the IAT, this is in comparison with Anxiety, Depression, and Schizophrenia spectrum groups. The least comorbidity of IA is with the latter. Excessive use was significantly higher in the Obsessive-Compulsive and Bipolar groups. The Cognitive-Behavioral model changed in two of the five groups, the Depression group model emphasized the role of Mood Regulation in the development of PIU more than the original, and the Schizophrenia group model developed a new interesting pathway, highlighting the social challenges of that disorder. Conclusion: preliminary findings show significant signs of differentiation in the development and process of IA across pre-existing disorders, suggesting that cases of IA should be conceptualized in an individualized approach.

Keywords: Internet Addiction, Problematic Internet Use, cognitive-behavioral conceptualization, Psychiatric Disorder classification, Lebanese sample, Internet Addiction Test, GPIUS2, Bipolar Disorder, Obsessive-Compulsive Disorder, Impulse Control Disorder

An Individualized Approach to Conceptualizing Problematic Internet Use, In the Context of the Preexisting Psychopathology

Internet Addiction (IA) is a recent and rapidly spreading phenomenon (Whang, Lee, & Chang, 2003; Young, 2004), associated with serious negative consequences, and calls for urgent research into finding out how and why the addiction is occurring, and who is most susceptible (Pies, 2009; Whang, Lee, & Chang, 2003). This study will attempt to determine which major Psychiatric disorders have the highest comorbidity with Internet Addiction, and attempt to determine whether different pre-existing Psychiatric disorders can influence the way that the problematic use of the Internet is developed. Is addiction to the Internet an extension of a pre-existing disorder, and therefore, individually differentiated in development and form, or is it an independent disorder that is unrelated to the variations of the underlying basic pathology?

Problematic Use of the Internet, a Real World Problem

The proliferation of the Internet world-wide has set the stage for the development, in some individuals, of a set of cognitive and behavioral symptoms, which have come to be referred to as Internet Addiction or Problematic Internet Use. In Lebanon studies have suggested that 4.2% of adolescents have significant problems from their Internet use (Hawi, 2012), and 30% of college students present with moderate and severe Internet Addiction (Samaha et al., 2018). Internet Addiction, which can be operationally defined as a behavioral addiction, (Pontes, Kuss, & Griffiths, 2015), is a subject that is attracting widespread attention. It is a unique condition because it deals with pathological symptoms related to Internet use, a medium that, when used correctly, can facilitate occupational, educational, and communication processes (Kraut et al., 2001; Young, 2004). It has been shown that younger individuals are more at risk of developing IA (Pontes & Grifiths, 2015) and more prone to develop further problems from it (Brenner, 1997; Widyanto & Mcmurran, 2004). Consequences of this

condition can range from physical and psychological problems, to social, educational, and occupational dysfunction (Block, 2008; Tahiroglu et al., 2008). Researchers and clinicians are still not clear on whether IA is an independent disorder, or an extension of a basic preexisting psychopathology, and researchers have highlighted the need for future studies to delineate this (Aboujaoude et al., 2006; Pies, 2009). Even though the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (American Psychiatric Association, 2013) proposed a potential diagnosis under the name Internet Gaming Disorder (IGD), it is restricted to online and offline gaming and does not address other internet related activities. None the less, the American Psychiatric Association (2013) states that the field is in need of further research in order to confirm that IGD has merit as an independent disorder. This brings about the first problem to be addressed, there is not enough data demonstrating whether internet addiction is clearly an independent disorder, or an extension or expression of an underlying basic disorder.

Potential Research Implications

Some experts believe that Internet Addiction is a symptom of an underlying disorder, and not a discrete disorder in itself (Pies, 2009). For a constellation of symptoms to be considered a discrete disorder or disease entity there needs to be at least one of the following: the discovery of genetic transmission of these symptoms, a good understanding of the etiology and pathophysiology of these symptoms, and/or the establishment of a relatively similar course, prognosis, and treatment response across different populations (McHugh & Slavney, 1998; Pies 2008). In the case of Internet Addiction, the literature is still in its early phases, and the above conditions have not yet been met. Some researchers believe that Internet Addiction should be considered a secondary disorder that stems from a primary one, until future studies support the presence of one of these conditions (Pies, 2009). Pathophysiological findings, for example, have suggested that excessive Internet gaming, similar to Substance Use Disorders, may belong to a wider umbrella of pathology, related to abnormal dopaminergic functions, that

can be referred to as Reward-Deficient Aberrant Behavior (Blum et al., 2008). Additional research into genetic, pathophysiological, etiological, and course-related factors relative to Internet Addiction is needed before it can be deemed an independent discrete disorder. Looking into the cognitive and behavioral components that explain the development and maintenance of the disorder is one of the approaches that can be used in attempting to understand aspects of its etiology and course, thus bringing the field closer to finding out whether it is a primary or secondary disorder. It would be particularly important to understand if these components interact differently relative to pre-existing disorders.

Potential Treatment Implications

Researchers have linked IA with Impulse Control Disorders (Aboujaoude et al., 2006; Block, 2008; Shapira et al., 2003; Young, 2011), and in line with treatments known to be effective for Impulse Control Disorders, clinicians started looking into Cognitive Behavior Therapy (CBT) for treatment (Young, 2011). To this date, there is some literature suggesting that Cognitive Behavioral Therapy (CBT) is the treatment of choice for Internet Addiction, and this specific type of therapy is referred to as CBT-IA (Senormanci, Konkan, & Sungur, 2012). This technique follows three phases; in the first, it focuses on behavior modification, in the second, the focus is on the maladaptive cognitions at play, and finally, harm reduction techniques are applied because it is unrealistic to consider total abstinence from the internet (Young, 2011). This type of therapy is still in its early phases. There are no long-term follow-ups yet to discern whether improvement from it is sustainable for more than six months, especially that in Young's (2013) study the mean scores for IA showed a slight rising trend at 6 months follow-up; or whether or not there is a risk of relapse into a different type of behavioral addiction, since addictive behaviors, whether chemical or behavioral, seem to share common attributes (Karim & Chaudhri, 2012; Pallanti, 2006). Seeing that CBT-IA is still in its early phases, there is still a need to understand this phenomenon better, and improve treatment

as much as possible; therefore the second problem that needs to be addressed is the absence of established efficacy in terms of treatment for this disorder, and a need to explore further. In the final stages of CBT-IA, comorbid and contributing factors are looked into, however, it does not utilize an individualized approach to conceptualizing the cases of Internet Addiction from the start, taking into consideration each individual's specific challenge in the entire internet experience. For example, an individual with an underlying Major Depressive Disorder presenting for Internet Addiction might have different needs satisfied by the internet than a person with an underlying Social Anxiety Disorder presenting for Internet Addiction. It can be proposed that being blind to the individual's specific psychological appeal for the Internet from the start can stall treatment progress. The function and the process of the problematic Internet use in each individual may be different, and this would make this disorder unique in that it needs to be approached in an individualized way. Established major disorders in the DSM-5 are independent discrete disorders that are not contingent upon an underlying psychopathology; Internet Addiction, on the other hand, is being considered, by some, a secondary disorder that is an expression of a basic underlying disorder (Pies, 2009). It is for this reason that the current paper suggests an individualized, rather than a standardized approach to treatment for Internet Addiction in particular. The findings of this study will aim to propose an individualized conceptualization of this disorder from the start, and will do so by looking at the relationship between the cognitive and behavioral components of the addiction, in light of the preexisting psychopathology of each client. This is proposed to help focus attention on where the individual needs it the most from the beginning of treatment, relative to his/her own pre-existing psychopathology, incorporating the interventions of CBT-IA, but in an individually customizable approach.

Introduction into the Variables and Model

In order to better understand the purpose of this present study, some information needs to be presented about Cognitive-Behavioral theories behind Problematic Internet Use. A Cognitive Behavioral model proposed by Davis (2001), is considered to be one of the most comprehensively studied towards this end. This model, to be discussed in more detail later, first demonstrates that there can be two types of Pathologic Internet Use (otherwise referred to as Problematic Internet Use), Specific Pathologic Internet Use (SPIU), and Generalized Pathologic Internet Use (GPIU). SPIU refers to addictive activities on the internet that seem to stem from an addiction present off of the internet, and can equally be present in real life, whereby the internet only acts as a medium in this case. An example of SPIU is when an individual is addicted specifically to online gambling, which conceptually is stemming from his/her Gambling Disorder; in the absence of the Internet the individual can easily resort to other mediums that enable gambling such as machine slots. Compulsive pornography viewers seek stimulation from any possible source, and the Internet happens to be one of the most expansive and facilitating mediums out there to provide such content; but in the absence of the Internet, this pathological behavior will continue to be present, but would simply redirect to other forms of pornography such as porn magazines. The core aspect of SPIU is that the role of the Internet is only a facilitating one, but the true addiction can equally be met off of the Internet (Davis, 2001). GPIU, on the other hand, refers to all other subtypes of internet addiction that seem to have a communicative driving force (Davis, 2001), this is where social media, browsing, online gaming, and chatting would fit in. Individuals with GPIU are attracted to the unlimited social communication aspect of the internet, whereby it serves as a lifeline to the rest of the world. Davis (2001) proposes that their internet-related pathology would not even exist had the Internet not been available; even though they likely have a predisposing psychopathology (which can essentially be any major Psychiatric disorder) with maladaptive

cognitions; in these cases the internet acts as a platform to express their distress. In this study, when Internet Addiction, or Problematic Internet Use is referred to, GPIU is what is meant. The Davis model proposes that a basic psychopathology is a necessary distal cause for the development of PIU. This means that in order for someone to have developed PIU, there must be an underlying predisposing psychopathology characterized by specific cognitions and ruminations about the self. In brief, his model describes a relationship between predisposing factors, pleasant internet exposure, maladaptive cognitions, and internet-related behaviors (Davis, 2001). The proposition of having a basic psychopathology as a necessary distal cause may be supported by other studies that demonstrate comorbidity between PIU and other DSM-IV (American Psychiatric Association, 2000) comorbidity that ranges between 86% (Block, 2008) and 100% (Shapira et al., 1999). This brings about the third problem to be addressed: The research available shows little interest in the underlying psychopathology that preexisted PIU, and how it may shape its conceptualization.

In order to address this problem there needs to be a way to show that PIU is developed and expressed differently in each individual. The process of this disorder would be expected to play out differently relative to each preexisting major Psychiatric disorder. To demonstrate this, the components underlying GPIU can be utilized, and specifically, in this case, the cognitive and behavioral components. Based on the Davis Cognitive-Behavioral model of PIU discussed earlier, Caplan (2002, 2010) attempted to operationalize the constructs of the model and test it. These constructs came to be known as the cognitive and behavioral components that explain the process of developing and maintaining GPIU. Caplan (2010) used these components to create an Updated Cognitive Behavioral Model of GPIU, which introduces the three key players in this disorder: The presence of a preference for online social interaction, the use of the internet for mood regulation, and the presence of deficient self-regulation (which can be split into a cognitive component and a behavioral one). These three factors, when present,

interact to lead to negative outcomes that are a result of the problematic use of the internet. Therefore, to attempt to demonstrate that GPIU is truly developed and expressed differently relevant to the preexisting Psychiatric disorder, it can be proposed that the Updated Cognitive Behavioral Model of GPIU can be explored within each Psychiatric group independently, to see if the interaction between the components will come out differently in each.

To measure and operationalize these components, Caplan (2002, 2010) developed a scale called the Generalized Problematic Internet Use Scale 2, which is one of the few theory-driven instruments available (Caplan, 2010). This scale includes four components, the first one is Preference for Online Social Interaction (POSI), the second is Mood Regulation, the third is Deficient Self-Regulation (which is essentially split into two parts, Cognitive Preoccupation and Compulsive Use), and the last one is Negative Outcomes from the Internet use (Caplan, 2010). These components are proposed to be consequences of a broader psychosocial problem (what Davis referred to as the basic psychopathology), and they interact to maintain the cycle of Problematic Internet Use (Caplan, 2010). The POSI component from the model is the tendency for an individual to feel more comfortable interacting with people online, rather than face-to-face, and it is commonly seen in people who have social anxiety, low presentational confidence, or deficient social skills (Caplan, 2010). The Mood Regulation component refers to the need to distract from undesirable emotions by using the internet, and this has been associated with more negative outcomes (Caplan, 2010). The Deficient Self-Regulation component has the Cognitive Preoccupation aspect, referring to obsessive thought patterns about wanting to be online, and what they are missing out on due to not being online, and the Compulsive Use aspect which is on the behavioral level, signaling a diminished sense of control. Finally, the Negative Outcomes component, includes examples of consequences that are arising from the uncontrolled internet use (Caplan, 2010), and perhaps in its own way continues to feed into the same cycle.

There is an established relationship between these components, and the model is considered to be a fixed model with clear causal relationships (Caplan 2010; Gámez-Guadix et al., 2012). Literature has shown that POSI and Mood Regulation increase the probability of Deficient Self-Regulation, and in turn, the latter was found to be significantly associated with Negative Outcomes of Internet use. Some studies show that POSI increases the likelihood of using the Internet for Mood Regulation as well (Caplan, 2010; Gámez-Guadix et al., 2012). In addition to that, Deficient Self-Regulation has been found to be a direct predictor of Negative Outcomes; the relationship between POSI and Negative Outcomes has been found to be mediated by Deficient Self-Regulation, and the relationship between Mood Regulation and Negative Outcomes has also been found to be mediated by Deficient Self-Regulation (Caplan, 2010). It is evident that this research supports the belief that Preference for Online Social Interaction (POSI) is the leading factor in this disorder, and the causal relationship then follows using the other factors, leading up to Negative Outcomes. This present study aims to challenge this conviction by proposing that the other factors can just as easily be leading factors in the model (i.e. different pathways may emerge) depending on the specific needs of an individual, which are likely affected by the underlying Psychiatric disorder.

This brings about the fourth problem, that even though studies have provided support for this model, they have all recruited individuals from the general population or from samples of students; there have been no studies testing this model on separate DSM-5 disorders, to see whether it will still present with the same relationship between the four dysfunctional components, or express different ones across the different diagnoses. The need for future research to incorporate the basic psychopathology (and how it relates to PIU) into the interaction has been requested by Caplan (2002) and Davis (2001), the two researchers responsible for the development of this updated model. This is called for in order to have a better understanding of the model, and how the predisposing psychopathology (which can

essentially be any DSM-5 Disorder) relates to it. This could have direct implications on the structure of the Cognitive-Behavioral treatments being developed to address PIU, whereby the more salient or leading factor in the model might be the emphasis of the treatment plan, highlighting the biggest function of the internet in each individual's life. In addition to that, this could offer some information into what the field is seeking answers to (Aboujaoude et al., 2006), which is whether Internet Addiction is truly an independent disorder, or if it is an extension of an underlying disorder; and this is because the current study will demonstrate whether the model will show different interactions between its components across different underlying psychopathologies (suggesting that PIU is expressed differently across disorders), or yield the same interaction (suggesting that it may truly be independent, and not affected by the underlying disorder).

Current Study

Despite the great gains that have been achieved in understanding and conceptualizing PIU, research has come this far with a clear need for more information. Researchers have requested answers to questions as to whether Internet Addiction is an independent disorder or an expression of an underlying disorder, and to whether the basic psychopathology can be incorporated into the Updated Cognitive-Behavioral Model of GPIU. In addition to that, the study has implications related to improving treatments whose effectiveness has not yet been confirmed, and to improving prevention by identifying at risk disorders.

Research Questions

First Research Question. In light of the above, the first research question in this quantitative study is as follows: In a clinical population, which major disorders will have the highest comorbidity with Internet Addiction when age is controlled for? The participants are adults who have consulted M.I.N.D. Clinics, a Psychiatry and Clinical Psychology clinic for

their preexisting disorders in Lebanon. Operationalization will be as follows: the major disorders are diagnosed through a one-on-one thorough and comprehensive intake interview based on the DSM-5 (American Psychiatric Association, 2013) conducted by the primary investigator (last year Clinical Psychology Masters student), a Psychiatry Resident, and a Psychiatric Nurse and Case Manager under the supervision of a Psychiatrist. These interviews did not use a structured instrument, but very closely resembled comprehensive interview instruments that were developed based on the DSM-5 (American Psychiatric Association, 2013). The instrument used to measure Internet Addiction is the Internet Addiction Test that was developed by Young in 1998 in a North American population sample (as cited in Samaha et al., 2018), and that has been validated among Lebanese college students by Samaha et al. (2018). Any result of 31 or above (out of a total score of 100, and the rationale will be discussed later) has been considered positive for Internet Addiction. The significance of this is that it will help determine the disorders that are most at risk of developing IA, and improve the direction of screening efforts. In addition to that, it will act as the first step in formulating a concept of differentiation in IA across different disorders. Other variables that have been investigated in addition to diagnosis of psychopathology are age, and gender for better understanding of prevalence rates and at-risk populations, in addition to internet activity preference (social media, personal chatting, gaming, downloading movies or music, searching for information, surfing the internet, shopping online), because researchers have questioned the importance of understanding the differences between each type of internet activity and its relation to the addiction (Young, 2013).

Second Research Question. The second research question in this study is as follows: Will the Updated Cognitive-Behavioral Model of GPIU show different relationships between components, compared to other studies, when the Generalized Problematic Internet Use Scale 2 is conducted on separate DSM-5 disorder samples? The outcome variable is the Negative

Outcomes of Internet use component, and the following are independent variables whose relationship is to be explored: POSI, Mood Regulation, the Cognitive Preoccupation aspect of Deficient Self-Regulation, and the Compulsive Use aspect of Deficient Self-Regulation. These variables are measured through different items in the GPIUS2 and they will be looked at independently across different disorders as different samples or groups. The main disorders to cover as separate samples are Bipolar and Related Disorders, Depressive Disorders, Anxiety Disorders, Obsessive Compulsive and Related Disorders, Schizophrenia Spectrum and Other Psychotic Disorders.

Rationale

In light of the explicit need for more information in understanding Problematic Internet Use and its conceptualization (Aboujaoude et al., 2006; Caplan, 2010; Davis, 2001), especially when it comes to the ambiguous role of the underlying psychopathology, and taking into consideration the implications it might have on enhancing treatment methods for this particular population, the current study aims to test the Updated Cognitive-Behavioral Model of GPIU across samples of different underlying psychopathologies. This study works on extending the research already presented by Caplan (2002, 2010) and Davis (2001) by extrapolating from their models and scales, and including an additional component: the diagnosis of an underlying psychopathology. Integrating the preexisting psychopathology into the model has been proposed by Davis (2001) and Caplan (2010), who appreciate the relevance of such a factor in the explanation of PIU. The Updated Cognitive Behavioral Model has established relationships between components when tested on the general population (Caplan 2010; Gámez-Guadix et al.. 2012), this study aims to test this model on separate diagnostic groups of Psychiatric Disorders in an attempt to see whether the relationship between the components will emerge the same, or whether it will be different in each diagnostic group. This will offer some answers into the field's questions as to whether PIU/IA should be deemed a new emerging independent

disorder, or viewed as an expression of a preexisting psychopathology, which is conceptualized differently in each diagnostic group, and therefore, treated distinctively.

Significance

The current study will determine the clinical populations most at risk of developing Problematic Internet Use, which would help prevention and intervention become more specific. More importantly, this study might have great research and clinical implications as will be discussed below.

If the model presents itself with a different relationship between components across different major disorders then more research should be directed towards looking into whether IA is truly expressed and conceptualized differently across different disorders, which may suggest that it is not as independent a disorder. If this is the case, then a new approach to treatment should be proposed whereby CBT is catered and conceptualized individually for each individual, taking into consideration the basic psychopathology and the salient component from the Updated Cognitive-Behavioral Model of GPIU. Changes in the emphasis of the interventions in CBT might prove more beneficial depending on the specific needs of each individual, whether it be Mood Regulation first, by increasing mood enhancing activities in real life, or POSI first by focusing on social skills and face-to-face interactions; if the salient component is Self-Regulation Deficiency then the initial stages of therapy can focus on self-monitoring and incorporating cues and stoppers. Such modifications in treatment might render it more efficient and more sustainable.

If the model presents itself similarly across the different disorders then this might support the growing belief that IA is in fact an independent disorder with an etiology that is not affected by the nuances of a preexisting psychopathology, and will provide further support for the Updated Cognitive-Behavioral Model of GPIU.

Literature Review

Introduction

In the following section, the literature will be reviewed concerning the topic of Internet addiction (IA) or Problematic Internet Use (PIU). The first part will start by discussing the relatively recent history of this disorder and how it came about. The general definition and classifications will be explored, in addition to the ramifications, prevalence rates, and some of the theories that have been proposed to explain the etiology of the disorder. The second part will delve into the Cognitive Behavioral Theory and its subsequent updates. The third part will explore the independent and dependent variables in relation to the theory introduced earlier, and will provide the support behind each. The last part summarizes the aim of the current study in relation to what is known, and what still needs to be explored.

Part 1 - Internet Addiction or Problematic Internet Use

History

Reports of the misuse of the Internet have emerged alongside the growing access and utilization of it (Shaw & Black, 2008). In 1995, Kimberly Young was the first to conceive of the idea of Internet Addiction after witnessing a friend's husband's compulsive use which seemed out of control, and resulted in financial ruin and divorce (Dalal & Basu, 2016). In 1996, Young suggested that the problematic or excessive use of the internet has features of addiction and needed to be considered for inclusion in the 4th edition Text Revision of the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2000). Around the same time, Mark Grifiths, a clinical psychologist interested in technology and gambling, published articles on Technological Addiction, and then about Internet Addiction (Dalal & Basu, 2016). Since then, the subject of Internet Addiction sparked controversial debates (Young, 2004), and is still gaining increasing attention (Shaw & Black, 2008) as the scientific

community realizes that the tool that has been used to enhance interpersonal communication, and occupational and economic advancement, has the potential to develop, in some, compulsive use and dependence (Gamez-Gaudix et al., 2012). Internet Addiction has come to be known by many names, such as Problematic Internet Use, Compulsive Computer Use, Pathological Internet Use, (Shaw & Black, 2008), Unregulated Internet Use (Kim, LaRose, & Peng, 2009), Internet Addiction Disorder, Compulsive Internet Use, Excessive Internet Use, Online Addiction, and Cyberspace Addiction (Douglas et al., 2008). IA and PIU refer to the same clinical phenomenon, and it's the inappropriate use of the internet to the point that it causes distress or interference in functioning. There's a slight difference, however, in the way that each one of them approaches this phenomenon. IA highlights the ways in which this inappropriate use parallels Substance Use Disorders and includes symptoms very similar to those of SUD such as tolerance, dependency, and withdrawal. PIU, on the other hand conceptualizes it through a cognitive behavioral perspective and relates the internet use to maladaptive coping mechanisms for psychological distress (Li et al., 2014). Throughout this paper, the terms Problematic Internet Use (PIU) and Internet Addiction (IA) will be used, relative to their original source, out of respect to their authors' approach.

Definition

Internet Addiction refers to an individual's inability to control his/her use of the internet, and this, as a result, causes functional impairment or marked distress (Young, 2004). Not unlike other addictions, people with Internet Addiction display preoccupation with internet activities, and a need for an increasing amount of time spent online to achieve the same satisfaction (Young, 2004). These individuals will likely have made efforts to reduce their time online, but have not been successful in doing so, and cutting down triggers physical or psychological distress (Young, 2004). The internet becomes a way to escape from certain problems or moods, and the individuals may make an effort to conceal the true time that they

spend online (Young, 2004). Variations of the above symptoms are used in different studies and different scales, but the criterion that is considered essential in all of them, is the resulting presence of distress, and/or educational, occupational, or social impairment or interference (Young, 2004).

The fifth edition of the DSM included Internet Gaming Disorder (IGD) under Conditions that Require Further Study in Section III (American Psychiatric Association, 2013). The DSM-5 chose to focus on gaming rather than Internet in general because the scientific reports that came out describing this new preoccupation seemed to show gaming in particular to be the one most likely to be addictive, whereby it can trigger certain pathways in the brain mimicking a drug abuser's response (APA, 2013). The proposed symptoms of Internet Gaming Disorder include preoccupation, withdrawal symptoms, tolerance, unsuccessful attempts at reducing the activity, compromising other relevant activities in real life, escaping negative feelings through gaming, concealing the real amount of time spent gaming, impairment or risk of impairment secondary to time spent gaming, and persistence in gaming despite problems (APA, 2013).

Classification

There has been a lot of debate around the classification of Internet Addiction. It can be operationally defined as a behavioral addiction (Karim & Chaudhri, 2012; Pallanti, 2006; Pontes, Kuss, & Griffiths, 2015) and has been linked, by some investigators, to addictive disorders alongside drug and alcohol use disorders (Griffiths, 1999). The symptoms of Internet Addiction were likened, by Young, to those of Pathological Gambling (Cheng & Li, 2014). It is considered an Impulse Control Disorder by many, whereby individuals suffering from this disorder experience problems regulating their engagement with the internet (Cheng & Li, 2014; Pallanti, 2006). Others have likened IA to Obsessive Compulsive Disorder and one of the

names given to it was Compulsive Computer Use (Black, Belsare, & Schlosser, 1999). In an attempt to discern whether IA is more likely to be an Obsessive-Compulsive Disorder or an Impulse Control Disorder, Shapira et al. (2000) adapted the Yale-Brown Obsessive Compulsive Scale (Y-BOCS) to make the questions revolve around Internet Addiction, and similarly adapted the additional module of Impulse Control Disorders - Not Otherwise Specified from the Structured Clinical Interview for DSM-IV (SCID), and used them both in assessing the Internet abuse symptomatology in twenty internet abusers. Their attempt was to see whether IA will present itself as an Obsessive Compulsive Spectrum Disorder by having more positive scores on the adapted Y-BOCS, or as an Impulse Control Disorder by having more positive scores on the adapted ICD-NOS module from the SCID. What they found was that all twenty subjects' Internet abuse meets DSM-IV criteria for Impulse Control Disorder (NOS), and only three of them have their Internet abuse additionally meet DSM-IV criteria for Obsessive Compulsive Spectrum Disorder. These results suggest that in this group of 20 internet addicts, the symptoms of Internet Addiction more closely resemble those of Impulse Control Disorders rather than Obsessive Compulsive Spectrum Disorders (Shapira et al., 2000). As a conclusion, Internet Addiction seems to be best categorized as a behavioral addiction most likely belonging to Impulse Control Disorders.

There is high comorbidity between PIU and other DSM-IV disorders, the comorbidity rate with any lifetime DSM-IV disorder ranges between 86% (Block, 2008) and 100% (Shapira et al., 1999). The disorders with the highest comorbidity with IA are Bipolar Disorder, Substance Use Disorder, Anxiety Disorders (Black at al., 1999; Shapira et al., 2000) and Attention Deficit Hyperactivity Disorder (Weinstein & Lejoyeux, 2010; Yoo et al., 2004).

Consequences

Young (1998) discovered that 58% of students displayed poor study habits, received poor grades, or even failed at school as a result of excessive Internet use. Internet addiction that interferes with working hours translates into around U.S. $54 billion annually in missing productivity according to one study (Adschiew, 2000, as cited in Young, 2004). Ha et al (2006) described various problems associated with Internet Addiction, including peer and familial conflicts, social and vocational impairment, and psychophysiological problems such as tension headaches and insomnia. Kraut et al. (1998) demonstrated that, overtime, both loneliness and Depression levels increase, as the time spent online increases when they compared scores of individuals before and after being introduced to the internet (Kraut et al., 1998). South Korea witnessed ten deaths in Internet Cafes from cardiopulmonary causes (Choi, 2007, as cited in Block, 2008) in addition to game-related murder (Koh, 2007, as cited in Block, 2008). A surprising 24% of children diagnosed with this disorder required hospitalization (Pies, 2009), making Internet Addiction one of South Korea's most serious public health concerns (Block, 2008).

Prevalence

A world-wide prevalence rate of IA was estimated at 6%, with 95% CIs [5.1–6.9] according to a meta-analysis involving 164 independent samples, across 31 countries, and a total of 89,281 participants (Cheng & Li, 2014). This prevalence rate is more than threefold of that of Pathological Gambling, which is another Impulse Control Disorder (Shaffer et al., 2004, as cited in Cheng & Li, 2014). In the Middle East, the prevalence rate of IA retrieved from 9 independent samples and a total of 3,979 participants is 10.6%, with 95% CIs of [5.4–16.3] which is the highest among the seven world regions (Cheng & Li, 2014). In Lebanon, studies have revealed that 4.2% of adolescents have significant problems from their internet use (Hawi,

2012), and 9.2% of adolescents in a separate study meet criteria for Internet Gaming Disorder (Hawi, Samaha, & Grifiths, 2018). Among Lebanese adults, 16.8% have potential IA in a sample of university students (Younes et al., 2016), and 30% of college students in a separate study present with moderate and severe Internet Addiction (Samaha et al., 2018). Generally this disorder seems to be more prevalent in younger adults (Pontes & Grifiths, 2015), and leads to more serious problems in younger populations (Brenner, 1997; Widyanto & Mcmurran, 2004). Gender differences, however, in Internet Addiction were not significant (Khan, Shabbir, & Rajput, 2017).

Etiology

Some of the theories that exist around Internet Addiction include Social Skills Deficit Theory whereby people with negative views regarding their social competence find an opportunity online to control the impressions that people have of them, through the freedom of manipulating their information (Caplan, 1998, as cited in Shaw & Black, 2008). The Needs theory posits that individuals with Internet Addiction have a need for the internet that differs from non-addicts; while non-addicts experience satisfaction when they engage in their preferred online activities, Internet addicts might play games to avoid dissatisfaction, rather than in pursuit of satisfaction (Wan & Chiou, 2006). The Neurobiological Theory suggests that a disruption in neurotransmission is responsible for the development and maintenance of Internet Addiction, specifically dopamine and serotonin neurotransmitters (Shaw & Black, 2008).

There are different models that attempt to explain the development and maintenance of Internet Addiction. The Anonymity, Convenience and Escape (ACE) model provides a framework to elaborate the dynamics driving cyber-cultural relationships that at times may lead to virtual adultery (Young et al., 2000). The Access, Affordability, Anonymity (Triple-A)

engine suggests that there is an ease of access to the internet which is available everywhere and can be used at any time, that the price is usually very affordable considering the rich content available especially in sexual fields, and finally that anonymity provides secrecy and therefore less inhibition (Cooper et al., 1999). The Comprehensive Model of the Development and Maintenance of Internet Addiction takes into consideration biological vulnerabilities, sociocultural factors, psychological predispositions, and specific attributes of the internet in explaining the process of this disorder (Winkler et al., 2013). Finally, there is the Cognitive-Behavioral Model by Davis (2001), which unlike other models, emphasizes the maladaptive cognitions, and places them in relation to internet use behaviors and negative outcomes (Şenormancı, Konkan, & Sungur, 2012). This theory will be discussed in more detail below due to its direct relevance to this study.

Part 2 - The Cognitive Behavioral Theory and its Updates

Cognitive Behavioral Theory of PIU

Davis (2001) proposes that there are two types of, what he referred to as Pathological Internet Use, Specific Pathological Internet Use (SPIU) and Generalized Pathological Internet Use (GPIU). SPIU refers to the dependence to a specific function online. This can include an overuse of sexual material, online gambling, or stock trading; these seem content-specific and are likely to exist just the same in the absence of the internet (Davis, 2001). An individual addicted to gambling, for example, will engage in it using any opportunity available, and the Internet in this case only provides a platform on which he/she can do so. SPIU can exist independent of the Internet and when found online, it's related to one aspect on the Internet only (Davis, 2001). GPIU, on the other hand, is multidimensional and is presumed to be linked to the social aspect of the Internet. It is believed that the rewards of existing in a virtual social experience is what attracts these individuals to the Internet. That said however, GPIU can also

include spending time online without any obvious objective (Davis, 2001). To explain Davis's model the distal causes will be described first, then the proximal causes, that lead up to PIU; while doing so, the key components will be introduced. Finally, Figure 1 will offer a visual display of the components together.

Distal causes are causes that are important for the development of symptoms but are not close in proximity to the time of onset of those symptoms; and necessary causes are causes that need to have been present for a phenomenon to occur. In Davis's model, a distal and necessary cause of PIU is a pre-existing psychopathology (Davis, 2001). This is not to say that any individual with a psychopathology will develop PIU, but that a pre-existing psychopathology must have been present in order for PIU to have developed. The pre-existing psychopathology predisposes the individual to developing cognitive ruminations about the self, and as a departure from other theories and models at the time, Davis's (2001) model proposes that maladaptive cognitions play an essential role in the etiology of PIU. Ruminative and depressogenic cognitive styles, low levels of self-worth, low self-esteem, and self-consciousness are all examples of cognitive symptoms that predispose an individual to PIU (Davis, 2001). In addition to the pre-existing psychopathology and the cognitions about the self that come with it, exposure to certain events on the Internet is another distal and necessary cause. The key factor in making the exposure to the Internet significant, is the reinforcement that comes from it. If the response is desirable, the individual becomes conditioned to engage in this activity more often (Davis, 2001). The conditioned response can then be triggered by cues that remind the individual of that experience, and these cues can be sounds, odors, or anything that relate to the Internet use. Davis's model proposes that these cues become situational cues that have a role in reinforcing PIU and maintaining it. Thus far we have covered the distal causes leading to the development of PIU (Davis, 2001).

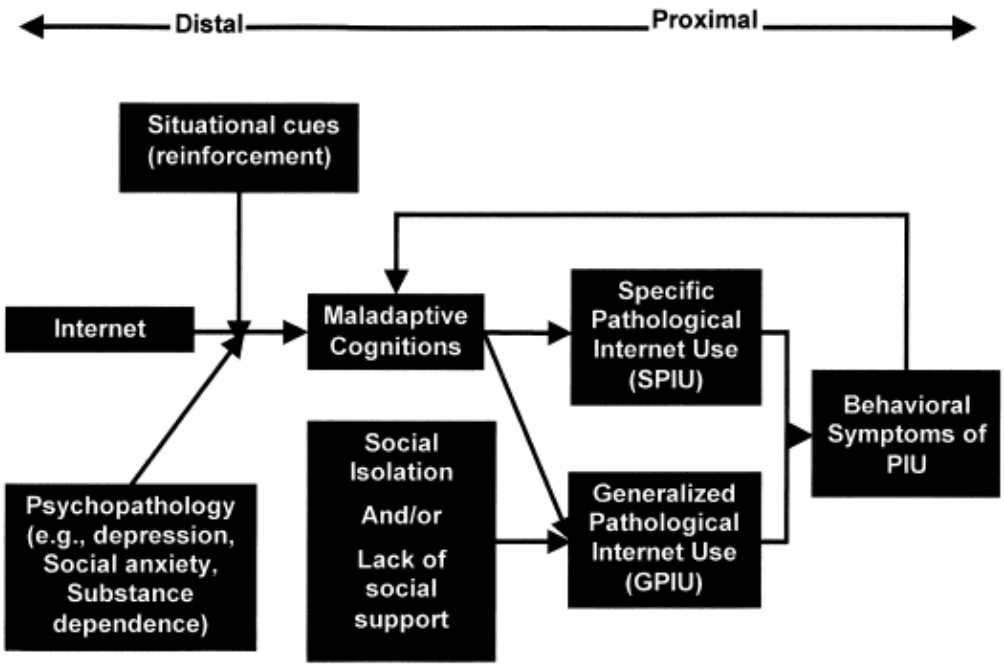
Proximal causes include, first and foremost, the fundamental cognitive dysfunction that is usually seen in individuals suffering from PIU. Davis considers this dysfunction a sufficient cause as well, meaning that it guarantees the development of PIU (Davis, 2001). The maladaptive cognitions are split into two subtypes, cognitions about the self, and cognitions about the world. The thoughts about the self are ruminative in nature, and the ruminations might revolve around the individual's relationship with the internet, or the internet usage. Engaging in these ruminations will lead to a vicious cycle whereby, on the one hand, they interfere with taking action and problem solving, and on the other, they trigger reinforcing memories of the internet. Negative self-appraisals and self-doubt are also types of cognitions about the self (Davis, 2001), and one can see how these set the stage for a behavioral addiction to take place. Davis believes that individuals with such poor self-appraisals seek positive responses from the internet. An example of negative self-appraisals and how they tie into the relationship with the internet, is when an individual has thoughts such as: "In real life I'm nobody, but online I'm somebody". Cognitions about the world include generalization and can produce thoughts such as "People are not respectful in real life" (Davis, 2001). The types of cognitive distortions often seen in people with PIU include selective abstraction, overgeneralization, personalization, dichotomous thinking, and magnification (Young, 2011). The reinforcing cues mentioned earlier such as sounds, visual icons, odors, or tactile sensations that remind someone of their internet experience, can immediately trigger such cognitions (Davis, 2001).

At this point in the model, we have introduced distal causes and proximal causes, and the different components at play; when all the necessary etiological causes come together, the individual develops either SPIU or GPIU (Davis, 2001). Those who develop SPIU will have already had their dependence manifest offline in many cases. In such a case, a pathological gambler discovers the ease of access of gambling online and will develop symptoms of PIU,

but that are in reality linked to the original dependence, making it SPIU. Generalized PIU, on the other hand, has an additional causal pathway, over and above the causes already discussed, and this is the social context (Davis, 2001). Davis believes that a lack of social support in addition to the other distal and proximal causes, will lead to GPIU. These individuals can be seen spending vast amounts of time on social platforms, or just aimlessly browsing; they might repeatedly check for messages or spend a very large portion of their time engaging in replying to posts. They tend to use the internet to escape from their responsibilities which leads to problems with functioning. Davis (2001) believes that even though individuals with GPIU likely have a pre-existing psychopathology that makes them prone to maladaptive cognitions, they are more problematic than SPIU in that their PIU wouldn't have existed if it weren't for the unique functions of the internet. He states that, for a person with GPIU, the internet is the individual's "lifeline to the outer world" (Davis, 2001, p. 193). The behavioral symptoms that follow the development of either SPIU or GPIU include spending increasing amounts of time online and anticipating the next online session. These individuals withdraw gradually from real social life, and spend less and less time engaging in activities in the real world that were once pleasurable; and this feeds into the vicious cycle whereby the only pleasure and social interaction that one ends up with are found online, (Davis, 2001). The model can be seen in Figure 1 below, reprinted from Davis (2001).

Figure 1

The Cognitive Behavioral Model proposed by Davis (2001)



Note. Reprinted from "A Cognitive-Behavioral Model of Pathological Internet Use", by Davis, R.A., 2001, *Computers in Human Behavior, 17*, p. 190.

Updated Cognitive Behavioral Model of GPIU

Caplan (2010) proposed an integrated model of GPIU, based on Davis's (2001) Cognitive Behavioral Model of PIU, on his own research on preference for online social interaction (Caplan 2003, 2005), and the Socio-Cognitive Model of Unregulated Internet Use (Kim, LaRose, & Peng, 2009). Based on the integrated model, he created the Generalized Problematic Internet Use Scale 2, a scale devised to depict the cognitive and behavioral components of GPIU, in relation to the negative outcome. Caplan (2010) ran confirmatory analyses on this scale to adequately test the integrated Cognitive Behavioral Model. He

developed an updated Cognitive-Behavioral Model of GPIU and validated it using the Generalized Problematic Internet Use Scale 2 (GPIUS2). Few instruments assess problematic internet use by drawing from a Cognitive-Behavioral model (Gamez-Gaudix et al., 2012), most of the instruments available are atheoretical or one-dimensional, (Davis, Flett, & Besser, 2002), and this has not, in any way, helped in understanding the etiology of the disorder (Davis et al., 2002). The GPIUS2 is one of the very few theory driven scales available for Internet use, and it includes the following components: Preference for Online Social Interaction, Mood Regulation, Deficient Self-Regulation (a higher order construct split into Cognitive Preoccupation and Compulsive Use), and Negative Outcomes. These variables, when taken together, accounted for 61% of the variance in negative outcomes (Caplan, 2010). This theory came to be known as the Updated Cognitive Behavioral Model of GPIU, and its respective theory-driven scale is the Generalized Problematic Internet Use Scale 2.

Part 3 - Independent & Dependent Variables

In the first research question, the independent variable is the clinical disorder that the individual belongs to, age is a covariate, and scores on the Internet Addiction test represent the dependent variable. The independent variables in this study, are four out of the five components from the Updated Cognitive Behavior Model of GPIU, and these are Mood Regulation, Preference for Online Social Interaction, Cognitive Preoccupation, and Compulsive Use (the last two are considered the two parts of Deficient Self-Regulation). It is believed that these are the four components that lead to the development and maintenance of GPIU. The dependent variable, is the Negative Outcome component of GPIU. These variables will be discussed below, and they can be measured through separate items in the GPIUS2.

Preference for Online Social Interaction

Preference for Online Social Interaction (POSI) is one of the components of the Updated Cognitive Behavioral Model of GPIU, and is one of the cognitive symptoms of the model (Caplan, 2010). This construct suggests that one is more comfortable with online social interactions as opposed to face-to-face interactions (Caplan, 2003). This can include feelings of efficacy, confidence, and even safety online, which are not perceived equally in real life (Caplan, 2010). Individuals who are at risk of developing POSI have social anxiety, deficient social skills, or are lonely; online interactions are less threatening for these individuals (Caplan, 2003; Caplan 2005; Kim, LaRose, & Peng, 2009).

Mood Regulation

Mood Regulation is another cognitive component of the Updated Cognitive Behavioral Model of GPIU (Caplan, 2010). This construct proposes that individuals will use the internet to distract from negative mood states. Mood Regulation was found to be a significant predictor of the internet's negative outcomes (Caplan, 2002). Caplan (2010) argues that people with social anxiety, and who likely have POSI, will find that the internet eases their anxiety, and that, to him, explains the role of Mood Regulation in the development and maintenance of PIU (Caplan, 2010).

Deficient Self-Regulation – Cognitive Preoccupation

Cognitive Preoccupation represents the cognitive component of the higher order construct Deficient Self-Regulation. It manifests as obsessional thoughts about being online (Caplan, 2010), such as wondering about what one is missing out on when they are offline. It has already been proposed by other researchers (Shapira et al., 2003 as cited in Caplan, 2010) that PIU involves cognitive preoccupation in addition to problematic use, and the presence of it makes the relationship stronger between Internet use and negative outcomes (Caplan, 2010).

Deficient Self-Regulation – Compulsive Use

Compulsive use is the behavioral aspect of the higher order construct Deficient Self-Regulation (Caplan, 2010). As previously discussed, PIU has been shown to closely resemble impulse control disorders (Shapira et al., 2000). This component represents the diminished control over the time spent online that is seen in PIU, and this results in interference in daily life activities (Caplan, 2010).

Negative Outcomes

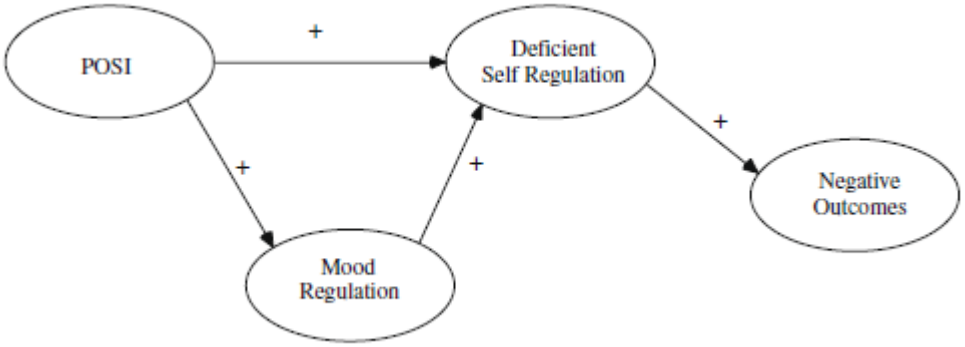
Negative Outcomes can be considered the component from the GPIU model that represents the outcome variable. The independent variables mentioned previously interact in ways that lead up to the Negative Outcome. To define this component is to review the consequences of PIU mentioned in a previous part of the literature review. This can include academic, occupational, or social interference, in addition to physical and psychological consequences (Block 2008, Young 2004).

The Established Relationships between the Independent and Dependent Variables

It has been established that POSI is a predictor of tendency for using the Internet for Mood Regulation. In addition to that, POSI is a predictor of Deficient Self-Regulation. The Mood Regulation component is a predictor of Deficient Self-Regulation. Deficient Self-Regulation is a predictor of Negative Outcomes. The relationship between POSI and Deficient Self-Regulation is mediated by Mood Regulation. The relationship between POSI and Negative Outcomes is mediated by Deficient Self-Regulation. Finally, the relationship between Mood Regulation and Negative Outcomes is mediated by Deficient Self-Regulation (Caplan, 2010; Gamez-Gaudix, Orue, & Calvete, 2013). These relationships are depicted in Figure 2 below, reprinted from Caplan (2010).

Figure 2

Caplan's (2010) proposed relationships between the components of GPIU



Note. Reprinted from "Theory and Measurement of Generalized Problematic Internet Use: A Two Step Approach" by Caplan, S.E., 2010, *Computers in Human Behavior, 26,* p.1091.

The Basic Psychopathology

Drawing from Davis's (2001) Cognitive Behavioral Model of PIU discussed earlier, the basic psychopathology is a necessary distal factor. In this study, in an attempt to account for the basic psychopathology, it will be represented through separate samples with separate groupings of Psychiatric disorders.

Part 4 - The Current Study

Preference for Online Social Interaction is believed to be a key driving force in this model. Caplan (2003, 2010) states that POSI predicts Mood Regulation motives, and then Mood Regulation in turn leads to Negative Outcomes, only when Deficient Self-Regulation is present. POSI can also lead directly to Deficient Self-Regulation, which then leads to Negative Outcomes. The basic psychopathology that Davis (2001) suggested, is a psychosocial one according to Caplan (2010), which leads to developing POSI. The above relationships between

components have been established in populations of students and general populations (Caplan 2010; Gámez-Guadix, Orue, & Calvete, 2013). There have been no studies that attempt to test the relationship between the components of GPIU within each set of Major Diagnoses separately. This is relevant because, just as Caplan (2003, 2010) proposed that POSI is a key component that seems to lead, in a lot of cases, to the other components, this study is suggesting that perhaps different psychopathologies will have different potential pathways that lead to negative outcomes. POSI has been established to appear salient in individuals with low social competence and social anxiety (Caplan, 2010), but this cannot be generalized to an assumption that this will be the same among individuals with Bipolar Disorder, Psychotic Disorders, Obsessive Compulsive Related Disorders, or others, who arguably may have more necessary functions of the Internet in their lives which leads to negative outcomes.

To explain why the model is expected to behave differently across different psychopathologies, the fact that PIU has not yet been established as an independent disorder will be reinstated. Despite all the effort and research that is going into understanding this phenomenon further (Aboujaoude et al., 2006; Caplan, 2010; Davis, 2001; Shapira et al, 2000), and the APA's statement for the need for more research, there still isn't sufficient information that demonstrates that PIU is not simply an extension of a basic major disorder. Some researchers believe that PIU is a symptom of a basic disorder such as depression or anxiety, rather than an independent entity (Karim & Chaudhri, 2012; Kratzer & Hegerl, 2008). Others, call for a need for future research to shed light on this specific question, (Aboujaoude et al., 2006), which is also the case in the conditional addition of Internet Gaming Disorder in the DSM-5 (American Psychiatric Association, 2013). If the model displays different relationships between components within each separate major disorder, it may be proposed that PIU is developed differently for each individual, depending on the basic psychopathology that he/she has. Whereas if the model displays the same relationship between components across the

separate major disorders, this might suggest that PIU does in fact have its own unique mechanism, that is unrelated to a direct contribution from the basic psychopathology.

The main significance of the study lies in the treatment implications of this disorder. Knowing that a disorder is independent and has its own mechanism of action warrants different types of therapeutic intervention relative to a set of symptoms that seem to stem from an underlying basic disorder. In the latter, even if the treatment of internet abuse symptoms is successful, there isn't enough information available on whether the individual will still be at risk of relapse later on; this should be considered when it is suspected that the original cause that led to that behavior in the first place was not addressed. Similarly, if the individual found a function in Internet use that was complementing his/her basic psychopathology, and the symptoms of Internet Addiction are treated, it is not known whether the individual is still at risk for developing a different behavioral addiction later or not. This means that in addition to treating the symptomatology, clinicians would need to focus more on the basic psychopathology, and the function of Internet abuse in relation to the psychopathology, in order to target the root of the problem. For example, if an individual suffers from Obsessive Compulsive Disorder, and develops PIU, the function of the Internet use in his/her case will differ from the function of the Internet use in an individual with Depression and PIU. Davis (2001), while explaining his Cognitive Behavioral Model of PIU, remarked on the possibility that some clinicians will question the wisdom of treating PIU, rather than treating what had led to PIU. He answers this, however, by pointing out that PIU does ultimately present with its own set of associated symptoms that is specific to it, and therefore warrants independent investigation. This study proposes that it doesn't have to be either or; rather, the treatment can be individualized taking into consideration the basic psychopathology, the individual's specific need for the internet in relation to or as a function of his/her basic psychopathology, and their symptoms of PIU itself, through assessing whether different psychopathologies develop

different pathways between components, leading to negative outcomes. The pathways that will emerge can explain the process of developing PIU in each disorder, which is key in prioritizing areas of treatment in an individualized approach.

The treatment modality that seems to be the most effective in treating this disorder is Cognitive Behavioral Therapy for Internet Addiction (CBT-IA) developed by Young (2011); and it has three stages of treatment. The first one includes behavioral modification to bring down the excessive use, the second focuses on the maladaptive cognitions and ensues with cognitive restructuring, and the third addresses all comorbid and contributing factors that led to the Internet Addiction including Psychiatric disorders, and personal, social, and familial problems (Young, 2011). In that sense, the treatment modality already in place recognizes the need to shed light on the basic psychopathology and connecting it with the Internet Addiction. Young recognizes that addressing contributing factors such as psychiatric disorders is important to prevent relapse (Young, 2013), but it takes place towards the final stages as a form of addressing factors, rather than being a more important part of treatment from the start. In a study that conducted CBT-IA on 128 individuals for 12 weekly sessions, the ability to manage IA symptoms at the end of the treatment was seen in 95% of the participants, with 78% of them sustaining the improvement six months later, suggesting that it is quite effective, especially right after the completion of therapy (Young, 2013). The study did not include a control group and did not apply a single case design. The Mean of the scores on the Internet Addiction Diagnostic Questionnaire went from 4.63 (before treatment), to 2.41 (at completion), and then rose again to 2.96 (at six months), suggesting either a regression artifact, history threats to internal validity, or a possible trend towards an increase in problematic symptoms as time went by. A rising trend in scores is worrying because this disorder contains a vicious cycle that may ultimately lead to worse results as time goes by, because when deficient self-regulation occurs, it causes problems in an individual's social, academic, or occupational functioning (Caplan,

2010), and this in turn may lead to a greater need to regulate negative affect online and socialize online, thus feeding into the same cycle. This can simply be due to dwindling of the effects of treatment, but there are no long-term follow-ups yet to discern whether improvement from this type of therapy is sustainable for more than six months, and whether or not there is a risk of relapse into a different type of behavioral addiction, since it has been established that addictive behaviors, whether chemical or behavioral, share common attributes (Karim & Chaudhri, 2012; Pallanti, 2006). Considering all of these factors, declaring that CBT-IA is good enough as is, without further modification, for the treatment of Internet Addiction is still premature.

Aims and Hypotheses

This current study will assess whether there is a need to integrate the Cognitive-Behavioral conceptualization of the basic psychiatric disorder, into the Cognitive-Behavioral conceptualization of the PIU, in treating a client. This outlook poses the possibility that the basic psychopathology may be more than just a contributing factor, and rather something that changes the conceptual framework of treatment for each client individually. The Updated Cognitive Model of GPIU and the application of its assessment tool the GPIUS2 will be used to make this theoretical connection. If the updated model of GPIU has different relationships between components in each separate psychiatric condition, the varied model can then act as a roadmap to each individual's own experience of PIU, and therefore, structure his/her treatment conceptualization differently. The component that seems to be the most relevant among the four components discussed earlier (POSI, Mood Regulation, Cognitive Preoccupation, and Compulsive Use) for any individual, or any psychiatric disorder group, can be the construct of focus within therapy, and perhaps can be considered the key mediator in the relationship between the basic psychopathology and PIU. This study will also look at prevalence rates of IA across five major diagnostic groups to identify the most at risk groups for developing this

addiction; in addition, it will measure the variables of the Updated Cognitive Behavioral Model of GPIU through the scale known as GPIUS2. The relationship between these variables will be compared between the diagnostic groups to determine whether there is a difference.

It is expected that there will be a difference in the prevalence of IA across the diagnostic groups, with a higher prevalence registered among patients with Bipolar disorder, Substance Use Disorders, and Anxiety Disorder as supported by previous findings *(Hypothesis 1)* (Black et al., 1999; Shapira et al., 2000; Young, Dong Yue, & Ying, 2011) But the Substance Use Disorders group had to be dropped due to time constraints. Scores of 31 or above on the Internet Addiction Test will be considered positive for Internet Addiction, since scores of 31 to 49 are considered to reflect Mild Internet Addiction, 50 to 79 are considered to reflect Moderate Internet Addiction, and scores of 80 to 100 Severe Internet Addiction (Young, 2011). This was supported by the Receiver Operating Characteristic (ROC) Curve which will be displayed later on. The means of the Internet Addiction Test will then be compared across groups of different diagnoses while controlling for age.

It is also expected that a different relationship between the components of the Updated Cognitive Behavioral Model of Generalized Problematic Internet Use will appear as it relates to each disorder separately, when testing the model in each.*(Hypothesis 2)*. This hypothesis will be non-directional because no previous research about this exists and it is difficult to determine what relationship between variables will occur in each sample. The hypothesis states, however, that the model should show a different relationship in at least one of the diagnostic groups. The components that will make up the model will be measured using separate items from the GPIUS2, and they are Preference for Online Social Interaction, Mood Regulation, Cognitive Preoccupation, Compulsive Use, and Negative Outcomes.

Methods

This section will discuss the choice of design for this study, the target population, and the ethical considerations that were taken throughout. It will go on to discuss the hypotheses, constructs, operationalization, and variables for each of the two research questions. Following that, a discussion about the statistical hypotheses and tests will ensue, in addition to a justification of the targeted sample size, and discussion about the validity of the study. Finally, translations and cross-cultural adaptation will be mentioned.

Design

This study is a cross-sectional passive survey design that aims to compare comorbidity of Internet Addiction among different Psychiatric diagnostic groups, to determine which diagnostic groups have the highest prevalence rates of IA while controlling for age. In addition, the study aims to evaluate whether models explaining the phenomenon of Internet Addiction differ as across major diagnoses. A survey design is the ideal design for the exploration of relationships between variables, and to compare means between naturally manipulated groups.

Target Population and Ethical Considerations

The participants were selected according to purposive non-random sampling from the patients consulting M.I.N.D. clinic, a Psychiatry and Clinical Psychology clinic affiliated with Saint George University Medical Center in Beirut, Lebanon, after approval was granted by the Institutional Review Boards of Haigazian University and Saint Georges University Medical Center. One hundred participants per diagnostic group, presenting to the clinic for treatment between ages of 18 and 65 were recruited. Patients who refused to provide access to their clinical file, and who did not use the internet were excluded. Participants were not offered any incentives and the voluntary nature of participation was stressed. All interested participants were provided with an online information letter and consent form where information about

aims of the study, risks and benefits of participation, the primary and secondary investigators, the affiliated organizations, and contact information for any questions, concerns, or complaints were shared. Participants were then prompted to reflect their consent by checking the boxes adjacent to the terms of participation which also included allowing access to their medical Psychiatric file, from which their clinical diagnoses were retrieved. More details about the diagnostic groups and the process of diagnosis is presented. The data collection occurred between the first of October and the first of November, 2020. Throughout November 2020, data analysis was carried out followed by the write-up and discussion of results.

Instruments

Clinical Diagnoses

The Diagnoses of major Psychiatric Disorders were established through semi-structured intake interviews following the criteria of the DSM-5 (American Psychiatric Association, 2013). The major disorders were diagnosed through a one-on-one thorough and comprehensive intake interview, conducted by the primary investigator[1] (Last year Clinical Psychology Masters student), a Psychiatry Resident, and a Psychiatric Nurse and Case Manager, under the supervision of the Psychiatrist in charge of the clinic, Prof. Elie Karam. These interviews very closely resemble comprehensive interview instruments that were developed based on the DSM-5. Each interview took up to 90 minutes to complete and covered the chief complaint of the patient, history of the present condition, and previous psychiatric history. For a diagnosis to be made, the symptoms had to meet the full criteria reported in the DSM-5. The major disorders were grouped according to the grouping of the DSM-5.

Internet Addiction

[1] The primary investigator is a last year Master's degree student with ten years of experience in the mental health field, in addition to one year of supervised implementation of Cognitive Behavior Therapy.

Internet Addiction was measured using the Young Internet Addiction Test (Young, 1998). This measurement was developed by Young in 1998 in a North American population sample (as cited in Samaha et al., 2018), and has been validated among Lebanese college students by Samaha et al., (2018). The purpose behind choosing this specific scale is that the Internet Addiction Test has been considered valid and reliable (Widyanto & Mcmurran, 2004) in measuring Internet Addiction, it measures the key characteristics of problematic use, such as the obsessional aspects related to IA, escapism, compulsivity and dependency; then inquiries about the social, personal, occupational consequences that are stemming from the excessive use are made (Young & Abreu, 2011, as cited in Samaha et al., 2018). The Internet Addiction Test is the first validated instrument used to assess for IA, as well as the first global psychometric instrument for this disorder (Young, 2011). This Test usually takes 5-10 minutes to complete, and is self-rated. The test comprises 20 items, rated on a 6 point likert-scale ranging from “Does not Apply” yielding a score of 0 to “Always” yielding a score of 5, per item; finally, each item is equally valued then summed up, and a total score is derived, which falls between 0 and 100. Scores of 30 and below indicate normal internet use, scores between 31 and 49 indicate mild addiction, scores between 50 and 79 indicate moderate addiction, and scores of 80 and above indicate a severe internet dependency (Young, 2011). For the sake of this study, any result of 31 or above (out of a total score of 100) was considered positive for Internet Addiction, thereby referring to the mild, moderate, and severe subgroups, this has been supported by findings of the ROC curve which will be displayed below.

The convergent validity of the Internet Addiction Test was established with the Internet-Related Problem Scale and self-diagnosis (Widyanto, Griffiths, & Brunsden, 2010).When the Internet Addiction Test was validated in Lebanon by Samaha et al. (2018), the authors used a sample of 256 medical students between the ages of 18 and 29, because they were considered an at-risk population (Samaha et al., 2018). An exploratory factor analysis

was performed to evaluate the underlying constructs which was subsequently followed by a confirmatory factor analysis on another sample testing the emerging structure from the exploratory phase. Results showed that 28.9% of students were categorized as moderate IA and 1.2% as having severe IA. The authors found that the four-factor model seen their study was also seen in previous studies (Kaya, Delen, & Young, 2016), but they were not the same factors. The factor structure of the tool in Lebanon presented the following factors: Factor 1 was labeled "Lack of Control", factor 2 "Social Withdrawal and Emotional Conflict", factor 3 "Time Management Problems", and factor 4 "Concealing Problematic Behavior". Some of those factors were seen in previous studies and one wasn't, which the authors refered to as "Concealing Problematic Behavior" (containing items 7, 9, and 10). 56.6% of the total variance was explained by the factors in the EFA (Samaha et al., 2018). The internal reliability's Cronbach alpha was 0.91, the internal consistency scores for the separate subscales were 0.76, 0.74, 0.69, and 0.63 for the four factors respectively, as presented above. Item total correlations presented a range of values from 0.37 to 0.63. It was deemed a proper tool that can be used for the evaluation of Internet Addiction among Lebanese university students (Samaha et al., 2018).

An Arabic version of the Internet Addiction Test was created and validated among 817 intermediate and secondary school students in Lebanon by Hawi (2013). It produced a one factor model, and had an internal consistency reliability with a Cronbach's alpha of 0.92. The Item-Total Correlation ranged from 0.46 to 0.66. The one factor model did not fit many others seen in the English version of the test (Hawi, 2013), but fit those seen in the French version (Khazaal et al., 2008) . This Arabic translated version was used, in addition to the original English form, and participants chose the language that they preferred.

Generalized Problematic Internet Use Scale 2 (GPIUS2)

The theoretical model in this study was tested using the Generalized Problematic Internet Use 2 (GPIUS2), which includes the independent and dependent variables addressed in the second research question except for the basic psychopathology, as will be discussed further. This scale was developed by Caplan (2002, 2010) to measure different components of the dysfunctional interaction, which has been theorized in Problematic Internet Use from a Cognitive Behavioral approach, and it is one of the few theory-driven instruments available (Caplan, 2010).

The original Generalized Problematic Internet Use Scale was created to operationalize the theoretical constructs that were presented by Davis (2001), and identify the cognitive and behavioral dimensions of GPIU. The items of the original scale were developed from examples of GPIU cognitions offered by Davis (2001), from other scales developed to measure PIU, and from additional items based on Davis's definition of GPIU (Caplan, 2002). After the items were developed, an exploratory factor analysis was conducted, to reveal the underlying constructs. With continued research and further adjustments, Caplan (2010) created the GPIUS2, which was an improvement over the original version. The GPIUS2 was subjected to confirmatory factor analysis which confirmed the cognitive and behavioral constructs, then to structural equation modeling which supported the relationships between the constructs.

The GPIUS2 includes four components, Preference for Online Social Interaction (POSI), Mood Regulation, Deficient Self-Regulation (which is essentially split into two parts, Cognitive Preoccupation and Compulsive Use), and Negative Outcomes from the Internet Use (Caplan, 2010). These components are proposed to be consequences of a broader psychological problem (what in this study is introduced as one of the major psychiatric disorders described above), that interact to maintain the cycle of Problematic Internet Use (Caplan, 2010). This scale was translated by the primary author and an uninformed Neuropsychiatric Nurse in a two-forward method, and synthesized, then it was tested on a group of 30 individuals with focus

groups to judge whether the true meaning was coming across to individuals, but no changes needed to be made. These steps were suggested by Beaton et al. (2000) for Cross Cultural adaptation, with the exception of the back-translation step. The original English and the translated Arabic forms were both offered to participants who chose the language that they preferred.

The POSI component from the model is the tendency for an individual to feel more comfortable interacting with people online, rather than face-to-face, and it is commonly seen in people who have social anxiety, low presentational confidence, or deficient social skills (Caplan, 2010). The Mood Regulation component refers to the need to distract from undesirable emotions by using the internet, and this has been associated with more negative outcomes (Caplan, 2010). The Deficient Self-Regulation component has the Cognitive Preoccupation aspect, referring to obsessive thought patterns about wanting to be online, and what they are missing out on due to not being online, and the Compulsive Use aspect which is on the behavioral level, signaling a diminished sense of control. Finally, the Negative Outcomes component, includes examples of consequences that arise from uncontrolled internet use (Caplan, 2010), and perhaps in its own way continues to feed into the same cycle.

The Generalized Problematic Internet Use Scale 2 has been validated in English (Caplan, 2010), German (Barke, Nyenhuis, & Kroner-Herwig, 2014), Italian (Fioravanti, Primi, & Casale, 2013), and Portugese (Pontes, Caplan, & Griffiths, 2016); it has also been validated in Mexican (Gámez-Guadix, Villa-George, & Calvetea, 2012), and Spanish (Gámez-Guadix, Orue, & Calvete, 2013). The GPIUS2 has been shown to be valid in the above validation studies, and Confirmatory Factor Analyses consistently support the four-scale structure, with excellent internal consistency (Casale, Primi, & Fioravanti, 2016).

The subscales of the GPIUS2 has strong association with the IAT scores, with Pearson correlation coefficients of .71 between IAT scores and Deficient Self-Regulation Subscale, .6 between IAT scores and Negative Outcomes subscale, and .73 between IAT scores and GPIUS2 total score, thus supporting criterion related validity (Casale, Primi, & Fioravanti, 2016). Strong correlations between IAT and GPIUS2 total scores have also been supported in the Italian and Portuguese studies (Fioravanti, Primi, & Casale, 2013; Pontes, Caplan, & Griffiths, 2016).

The pre-established hypotheses behind the interaction of the four components of this updated model, that have also been supported by others (Gámez-Guadix et al., 2012) are that: POSI and Mood Regulation increase the probability of Deficient Self-Regulation, in turn, increasing the likelihood of experiencing Negative Outcomes; some studies show that POSI increases the likelihood of using the internet for Mood Regulation as well (Gámez-Guadix et al,. 2012); and that Deficient Self-Regulation has been found to be a direct predictor of Negative Outcomes, the relationship between POSI and Negative Outcomes has been found to be mediated by Deficient Self-Regulation; and last, the relationship between Mood Regulation and Negative Outcomes has been found to be mediated by Deficient Self-Regulation (Caplan, 2010). This model suggests that a big part of the problem in PIU stems either from POSI alone, or from POSI and Mood Regulation, and then both pathways lead to Negative Outcomes through the Deficient Self-Regulation Component. This model is to be tested within separated diagnostic groups to determine whether pathways change, or new relationships emerge, relative to the diagnostic group.

All participants were asked to fill the 15 item GPIUS2 rated on a 1 “Definitely Disagree” to 7 “Definitely Agree” likert type scale. Each subscale has three items. The subscales’ item Cronbach’s alpha values range from 0.82-0.87. Some items included in this scale are as follows: “I prefer online social interaction over face-to-face communication” (an

item from the POSI Component),"I have used the Internet to talk with others when I was feeling isolated"(an item from the Mood Regulation Component), "When I haven't been online for some time, I become preoccupied with the thought of going online" (an item from the Cognitive Preoccupation Component), "I have difficulty controlling the amount of time I spend online" (an item from the Compulsive Use Component), and finally, "My internet use has made it difficult for me to manage my life" (an item from the Negative Outcomes Component). Both a total and subscale scores can be derived by summing participant responses on items with higher scores reflecting increased problematic use, but according it is important to note that there is no established cut-off that acts as a positive screen for PIU.

In this research question, the groups of major Psychiatric Disorders, Anxiety Disorders, Bipolar and Related Disorders, Depressive Disorder, Obsessive-Compulsive and Related Disorders, and Schizophrenia Spectrum and Related Disorders, served as separate samples, as such there were five clinical samples. In each of the five clinical samples, the theoretical model as put forward by Caplan was tested.

Statistical Hypotheses and Tests

For the first research question, there was a natural manipulation comparison of positive scores of Internet Addiction across five groups of psychiatric disorders, suggesting comorbidity, while controlling for the effect of age. Since the literature supports a negative correlation between age and IA (Pontes & Grifiths, 2015) and between age and problems resulting from the internet (Brenner, 1997; Widyanto & Mcmurran, 2004), addressing age as a covariate was necessary. This required the use of a Binomial Logistic Regression with the dependent variable being categorical representing whether or not the individual scored positively for Internet Addiction, using the mild, moderate, and severe levels of Internet Addiction, as was determined by the ROC curve when checked across the self-diagnosis

question, which also falls in line with Young's (2011) cut-off for Mild Addiction followed by higher severities, which is a score of 31 or higher.

For the second research question, a Confirmatory Factor Analysis was conducted first in order to see whether the items load according to their respective constructs. After that, a multi-group structural equation modeling was done using IBM SPSS AMOS Graphics 21. This method allows for the analysis of a multigroup mediation relationship (Nachtigall, 2003) between the predictor variables (POSI, Mood Regulation, and Deficient Self-Regulation), and the outcome variable (Negative Outcomes). Deficient Self-Regulation is a higher order construct represented by two variables, Cognitive Pre-ocupation and Compulsive Use. SEM can consider different equations at the same time, and a variable can play different roles in the same model, in one equation it can play the role of regressor and in the other the role of regressand (Nachtigall, 2003). To address the hypothesis of this research question, there needs to be a difference in pathways between components in the model. The null hypothesis would be a finding whereby all the models come out the same with good fit indices, and this would refute the research hypothesis, and would support the theory of Internet Addiction being a discrete entity regardless of the type of underlying psychiatric disorder.

Sample Size

As is often the case, the aim in calculating an appropriate sample size is to ensure adequate statistical power, and to observe the effect if the effect is there. The alpha level in this study will be the conventional .05 level. When looking at effect sizes from previous research, Caplan (2010) found while exploring the relationship between the components of the GPIUS2, standardized product coefficients ranging between .4 and .78. Together, the variables in Caplan's (2010) model of the GPIUS2, accounted for 61% of the total variance in Negative Outcomes. This study will aim for a small effect size. There are different rules of thumb for

Structural equation modeling, some suggest a minimum number of cases per observed variable in the model as 10:1 rule, this would require at least 150 participants per group in this study, and a general rule of thumb of at least 200 (Sagan, 2019). But due to time constraints, only 100 participants per group could be recruited, making the sample size in each group smaller than ideal for structural equation modeling. Originally, the study had planned to include two additional diagnostic groups which proved difficult to recruit, they were Impulse Control Disorders, and Substance (and non-substance) Use Disorders. The other groups had to be dropped, similarly, due to constraints of time.

Validity of the Study

Hypothesis Validity

The hypotheses' significance and relevance have already been discussed prior. It is necessary to have a clear and direct relationship between the research hypotheses and the statistical ones, to prevent any incongruence. The relationship between the research hypotheses and the statistical hypotheses is as follows: The first research hypothesis is that there will be a difference in the comorbidity between groups, and that higher prevalence rates of IA, reflected in percentages, will be seen among Bipolar Disorder, Substance Use Disorder, and Anxiety Disorder participants, when age is controlled for (as indicated by a score of 31 or above on the IAT); the corresponding statistical hypothesis is that there will be a natural manipulation comparison of the comorbidity of Internet Addiction across five groups of psychiatric disorders, while controlling for the effect of age, using a Binomial Logistic Regression. If the difference is significant at the .05 level then the null hypothesis of no difference would be refuted. The higher percentage of comorbid cases are expected to belong to the Bipolar Disorder, and Anxiety Disorder groups (the Substance Use Disorder group was dropped). As for the second research hypothesis, it states that a difference in pathways between the

components of the Updated Cognitive Behavioral Model of GPIU will appear when taking each disorder separately (each disorder as a different sample); the corresponding statistical hypothesis is that a difference in the pathways of the model will appear after performing Structural Equation Modeling in each diagnostic group separately. If the theoretical model is not equally supported across all diagnostic categories (i.e., poor fit indices, lack of emergence of hypothesized pathways) then the null hypothesis of no difference would be refuted. The statistical hypotheses mentioned above are well-defined, falsifiable, and lacking in ambiguity.

Construct Validity

Construct validity deals with the degree to which inferences can be made from the operationalization used to represent the constructs. Therefore, it is imperative that the selected tools are valid and reliable in the detection of the constructs that they are meant to represent. The Internet Addiction Test is known to be valid and reliable, it is the tool that is most commonly used to evaluate Internet Addiction, and that covers the key characteristics of this disorder (escapism, compulsivity, and dependency, and consequences). It has been validated in Lebanon (and in several other countries as well) (Samaha et al., 2018). Convergent validity was established with the Internet-Related Probem Scale and self-diagnosis (Widyanto, Griffiths, & Brunsden, 2010).

The Generalized Problematic Internet Use Scale 2 has been validated in English (Caplan, 2010), German (Barke, Nyenhuis, & Kroner-Herwig, 2014), Italian (Fioravanti, Primi, & Casale, 2013), and Portugese (Pontes, Caplan, & Griffiths, 2016) translations; it has also been validated in Mexican (Gámez-Guadix, Villa-George, & Calvetea, 2012), and Spanish (Gámez-Guadix, Orue, & Calvete, 2013) populations. It has been translated by the primary investigator into Arabic for the purpose of this study. The GPIUS2 has been shown to be valid

in the above validation studies, and Confirmatory Factor Analyses consistently support the four-scale structure, with excellent internal consistency (Casale, Primi, & Fioravanti, 2016).

As for criterion validity, the subscales of the GPIUS2 had strong association with the IAT scores, whereby the Pearson correlation coefficients were .71 between IAT scores and Deficient Self-Regulation Subscale, .6 between IAT scores and Negative Outcomes subscale, and .73 between IAT scores and GPIUS2 total score (Casale, Primi, & Fioravanti, 2016). Strong correlations between IAT and GPIUS2 total scores were also seen in the Italian and Portuguese studies (Fioravanti, Primi, & Casale, 2013; Pontes, Caplan, & Griffiths, 2016).

The clinical interview that was conducted is based on the DSM-5 (American Psychiatric Association, 2013), checked by two individuals each, the primary investigator, the Psychiatry Resident, or the Psychiatric Nurse and Case manager, in addition to the Psychiatrist, the primary investigator holds ten years of experience and practice in conducting such assessments.

The following interventions were implemented, in the current study, to check the validity and reliability of the scales used among the clinical Lebanese population after data collection: Confirmatory Factor Analyses were conducted on both scales and findings were compared to originals (and checked as to whether similar outcomes were yielded from the two languages). Convergent validity was checked by looking for a correlation between subscales and total of GPIUS2 with the IAT scores (which also prevents mono-operationalization bias). To control for carry-over effects, the two scales were counter balanced; there were, therefore, two versions of the questionnaire according to the order of the measurements, in addition to two languages offered. The individual questionnaires were coded based on these 4 conditions: English or Arabic language, and sequence 1 or sequence 2. Internal consistency reliability of the scales was checked by calculating the Cronbach's alpha level of each, to measure the inter-

correlation between items, the results of these were all satisfactory and are presented below, under the title “Validity Assessment Results”.

To address the possibility of confounding constructs, the literature was reviewed for factors that are known to affect Internet Addiction, and therefore the study design accounted for the effect of age on the relationship between the psychiatric disorder and Internet Addiction.

To address reactive self-report changes the participants did not receive the specific details of the study prior to filling out the questionnaire (such as the hypotheses and research questions) they read, however, in the information letter a very general description of the study. To address experimenter effects the primary investigator who sent the questionnaires to the participants restricted her communication with them to a greeting and a request to participate in the study. The rest of the instructions were written in the questionnaire so as to not require further interference from the investigator.

Internal Validity

As the study employed convenience purposive sampling selection bias is a threat to validity, such as particular differences in the patients consulting MIND clinics relative to the rest of the clinical population; this is due to the lack of random selection. It is worth noting, however, that patients consulting this clinic belong to different age groups, various clinical diagnoses and severity levels, and come from various socioeconomic statuses.

Assignment of groups could not be random because the groups are defined by the diagnoses that the participants have, therefore they are naturally assigned. This makes it difficult to control for differential influence between the groups. To address this however, literature was reviewed to determine which factors influence Internet Addiction other than pre-existing psychiatric disorders and only age (Pontes & Grifiths, 2015) seemed to appear; gender

showed conflicting findings in the literature and mainly non-significant differences in IA (Khan, Shabbir, & Rajput, 2017).

Instrumentation threat was prevented by making sure that the participants were interviewed using the same method of interviewing, this method has been made consistent through several years of practice. This is in addition to being consistent with the choice of scales for the questionnaire (i.e. the IAT and GPIUS2).

External Validity

There are advantages and disadvantages in this study when looking at the degree to which results can be generalized across populations. The advantage is that the study includes participants of all ages of adulthood, from both genders, from varying socioeconomic statuses, and across five major diagnostic groups in Psychiatry, refer to Table 2 in Results for details. The disadvantages include the lack of random selection, therefore external validity is compromised; replication across different populations is needed to support generalizability, as stated in the limitations. As for the degree to which results can be generalized across different environments, this study was conducted during the COVID-19 pandemic, which compelled people in Lebanon and many other countries to stay home, driving them into a deeper relationship with the internet. It is not clear whether this will play a role in the conceptualization, and if so, how. The degree to which results can be generalized across different time periods may be worth paying attention to, because Internet usage and abuse seem to be rising as a function of time, the number of internet users has increased tenfold from 1999 to 2013, and continues to increase (Internet Live Stats, 2015), the rate of penetration of internet use in Lebanon is 91% (Samaha et al., 2018). That said, the cognitive behavioral conceptualization of IA, and its relationship with psychiatric disorders should not be expected to change with time.

Statistical Conclusion Validity

To address the threat of low statistical power, the following have been considered: A small effect size will be aimed for, and the significance level will be set to 5% ($p < .05$). To otherwise ensure statistical conclusion validity, sensitivity is achieved by ensuring appropriate scales, and assumptions of statistical tests were respected and corrected for.

Translation and Cross-Cultural Considerations

This study utilizes scales developed in the United States of America applied within the Lebanese context. As such, certain cross-cultural considerations are necessary. It is unlikely that the construct of Internet Addiction, and the thoughts and behaviors revolving around IA, would be subject to construct bias. The symptoms of Internet Addiction that are represented through the items of the scale seem to be equivalent across cultures, (Young, 2011). Both scales have been validated in a number of different cultures (Gámez-Guadix, Orue, & Calvete, 2013; Pontes, Caplan, & Griffiths, 2016; Samaha et al., 2018; Widyanto, Griffiths, & Brunsden, 2010). In the questions of the GPIUS2, the middle option "Neutral" was reworded into "Neither Agree nor Disagree" to avoid ambiguity in what might be meant by neutral (Nadler, Weston, & Voyles, 2015).

As for translation, the GPIUS2 is available in the original English, and was translated into Arabic. Two Arabic speaking individuals translated the scale, then the two versions were synthesized and discrepancies were addressed, and fiinal adjustments were made accordingly. It was tested on a group of 30 individuals, followed by focus groups to discuss what was understood by the questions, but no additional changes needed to be made. This method of translation is proposed to be an effective process that takes into consideration cross-cultural adaptations, with the exception of the step of back-translation (Beaton et al., 2000).

Validity Assessment Results

Assessment of Convergent Validity

There was a moderate positive association between scores on the Internet Addiction Test and the self-diagnosis question, with a Pearson's correlation coefficient of $r = .421$, $p = .000$, $p < .05$. There was also a significant moderate positive relationship between the self-diagnosis question and the Total Negative Outcome component of the GPIUS2 scale, which is an item that reflects consequences from internet use ($r = .488$, $p = .000$, $p < .05$).

A strong positive and significant relationship between the Negative Outcomes component of the GPIUS2 scale and the total Internet Addiction score was observed ($r = .647$, $p = .000$, $p < .05$), which is very similar to previous studies measuring the same relationship, yielding a Pearson's Correlation Coefficient of .6 (Casale, Primi, & Fiorvante, 2016). Similarly, the Deficient Self-Regulation component of the GPIUS2 scale and the total Internet Addiction score were strongly and positively related ($r = .726$, $p = .000$, $p < .05$) which is very similar to previous studies measuring the same relationship, yielding a Pearson's Correlation Coefficient of .71 (Casale, Primi, & Fiorvante, 2016). Total score of the GPIUS2 and the total Internet Addiction scores were also strongly and positively correlated ($r = .742$, $p = .000$, $p < .05$) which is very similar to previous studies measuring the same relationship, yielding a Pearson's Correlation Coefficient of .73 (Casale, Primi, & Fiorvante, 2016). Together these associations support the convergent validity of the Internet Addiction Test against the Self-Diagnosis test, the GPIUS2 against the Self-Diagnosis question, and the IAT and GPIUS2's criterion validity.

Assessment for Carry-over Effects

The means of total Internet Addiction scores were compared in the two samples that were differentiated by the order in which the aforementioned scales were provided. Group 1

received the Internet Addiction test prior to the GPIUS2 scale, and Group 2 received the GPIUS2 scale prior to the Internet Addiction test. An independent sample's t-test was conducted on the mean total scores of Internet Addiction in order to compare means and see if they were significantly different according to the order in which participants received the scale, which would suggest some sort of carry-over effect.

The difference between Group 1 (M = 32.98, SD = 19.74) and Group 2 (M = 29.73, SD = 19.54) was not significant (MD = 3.25, SE = 1.75, 95% CI [-.202-6.702]) as seen by: $t(498) = 1.85$, $p = .065$, $p > .05$. Levene's test was not significant as seen by $F(1,498) = .152$, $p = .697$, $p > .05$, therefore equal variances were assumed and the first t statistic was used. We can conclude that the order in which the scale was presented did not significantly affect the way that participants responded to it, and therefore, there were no carry over effects.

The means of total GPIUS2 scores were compared in the two samples that were differentiated by the order in which they received the aforementioned scale. Group 1 received the Internet Addiction test prior to the GPIUS2 scale, and Group 2 received the GPIUS2 scale prior to the Internet Addiction test. An independent sample's t-test was conducted on the mean total scores of GPIUS2 in order to compare means and see if they were significantly different according to the order at which participants received the scale, which would suggest some sort of carry-over effect.

The difference between Group 1 (M = 44.43, SD = 19.89) and Group 2 (M = 46.04, SD = 16.78) was not significant (MD = -1.6, SE = 1.64, 95% CI [-4.83 -1.62]) as seen by: $t(498) = -.975$, $p = .33$, $p > .05$. Levene's test was significant as seen by $F(1,498) = 8.15$, $p = .004$, $p < .05$, therefore, equal variances were not assumed and the second t statistic was used. We can conclude that the order in which the scale was presented did not significantly affect the way that participants responded to it, and therefore, there were no carry over effects.

Assessment of the Internal Consistency of the Scales

A Cronbach's alpha value was computed for each of the original and translated scales, and the subscales, in order to assess their internal consistency. The English version of the Internet Addiction Test obtained a Cronbach's alpha of .922; the Arabic version of the Internet Addiction Test obtained a Cronbach's alpha of .942; the English version of the GPIUS2 obtained a Cronbach's alpha of .897; and finally, the Arabic version of the GPIUS2 obtained a Cronbach's alpha of .911. Refer to Table 1 for a summary of the Cronbach's alpha results of the scales and subscales.

Table 1

Cronbach's alpha of the Scales and Subscales

Scales and Subscales	Cronbach's alpha
Scales	
English IAT	.922
Arabic IAT	.942
English GPIUS2	.897
Arabic GPIUS2	.911
Subscales of IAT	
Salience (IAT)	.755
Excessive Use (IAT)	.805
Neg Work (IAT)	.714
Anticipation (IAT)	.586
Lack of Control (IAT)	.776
Neg Social (IAT)	.356
Subscales of GPIUS2	

POSI (GPIUS2)	.821
MR (GPIUS2)	.827
COG (GPIUS2)	.760
COMP (GPIUS2)	.799
NEG (GPIUS2)	.775

Assessment of Factor Analyses

Internet Addiction (English) Confirmatory Factor Analysis. The CFA was conducted using IBM SPSS AMOS 21. The results, without any modifications, revealed $\chi 2(155) = 507.776$, $p < .001$, GFI = .855, CFI = .866, TLI = .836, RMSEA = .086. All items loaded on their respective subscales with significant regression weights. Hence, the tested model seemed to fit the factor structure seen in other literature (Widyanto & McMurran, 2004).

Internet Addiction (Arabic) Confirmatory Factor Analysis. The CFA was conducted using IBM SPSS AMOS 21. The results, without any modifications, revealed $\chi 2(155) = 335.936$, $p < .001$, GFI = .953, CFI = .912, TLI = .892, RMSEA = .079. All items loaded on their respective subscales with significant regression weights. The tested model seemed to fit the factor structure seen in other literature (Widyanto & McMurran, 2004).

GPIUS2 Confirmatory Factor Analysis. The CFA was conducted using IBM SPSS AMOS 21. The results, without any modifications, revealed $\chi 2(84) = 324.134$, $p < .001$, GFI = .918, CFI = .938, TLI = .923, RMSEA = .076. All items loaded on their respective subscales with significant regression weights. The tested model seemed to fit the factor structure seen in other literature (Caplan, 2010).

Results of the Main Analysis

A sample of 500 Lebanese adults from a clinical setting were selected based on their diagnoses, and upon their consent, were asked to fill out an online survey on any device that they own, sent through a link. The survey included demographic questions, asking about age and gender, it included the Internet Addiction Test and the Generalized Problematic Internet Use Scale 2 (in an alternating order), and questions about online activity usage, device usage, and internet access usage. Lastly, participants were asked whether they believed that their Internet use was problematic; if the individual answered yes, a follow-up question asked since when. In parallel, individuals gave access to retrieve relevant information from their clinic medical file which was kept confidential and used for the purposes of the study only. From their medical file, the diagnosis that was made following a thorough interview was retrieved, along with the age of onset to establish temporal order. The interviews had been conducted by the primary investigator, a Psychiatry Resident, and a Registered Psychiatric Nurse and Case Manager all trained in administering semi-structured clinical interviews based on the DSM-5. Diagnostic accuracy was then established by the Psychiatrist in charge Dr. Elie Karam, and adjusted when necessary. When comorbid diagnoses existed, the primary diagnosis was determined by diagnostic hierarchy, when possible, and otherwise by the disorder causing the chief complaint or the greatest distress. The surveys collected were then divided into their respective participants' diagnostic groups, creating five groups of 100 individuals each as follows: Anxiety Disorders, Bipolar and Related Disorders, Depressive Disorders, Obsessive-Compulsive and Related Disorders, and finally, Schizophrenia Spectrum and Related Disorders.

Sample Description

In the total sample, the mean of Internet Addiction is 31.36 (*SD* = 19.69) which is on the lower boarder of Mild Internet Addiction, according to the cut-offs set by Young (2011).

The normal range is between 0 and 30 points, Mild Internet Addiction is seen between 31 and 49 points, Moderate Internet Addiction is reflected by 50 to 79 points, and Severe Internet Addiction is determined by 80 to 100 points, (Young, 2011).

In the self-diagnosis question, where participants were asked if they believed their Internet use is problematic, 81% responded with no, while and 19% assessed their use as problematic. The age of onset of self-diagnostic problematic use (M = 23.82, SD = 9.58) was compared with the age of onset of their major diagnoses to determine which symptoms came first. The mean of individuals' Psychiatric Disorder's age of onset could not be calculated due to a high number of individuals reporting that their symptoms go back to childhood, or for as far back as they could recall. 18 out of the 95 individuals who self-diagnosed as having their Internet use be problematic, determined an age of onset of symptoms of Internet Addiction that preceded the symptoms of the Major Psychiatric Disorder for which they later consulted. Three of them developed 2-8 years later GAD, five developed 2-13 years later Bipolar Disorder (most were type II, and one was medication-induced), two developed 4-5 years later Major Depressive Disorder, four developed 1-3 years later OCD, three developed 3-15 years later Schizoaffective Disorder (Bipolar Type), and one developed 8 years later Delusional Disorder. The remaining 77 participants who self-diagnosed with IA had the symptoms of the Major Psychiatric Disorder for which they were treated begin prior to the symptoms of Internet Addiction. The implication of this will be discussed later on.

As for the level of Internet Addiction among the entire sample, 28.8% of the sample had Mild Internet Addiction, 15.4% had Moderate Internet Addiction, and 1.8% had Severe Internet Addiction. Refer to Figure 3, which represents the percentage of individuals scoring among the predetermined cut-offs (Young, 2011) and Figure 4, representing the ROC curve, comparing the IAT scores with the self-diagnosis question.

Figure 3

Percentage of Individuals in each Severity Level of Internet Addiction

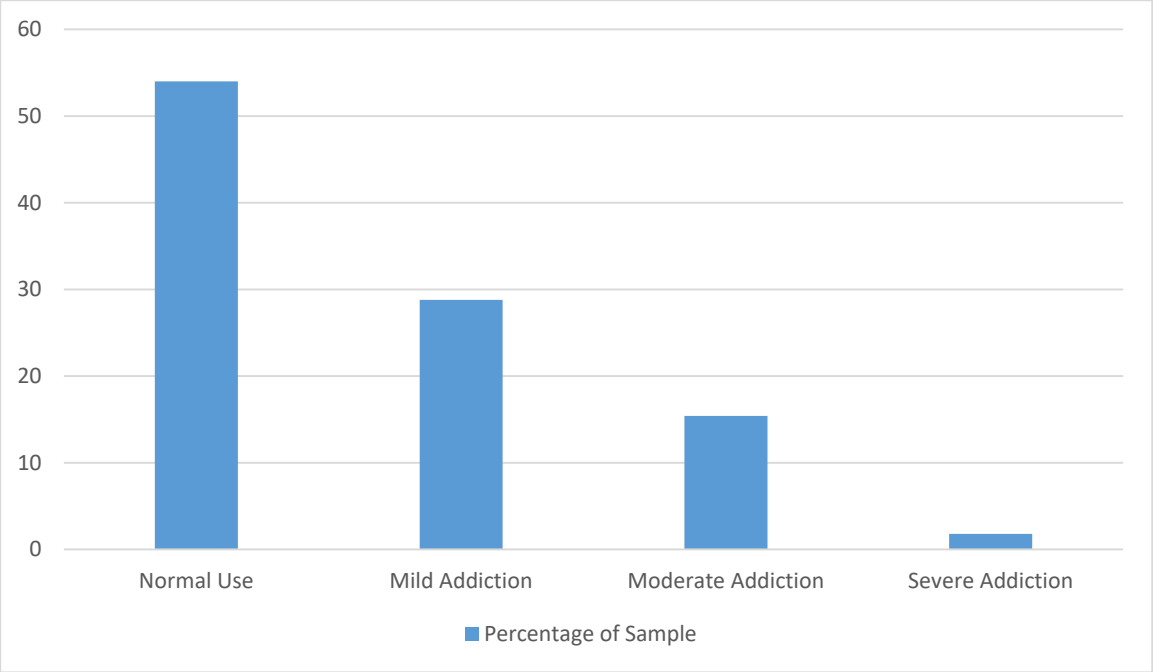
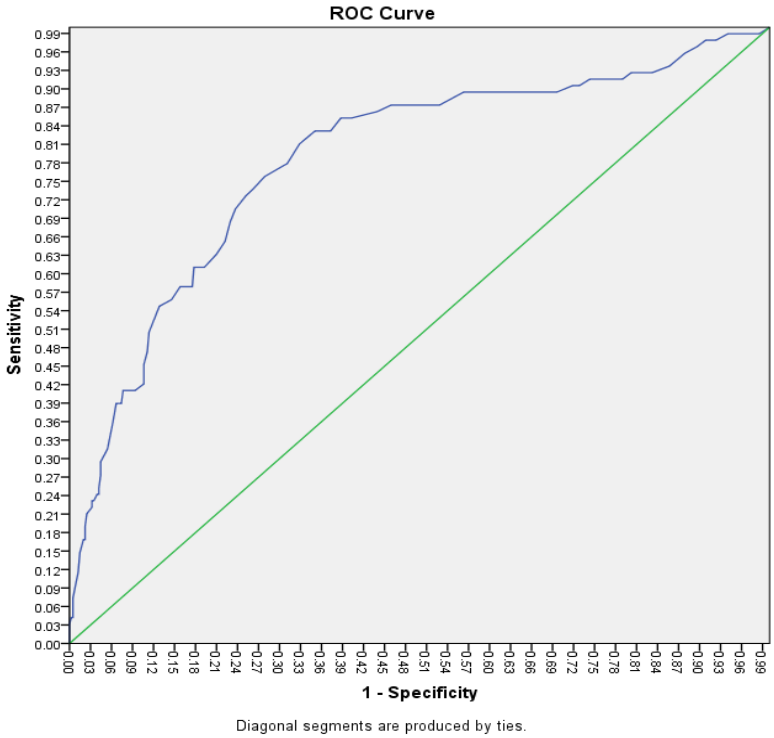


Figure 4

Receiver Operator Characteristic Curve of IAT Scores and the Self-Diagnosis Question



The Area Under the Curve (AUC) value is .785 which is considered fair, *SE* = .028, *p* < .001, with 95% CI [.73 - .84]. The point on the curve that was determined to be the most convenient in terms of sensitivity and specificity, led to a sensitivity value of .832 and a 1 – Specificity value of .351; and according to the coordinates of the curve, this corresponds to a score equal to, or greater than, 31.5 on the IAT to be considered positive for Internet Addiction. This is in line with Young's (2011) predetermined cut-offs of Internet Addiction, whereby scores of 31 to 49 are indicative of Mild Internet Addiction, and higher scores reflect more severe levels.

The total score of GPIUS2 scale is not interpretable because the scale's function is to pinpoint the constructs of interest and therefore the sum of items does not represent much in itself (it has no determined cut-offs). However, the Negative Outcomes component represents consequences from internet use and the mean of Negative Outcomes in the current sample is 6.95 (*SD* = 4.24).

The mean age of the participants in the entire sample is 35.9 (*SD* = 10.8), with a minimum of 18 years old and a maximum of 65 years old.

The survey was offered in one of two languages, English and Arabic, 38% of the participants filled it out in Arabic, and 62% in English.

When it comes to favored online activities, instant messaging applications were the most utilized (*M* = 3.1, *SD* = 1.34) when rated on a score from 0 to 5 (note that participants rated each activity independently, and the rating of one did not affect the rating of another, they were not mutually exclusive), followed by news and searching (*M* = 2.93, *SD* = 1.53), then social media (*M* = 2.69, *SD* = 153); the least favored was online gambling (*M* = .19, *SD* = .74).

Participants were asked about the device that they use the most while using the internet and almost 90% chose the smartphone as their most used device, as opposed to desktop/laptop

and tablets. 46.2% of participants said that they use both Wifi and 3G/4G equally, this is followed by 45.4% who use mainly Wifi.

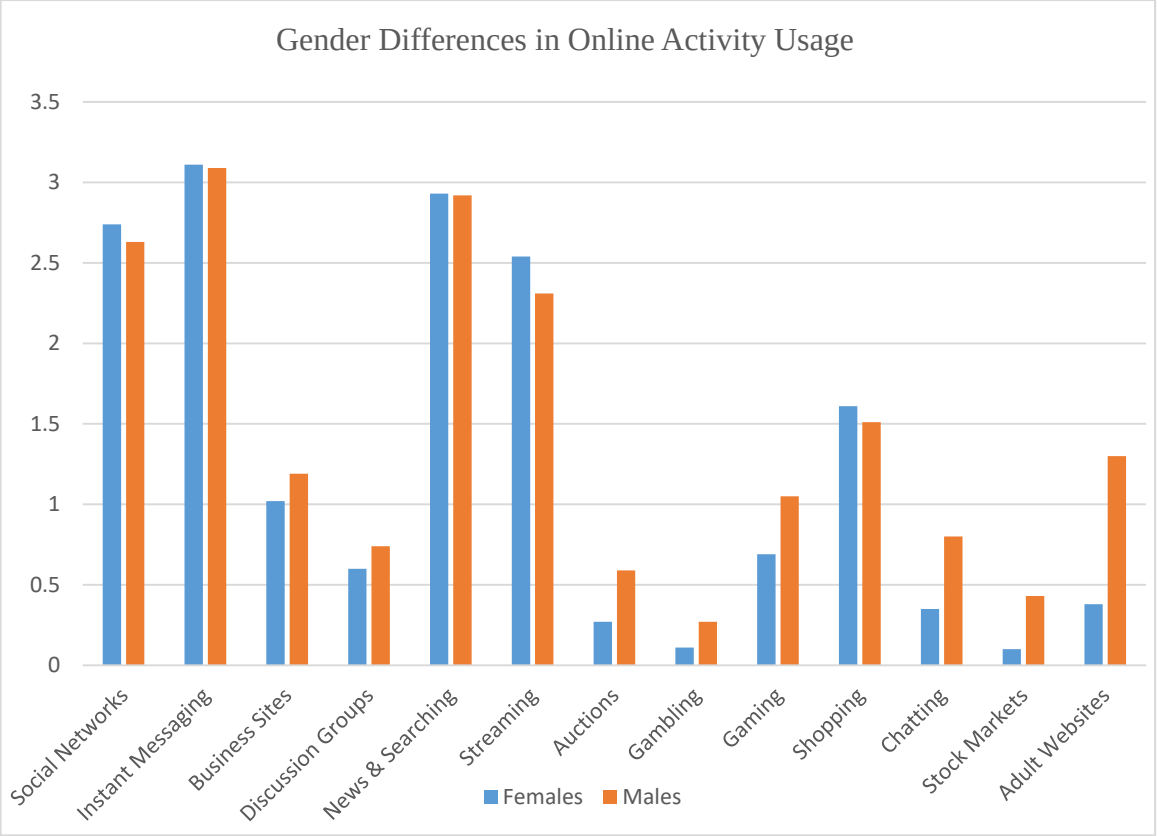
Gender Differences

In this sample, 53.6% of the participants are female, 46.2% male, and 0.2% identified as Other (Self-defined as Trans-sexual). When it comes to gender differences in Internet Addiction, the mean of the total score of the Internet Addiction Test in females is 30.16 (M = 30.16, SD = 19.02) and in males it's 32.81 (M = 32.81, SD = 20.41) making males cross the border into Mild Internet Addiction and females on the higher border of normal use. But this difference wasn't significant ($t(497) = -1.49$, $p = .135$, $p > .05$, $MD = -2.64$, $SE = 1.76$, 95% CI [-6.12 - .823]), and Cohen's $d = .134$.

Both genders rated Instant Messaging Apps as their most utilized activity online. Males were much more likely, to spend time on gambling, gaming, stocks, and adult sites compared to females. Social media and online shopping were similarly popular in both genders (See Figure 5 below). The percentage of individuals who chose to self-diagnose themselves with PIU is the same in both genders.

Figure 5

Graphical Representation of Gender Differences in Online Activity Usage



Diagnostic Group Differences

There are five groups of 100 individuals each, the Anxiety Disorders group included cases of Separation Anxiety Disorder, Social Anxiety Disorder, Panic Disorder, Agoraphobia, and Generalized Anxiety Disorder. The Bipolar and Related Disorders group included cases of Bipolar I Disorder (some with psychotic features), Bipolar II Disorder, and Medication-Induced Bipolar Disorder. The Depressive Disorders group included cases of Major Depressive Disorders. The Obsessive-Compulsive and Related Disorders group included cases of Obsessive Compulsive Disorder, Body Dysmorphic Disorder, and Trichotillomania. The Schizophrenia Spectrum and Related Disorders group included cases of Schizophrenia, Schizoaffective Disorder (of either Bipolar or Depressed type), and Delusional Disorder.

Table 2

Differences across Groups

Diagnostic Group	Gender	Age		Internet Addiction Scores		Percentage of Positive Internet Addiction cases
		M	*SD*	*M*	*SD*	
Obsessive-Compulsive Disorders	49% Female & 51% Male	34.2	9.6	35	19.7	52%
Bipolar Disorders	56% Female, 43% Male, & 1% Other	35	9.8	33.9	19.8	53%
Anxiety Disorders	56% Female & 44% Male	35	10.7	32	21	45%
Schizophrenia Spectrum Disorders	45% Female & 55% Male	37.7	11.2	28	21.3	36%
Depressive Disorders	62% Female & 38% Male	37.6	12.3	27.6	14.9	44%

Note. The positive cases of Internet Addiction are defined by scores of 31 and above on the Internet Addiction test

The Obsessive-Compulsive & Related Disorders group (O) has a mean age of 34.2 (*SD* = 9.6) and a mean IA score of 35 (*SD* = 19.7), The Bipolar & Related Disorders group (B) has a mean age of 35 (*SD* = 9.8), and a mean IA score of 33.9 (*SD* = 19.8), the Anxiety Disorders group (A) has a mean age of 35 (*SD* = 10.7), and a mean IA score of 32 (*SD* = 21), the Schizophrenia Spectrum & Related Disorders group (S) has a mean age of 37.7 (*SD* = 11.2), and a mean IA score of 28 (*SD* = 21.3), and finally, the Depressive Disorders group (D) has a

mean age of 37.6 (*SD* = 12.3)and a mean IA score of 27.6 (*SD* = 14.9). Figure 6 displays the percentage of severity levels per group, and Figure 7 presents the average frequency of online activity engagement per diagnostic group graphically.

Figure 6

Severity levels of IA per Diagnostic Groups

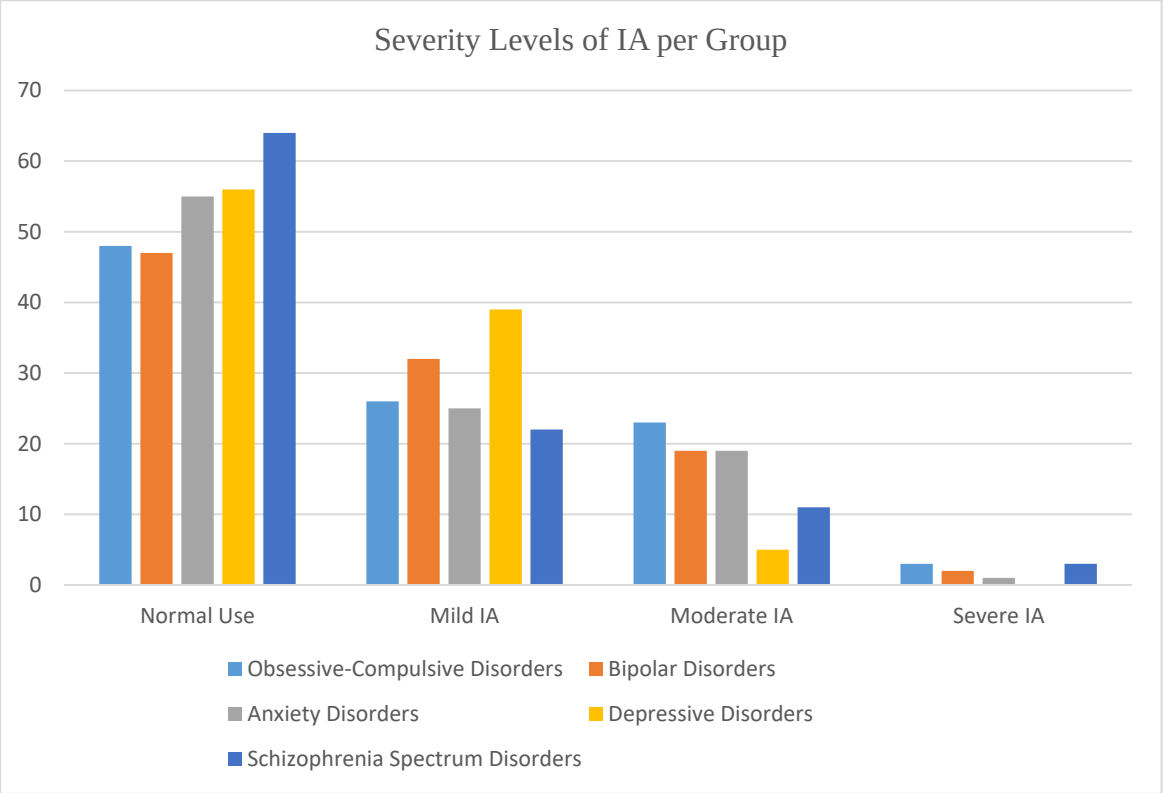
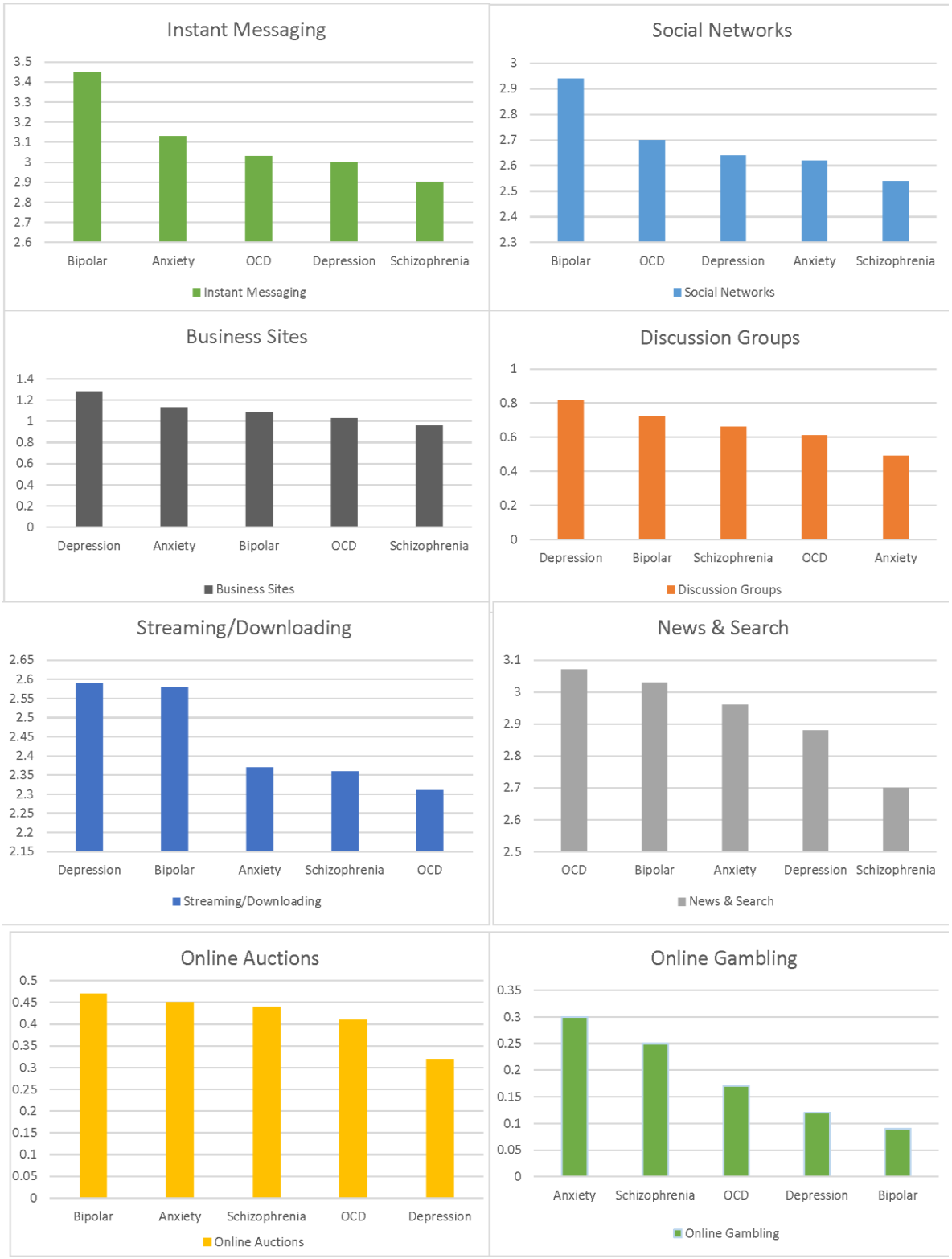


Figure 7

Graphical Representation of Online Activity Usage across Diagnostic Groups



The groups had individuals of various symptomatology level, and various comorbidities. All groups had the highest scores on the Mood Regulation component compared to the rest of the components, followed by Compulsive Use and Cognitive Preoccupation

components, both of which seemed almost equal in value in all groups (and are known to reflect a higher order construct of Deficient Self-Regulation). Preference for Online Social Interaction (POSI) and Negative Outcomes were the least scoring in all groups similarly. Table 3 below, summarizes the mean scores of the components of the GPIUS2 per diagnostic group.

Table 3

Mean Scores of the Components of the GPIUS2 per Diagnostic Group (between 3 and 21)

Diagnostic	POSI		MR		COG		COMP		NEG	
Group	*M*	*S*	*M*	*S*	*M*	*S*	*M*	*S*	*M*	*S*
Obsess-Comp Disorders	8.22	4.93	12.41	5.61	9.56	5.26	9.76	5.29	7.29	4.55
Bipolar Disorders	7.73	5.02	13.36	5.15	9.06	4.99	9.77	4.99	6.98	4.39
Anxiety Disorders	8.53	4.95	11.66	4.88	8.68	4.43	8.58	4.72	6.61	3.91
Depressive Disorders	8.18	4.66	11.33	5.55	8.69	4.3	8.6	4.02	6.54	3.59
Schizophrenia Disorders	8.22	4.72	11.7	5.25	8.9	4.19	8.45	4.68	7.33	4.69

Normality Tests and Outliers

Outliers

Outliers were assessed by converting raw scores into standard scores (z scores). The resulting z scores were compared against the cut-off value of +/-1.96 such that all values above the absolute value of 1.96 were counted as outliers. All outliers were higher than +1.96

suggesting that the distribution is positively skewed. This means that the sample was more likely to have normal scores, rather than high scores.

In the Internet Addiction Total Scores, the outliers are as follows, Group A had 7 outliers, Group B had 6 outliers, Group D had 2 outliers, Group O had 6 outliers, and Group S had 6 outliers. In the GPIUS2 Total Scores, the outliers are as follows, Group A had 4 outliers, Group B had 3 outliers, Group D had 2 outliers, Group O had 7 outliers, and Group S had 4 outliers. Since these outliers were reflective of higher scores on the IAT, they were not removed. Table 4 below summarizes them.

Table 4

Outliers of Internet Addiction Test per Diagnostic Group

Diagnostic Group	Number of Outliers for the IAT	Number of Outliers for the GPIUS2
Obsessive-Compulsive Disorders	6	7
Bipolar Disorders	6	3
Anxiety Disorders	7	4
Depressive Disorders	2	2
Schizophrenia Spectrum Disorders	6	4

Normality Tests Using the Kolmogorov-Smirnov Test

When normality was checked on the Internet Addiction Test using the Kolmogorov-Smirnov Test, the following was found; In Group A, the KS test indicates a significant deviation from normality, therefore, normality is not assumed, $D(100) = .116$, $p = .002$, $p < .05$. In Group B, the KS test indicates no significant deviation from normality, therefore normality is assumed, $D(100) = .079$, $p = .132$, $p > .05$. In Group D, the KS test indicates no

significant deviation from normality, therefore, normality is assumed, $D(100) = .068$, $p = .200$, $p > .05$. In Group O, the KS test indicates a significant deviation from normality, therefore, normality is not assumed, $D(100) = .100$, $p = .015$, $p < .05$. In Group S, the KS test indicates a significant deviation from normality, therefore, normality is not assumed, $D(100) = .123$, $p = .001$, $p < .05$. Therefore, normality is assumed in two of the five groups across scores of the Internet Addiction Test. That said, the sampling distribution tends to be normal in samples that are larger than 30, regardless of the population distribution. The KS test can conclude that the slightest deviation from normality in large samples, is 'significant' (Field, 2018). The visual inspection of the frequency distribution Histogram with the normal curves provided support for a normally distributed sample.

When normality was checked on the GPIUS2 Total Scores using the Kolmogorov-Smirnov Test, the following was found; In Group A, the KS test indicates no significant deviation from normality, therefore, normality is assumed, $D(100) = .088$, $p = .056$, $p > .05$. In Group B, the KS test indicates a significant deviation from normality, therefore, normality is not assumed, $D(100) = .093$, $p = .033$, $p < .05$.. In Group D, the KS test indicates no significant deviation from normality, therefore, normality is assumed, $D(100) = .068$, $p = .200$, $p > .05$. In Group O, the KS test indicates a significant deviation from normality, therefore, normality is not assumed, $D(100) = .108$, $p = .006$, $p < .05$. In Group S, the KS test indicates no significant deviation from normality, therefore, normality is assumed, $D(100) = .065$, $p = .200$, $p > .05$. Therefore, normality is assumed in three out of the five groups across the scores of the GPIUS2. As previously mentioned, the sampling distribution tends to be normal in samples this large, (i.e. 100 individuals per group) (Field, 2018). The visual inspection of the frequency distribution Histogram with the normal curves provided support for a normally distributed sample.

Internet Addiction and other Diagnostic Conditions

The first research question was examining which major disorders will have the highest comorbidity with Internet Addiction when age is controlled for. The hypothesis was that there will be a difference in the comorbidity across groups, and a higher prevalence rate of IA will appear among Bipolar disorder patients, Substance Use Disorder patients, and Anxiety Disorder patients as seen in previous studies (Black et al., 1999; Shapira et al., 2000; Young, Dong Yue, & Ying, 2011). Unfortunately, recruiting enough Substance Use participants was not possible instead, the groups collected were Bipolar and Related Disorder group, Anxiety Disorders group, Depression and Related Disorders group, Obsessive-Compulsive and Related Disorders group, and finally, Schizophrenia Spectrum and Related Disorders group. With the groups available, the hypothesis would expect higher scores in the Bipolar Disorders group and the Anxiety Disorders group.

Different analyses were conducted to thoroughly understand the differences in Internet Addiction between the groups; initially, to check the comorbidity, the number of participants who scored positively on the Internet Addiction Test (thus representing the number of individuals with Internet Addiction) was compared across diagnostic groups, while controlling for age, and checked for significance, by using a Binomial Logistic Regression. Then the relationship between each two of these variables was evaluated using an Analysis of Variance (ANOVA), as well as the relationship when all three are accounted for using an Analysis of Covariance (ANCOVA). Finally, the different components within the Internet Addiction Test were evaluated for significant differences across the groups, to better understand how the groups compare in specific aspects of Internet Addiction using a Multivariate Analysis of Covariance (MANCOVA). The analyses in Research Question One were conducted using the software IBM SPSS Statistics 20.

Number of Positive Cases of Internet Addiction per Diagnostic Group (Comorbidity)

The percentage of individuals who scored within the normal range, and within the Mild, Moderate, and Severe Internet Addiction range, per diagnostic group, is displayed in Table 5 below.

Table 5

Percentage of individuals within Severity levels of Internet Addiction across Diagnostic Groups

Diagnostic Group	Normal Use	Mild IA	Moderate IA	Severe IA	Cumulative of Positive Cases
Obsess-Comp Disorders	48%	26%	23%	3%	52%
Bipolar Disorders	47%	32%	19%	2%	53%
Anxiety Disorders	55%	25%	19%	1%	45%
Depressive Disorders	56%	39%	5%	0%	44%
Schizophrenia Disorders	64%	22%	11%	3%	36%

Note. Normal use is defined as scores between 0 and 30 on the IAT, Mild IA is defined as scores between 31 and 49, Moderate IA between 50 and 79, Severe IA between 80 and 100, and Cumulative of Positive Cases includes all the scores in the Mild, Moderate, and Severe levels.

Total scores on the Internet Addiction Test were recoded into a variable with two levels, one level reflects normal use, and one level reflects any severity level of Internet Addiction as defined by scores of 31 and above on the IAT. A score of 31 and above on the IAT was determined to be reflective of the cut-off between normal use, and Mild Internet Addiction. This cut-off (or 31.5 to be more exact) was found to be suitable when evaluating the coordinates of the ROC curve, after assessing the IAT scores across the self-diagnosis question, while achieving acceptable sensitivity and specificity; it also suitably coincides with Young's (2011) predetermined cut-off of 31. A Binomial Logistic Regression was then conducted on this dependent variable, across the different diagnostic groups, while controlling for age. The diagnostic groups were dummy coded and the last group was used as base by default; the last group was the Schizophrenia Spectrum Disorders group, because the groups were ordered alphabetically. The results are as follows.

The full model, that includes all the set of predictors, is a significant improvement in fit over the null model, as seen in the Omnibus Tests of Model Coefficient's significant Model Chi-Square, $\chi2(5) = 61.946$, $p < .001$. Additionally, the Hosmer and Lemeshow Test's non-significant Chi-Square, $\chi2(8) = 10.875$, $p = .208$, is indicative of Goodness of fit. There is no multicollinearity between the variables diagnostic group, and age, as seen with a Variance Inflation Factor of 1.

The significant Betas in the Bootstrapped Parameter Estimates belong to the effect of age, such that older participants were less likely to develop Internet Addiction, ß = -.068, *SE*= .010, $p = .001$, 95% CI [-.090 - -.049], and the Diagnostic group Bipolar Disorders, such that individuals in the Bipolar Disorders group were significantly more likely than the base (Schizophrenia Spectrum Disorders) to have comorbid Internet Addiction compared to the other diagnostic groups, ß = .609, *SE* = .302, $p = .033$, 95% CI [.055 - 1.191]. Participants in the Obsessive-Compulsive and Related Disorders group had a marginally significant ß such

that they were more likely than the base group to have comorbid Internet Addiction ß = .503, *SE* = .309, *p* = .087, 95% CI [-.060 – 1.156]. These results support part of the first hypothesis, that there is a difference between the groups in terms of comorbidity with IA, and that the highest comorbidity lies in the Bipolar Disorders group, and it is significant. However, the Anxiety group which was predicted to be one of the groups with the higher comorbidity was preceded by Obsessive-Compulsive Disorders group, which was marginally significant.

The Relationship between Age and Scores on the Internet Addiction Test

In the combined sample, a significant moderate negative relationship was found between age and scores on the Internet Addiction test, as evidenced by Pearson's correlation coefficient $r = -.3$, $p = .000$, $p < .05$.

When taking each group separately, age was negatively associated with Internet Addiction in all groups, however, the size of the correlation and the significance of it, differed across groups. There was a significant, moderate, negative correlation between the age of participants and Internet Addiction in the Anxiety Disorders and Depression and Related Disorders groups. There was a significant, but small, negative correlation between the age of participants and Internet Addiction in the Bipolar and Related Disorders and Schizophrenia Spectrum and Related Disorder groups. In contrast, there wasn't a significant relationship between the age of participants and Internet Addiction in the Obsessive-Compulsive and Related Disorders group, this means that age did not play a role in the scores of the Internet Addiction Test in the Obsessive-Compulsive and Related Disorders group. The details are below, and are summarized in Table 6 below.

In the Anxiety Disorders group (Group A), there was a significant moderate negative relationship between the age of participants, and their scores on the Internet Addiction Test, as

evidenced by Pearson's correlation coefficient r = -.417, p = .000, p < .05, with bootsrtapped 95% CI [-.546 - -.263].

In the Bipolar Disorders group (Group B), there was a significant, but small, negative relationship between the age of participants, and their scores on the Internet Addiction Test, as evidenced by Pearson's correlation coefficient r = -.222, p = .026, p < .05, with bootstrapped 95% CI [-.396 -.038].

In the Depressive Disorders group (Group D), there was a significant moderate negative relationship between the age of participants, and their scores on the Internet Addiction Test, as evidenced by Pearson's correlation coefficient r = -.445, p = .000, p < .05, with bootstrapped 95% CI [-.569 - -.301].

In the Obsessive-Compulsive and Related Disorders group (Group O), there was a non-significant, and very small, negative relationship between the age of participants, and their scores on the Internet Addiction Test, as evidenced by Pearson's correlation coefficient r = -.183, p = .068, p > .05, with bootstrapped 95% CI [-.364 - .014].

Finally, in the Schizophrenia Spectrum and Related Disorders group (Group S), there was a significant, but small, negative relationship between the age of participants, and their scores on the Internet Addiction Test, as evidenced by Pearson's correlation coefficient r = -.236, p = .018, p < .05, with bootstrapped 95% CI [-.390 - -.085].

Table 6

Correlation between Age and Internet Addiction Scores per Group

Diagnostic Group	Pearson Correlation	Sig. (2-tailed)	Bootstrapped 95% Confidence Intervals	
			Lower	Upper
Anxiety Disorders	-.417	.000	-.546	-.263
Bipolar Disorders	-.222	.026	-.396	-.038
Depressive Disorders	-.445	.000	-.569	-.301
Obsess-Comp Disorders	-.183	.068	-.364	.014
Schizophrenia Disorders	-.236	.018	-.390	-.085

The Differences in Age among the Diagnostic Groups

The variable age was compared across the different diagnostic groups, and checked for significant differences. A one-way Analysis of Variance (ANOVA) was conducted on the dependent variable age, across the different levels of diagnostic groups. Levene's test showed that Homogeneity of variances was assumed ($F(4, 495)= 2.08$, $p = .082$, $p > .05$) and the main model was not significant ($F(4,495) = 2.22$, $p = .065$, $p > .05$) meaning that the average age of participants was not different across diagnostic conditions..

The Differences in Mean Internet Addiction Test Scores based on Diagnostic Groups while Controlling for Age

To assess whether Internet Addiction Test scores differ according to diagnostic group, while controlling for the effect of age, an Analysis of Covariance (ANCOVA) was conducted on total scores of the Internet Addiction Test.

The Assumptions of an ANCOVA were first evaluated, by checking the normality of the scores and the outliers and they were discussed in the previous section on the Normality and Outliers of the Internet Addiction Test per Group. Homogeneity of regression slopes was not met ($F(5,495) = 12.06$, $p = .00$, $p < .05$), similarly, Homogeneity of variance was not met (Leven's test: $F(4,495) = 5.18$, $p = .000$, $p < .05$).

While controlling for the effect of age, there was no significant difference between mean scores of Internet Addiction Test, across the different diagnostic groups. $F(4, 494) = 1.788$, $p = .13$, $p > .05$.

Comparisons of the Components of Internet Addiction Test across Diagnostic Groups

Using Multivariate Analysis of Covariance (MANCOVA), components of Internet Addiction were assessed for differences across diagnostic groups, when age and the total Internet Addiction scores are controlled for. There are components in the Internet Addiction Test that are represented by certain clusters of items within the scale, and represent different aspects experienced in Internet Addiction, and they are Salience (items 10, 12, 13, 15, and 19), Excessive Use (items 1, 2, 14, 18, 20), Neglect Work (items 6, 8, 9), Anticipation (items 7 & 11), Lack of Control (items 5, 16, & 17), and Neglect Social Life (items 3 & 4) (Widyanto & McMurran, 2004).

The assumptions of a MANCOVA were first evaluated, while the number of participants per group was equal with no missing values, normality was not assumed for the

outcome variables when applying the Kolmogorov-Smirnov test. The KS was found to be significant for Salience, (D(500)= .096, p < .000), Excessive Use (D(500)= .111, p < .000), Neglect Work (D(500)= .160, p < .000), Anticipation (D(500)= .093, p < .000), Lack of Control (D(500)= .121, p < .000), and Neglect Social Life (D(500)= .165, p < .000). However, as previously mentioned, the sampling distribution will tend to be normal in large samples regardless of the score of the KS Test, and the latter can conclude that the slightest deviation in such samples, is significant (Field, 2018). The visual inspections of the Histograms with the normal curve line were satisfactory for each of the six dependent variables per diagnostic group. The correlations between the continuous dependent variables were all moderate in size, ranging between Pearson's correlation coefficient of .45 and .808. Equality of variance and covariance matrixes was assessed and was significant when considering an alpha level of .05 (Box's M = 130.837, F(84, 4681) =1.517, p = .002) indicating that the assumption is violated. That said, Box's M has been shown to be very sensitive to deviations from normality and results in such cases could be misleading. It is also worth noting that in large samples (as is the case in the current study) smaller alpha levels may be more suitable to assess potential deviations (e.g. p < .001) as Box's M is overly sensitive, often resulting in false positives (Hahs-Vaughn, 2016). Given the alpha level of .001, the current findings support the assumption of equality of variance and covariance matrixes. The assumption of homogeneity was violated in three out of the six dependent variables as evidenced by significant Levene's Tests in the following components: Exessive Use F(4, 495) = 4.737, p = .001, Neglect work F(4, 495) = 2.742, p = .028, and Lack of Control F(4, 495) = 5.545, p = .000, the assumption was met in the remaining three components. That said, in large samples, small differences in the variance between the groups can produce a significant Levene's Test (Field, 2018).

As for Univariate Tests, the components that had significant differences between the groups were Salience (F(4,493)= 2.683, p = .031, p < .05), Excessive Use (F(4,493)= 3.249, p

= .012, $p < .05$), and Lack of Control ($F(4,493)= 2.77$, $p= .027$, $p < .05$). To address where the differences lie, subsequent post hoc analysis with the Bonferroni correction was applied, the results are summarized in Table 7 below.

Table 7

The Difference in Diagnostic Groups across Components of the IAT, when Age and Total IA scores are controlled for

Diagnostic Group	Excessive Use		Salience		Lack of Control		Neglect Work		Anticipation		Neglect Social Life	
	M	*SE*	*M*	*SE*	*M*	*SE*	*M*	*SE*	*M*	*SE*	*M*	*SE*
Anxiety Disorders	1.68	.109	1.48	.107	1.74	.126	1.24	.112	2.08	.131	1.37	.114
Bipolar Disorders	1.86	.109	1.64	.107	1.8	.126	1.14	.112	2.22	.131	1.40	.114
Depressive Disorders	1.52	.109	1.35	.107	1.47	.126	.979	.112	1.98	.132	1.20	.115
Obsess-Comp Disorders	1.86	.109	1.77	1.07	1.9	.126	1.11	.112	2.29	.132	1.37	.115
Schizophrenia Disorder	1.42	.109	1.38	.107	1.41	.126	1.26	.112	1.89	.132	1.38	.115

In Excessive Use, there were two statistically significant differences in this component. The difference between Group O (M = 1.864, SE = .109, 95% CI [1.649-2.07]), and Group S (M = 1.42, SE = .109, 95% CI [1.2-1.63]) is significant (MD = .442, SE = .155, p = .046, 95% CI [.005-.879]). The difference between Group B (M = 1.863, SE = .109, 95% CI [1.64-2.07]), and Group S (M = 1.42, SE = .109, 95% CI [1.207-1.636]) is significant (MD = .442, SE = .155, p = .045, 95% CI [.006 - .878]). Therefore, both Group O and Group B had significantly more excessive use compared to Group S.

In Salience, the difference between Group O (*M* = 1.77, *SE* = .107, 96% CI [1.56-1.98]) and Group D (*M* = 1.35, *SE* = .107, 96% CI [1.14-1.56]) is approaching significance (*MD*= .419, *SE* = .153, *p* = .063, 95% CI [-.012 - .849]). Group O has more salience compared with group D, but it was only marginally significant.

In Lack of Control, the difference between Group O (*M* =1.904, *SE* = .126, 95% CI [1.65-2.15]) and Group S (*M* = 1.41, *SE* = .126, 95% CI [1.16-1.66]) is marginally significant (*MD* = .488, *SE* = .179, *p* = .067, 95% CI [-.018 - .993]). Group O has more lack of control compared with Group S, and it was marginally significant.

In conclusion, this means that the groups significantly differ, when controlling for the age of participants and the total Internet Addiction scores, in one of the six components of Internet Addiction, namely Excessive Use. Additionally, the groups approach a marginally significant difference in the components Lack of Control, and Salience. In these three components, the means were higher for the Obsessive-Compulsive and Related Disorders group, and the Bipolar Disorders group, relative to the Depressive Disorders group and the Schizophrenia Spectrum and Related Disorders group. The Obsessive-Compulsive and Related Disorders group and the Bipolar Disorders group were significantly more likely to struggle with excessive use of the Internet, compared with the lowest scoring group which was the Schizophrenia Spectrum Disorders group. The Obsessive-Compulsive and Related Disorders group was also more likely to struggle with having lack of control, and having salience of the Internet, compared with the lower scoring groups, which were Schizophrenia Spectrum Disorders group and Depressive Disorders group respectively, but this difference only approached significance.

The Updated Cognitive behavioral Model within Diagnostic Groups

The second research question aimed to examine whether the Updated Cognitive-Behavioral Model of GPIU shows different relationships between components, compared to

other studies, when the Generalized Problematic Internet Use Scale 2 is conducted on separate DSM-5 disorder samples. The hypothesis was that at least one model will show different relationships between the components.

This requires testing the Updated Cognitive Behavioral Model (Caplan, 2010) within each diagnostic group. The assessment of the model within separate diagnostic groups, to our knowledge, has never been done, therefore there are no theories as to what relationships are to be expected to emerge, if a difference is seen. This analysis was conducted using IBM SPSS AMOS Graphics 21.

After conducting the Confirmatory Factor Analysis on the scale GPIUS2 with good fit indices as previously reported in detail, and supporting the 4 components Preference for Online Social Interaction (POSI), Using Internet for Mood Regulation (MR), Deficient Self-Regulation (DEF) as a higher order construct merging Cognitive Preoccupation with the Internet (COG) and Compulsive Use of the Internet (COMP), and finally, Negative Outcomes from the Internet (NEG), Multigroup Structural Equation Modeling was conducted. When assuming model unconstrained to be correct, the Chi-Square of structural weights is $\chi 2(60) = 96.192$, $p = .002$, which suggests that the models in the different groups are in fact different.

Structural Equation Modeling was conducted on the Updated Cognitive Behavioral Model of Generalized Problematic Internet Use according to Caplan's (2010) findings whereby POSI predicted DEF, and DEF predicted NEG, therefore the relationship between POSI and NEG was mediated by DEF; additionally, POSI predicted MR, MR predicted DEF, MR mediated the relationship between POSI and DEF, and finally, DEF mediated the relationship between MR and NEG. Once this model was created within each group, it was tested for model fit by looking at model fit indices. The aim in each model was to reach a non-significant Chi-Square, and high (ideally above .9) values of Goodness of Fit Index (GFI) (Tanaka & Huba,

1985), Tucker-Lewis coefficient (TLI), and the Comparative Fit Index (CFI) (Hu & Bentler, 2009), and a small RMSEA that was ideally below .06 (Browne and Cudeck, 1993). Additionally, when regression weights were non-significant at the .01 level, they were removed; and finally, some errors between variables were correlated when their Modification Indices were high (most that were correlated were above 10)

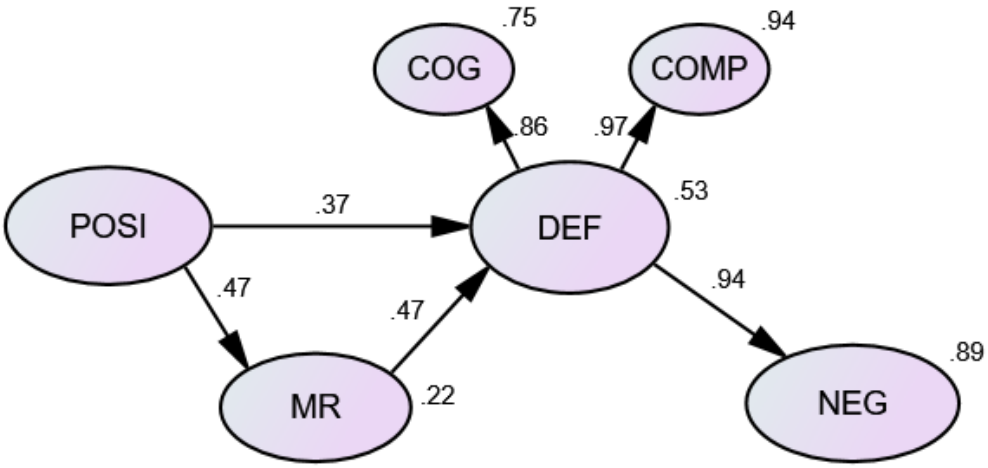
The Anxiety Disorders Group Model

In the Anxiety Disorders group, the model found was identical to the Updated Cognitive Behavioral Model of Generalized Problematic Internet Use (Caplan, 2010). Four covariance relationships were added between errors with high modification indices (errors of POSI3 and COMP3, of COG3 and COMP3, of COG2 and NEG2, and of COG and COMP3). The model had good fit as evidenced by $\chi^2(80) = 108.386$, $p = .019$, GFI = .881, CFI = .966, TLI = .956, and RMSEA = .060. The standardized regression weights between the latent variable POSI and its three observable variables were .638, .873, and .860 for POSI1, POSI2, and POSI3 respectively. The standardized regression weights between the latent variable MR and its three observable variables are .487, .840, and .932 for MR1, MR2, and MR3 respectively. The standardized regression weights between the latent variable COG and its three observable variables are .721, .766, and .657 for COG1, COG2, and COG3 respectively. The standardized regression weights between the latent variable COMP and its three observable variables are .875, .851, and .624 for COMP1, COMP2, and COMP3 respectively. The standardized regression weights between the latent variable NEG and its three observable variables are .839, .735, and .631 for NEG1, NEG2, and NEG3 respectively. The model predicts 89% of the variance in Negative Outcomes ($R^2 = .89$). The standardized regression weights between DEF and the lower order constructs are .864 for COG, and .970 for COMP. The standardized regression weight between POSI and MR is .470, between POSI and DEF .369, between MR

and DEF .474, and finally, between DEF and NEG .942. All the unstandardized regression weights were significant at the .001 level.

Figure 8

Standardized estimates for structural model in Anxiety Disorders group



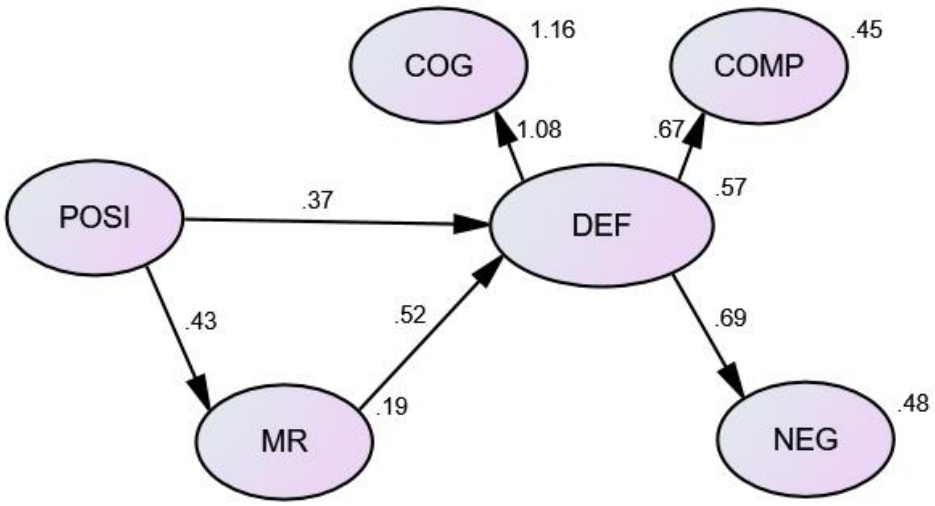
The Bipolar Disorders Group Model

In the Bipolar Disorders group, the model found was identical to the Updated Cognitive Behavioral Model of Generalized Problematic Internet Use (Caplan, 2010). Nine covariance relationships were added between errors with high modification indices (errors of POSI1 and COG2, of POSI2 and MR1, of MR2 and COMP1, of POSI1 and NEG2, of COMP3 and NEG1, of COMP3 and DEF, of COMP and NEG, of COMP and NEG1, and finally, of COMP and NEG2). The model has good fit as evidenced by $\chi 2(75) = 100.603$, , $p = .026$, GFI = .893, CFI = .969, TLI = .956, and RMSEA = .059. The standardized regression weights between the latent variable POSI and its three observable variables are .714, .830, and .865 for POSI1, POSI2, and POSI3 respectively. The standardized regression weights between the latent

variable MR and its three observable variables are .443, .884, and .956 for MR1, MR2, and MR3 respectively. The standardized regression weights between the latent variable COG and its three observable variables are .664, .783, and .751 for COG1, COG2, and COG3 respectively. The standardized regression weights between the latent variable COMP and its three observable variables are .858, .871, and .401 for COMP1, COMP2, and COMP3 respectively. The standardized regression weights between the latent variable NEG and its three observable variables are .898, .732, and .515 for NEG1, NEG2, and NEG3 respectively. The model predicts 48% of the variance in Negative Outcomes (R^2 = .48). The standardized regression weights between DEF and the lower order constructs are 1.079 for COG, and .667 for COMP. The standardized regression weight between POSI and MR is .432, between POSI and DEF .365, between MR and DEF .520, and finally, between DEF and NEG .694. All the unstandardized regression weights were significant at the .001 level.

Figure 9

Standardized estimates for structural model in Bipolar and Related Disorders group

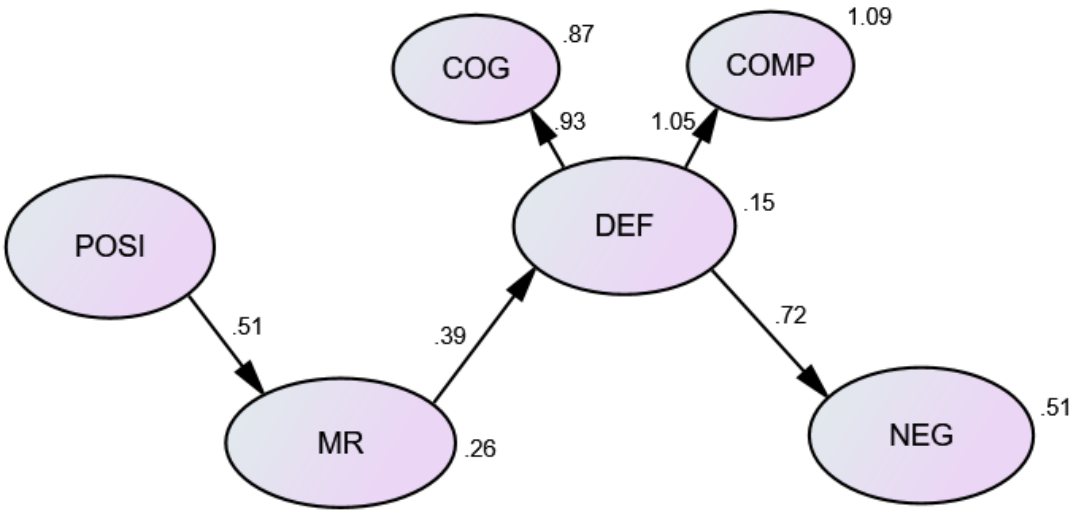


The Depressive Disorders Group Model

In the Depressive Disorders group, the model found was similar, but not identical, to the Updated Cognitive Behavioral Model of Generalized Problematic Internet Use (Caplan, 2010). There wasn't a significant relationship between POSI and DEF, therefore, the only pathway leading to Negative Outcomes from the Internet in this group is through POSI predicting MR, which then in turn predicts DEF, which leads to NEG; the significance of this will be discussed later on. Two covariance relationships were added between errors with high modification indices (errors of COG3 and COMP3, and of COMP1 and NEG1). The new model has good fit as evidenced by $\chi 2(83) = 105.622$, , $p = .048$, GFI = .886, CFI = .966, TLI = .957, and RMSEA = .052. The standardized regression weights between the latent variable POSI and its three observable variables are .530, .934, and .780 for POSI1, POSI2, and POSI3 respectively. The standardized regression weights between the latent variable MR and its three observable variables are .644, .919, and .931 for MR1, MR2, and MR3 respectively. The standardized regression weights between the latent variable COG and its three observable variables are .751, .747, and .672 for COG1, COG2, and COG3 respectively. The standardized regression weights between the latent variable COMP and its three observable variables are .654, .665, and .668 for COMP1, COMP2, and COMP3 respectively. The standardized regression weights between the latent variable NEG and its three observable variables are .702, .619, and .587 for NEG1, NEG2, and NEG3 respectively. The model predicts 51% of the variance in Negative Outcomes ($R^2 = .51$). The standardized regression weights between DEF and the lower order constructs are .932 for COG, and 1.046 for COMP. The standardized regression weight between POSI and MR is .511, between MR and DEF .392, and finally, between DEF and NEG .715. All the unstandardized regression weights were significant at the .001 level.

Figure 10

Standardized estimates for structural model in Depressive Disorders group



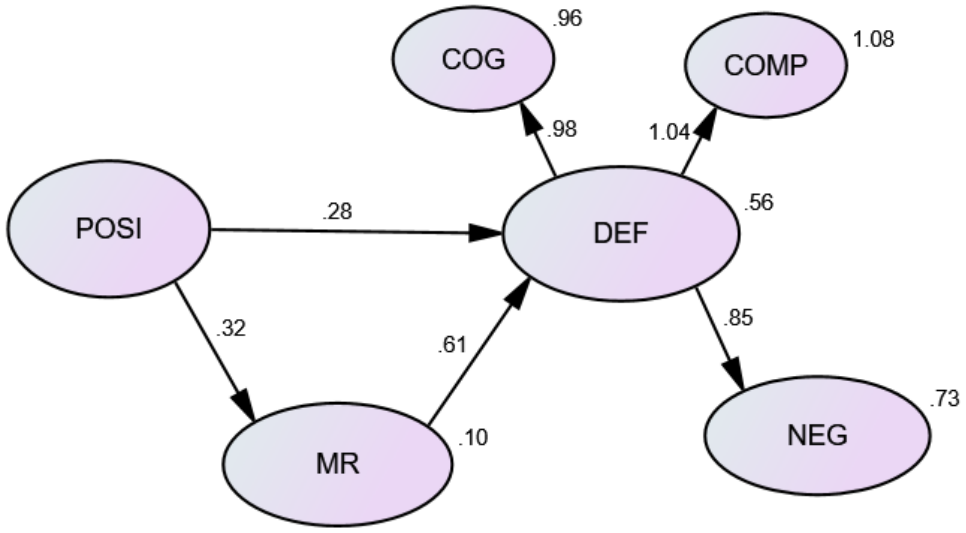
The Obsessive-Compulsive and Related Disorders Group Model

In the Obsessive-Compulsive and Related Disorders group, the model found was identical to the Updated Cognitive Behavioral Model of Generalized Problematic Internet Use (Caplan, 2010). Five covariance relationships were added between errors with high modification indices (errors of MR and POSI2, of COG2 and POSI3, of COG3 and COMP3, of COMP1 and NEG1, and of COMP2 and NEG2). The model has good fit as evidenced by $\chi 2(79) = 98.988$, , $p = .064$, GFI = .891, CFI = .981, TLI = .975, and RMSEA = .051. The standardized regression weights between the latent variable POSI and its three observable variables are .840, .817, and .817 for POSI1, POSI2, and POSI3 respectively. The standardized regression weights between the latent variable MR and its three observable variables are .723, .935, and .871 for MR1, MR2, and MR3 respectively. The standardized regression weights between the latent variable COG and its three observable variables are .766, .723, and .832 for COG1, COG2, and COG3 respectively. The standardized regression weights between the latent

variable COMP and its three observable variables are .765, .842, and .813 for COMP1, COMP2, and COMP3 respectively. The standardized regression weights between the latent variable NEG and its three observable variables are .853, .769, and .858 for NEG1, NEG2, and NEG3 respectively. The model predicts 73% of the variance in Negative Outcomes ($R^2 = .73$). The standardized regression weights between DEF and the lower order constructs are .978 for COG, and 1.041 for COMP. The standardized regression weight between POSI and MR is .321, between POSI and DEF .284, between MR and DEF .605, and finally, between DEF and NEG .853. All the unstandardized regression weights were significant at and below the .005 level.

Figure 11

Standardized estimates for structural model in Obsessive-Compulsive and Related Disorders group



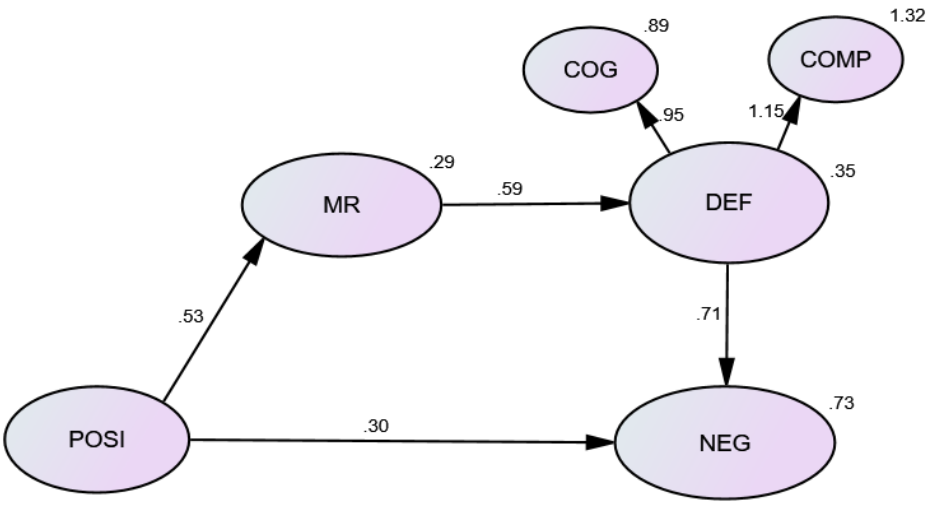
The Schizophrenia Spectrum Disorders Group Model

In the Schizophrenia Spectrum Disorders group, the model found was similar, but not identical, to the Updated Cognitive Behavioral Model of Generalized Problematic Internet Use (Caplan, 2010). The familiar pathway seen before, is present here as well, POSI predicts MR, MR predicts DEF, and DEF predicts NEG, however, in this model, POSI predicts NEG directly, suggesting a more prominent and direct role for preference for online social interaction over face to face interaction on negative outcomes of Internet use, in this group. The implications of this will be discussed later on. Five covariance relationships were added between errors with high modification indices (errors of POSI2 and COG3, of MR3 and COMP3, MR3 and NEG3, COG2 and COMP2, and of COMP1 and COMP2). The new model has good fit as evidenced by $\chi 2(79) = 102.980$, =, $p = .036$, GFI = .885, CFI = .967, TLI = .956, and RMSEA = .055. The standardized regression weights between the latent variable POSI and its three observable variables are .753, .825, and .695 for POSI1, POSI2, and POSI3 respectively. The standardized regression weights between the latent variable MR and its three observable variables are .487, .947, and .885 for MR1, MR2, and MR3 respectively. The standardized regression weights between the latent variable COG and its three observable variables are .569, .537, and .789 for COG1, COG2, and COG3 respectively. The standardized regression weights between the latent variable COMP and its three observable variables are .577, .676, and .729 for COMP1, COMP2, and COMP3 respectively. The standardized regression weights between the latent variable NEG and its three observable variables are .800, .736, and .647 for NEG1, NEG2, and NEG3 respectively. The model predicts 73% of the variance in Negative Outcomes ($R^2 = .73$). The standardized regression weights between DEF and the lower order constructs are .946 for COG, and 1.149 for COMP. The standardized regression weight between POSI and MR is .535, between MR and DEF .589, between DEF and NEG .712, and finally, between POSI and NEG .300. All the unstandardized regression

weights were significant at, and below, the .005 level. The combined indirect effect between POSI and NEG is .222, while the direct effect between POSI and NEG is .30.

Figure 12

Standardized estimates for structural model in Schizophrenia Spectrum and Related Disorders group



Discussion

Internet Addiction, or Problematic Internet Use, is the name given to a cluster of symptoms that started emerging with the spread of the Internet, since as far back as 1996 (Young, Dong Yue, & Ying, 2011). The widespread acceptance of this cluster of symptoms as a legitimate disorder started growing two decades ago (Young, 2007), but whether or not it should be considered an independent disorder, is still being debated (Aboujaoude et al., 2006; Pies, 2009). The aim of this study was to determine whether there are any signs of differentiation in this condition across different Psychiatric diagnostic groups, which would be the first step in evaluating whether it is a condition that changes in development and cycle

according to the underlying Psychiatric disorder that an individual has, or a rather a stable condition which is not affected by the processes of a pre-existing disorder. In order to do so, two research questions were proposed, where an assessment of the prevalence rates of Internet Addiction across different major Psychiatric groups was undertaken (RQ1) and the cognitive and behavioral model that represents Problematic Internet Use in the different Psychiatric groups was assessed to examine whether the stability of the model across groups (RQ2).

Potential implications to such findings could be extended towards treatment applications of this condition in a way in which the steps of treatment can be individually constructed for each patient, taking into consideration his/her underlying pre-existing disorder, and the salient dysfunctional component of their group's model which can act as the key to treatment. Findings could also lend support to one of the competing opinions about Internet Addiction in research, as to whether it is more likely to be independent (Young, 2004), or dependent (Aboujaoude et al., 2006; Bipeta et al., 2015; Pies, 2009) on the factors previously mentioned.

Five groups of Psychiatric disorders, namely Anxiety Disorders, Bipolar Disorders, Depressive Disorders, Obsessive-Compulsive and Related Disorders, and finally, Schizophrenia Spectrum Disorders were evaluated. One hundred participants were recruited into each diagnostic category, and they filled out the Internet Addiction Test, the Generalized Problematic Internet Use Scale 2 questionnaire, a few demographic questions, questions about their favorite activities online, and their most used methods of Internet access.

It is important to discuss the 18 out of the 95 individuals who determined the onset of their PIU to predate the onset of the major Psychiatric disorder that they eventually sought treatment for. This would seem to negate the original assumption that Internet Addiction or PIU is an extension of a broader pre-existing disorder (Davis, 2001). The possibility of Internet

Addiction acting as a precipitating factor to the major Psychiatric disorder that came later cannot be ruled out. Temporal order as such can be interpreted in different ways. It is important to note that the age of onset of the major Psychiatric disorders was determined when the patient displayed the full criteria needed for a diagnosis, or retrospectively, when he or she recalled the impact of the disorder beginning to affect their life. There are no certain measurements of when the prodromal symptoms of their major disorder began or what kind of behavioral predictors were starting to precede the diagnosable disorder, if any. There are cognitive, behavioral, and affective subsyndromal symptoms that sometimes precede the onset of a major Psychiatric Disorder; cognitive styles, for example, encompass individuals' perceptual, interpretative, and reactive styles, and maladaptive cognitive styles have been found to contribute to the onset of a Unipolar or a Bipolar first episode (Alloy et al., 2009). Similarly, an abnormally high Obsessive Compulsive dimension was seen at the baseline of individuals who later on developed Internet Addiction in a longitudinal study (Dong et al., 2011), this high dimension could additionally be a predictor of a future diagnosis of OCD. There are affective and behavioral predictors that are known to predict Bipolar Disorder onset such as higher baseline levels of lability, disinhibition, intattention, depression and anxiety levels, at a subsyndromal level prior to the onset of the disorder (Hafeman et al., 2016). But life events have also been known to contribute to the onset of psychiatric episodes (Alloy et al., 200). Is Internet Addiction a manifestation of early behavioral signs as a result of specific cognitive styles, obsessive-compulsive dimensions, or a part of prodromal subsyndromal affective and behavioral symptoms; or is this addiction an added external context that turns into a precipitating factor? This cannot be determined for certain at this point, there is a possibility that it is a combination of both.

Internet Addiction and Diagnostic Groups

The first aim of the present research was to assess which major disorders will have the highest comorbidity with Internet Addiction after controlling for age in a clinical population.

The group with the highest number of mild, moderate and severe cases of Internet Addiction was the Bipolar Disorder group with 53% of its participants scoring positive for Internet Addiction, followed by Obsessive-Compulsive Disorders with 52%, then Anxiety Disorders with 45%, followed by Depressive Disorders with 44%, then Schizophrenia Spectrum Disorders with 36%. The difference across these groups in terms of comorbidity with IA, was significant, even when controlling for the effect of age. The Bipolar Disorders group had significantly higher comorbidity with Internet Addiction, compared with the base group which was the Schizophrenia Spectrum Disorders group, and the Obsessive-Compulsive and Related Disorders group had a marginally significant higher comorbidity with Internet Addiction compared with the base group. This means that the diagnostic groups significantly differ regarding their comorbidity with Internet Addiction. The Obsessive-Compulsive Disorders group has a higher number of moderate and severe cases of IA compared with the Bipolar Disorder group which has more mild cases. The findings above support part of the first hypothesis, that the groups will be significantly different in terms of their comorbidity with IA, and that the highest comorbidity would be found in Bipolar Disorders; however, it was followed by the Obsessive-Compulsive Disorders group, and the Anxiety group was not among the highest groups in terms of comorbidity with IA as was proposed in the remaining part of the first hypothesis.

As for means on the IAT scores, the group with the highest mean Internet Addiction score was the Obsessive-Compulsive and Related Disorders group with a mean score of 35, which is considered to reflect a mild degree of Internet Addiction. The group was followed by

the Bipolar and Related Disorders group with a mean score of 33.9, which is also reflective of mild Internet Addiction, then the Anxiety Disorders group follows with a mean score of 32, placing it similarly among the groups with a mild degree of Internet Addiction. The Schizophrenia Spectrum group and the Depressive Disorders group had mean scores that reflected normal Internet usage at 28 and 27.6 respectively. To see whether this difference in mean scores was significant when factoring in the effect of age, an analysis of Covariance was conducted, and the difference wasn't significant. This means that the mean scores of Internet Addiction are not significantly different across diagnostic groups when taking into consideration the effect of age.

As for the effect of age on IA scores, in the combined sample, where all the groups were merged into one, the age of participants was negatively correlated with Internet Addiction scores, it a significant moderate negative relationship. This means that the younger the individual is in this merged sample, the more likely he/she is to have Internet Addiction symptoms. This is in line with what has already been seen in literature (Pontes & Grifiths, 2015). When the groups were taken separately, all the diagnoses had a significant small or moderate negative relationship between age and IA scores, with the exception of the Obsessive-Compulsive Disorders group, whose IA scores did not have a significant relationship with age. This means that age does not play a role in the scores of the Internet Addiction Test in the Obsessive-Compulsive and Related Disorders group, this may be due to the nature of the impulsive-compulsive spectrum that will be introduced later, insinuating other more important drivers in the OCD group towards Internet Addiction than age.

Further analyses were conducted on the individual components of the Internet Addiction Test, and were compared across diagnostic groups, while controlling for the effect of age and the total Internet Addiction scores. In three out of the six components there was a significant difference between the diagnostic groups, namely Excessive Use, Lack of control,

and Salience. In these components, the Obsessive-Compulsive Disorders group came in highest among the scores, followed by the Bipolar Disorders group; while the Depressive Disorders group and Schizophrenia Spectrum group had generally the lowest scores. The Obsessive-Compulsive and Related Disorders group and the Bipolar Disorders group were found to be significantly more likely to struggle with excessive use of the Internet, compared with the lowest scoring group which was the Schizophrenia Spectrum Disorders group, a component which reflects compulsive usage and points to a higher likelihood of experiencing distress upon withdrawal from the Internet. Individuals from the Obsessive-Compulsive Disorders group are also more likely to struggle with having lack of control, a component which reflects impairment in online time management, and with having salience of the Internet in their lives, a component which reflects pre-occupation with the Internet, a tendency to hide time spent online, to withdraw from real life activities/relationships, and to use the Internet to stop disturbing thoughts (Widyanto & McMurran, 2004), compared to the lower scoring groups Schizophrenia Spectrum and Depressive Disorders group respectively, but this difference only approached significance.

Even though the Bipolar Disorder group had the highest comorbidity with Internet Addiction, the Obsessive-Compulsive group had more moderate and severe cases, had a higher mean on the IAT scores, and had marginal increased likelihood of experiencing salience and lack of control of the internet, in addition to having excessive use which is significantly higher in both groups. This suggests that even though IA is more present in Bipolar Disorders, it seems to have a stronger impact on individuals with Obsessive-Compulsive Disorder.

In literature, the disorders most often linked with Internet Addiction are Substance Use Disorders, Bipolar Disorder, and Anxiety Disorders (Black et al., 1999; Shapira et al., 2000; Young, Dong Yue, & Ying, 2011); Attention Deficit Hyperactivity Disorder has also been seen frequently (Ho et al., 2014). In this study, the groups were restricted to the previously

mentioned five, and therefore Substance Use Disorders and ADHD weren't studied. Bipolar Disorders and Obsessive-Compulsive and Related Disorders were in fact among the highest scoring groups in this sample in terms of Internet Addiction scores, the independent components of the Internet Addiction Test, and the number of moderate and severe cases per group.

The Anxiety Disorders group did not in fact compete with the groups that scored highest on all parameters mentioned above. However, the mean score of the Internet Addiction Test in the Anxiety Group was 32, reflecting a mild level of Internet Addiction. On its own, this is alarming, suggesting that a significant number of individuals in this group are suffering from at least a mild degree of Internet Addiction, but when compared with the higher scoring groups, it wasn't significant.

Bipolar Disorders and Impulse Control Disorders, such as in the case of Internet Addiction, overlap in phenomenology and have high comorbidity with each other, and with similar other disorders. (Karakus & Tamam, 2011; McElroy et al., 1996). In fact, abnormalities in impulse control in Bipolar Disorder is not only affective-state dependent, but also a trait component of the disorder. (Najit et al., 2007; Strakowski et al., 2010). This means that individuals with Bipolar Disorder tend to have problems with impulse control even in their everyday lives. Additionally, reward system alterations in Bipolar patients make them vulnerable to addictive behaviors, even in euthymic states (Pettorruso et al., 2014). This explains the findings in this study, that suggest that the Bipolar Disorders group included the highest number of individuals scoring positive for Internet Addiction, and struggled significantly more with excessive use.

As for the Obsessive-Compulsive and Related Disorders group, this was not included in the hypothesis, but this group had the highest scores on the mean of Internet Addiction Test

(35), the highest number of moderate and severe cases of Internet Addiction per group (26%), and had significantly higher scores on Excessive Use, and approaching significance higher scores on Lack of Control, and Salience, compared with the lower scoring groups, suggesting a great degree of impact from the Internet on this population. Shapira et al. (2000) theorized that Internet Addiction could be part of the Obsessive-Compulsive spectrum disorders, but when they tested their theory, it turned out to have more in common with Impulse Control Disorders than with OCD. In a study conducted by Bipeta et al. (2015), Internet Addiction was studied in relation to OCD, and found that people with OCD were more likely to have Internet Addiction, furthermore, they were able to demonstrate improvement in Internet Addiction symptoms through the treatment of the underlying OCD. Significant correlation between Internet Addiction and OCD is seen in some studies (Adalier & Balkan, 2012; Cecilia et al, 2013; Chou, Condron, & Belland, 2005), and in another study, OCD severity was the only predictor of IA scores in the Symptom Checklist-90-Revised subscales (Dalbudak et al., 2013). A longitudinal study found that students who went on to develop IA had at baseline an abnormal Obsessive Compulsive dimension which was significantly higher than the norm (Dong et al., 2011). This would all suggest a role for Obsessive-Compulsive symptoms in the understanding of Internet Addiction and its behavior that requires more attention in the future.

As previously mentioned, Internet Addiction has been classified as an impulse control disorder, (Cheng & Li, 2014; Pallanti, 2006), but some researchers consider it an Obsessive-Compulsive spectrum disorder (Black, Belsare, & Schlosser, 1999). Shapira et al.'s study (2000) shed light on this issue by comparing instruments of OCD and Impulse Control around the usage of Internet, and they found out that all of their participants' Internet use fulfilled criteria of an Impulse Control Disorder, and to a much lesser degree Obsessive Compulsive Disorder, and that was because of low ratings on the questions related to distress regarding thoughts and urges about their usage, which would be a requirement for an Obsessive

Compulsive Disorder. This highlights the difference between Obsessive Compulsive Disorders and Impulse Control Disorders, the argument of one being ego-dystonic, and therefore causes distress, resistance, or discomfort, and one being ego-syntonic, and in the latter, the urges bring pleasure and are not, in fact, internally resisted (Bipeta et al., 2015). Obsessive-Compulsive Disorders and Impulse Control Disorders are very similar in many ways, but at the same time different, and some researchers explain it as an impulsive-compulsive spectrum, with impulsivity on one side, and compulsivity on the other (Blaszczynski, 1999; McElroy, Phillips, & Keck, 1994; Van Den Heuvel et al., 2010). The two categories of disorders share similar symptomatology (Blaszczynski, 1999; McElroy, Phillips, & Keck, 1994) and neuropsychiatric imbalances (Van Den Heuvel et al., 2010). This explains the somewhat surprising role of the Obsessive-Compulsive Disorders group in the parameters of this study. Internet Addiction, being most likely an Impulse Control Disorder, may lie on the same spectrum as Obsessive-Compulsive Disorders, in an impulsive-compulsive continuum.

The Updated Cognitive behavioral Model within Diagnostic Groups

The Updated Cognitive-Behavioral Model of GPIU was tested for different relationships between components, compared to other studies, when the Generalized Problematic Internet Use Scale 2 was conducted on separate DSM-5 disorder samples.

In terms of the findings in the model testing of the Updated Cognitive Behavioral Model of Generalized Problematic Internet Use, three groups showed a good fit with the already existing model, which were the Anxiety Disorders group, the Bipolar and Related Disorders group, and the Obsessive-Compulsive group, suggesting a path from preference for online social interaction over face to face interaction, to deficiency in self-regulating Internet usage, with and without needing to use the internet for mood regulation, and resulting in negative outcomes from the Internet. This supports the proposition that Caplan (2003, 2010) made about

people with psychological disorders feeling more comfortable socializing online due to the decrease of perceived social threats or obstacles, followed, at times, by a reduction in anxiety symptoms while online, and therefore, regulation of negative affective states; and eventually experiencing symptoms of preoccupation and compulsive use, which are what leads to consequences from Internet use. One of the conclusions that can be drawn from this is that individuals with Bipolar, Obsessive-compulsive, or Anxiety disorders have come to find refuge in meeting their social needs online, and this has the potential to lead them into a cycle of negative reinforcement and real-life withdrawal.

Two diagnostic groups provided a better fit when the model was changed slightly based on the significance of regression weights, the modification indices, and the model fit indices. These two groups are the Depressive Disorders group and the Schizophrenia Spectrum and Related Disorders group. The differences from the original model will be explained below.

In the Depressive Disorders group, the path between preference for online social interaction over face to face interaction does not directly predict deficiency in self-regulating Internet usage, and therefore, to negative outcomes from the Internet. Rather, the new model does not allow bypassing using the internet for mood regulation. In other words, the only way that addictive behavior begins to show (through deficiency in self-regulation), is when preference for online social interaction predicts usage of internet for mood regulation. This makes using the Internet for mood regulation an essential part in the model for this group, in the development of Internet Addiction, unlike other groups which have two potential pathways, one not related to mood regulation. This observation supports the theory that one of the essential motives for people who have Depression, for using the Internet, is to improve their negative mood state, which falls in line with what has already been proposed about the function of the internet as a mood regulator in individuals who have Depression (Davis, 2001). Internet provides a medium that allows individuals to cope with negative affect (Muñoz-Rivas et al.,

2010; Scherer, 1997; Young & Rodgers, 1998) and achieve psychological escape (Morahan-Martin & Schumacher, 2000). Individuals with Depression tend to have decreased reward sensitivity (Hayes, 2015), making them more susceptible to the problematic use of the Internet. These findings suggest that individuals with depression and Internet Addiction, coming for treatment of their Internet Addiction, might need to have their treatment emphasize improvement in their negative affect, even if it is integrated into the standard CBT for Internet Addiction (Young, 2007; 2011). For example, a specific kind of Exposure-based CBT adapted for depression focuses on emotional avoidance, and emotional processing. It particularly helps individuals to release themselves from reinforcing maladaptive escape-based loops, of which arguably the excessive use of the Internet can be an example. Mindfulness is often integrated into this treatment to establish a nonjudgmental stance to experiencing emotions (Hayes, 2015). Individuals with Depression, according to this model, could not develop addictive symptoms to the Internet, unless they use the Internet for mood regulation; and the preference for online social interaction is proposed to be present because it is generally less threatening for people struggling with depression and depressive beliefs to socialize with others online (Caplan, 2003).

The model in the Schizophrenia Spectrum Disorders group, similarly does not have a pathway that links preference for online social interaction with deficiency in self-regulation (which would then lead to negative outcomes); but the familiar pathway exists that leads from preference for online social interaction, to using the internet for mood regulation, to deficiency in self-regulation, and finally to negative outcomes, which is a pathway that exists in all the groups' models. More interestingly, there is a direct pathway from preference for online social interaction to negative outcomes, without passing through any other component. In other words, this group might start suffering from their internet use, without having their internet use be excessive, or be negatively reinforcing. This is unexpected because preference for online

social interaction over face-to-face interaction, in and of itself, would not be expected to lead directly to distress from the Internet, in the absence of addiction. Caplan (2003) proposed that individuals would prefer online social interaction over to face-to-face communication, at times, to compensate for their social skill deficiencies. Social deficits are core aspects of Psychotic Disorders (Van Os, Kenis, & Rutten, 2010), and individuals with Psychotic Disorders are heavy users of Social Media, while maintaining fewer contacts offline (Bjornestad, 2019). Some researchers have found that the use of the internet for this specific population is helpful to them, because it bypasses some of the social difficulties that they face in real life social contexts (Highton-Williamson, Priebe, & Giacco, 2015; Spinzy et al., 2012); in fact, when the online behavior of individuals with Psychotic Disorders was examined, they were found to spend more time playing online games or engaging in chat rooms, compared to controls; in other words, they made use of online social networking for developing and maintaining relationships (Highton-Williamson, Priebe, & Giacco, 2015).

This is at odds with what presented in the model of the Schizophrenia Spectrum Group in this study, whereby merely socializing online, contributed directly to suffering from negative consequences from the Internet (e.g. internet making it difficult for them to manage their lives, causing them to miss social engagements, and creating problems for them in their lives – statements derived from the GPIUS2 Negative Outcomes). Two possible explanations will be offered to explain this phenomenon, but unfortunately, information on the online social behavior of people with Schizophrenia or other Psychotic Disorders is scarce.

The first explanation supposes that the online social interaction is in fact positive and reassuring. The more comfortable the individual with a Psychotic Disorder is, socializing online, the more the gap might grow in face-to-face socializing, due to less exposure opportunities. This might lead the individual to withdraw more from real life events and meetings. This gap being referred to, can be considered a form of social disconnection from

the general community, which is known to, in turn, lead to physical and mental health consequences when occurring in individuals with Schizophrenia (Green et al., 2018).

The second explanation supposes that the online social interaction yields negative feedback of some sort. It can be argued that the more an individual feels comfortable socializing online, rather than face-to-face, the more the social challenges that he/she might have in real life; therefore, if the individual with a Psychotic Disorder has significant social challenges, then it can be argued that even when socializing online, deficits will show, and the feedback from others might not be as satisfying or as comforting as expected. In a recent study, the online posts of 150 participants with Psychotic Disorders were analyzed, and when in a stable state, they had significantly unique communication patterns, compared with controls; for example, their posts had significantly less emphasis on friendship, and significantly more emphasis on health (Birnbaum et al., 2018). Other studies found that individuals who have a self-disclosed diagnosis of Schizophrenia, discuss Tobacco use more frequently online, they also discuss depression and anxiety symptoms, disclose of mental illness, and even suicide, more frequently than others (Naslund et al., 2020). During their relapse, individuals with Psychotic Disorders exhibit shifts in language, and post more swearing and negations (Birnbaum et al., 2018). Social interaction online puts everyone at risk of social comparison pressure and an emphasized feeling of isolation. It also exposes people to the risk of being rejected by others (Naslund et al., 2020). If harsh negative feedback is experienced by individuals who already have challenges in the social arena, the impact on their mental health or daily behavior can be detrimental, thus explaining the direct relationship between having preference for online social interaction and experiencing negative outcomes from the Internet, without having the signs and symptoms of Internet Addiction. Treatment of psychotic disorders presenting with Internet Addiction can, therefore, include when applicable, interventions that target social cognitive skills training, in a safe group-based setting, where skill building strategies, practice, and

breaking down of complex social processes can be achieved. Studies show increased emotional awareness and coping, as a result of this intervention, in addition to improved facial affect perception, (Horan et al., 2014), despite still being in its early stages of development.

In conclusion, this study revealed interesting findings. While attempting to look for signs of differentiation in Internet Addiction across clinical Psychiatric diagnoses, it uncovered a higher comorbidity of Internet Addiction with Bipolar Disorders, compared with the remaining groups, Obsessive-Compulsive Disorders, Anxiety Disorders, Schizophrenia Spectrum and Related Disorders, and Depressive Disorders. The Obsessive-Compulsive Disorders group had a higher percentage of moderate and severe cases of Internet Addiction, and had the highest mean scores on the IAT, even though it wasn't significant when age was controlled for. It revealed that the Obsessive-Compulsive Disorders group and the Bipolar Disorders groups struggled significantly more than others with excessive use of the Internet, and the Obsessive-Compulsive Disorders group struggled more with lack of control and salience of Internet, in a marginally significant way. The negative relationship between age and Internet Addiction scores was seen, similar to literature, and it was significant, except in the Obsessive-Compulsive Disorders group, where age did not play a role. Finally, different relationships between the cognitive and behavioral components of the Updated Cognitive Behavioral Model for Generalized Problematic Internet Use, from the original, were seen in two out of the five groups, and these differences were in line with what is already known clinically, about these disorders, and shed light on their specific vulnerability with the Internet. This insight can help clinicians better prioritize the treatment approach for someone presenting with Internet Addiction and a pre-existing diagnosis of Depression or a Psychotic Disorder. It also provides support for Caplan's (2010) Updated Cognitive Behavioral Model of GPIU in the remaining groups. In addition to that, this information supports the growing belief that Internet Addiction might be highly affected by the pre-existing Psychiatric Disorder, whereby

the Internet is a convenient platform serving as a function for the needs of the underlying disorder. This warrants the proposition for a conceptualization of PIU, in the clinical setting that includes and integrates the role of the pre-existing psychopathology.

When comparing Internet Addiction with other addictions, such as Alcohol Use Disorders (AUD), similarities are seen, in that researchers strongly advise a thorough conceptualization of a case of AUD, looking specifically for comorbid diagnoses. This is because Alcohol has been shown to have different motives for use in cases of dependence, and these motives need to be addressed in order to improve the chances of abstinence (McHugh, Hearon, & Otto, 2010). Moreover, a scale has been developed particularly to assess the motives of drinking, in order to guide clinicians in understanding motives for use and comorbidities in cases presenting for AUD, and it's known as the Revised Drinking Motives Questionnaire (Cooper, 1994). A similar perspective should be adopted when addressing Internet Addiction, and it's to start with a conceptualization that integrates comorbid diagnoses and motives.

Future studies should aim to find individuals with PIU, who are without comorbid Psychiatric disorders, and evaluate the Updated Cognitive Behavioral Model of GPIU in such a sample, to address whether PIU is disorder specific or not. Studies that have been conducted with this model on the general population (Caplan, 2010; Gamez-Gaudix, Orue, & Calvete, 2013), did not exclude individuals with Psychiatric disorders. In addition to that, future studies should consider assessing the model across different age groups, and across different users of online activities. The latter would be particularly interesting in seeing whether preference for online social interaction will appear to be significant in different online activities, even those that do not seem to include an obvious social component, such as using the Internet for news and searching.

Limitations

There are several limitations to this study, first of all the sample size in each group is 100, and there are debated opinions on the minimum number of participants when structural equation modeling is to be conducted, some suggest as a rule of thumb 200 participants, and some suggest that 10 people per observed variable is good enough (Sagan, 2019). In this SEM analysis there are 15 observable variables, thus requiring 150 participants in each group. This means our sample size per group needed to be larger. Since this is a clinical population, large numbers were difficult to achieve. In addition to that, temporal order of onset of Internet Addiction and Psychiatric Disorders was conflicting in some participants, which led to questions about which may have precipitated the other.

Another limitation is the fact that the groups are highly heterogeneous, and this is also due to the difficulty in recruiting large enough numbers in a clinical population. The participants belonging to each diagnostic group have different comorbid diagnoses, and are in a different state of symptomatology; this means that within the same diagnostic group, some participants were severely symptomatic, and others were in remission; additionally, participants were on different kinds of medication. It is debatable whether individuals who are in remission will still reflect a relationship with the Internet that is unique to their disorder, or reflect a relationship that is similar to the general population. In an ideal situation, participants need to have one diagnosis each, without any comorbidities, and they should all be in a similar state of symptomatology in order to have less unsystematic variation.

A final limitation is that the data collection took place during a world-wide pandemic due to COVID-19 which imposed on people higher reliance on the Internet for academic, occupational, and social functioning. It is not clear to what degree this impacted individuals' perception of the Internet and the functions of it. The scores obtained on the Internet Addiction

test could be reflective of an increase compared to pre-pandemic baseline and we wouldn't know, because of lack of pre-pandemic testing. Comparisons with previous studies on Internet Addiction conducted in Lebanon is not appropriate since this is the only one, to our knowledge, that has been conducted on a clinical sample.

In order to address these limitations, and extend these results further than this particular sample, the study requires replication across larger samples, different cultures, different times (in terms of pandemic status), and across more pure samples of diagnostic groups with less differentiation across participants of the same group.

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