

**COGNITIONS IN PROBLEMATIC INTERNET USE: A CROSS-
SECTIONAL STUDY ON PREDICTING, MEDIATING, AND
MODERATING EFFECTS**

**A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF
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EBENEZER LALDUHSAKA

MZU REGISTRATION NO.:2200067

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MODERATING EFFECTS**

BY

EBENEZER LALDUHSAKA
Department of Clinical Psychology

Supervisor

Prof. ZOKAITLUANGI

Joint Supervisor

Dr. NARENDRA NATH SAMANTARAY

Submitted

**In partial fulfillment of the requirement of the Degree of Doctor of Philosophy
in Clinical Psychology of Mizoram University, Aizawl.**

SUPERVISOR'S CERTIFICATE

This is to certify that the present research work titled, “cognitions in problematic internet use: a cross-sectional study on predicting, mediating, and moderating effects” is the original research work carried out by Mr Ebenezer Lalduhsaka under my supervision. The work done is being submitted for the award of the Doctor of Philosophy in Psychology of Mizoram University.

This is to further certify that the research conducted by Mr Ebenezer Lalduhsaka has not been submitted in support of an application to this or any other University or an Institute of Learning.

Date: December 2025

Place: Aizawl

(Prof Zokaitluangi)

Supervisor

Department of Clinical Psychology

Mizoram University

(Dr Narendra Nath Samantaray)

Co-supervisor

Department of Clinical Psychology

National Institute of Mental Health and Neuroscience

DECLARATION
MIZORAM UNIVERSITY
JUNE, 2025

I **EBENEZER LALDUHSAKA**, hereby declare that the subject matter of this thesis is the record of work done by me, that the contents of this thesis did not form basis of the award of any previous degree to me or to do the best of my knowledge to anybody else, and that the thesis has not been submitted by me for any research degree in any other University/Institute.

This is being submitted to the Mizoram University for the **Degree of Doctor of Philosophy in Clinical Psychology**.

EBENEZER LALDUHSAKA

(Dr LAXMI NARAYAN RATHORE)

Head

(Prof ZOKAITLUANGI)

Supervisor

(Dr. NARENDRA NATH SAMATARAY)

Joint-Supervisor

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CHAPTER 1
INTRODUCTION

With the advancement of the Internet and digital technologies, society is becoming more linked. In 1969, the first version of the Net was created and interconnected 15 academic institutions, including Stanford University and the University of California, Los Angeles (Wu, 2017). People are rapidly adopting information and communications technology (ICT) to exchange ideas, connect with one another, buy things, and acquire data from internet sources due to the rapid growth and pervasiveness of ICT (Cheung et al., 2013; Wong et al., 2018).

The widespread usage of the internet by the younger generation is having a negative impact on their ability to perform in social, intellectual, and psychological domains. Web users, and especially students engage in a wide range of online activities that could cause them to neglect their crucial daily duties. Digital gadgets like computers, tablets, and smartphones are great tools in academic settings that improve the level of instruction and learning in the classrooms (Chen et al., 2014; Aagaard, 2015), but they can cause disruptions amongst class-going students (Akbulut et al., 2017; Seemiller, 2017; Wu et al., 2018). About one-third (35.3%) of American post - secondary students were taking at least one remote learning course as of 2018, with 16.6% enrolling only in online courses (Distance Learning, 2019).

The World Health Organization announced a pandemic in March 2020 after the outbreak of a virus known as coronavirus disease 2019 (COVID-19) spread from Wuhan, China, by December 2019. (Ghebreyesus, 2020). Since then, it has resulted in a significant disruption to American higher education. Well over 1,100 schools and universities across all fifty states have already switched to online classes or cancelled on-campus programs as of March 6, starting with the University of Washington (Smalley, 2020). Similar issues were detected in India across different states including Mizoram. Unless a viable vaccine could be produced and made available to medical experts, it is realistic to assume that a significant number of educational institutes will remain in operation exclusively online in order to safeguard students and staff.

Regardless of knowing how widespread COVID-19 is in the community as a whole, the Centers for Disease Control and Prevention (CDC) expressly advises online classes in the presence of even one reported case on campuses (Interim Guidance for Administrators of US Institutions of Higher Education, 2020). If a student hasn't ever taken a distance learning course before, it may be difficult for them to jump to one suddenly. Students might not have access to household amenities that support productive study routines, like a quiet space away from outside interruptions. An increase in members of the family who work from home or being unemployed might make this situation worse (Brynjolfsson et al., 2020). Students must deal with their own digital device habit in addition to disruptions from members of the family when studying at home without such guidance of professors to assist them stay on track. Self-discipline is essential for success at college since students are often going through a critical phase of learning and development and are no more underneath the harsh control or monitoring of their parents or lecturers at school. The Online world has almost permeated every element of modern living and is distinguished by its involvement, promptness, popularity, and openness.

As a result, young people and students' scholastic and life choices are significantly influenced by the Internet. Today's digital systems' promise of fast communication has resulted in digital temptations that harm work efficiency and undermine organizational discipline (Rigby, 2006; PR Newswire, 2013). The socio-economic growth of a nation depends in large part on its educational system, which must be functional and productive in order to meet the objectives set forth in the resources available. 2012 (Cornali).

What we mean by "healthy use of the internet" is using it to get things done in a reasonable amount of time without causing any intellectual or emotional issues (Davis, 2001). While there are some people who limit their use of the internet to things that are absolutely essential, there are others who find it difficult to impose any kind of constraints on their online consumption. Excessive

internet usage, referred to as uncontrolled internet use, pathological internet use, net addiction, or internet addiction, results in challenges in both professional and interpersonal settings (Whang, Lee, & Chang, 2003a; Widyanto, 2007).

Griffiths (1998) points out that although most people's Internet usage isn't an issue, there are others whose dependency to the Internet is a serious issue to worry about, based on the limited investigation data. The consumption of food, tobacco use, engaging in gambling, shopping, work, leisure, and sexual activity are all examples of things that people are considered to be "addicted" to (Truan, 1993). Addictions to technologies that entail human-machine interaction falls under the operational definition of non-chemical (behavioral) addictions. They can be either active or passive (like television or computer games), and they typically have cues and rewards that can encourage the development of addictive behaviors (Griffiths, 1995). Early studies, such as the one that Shotten (1991) carried out, investigated the phenomenon of "computer addiction" among people who worked in the field of computer science and technology. A young "independent bachelor introvert" who had an ongoing passion in science and technological advances was the usual candidate in the empirical study. As a subclass of behavioral addictions, Internet addiction is considered by Griffiths (1998) to be similar to addiction to computers and obsession with gambling, both of which are forms of technology addiction.

According to Kandell (1998), "a psychological dependency on the Internet, regardless of the type of activity once logged on" is what defines Internet addiction.

1 History, Terminology and growth of internet addiction

Kimberly Young, PhD, made the initial suggestion for Text Revision in her groundbreaking 1996 work when she realises the concept that problematic computer use fulfills the criteria for an addiction and suggested that it should be added in the Diagnostic and Statistical Manual of Mental Disorders (DSM), 4th edition, when it is revised. As a result, the negative effects of spending too much time online are affecting more people than before. An individual's

personal, professional, and physical lives are all negatively impacted by an addiction to the internet (Young, 2004).

Based on the findings of online gambling disorder, many scholars have advocated for the addition of Internet addiction to DSM-5 (Kuss et al., 2013). The acceptance of this proposition occurred not too long ago. In addition, the number of people who are addicted to the Internet is growing at a rapid rate, which coincides with the considerable annual increase in the number of people who use the internet and the faster connection times (Hawi (2012). Although it is still debatable to what degree the Internet serves as a centre for addiction or encourages addictive behaviour. Playing games has been thoroughly examined as a web-based program with significant addictive potential (Huang, 2006; Kuss & Griffiths, 2012b; Leung, 2004).

As a result, internet-gaming disorder, one particular type of Problematic internet use, has previously been added to section III of the Diagnostic and Statistical Manual (DSM-5) (APA, 2013), emphasizing that it is most likely that this disorder has clinical implications yet additional study is required to guarantee its clinical significance and the precise phenomenology.

The clinical significance is evident, as numerous clinicians encounter patients experiencing severe adverse effects from excessive Internet use or specific applications. However, the terminology and classification of this phenomenon remain subjects of ongoing debate (Young, 1998b, 1999; Charlton and Danforth, 2007; Starcevic, 2013). Young (2004) believes that the criteria established for pathological gambling and substance dependency should similarly be applied to Internet addiction. This aligns with the findings of other researchers, such as Griffiths (2005) in his component model of addictive behaviours. Various terms are employed in the field of science to describe excessive Internet use, including Internet addiction (Young, 1998b, 2004; Hansen, 2002; Chou et al., 2005; Widyanto and Griffiths, 2006; Young et al., 2011), compulsive Internet use (Meerkerk et al., 2006, 2009, 2010), Internet-related addictive behaviour (Brenner, 1997), Internet-related

problems (Widyanto et al., 2008), problematic Internet use (Caplan, 2002), and pathological Internet use (Davis, 2001). The term Internet addiction is preferred due to significant parallels observed between Internet addiction and other behavioural addictions (Grant et al., 2013) as well as substance dependency (Griffiths, 2005; Meerkerk et al., 2009).

The term problematic internet use, problematic internet use and internet use disorder has been used interchangeably in previous researches and also in consistent with the nomenclature of the DSM-5 and the ICD-11, however we will use the term 'problematic internet use' more except when it's more precise to use the term 'problematic internet use'.

1.1 Problematic internet use; features and outcomes

Kimberly Young (1996) reported the first account of a patient exhibiting signs of Problematic internet use. According to Young (1999a,b), the phrase "Problematic internet use" is broad and encompasses a wide range of behaviors and issues with control of impulses. She says there are five distinct subtypes that fit this description:

- Cyber sexual addiction: compulsive use of adult websites for cybersex and cyber porn.
- Cyber-relationship addiction: Over-involvement in online relationships.
- Net compulsions: Obsessive online gambling, shopping or day-trading.
- Information overload: Compulsive web surfing or database searches.
- Computer addiction: Obsessive computer game playing (e.g., Doom, Myst, Solitaire etc.).
-

Disordered behaviour related to Internet use qualify as behavioral addiction according to these criteria (Chou et al., 1999). Since it is classified as a behavioral addiction (Holden, 2001; Kuss, 2012), it is characterized by the same symptoms that are often associated with substance-related addictions. These

symptoms include mood modulation, salience, tolerance, withdrawal, conflict, and relapse (Griffiths, 2005). There is a multitude of neurological data that supports the resemblance with other addictions which further supports the similarity (Kuss & Griffiths, 2012a). According to the findings of a subsequent study (Chou and Hsiao, 2000), investigators discovered that the participants of an addictive group devoted a greater amount of time on BBSs as well as emails than participants of a group that did not have an addiction. Additionally, the group that was hooked to the internet spent a greater amount of time on the internet compared to the group that was not addicted. The amount of minutes spent using mail and bulletin boards (BBSs) is a factor for assessing whether or not someone is addicted to the Internet, according to this research.

According to Adile and Olatokun (2014) and Widyanto and Griffiths (2006), internet addiction can be characterised as an atypical condition, a stimulant for other behavioural addictions, an impulse control disorder, or a result of other mental diseases. Actually, among all Internet users, online gaming accounts for 50.9%, with information services coming in at 46.8%. Research has shown that gaming is a factor that can lead to an individual becoming overly reliant on the Internet (Jiang, 2014; Siomos et al., 2008). This conclusion is supported by the study conducted by Müller et al. (2014), which found that individuals with an addiction to the Internet often visit several pornographic, gaming, and gambling websites.

However, there is a behavioural overlap between gaming and Internet addiction when it comes to online gaming. Certain authors (Widyanto & Griffiths, 2006) argue that instead of examining Internet addiction in general, researchers ought to concentrate on specific online activities that may be addictive, as individuals do not become addicted to the medium itself, but rather to the behaviors they perform online. Furthermore, the utilization of social applications, specifically online chatting (Huang, 2006; Leung, 2004), social networking sites (SNSs) (Kuss & Griffiths, 2011; Leung & Lee, 2012), including Facebook (Kittinger, Correia, & Irons, 2012), and online instant messengers (Leung, 2004; Yuen & Lavin, 2004), has been correlated with Internet addiction. Goldberg (1995) developed the

phrase "Internet addiction" to describe the negative effects of spending too much time online. Ever since then, scholars have taken notice of this issue and are actively seeking solutions (Kuss et al., 2013). From a clinical point of view, Internet addiction is taken very seriously, and specialized treatment techniques have been implemented in a number of countries. This is evidence that persons who suffer from this addiction need the assistance of a trained expert (King et al., 2011).

1.2 Revision into the DSM 5

There is significant agreement regarding the various uses of the Internet that can lead to addictive behaviours, including gaming, gambling, pornography, social networking, and online shopping. However, only Internet Gaming Disorder has been recently recognised in the appendix of the DSM-5 (APA, 2013), indicating a need for further research to establish its clinical significance and underlying mechanisms.

The proposed criteria show notable similarities to those utilised in diagnosing other types of addiction and encompass:

- preoccupation with Internet games
- withdrawal symptoms of irritability, anxiety, or sadness
- development of tolerance
- unsuccessful attempts to control the behavior
- loss of interest in other activities
- continued excessive use despite knowledge of psychosocial problems
- deceiving others regarding the amount of time spent gaming
- use of this behavior to escape or relieve a negative mood
- jeopardizing/losing a significant relationship/job/educational opportunity

The APA has now directed its attention towards Internet gaming. We contend, however, that other applications may also be utilised in an addictive manner (Young et al., 1999; Meerkerk et al., 2006). We summarise the results of prior studies on Internet addiction in a comprehensive manner, noting that a significant number of published studies have focused primarily on Internet gaming. While not all criteria need to be met, we wish to emphasise one particular criterion that appears to be significant and is most commonly observed in patients with

Internet addiction. This criterion is defined as "unsuccessful attempts to control behaviour," or more concisely, "loss of control." This criterion has been frequently identified in the analysis of the factorial structure of questionnaires designed to evaluate Internet addiction (Chang and Law, 2008; Korkeila et al., 2010; Widyanto et al., 2011; Lortie and Guitton, 2013; Pawlikowski et al., 2013).

The capacity to regulate personal Internet usage is a significant determinant in mitigating the risk of Internet addiction. Consequently, if an individual experiences Internet addiction, a primary therapeutic objective should be to restore the patient's control over their Internet usage.

2 Integration of the Person-Affective-Cognitive-execution (I-PACE) model of problematic internet use

The following elements are the primary parts of the I-PACE model: Predisposing factors, emotional and cognitive reactions to internal and external stimuli, inhibitory and executive control, decision-making behaviour that leads to the use of particular Internet apps and websites, and the results of using the preferred Internet applications and websites.

The improved I-PACE model integrates psychosocial and neuroscientific theories concerning behavioral dependencies and substance use disorders to provide a theoretical framework for understanding the development of addictive behaviors. We view diseases brought on by addictive behaviors as the outcome of interactions between an individual's fundamental traits and a number of moderating and mediating variables. These associations may be dynamic and arise gradually as a result of engaging in particular behaviors. There are three primary steps in the I-PACE model revision.

First, we distinguish predisposition variables from more behavior-specific ones by concentrating on those that have been linked to various addictive behaviors (gambling disorders, gaming disorder, and others). Second, we characterize the inner ecosystem of the addiction process in the I-PACE model more

precisely in light of the most recent studies. Third, we distinguish between the initial and later phases of the process to clearly show how the stage of addiction may affect the moderating and mediating variables' functions.

We suggest that because the I-PACE model of addictive behaviors allows for the development and testing of precise hypotheses about the interaction effects of particular variables that clarify variances in the severity of behavioral addiction symptoms, it may be helpful for psychological and neuroscientific research. By identifying and examining potential mediating variables that could serve as crucial therapeutic targets, such as expectancies and affective and cognitive reactions to triggers, the model may also provide inspiration for clinical practice (King et al., 2017; Potenza, 2017).

2.1 The P Component of the model: A person's fundamental traits are influenced by predisposing factors, and they may be rather constant over time. Regarding the possibility of a genetic component to Internet use disorders, studies indicate that up to 48% of individual differences in Internet use disorder characteristics may be accounted for by genetic factors. However, the degrees of heritability estimates vary across investigations (Deryakulu & Ursavas, 2014; M. Li et al., 2014; Vink et al., 2015).

However in terms of genetic profiles, those who suffer from various Internet-use problems probably constitute a diverse population. The majority of genetic research either included people who had an Internet gaming issue or did not distinguish between different forms of usage (Weinstein & Lejoyeux, 2015). Psychopathological features, personality, and social cognitions also play an important role. The three primary co-morbid disorders of Internet-use disorders are depression, (social) anxiety disorders, and attention-deficit/hyperactivity disorder (ADHD) (Ho et al., 2014; PrizantPassal et al., 2016).

Unwanted early childhood experiences, such as early trauma, physical or emotional abuse, and social withdrawal, are additional biopsychological

elements that may make people more susceptible to developing a psychological disorder in general or an addictive habit in particular. According to certain research, bad early life experiences and Internet use disorders are correlated (Dalbudak et al., 2014; Hsieh et al., 2016). Traumatic early-life experiences have also been associated with an insecure attachment style, which has been connected to problematic Internet use (Schimmenti et al., & Famà, 2014; Odaci & İkrîkçi, 2014) including problematic internet pornography usage. (Kor et al., 2014). High impulsivity is one of the personality characteristics that has also been linked to disorders related to gambling (Dowling et al., 2017), gaming (Gervasi et al., 2017; Kuss et al., 2018; Ryu et al., 2018), and internet-use that are not specified (Kayış et al., 2016) disorders, as also maladjusted adaptive strategies with gaming disorder (Schneider et al., 2018).

2.2 Affective and cognitive responses to external or internal stimuli: The A- and C-components of the model

There is still a mystery around why certain people may use various Internet apps or websites in an addictive way, aside from general and situational risk factors for developing a particular Internet use problem. Some researchers perceive Internet usage disorders as maladaptive coping mechanisms for dealing with daily life (Kardefelt-Winther, 2014).

Cognitive processes may be affected by factors like perceived stress caused by interpersonal disputes or unstable mood (such as happiness or depression) by drawing attention to immediate rewards and impulse decision-making, for instance (Starcke & Brand, 2012, in press). Individuals' subjective stress reactions to environmental circumstances may have an impact on their decision to using the Internet to overcome the related thoughts and emotional problems in their life (Tavolacci et al., 2013).

In accordance with this theory, people with Internet-gaming disorders may react to cues related to the Internet by experiencing mood changes and other withdrawal symptoms, whereas cues related to addiction may be linked to the anticipation of pleasure or the alleviation of withdrawal symptoms (Kaptsis et al.,

2016; Osborne et al., 2016; Romano, Osborne, Truzoli, & Reed, 2013). If the person or individual has the (implicit or explicit) expectation or belief that using the Internet is stress-relieving or has other Internet-related cognitive biases, this interaction might then lead to a greater chance of using the Internet. Affective and cognitive responses influence choices on how to behave. Two systems of interaction may influence a person's choice to engage in a particular behavior: an impulsive/reactive system that primarily relies on associative learning (classical and operant conditioning), and a reflective/deliberative system that primarily relies on reasoning and executive functions (Kahneman, 2003; Schiebener and Brand, 2015; Strack and Deutsch, 2004).

2.3 Executive functions, inhibitory control: The E-component of the model

The model on Internet-gaming disorder by Dong and Potenza (2014) and the framework by Brand, Young, et al. (2014) both included central components that could be impacted by decreased executive functioning and reduced inhibitory control (Brand, Young, et al., 2014). Executive functioning, inhibitory control, and decision-making have been the subject of research in the context of Internet-use disorders (Dong, Hu, Lin, & Lu, 2013; Pawlikowski & Brand, 2011; Sun et al., 2009). Individuals with Internet or alcohol use problems shows comparable performance on executive-function tests, although both groups scored considerably lower than healthy participants (Z. Zhou, Zhu, Li, & Wang, 2014).

The results of neuroimaging experiments are in line with results about diminished executive functioning and inhibitory control, possibly as a result of cue reactivity and desire (cf. Kuss & Griffiths, 2012; Meng, Deng, Wang, Guo, & Li, 2015; Sepede et al., 2016). Gray and white matter in prefrontal brain areas as well as other brain regions, such as limbic structures, have been found to show structural variations among people with and without Internet-gaming disorder (e.g., Hong, Kim, et al., 2013; Hong, Zalesky, et al., 2013; H. Wang et al., 2015; Y. Zhou et al., 2011). To sum up, Individuals with Internet use disorders or those who seem to be at a higher risk of developing addictive patterns of Internet use exhibit reductions in executive functions, inhibitory control, and decision-making when combined, especially when they are exposed to circumstances that have cues associated with

Problematic internet use.

3 Loneliness and internet addiction; a looping effect

According to Peplau and Perlman (1982), an individual experiences loneliness when there is a discrepancy between his desired social relationships and the ones he really maintains. Everyone, regardless of age, gender, religion, race, or financial status, is capable of describing the sour taste of loneliness they've experienced (Rokach, 2004).

Despite this, studies have shown that young adults and teenagers are more likely to experience loneliness than older persons (Jones & Carver, 1991; Ostrov & Offer, 1980; Hartog, 1980; Rubenstein & Shaver, 1982). Despite this, being lonely is inherently a subjective experience that may be measured according to how fulfilling interpersonal relationships are for the individual (Ilhan, 2012). According to Weiss (1973), a person experiences loneliness when their social connections are lacking in qualities like honesty, openness, and intimacy. Weiss views loneliness as a problem with the quality of relationships with other people rather than the quantity.

According to the DSM-IV-TR (2000), symptoms of depression include profound sadness or grief, sleeplessness, appetite loss, an unpleasant mood, loneliness, hopelessness, irritability, self-dislike, and suicide thoughts. Shotton (1991) previously emphasised that technological devices do not induce loneliness in individuals; rather, those who are addicted to computers tend to be socially isolated persons from the very beginning. Over time, especially with the increasing popularity of the Internet, certain research corroborated this finding while others did not. The research by Loytsker and Aiello (1997) posits that loneliness induces Internet addiction, while Morahan-Martin (1999) asserts that excessive Internet use forecasts loneliness.

Morahan-Martin and Schumacher (2000) eventually argued that the relationship between loneliness and Internet use is complex and difficult to ascertain. In the present day, scholars have the same belief and state that implications in both

directions are true, which implies that the link is looping. According to Sinkkonen et al. (2014), the feelings of loneliness and isolation that an individual experiences can either motivate or assist extensive Internet usage. In addition, Kim et al. (2009) pointed to feelings of isolation as both the cause and the result of problematic Internet use. The authors Pratarelli et al. (1999) provided evidence that supports the notion of this repetitive loop between the use of computers and the Internet and feelings of loneliness. They argued that loneliness encourages the use of computers and the Internet, which in turn leads to feelings of loneliness, which in return encourages the use of computers and the Internet, and so on. The distinction between an unhealthy user and a regular enthusiast lies in the fact that an ordinary Internet user engages in communication both in cyberspace and in person (Suler 2004).

Furthermore, Weiss (1987) has examined familial and private friendship interactions in the area of emotion and friendship connections in social situations in the social dimension, both of which pertain to the topic of loneliness. Russel et al., (1980) posited that loneliness possesses a singular dimension, characterizing it as a universal phenomenon encountered at varying levels and intensities, influencing all facets of existence (social, psychological, cultural, etc.). (Cecen, 2008). Various literary works (Russell et al., 1980; DiTomasso & Spinner, 1997) have explored the unpleasant sensation of loneliness and its associated emotions, such as grief, anger, fear, and concern.

3.1 The social needs perspective and the cognitive discrepancy model: Prominent theoretical frameworks for understanding loneliness encompass the social needs perspective and the cognitive discrepancy model (Heinrich & Gullone, 2006; Marangoni & Ickes, 1989). The social needs perspective asserts a clear correlation between objective social deficiencies and the subjective sensation of loneliness (Heinrich & Gullone, 2006; Marangoni & Ickes, 1989; Sullivan, 1953).

Practitioners of this viewpoint assert that relationship-specific forms of loneliness emerge when a partnership fails to fulfil its fundamental social demands (DiTommaso & Spinner, 1997; Weiss, 1973). The cognitive discrepancy

model, in contrast to the social needs standpoint, emphasises individuals' subjective assessment of their connections rather than the requirements satisfied by such interactions (Heinrich & Gullone, 2006; Marangoni & Ickes, 1989; Russell et al., 2012). It is presumed that all persons employ an internal criteria to assess their interactions (de Jong-Gierveld et al., 2006; Marangoni & Ickes, 1989; Perlman & Peplau, 1981; Russell et al., 2012). This internal criteria pertains to the expected amount and quality of social ties (de Jong-Gierveld et al., 2006) and is partially founded on a comparison between an individual's interpersonal connections and those of comparable people (Russell et al., 2012).

Loneliness is believed to arise when individuals sense a gap between their internal standards and the actual amount or quality of their social relationships (de Jong-Gierveld et al., 2006; Marangoni & Ickes, 1989; Perlman & Peplau, 1981; Russell et al., 2012). As a result the cognitive discrepancy hypothesis focusses on subjective deficiencies in social connections rather than real ones. The social needs perspective and cognitive discrepancy model both highlight the significance of the social context in the sensation of loneliness (Marangoni & Ickes, 1989). Furthermore, these ideas emphasise the detrimental aspects of loneliness. Loneliness is perceived as a detrimental emotion linked to adverse events within one's social environment.

3.2 Loneliness from the Evolutionary Theory Perspective

A novel idea that has lately gained traction in loneliness studies is the ETL (Evolutionary Theory of Loneliness). This hypothesis posits that both genetic factors and the social environment significantly influence the sensation of loneliness. Furthermore, it examines both the adverse and beneficial aspects of loneliness.

Forming and sustaining social connections with conspecifics is crucial for reproduction and the survival of social organisms, including humans. Social groups can collectively assume the responsibilities of procuring food, nurturing babies, and safeguarding against predators. Biological warning mechanisms have developed to promote behaviours that enhance the probability of

survival (J. T. Cacioppo et al., 2014; J. T. Cacioppo & Patrick, 2008). The ETL posits that the sensation of social isolation, or loneliness, persists even in the presence of others and functions as a biological alert system, prevalent among all social species, indicating that beneficial social connections are threatened or compromised (J. T. Cacioppo et al., 2015; S. Cacioppo et al., 2014). The unpleasantness of loneliness compels individuals to restore or substitute inadequate beneficial connections, and the resultant alleviation of bad emotions is gratifying.

Furthermore, beneficial social interactions constitute inherently good and gratifying experiences (J. T. Cacioppo et al., 2006; S. Cacioppo, 2018).

Nonetheless, the ETL indicates that the neurocognitive and adaptive behavioural consequences of loneliness extend beyond that. Intraspecies hostility poses a considerable risk to reproductive success in anthropoid primates (Dunbar, 2011; Silk, 2007), particularly humans (Georgiev et al., 2013; Harari, 2015). The unrestrained desire to establish dependable connections among individuals in such settings might thus be detrimental. The ETL indicates that the perception of social isolation (e.g., lack of mutual help and protection) is detrimental to health and well-being, and poses significant risks (J. T. Cacioppo & Patrick, 2008). The ETL asserts that loneliness heightens the motivation to engage with others and fosters a focus on immediate self-preservation, which includes (a) heightened implicit vigilance for social threats and, particularly in humans, (b) an augmented concern for one's own interests and welfare, leading to increased self-centredness. Evidence currently exists for both ideas (J. T. Cacioppo et al., 2017; S. Cacioppo et al., 2016; Spithoven et al., 2017).

The ETL asserts that loneliness is affected by both factors in the environment and genetic predisposition (J. T. Cacioppo et al., 2014; J. T. Cacioppo & Patrick, 2008). The latter phrase denotes the mechanism via which parents transmit genetic information to their progeny. Loneliness functions adaptively as a signal that encourages individuals to re-establish connections with important others; hence, genetic variations affecting loneliness persist in the population via transmission over generations. This argument suggests that the genetic basis of loneliness extends

beyond the emergence of a solitary gene. The ETL posits that the establishment and preservation of social relationships yield various adaptive advantages that facilitate mutual assistance and safeguarding (J. T. Cacioppo et al., 2014; J. T. Cacioppo & Hawkley, 2009). Consequently, several genes are implicated with loneliness. This assertion corresponds to recent research indicating that several behavioural characteristics are polygenic (Visscher et al., 2012).

The ETL indicates that certain individuals are predisposed to experiencing loneliness greater than others. This individual heterogeneity in loneliness is influenced by both genetic factors and environmental conditions, or more accurately, by their interplay. The relationship between environments is characterised in psychology as differential sensitivity to the environment and is represented in biology and evolutionary genetics by the idea of response norm. The differential susceptibility theory (Belsky et al., 2007) posits that people with particular genetic variations exhibit heightened sensitivity to environmental influences. They experience bad consequences (e.g., loneliness) in detrimental situations and favourable results (e.g., social connectivity) in advantageous ones.

In the contrary, people without these particular beneficial interactions are inclined to rejoin the group to offer their acquired skills and insights from external experiences. Individuals who are attuned to the sensation of loneliness are more inclined to persist in and protect their social group. Furthermore, the ETL suggests that the depressive behaviours linked to loneliness diminish the probability that an individual will actively seek reintegration into the social group, while the depressive vocal tone and expressive and postural movements serve as a subtle invitation for those eager to get back together (J. T. Cacioppo et al., 2014).

4. Problematic internet use; attention control and attentional lapses

Attention is a multi-faceted mental process that relies on the interplay of several brain networks. Posner and his colleagues put out the attentional network model, which has been significant in the field of attention theory (Fan et al., 2002; Posner and Petersen, 1990). Human attention, in accordance to this model, is divided into

three parts: alertness, which is being awake and ready to respond to signals; orienting, which is moving focus from one place to another to pick out information from sensory input; and conflict network, which is resolving conflicts in response. Notably, according to research conducted by Fan et al. using the attentional network test (ANT) paradigm, key areas of the brain involved in alerting, orienting, and conflicting attention include the temporal parietal junction, the superior parietal lobe, and the frontal eye fields, respectively (Fan et al., 2003).

Attention Deficit Hyperactivity Disorder is a neurodevelopmental condition characterised by attention deficiency, hyperactivity, and impulsivity. The global frequency is 5.29% (Polanczyk et al. 2007). It is linked to reduced academic performance, challenges in peer interactions, challenges with interpersonal relationships, and behavioural issues among children and adolescents. Furthermore, the co-occurrence of ADHD with oppositional defiant disorder, conduct disorder, anxiety disorder, and elimination disorders has been commonly documented (Alqahtani 2010, Herguner and Herguner 2012).

Additionally, a strong connection exists between substance-use disorders and ADHD (Frodl 2010, Molina and Pelham 2003). Recent studies indicate that ADHD is the most common comorbid disorder with IA, and there is a correlation between the severity of ADHD and the severity of IA (Cao et al., 2007, Ko et al., 2008, Ko et al., 2009, Yoo et al., 2004). Although the exact ways in which ADHD and IA are related remain unclear, it is possible that both disorders share common biological and psychological bases (Ko et al., 2012).

4.1 Selective filter & Attenuation theory

The premise that attention is directed to a single message at any given moment is fundamentally inherent in all contemporary theories of attention. Broadbent's (1958) research on the memory of dichotically given brief messages led him to infer that the cognitive capacity necessary for understanding one spoken word inhibits the concurrent processing of a second message. His filter model of selective attention (1958) was subsequently revised (Treisman, 1960) upon discovering that significant

recognition of secondary signals transpired.

However, not even substantial secondary message detection is incompatible with Broadbent's single-channel hypothesis. Instead of assuming that a single input channel can process all data at once, regardless of type, it suggests that several input channels merge into a single, limited channel that can process as many input channels as its capacity allows, with the maximum number of channels depending on the data carried by each. It is possible to reframe the results of secondary message identification as proof of surplus capacity following primary signal analysis, rather than as proof that the model is false.

Furthermore proof suggesting there may be spare capacity after processing one spoken communication has been put forward by Shaffer and Hardwick (1969). When asked to monitor two voice messages at once, both of which contained target words, respondents were unable to identify all of them but were able to identify over 50% of them. According to their reasoning, these findings contradict theories that propose selective attention tasks either completely ignore sensory data or partially block it. Since it is not necessary to block the entire "non-attended" message according to Broadbent's idea, detection rates above 50% need not be in contradiction with filter theory (Shaffer and Hardwick, 1969).

The fact that secondary message detection does not seem to be random is one of its characteristics. The pattern of detection that happens cannot be explained by Broadbent's hypothesis, which is lacking in detail. Treisman (1964), Deutsch and Deutsch (1963), and Moray (1959) all used the concept of "importance" as a common feature of the detected material, whether it was long-lasting or temporary. This idea was used in the explanatory theories of Treisman (1960), Deutsch and Deutsch (1963), and Norman (1968).

Another thing that Treisman speculated about is the role of probability as a regulator. There are certain results that cannot be explained by the "importance" and "probability" concepts. Repeated digits, anglicised Czech, and the non-normality of a second order approximation to English were seen by several of

Treisman's (1964b) participants; material of this kind is neither very important nor highly probable. Because of this, models that use these ideas are only partially correct. It appears, however, that Broadbent's filter theory, in conjunction with the theory of analysis by a hierarchy of tests, can handle not only all the discoveries that are described by the "importance" and "probability" processes, but also those that these principles do not.

Prose excerpts used as both the main and secondary messages in the initial selective attention trials that supported the usage of these models. Since the quantity of redundancy in prose is known to change from one point to another, the amount of capacity needed to shadow the principal message is also known to fluctuate. The quantity of processing for the secondary message should fluctuate oppositely with the quantity of processing capability requested by the primary message if, as allowed by Broadbent's model, any extra capacity after analysing one input is employed to analyse subsequent inputs.

According to Treisman (1964a; Treisman, 1969), there is a definite order of analysis that includes physical clues, syllabic pattern, sounds, words, grammar, and meaning. Here we can see an example of how the execution of the Secondary messages might change from one point to another. The tasks are executed in a certain sequence, starting from the lowest level and progressing upwards. If an individual's ability to process the entire message is insufficient, the lower-level tests can be completed to provide information about the physical characteristics and syllabic pattern, but the higher-level tests must be skipped so that the hearer does not lose out on specific sounds, words, and word sequences in the message. This hierarchical testing system indicates a lack of sufficient capacity for comprehensive analysis. The entire hierarchy of tests is conducted for the primary message, and all relevant information is extracted. The quantity of information derived from the secondary message at any given moment is contingent upon the hierarchical level of tests attained, which fluctuates based on the processing capacity demanded by the primary message at that time.

The secondary message should be analysed for relevant information when there is inadequate capacity for a comprehensive analysis. The entire hierarchy of tests is conducted for the primary message, and all relevant information is extracted. The quantity of information derived via the secondary message during any given moment is contingent upon the hierarchical level of tests attained, which fluctuates based on the processing capacity demanded by the primary message at that time. It is reasonable to anticipate that the listener will recognize aspects of a secondary message that are evaluated at lower levels of the hierarchy of tests. However, knowledge of features assessed at higher levels will likely be less prevalent. This is due to the fact that the surplus capacity available after processing the primary message typically permits analysis at lower levels more frequently than it does for higher levels. Therefore, basic physical attributes, such as pitch (Cherry, 1953), are consistently recognised.

The rare identification of a foreign language (Treisman, 1964b) arises from the requirement for analysis beyond phonetic patterns for languages that exhibit significant phonetic similarity to English. Recognition of message identity separated by brief time intervals (Treisman, 1964c) is facilitated by the sufficiency of phonetic-level analysis for identity recognition, while the trace of the preceding message persists in echoic memory for comparison. Identity at the level of meaning is likely assessed on rare occasions when analysis at this level is feasible. The frequent detection of one's own name (Moray, 1959) can be attributed solely to a response to sound patterns, devoid of any semantic significance.

5. Problematic Internet Use; a student's cause of academic procrastination

During the development of the 21st century, the change of multiple spheres of social life transpired as a result of the Internet's effect. The uncertain nature of its influence and the emergence of both beneficial and harmful social repercussions stimulate curiosity and concern from academics across several fields (Arshinova & Bartsalkina, 2010; Gubanov & Chkhartishvili, 2009; Khil'ko, 2015;

Khutornoi, 2013). The utilisation of the Internet on educational campuses and within society has surged significantly in recent years.

The academic utilisation of the Internet is mostly aimed at learning and research; nevertheless, it has also become a significant aspect of student life. Students have been recognized as a risk demographic for many reasons (Widyanto & Griffiths, 2006). They possess an inherent inclination towards the Internet (Veen & Vrakking, 2006), and their notable Internet literacy has been associated with Internet addiction (Leung & Lee, 2012). Furthermore, they generally possess (i) unrestricted and boundless access, (ii) adaptable timetables, and (iii) autonomy from the oversight of their parents. Moreover, their online actions are not subject to external regulation; university authorities anticipate the use of technology, and academic environments may promote societal fear and detachment (Moore, 1995; Young, 2004).

Addiction to the Internet is rampant among students at institutions of higher education, according to Wallace (2014), because of the easy access to computers, laptops, and computer laboratories on campus. The occurrence is supposedly a major worry on a worldwide scale, increasing daily since 4% of youth and 1% of the overall population display disorder in their everyday lives (Rumpf et al., 2014). Occasionally, instances of excessive Internet engagement have been noted across several schools. The Internet has engendered severe social and psychological repercussions, notably the issue of Internet addiction, which has been a focal point of scholarly discourse for the last two decades, influenced by advancements in information technology and its accessibility.

Within the framework of Asian culture, Chou et al. (1999) found that certain Taiwanese college students who were perceived to be "addicts" implemented the messaging and conversation capabilities of electronic Bulletin Board Systems (BBSs) the most often. This was subsequently followed by the usage of the World Wide Web, the File Transfer Protocol (FTP), Newsgroups, electronic mail, and gaming. The effects of computers and the Internet, as well as new ways for teens and young adults to have fun and talk to each other, need to be looked at in the

context of larger cultural changes if we want to lessen their effects. Teenagers who are addicted to the internet additionally develop a number of mental health issues, which make their interpersonal issues and lack of social experience even worse. Teenagers and young adults often feel like they can do whatever they want in cyberspace, which has a big effect on how they develop as individuals (Davydov et al., 1994; Malygin et al., 2011; Minicheva & Khrustova, 2017; Objorin, 2011).

According to popular belief, someone who is addicted to the Internet is so engrossed in his or her online activities that he or she ignores or refuses to do anything other than engage in Internet-based activities. Addicts tend to be introverted and neglect even the most fundamental human needs, such as eating, sleeping, and resting. According to the findings of a study conducted by Ghassemzadeh et al. (2008) with a total of 1968 high school students, Internet addicts are more likely to experience feelings of isolation and have less developed social skills than moderate users. This correlation is corroborated by the findings of a number of research (Morahan-Martin and Schumacher (2000), Nalwa and Anand (2003), Tokunaga and Rains (2010), and Whang et al. (2003), among others).

According to the model proposed by Caplan (2005), a desire for social connection via the internet leads to an increase in compulsive Internet use, which ultimately results in unfavourable consequences.

In comparison to those who do not suffer from an addiction, people who are severely dependent on the Internet tend to be less extroverted, more neurotic, and experience more stressful situations in their lives (Yan et al. 2014). The research conducted by Sanders et al. (2000) corroborated this conclusion, indicating that those with lower levels of Internet use were reported to foster and sustain superior connections with peers compared to those with higher usage levels. They indicated that heightened Internet use correlated with a decreased size of local circles of friends. Abhijeet et al, 2017 on a sample of 100 college students found that loneliness, social anxiety and social support has been linked to problematic internet use among the selected sample. Social anxiety has a significant

relationship with loneliness and act as a prominent predictor for loneliness. Prevalence of internet addiction was higher among the college students selected for the study.

Manoj et al in 2017 on 100 post graduate students revealed that participants who scored higher on facebook addiction showed higher scores on loneliness as compared to participants with possible or no facebook addiction. Participants who reported higher levels of loneliness were significantly more likely to develop a severe addiction to facebook to find social comfort or to pass the time. Tania Moretta & Giulia Buodo in 2020 in a review of 17 articles shows a positive association between problematic internet use and loneliness which was reported in several cross-sectional design studies reviewed in the study. The research evidence shows ample evidence that problematic internet use and loneliness are positively related. In a 2015 study done by Kawa MH, Shai H on 75 male and 75 female University students Male university students had more internet addiction, impulsivity, and psychological distress than female university students, according to the findings, and there was a significant positive correlation between internet addiction and psychological distress, as well as internet addiction and impulsivity among university students.

According to Yung et al. (2015), there is evidence that suggests a correlation between excessive Internet use and interpersonal and emotional issues in various aspects of daily life. Additional research by Jiang and Leung (2012) adds to the mounting evidence that it is a health concern. A further research revealed that individuals who had just begun using the Internet had a greater disregard of their social life compared to long-term users (Widyanto and McMurran 2004). Yen et al. (2007) found that there is a comparable prevalence of problematic internet use among individuals who suffer from depression. Children and adolescents with no mental health issues reported developing a dependence on the internet and mental health issues as a result of utilizing a lot of time on chat rooms, hobby websites, online shopping sites, pornographic websites, and computer games (Young, 1996).

The following conditions have been linked to problematic internet use: anxiety disorders (Kratzer & Hegerl, 2008; Robin-Marie Shepherd, & Edelmann, 2005); timidity or shyness (Saunders & Chester, 2008); introversion (Ebeling-Witte, Frank, & Lester, 2007); personality disorders (Bernardi & Pallanti, 2009); and mental health issues, including paraphilia, pathological gambling and game-playing, bipolar disorder, social phobia, attention deficit hyperactivity disorder, and depression in youths (Yen, Ko, & Yen, 2007). Studies have shown that depression and problematic internet use are equally common in those with depression (Yen et al., 2007). People with depressive traits, such as low self-esteem, low motivation, fear of rejection, and the need for validation from others, may use the internet frequently. Because of the interactive features of the internet, these people may develop an problematic internet use (Yang, Choe, Baity, Lee, & Cho, 2005).

Additionally, it has been discovered that social isolation brought on by problematic internet use may contribute to depression (Tsai & Lin, 2003). A reduction in family contact and a significantly smaller social circle are two examples of the negative effects that might result from greater Internet use, as demonstrated by Sanders et al. (2000). In a similar vein, Kraut et al. (1998) discovered that prolonged use of the Internet reduces the amount of engagement that individuals have with friends and family, leads to a smaller community of friends, and increases the amount of loneliness that they experience.

6. Internet use and memory lapses

Working memory is an executive function that facilitates the retention of knowledge necessary for executing higher-order plans, which is crucial for teenagers' reasoning, learning, and language understanding. Numerous research indicate that persons with Internet Addiction (IA) have working memory deficits akin to those observed in behavioural and chemical addictions, including alcohol dependence (Zhou et al., 2014) and compulsive gambling (Zhou et al., 2016). An overview of recently neuropsychological studies indicates that internet-related cues disrupt control processes governed by the prefrontal cortex, adversely affecting functions such as working memory and other executive functions (Brand et al., 2014).

For example, focussing on the overconsumption of online pornography, a type of IA, one study indicated that healthy adults had worse working memory performance for pornographic stimuli compared to positive, negative, and neutral images (Laier et al., 2013). It has been proposed that working memory performance may be variably influenced when persons with Internet Addiction (IA) encounter internet-related stimuli.

6.1 Multi store or Dual process model of memory

In 1968, Richard Atkinson and Richard Shiffrin proposed the Atkinson-Shiffrin model, often known as the multi-store model or dual process model of memory. The concept is referred to as "stage theory" and posits that knowledge advances in a succession of discrete stages. This model elucidates the functioning of memory mechanisms. An individual may perceive numerous stimuli through sight, sound, and touch; yet, only a limited portion can be effectively retained and recalled (Atkinson & Shiffrin, 1968; Miller, 1956).

The approach has a three-store idea and asserts that memory in humans is composed of three different sections. They consist of a sensory registration, a short-term store/working memory (STM), and a long-term store (LTM). Sensory information is received by the sensory register and thereafter persists in the working memory for a duration. Ultimately, the data are transferred to the long-term storage and retained permanently.

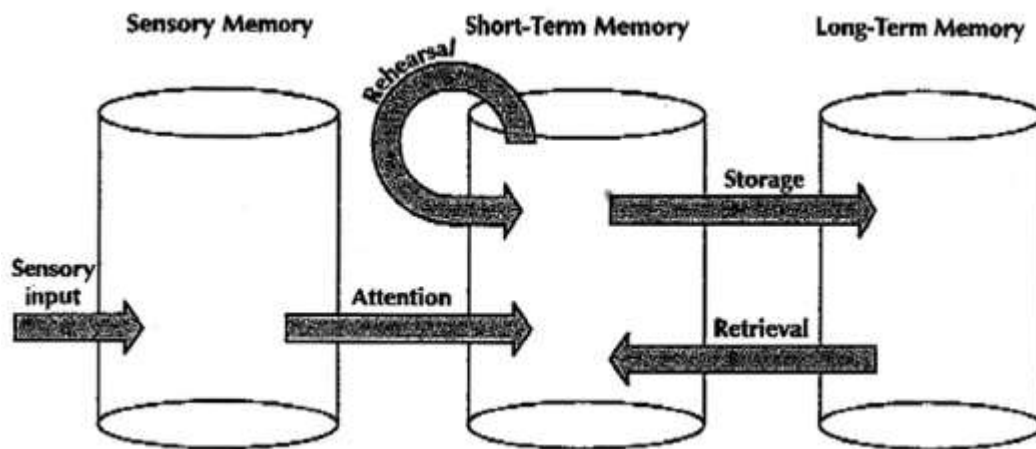


Figure 1 Atkinson & Shiffrin Model of Memory.(Atkinson & Shiffrin Model of Memory,1968)

Sensory memory (STSS) is linked to energy transduction. The human brain can just process electrical energy, while stimuli encompass many information sources such as light, sound, and temperature. Sensory receptor cells convert incoming stimuli from various forms of energy into electrical energy. This mechanism generates a memory that endures around 0.5 seconds for visual stimuli and 3 seconds for auditory stimuli. To transmit this information to the subsequent compartment of Short-Term Memory (STM), it is crucial that the original information is effectively acquired. It is feasible if the external stimuli garners attention or exhibits a remarkable characteristic. This may occur if the stimulus signifies a previously recognised and perceived pattern (Atkinson & Shiffrin, 1968; Miller, 1956).

Short-Term Memory (STM) denotes a working or conscious memory activated by external stimuli or internal cognitive processes. Occasionally, both stimuli result in short-term memory (STM) with a duration of 15 to 20 seconds. The frontal lobes of the cerebral cortex manage working memory and information processing in short-term memory, contingent upon the quantity of units being processed within a designated timescale. Prior research determined that the quantity of units that may be handled varies from $7 + 2$ to $5 + 2$ (Miller, 1956; Kahana et al.,

2008). The Organisation and repetition are the two major principles involved in the retention of knowledge in short-term memory (STM). Organising information categorically, sequentially, and chronologically, while also grouping it by relevance and suitable connections, promotes retention in short-term memory. Repetition or rehearsal, sometimes referred to as memorisation, is an effective approach for mastering any topic. The repetition of forgotten information has significant efficacy (McLeod, 2007; Kahana et al., 2008; Usher et al., 2008).

Long-Term Memory (LTM) is also known as preconscious and unconscious memory. When knowledge is readily accessible, it is termed preconsciousness, often spanning a few minutes to several hours, and is associated with long-term memory. Unconscious memory denotes any information that is inaccessible during typical consciousness. Distributed practice and elaboration are the two mechanisms that facilitate the encoding of information into long-term memory (Kahana et al., 2008; Miller, 1956; McLeod, 2007; Atkinson & Shiffrin, 1968; Malmberg, 2008; Usher et al., 2008).

The multi-store model is simplistic, basic, and severely restricted in its capacity to elucidate the intricate, varied, and perplexing phenomenon of "memory." However this psychological model fails to elucidate the non-linear dynamics of activity in the brain between anatomical regions, hence contradicting its linear framework. This model neglects to include prior experience with learning procedures or an individual's cognitive capacity, and it does not address a tri-partite memory structure (Baddeley, 1986). This concept is exceedingly simplistic; nonetheless, the operation and significance of memory are inadequately elucidated. Long-term memory cannot be a singular repository as it contains a plethora of memories and information.

This model is regarded as a mere hypothetical representation of the memory system's operation; yet, it fails to include the physical or biological foundations of memory. New models are being developed that more effectively include these additional properties, and several developmental and research

investigations have been undertaken about the physical architecture of memory systems (Baddeley, 2000). As a result, this current model is far from limitations.

7. Internet Addiction & Impulsivity

Problematic Internet Use isn't simply a behavioral addiction; it is also an impulse control problem (Sadock et al., 2007). A research revealed that individuals in the IA group exhibited more impulsivity compared to the control group, as assessed by self-reports and the Go–Stop impulsivity paradigm (Cao et al., 2007).

Impulsivity is acknowledged as multidimensional and categorised into five dimensions: negative urgency (acting rashly under intense negative emotions), positive urgency (acting rashly under intense positive emotions), lack of premeditation (acting without contemplating consequences), lack of perseverance (inability to sustain focus on tedious or challenging tasks), and sensation seeking (engaging in thrilling activities) (Cyders and Smith 2008). It is characterised by a failure to evaluate alternative options, acting on the first thought that arises without considering the implications (D’Zurilla et al. 2003), and a lack of self-regulation in response to rewards or punishments (Stewart et al. 2004).

Consequently, impulsivity is acknowledged as a predictive factor in the emergence of maladaptive behaviours that alleviate unpleasant feelings (Cyders and Smith 2008).

The latest research indicated that trait impulsivity serves as a predictor of susceptibility to Internet Addiction (IA) and compulsive gambling (Lee et al., 2012). Impulsivity is a significant personality feature that can forecast an individual's loss of control and propensity for addictive behaviours (Blaszczynski et al., 1997). Individuals with substance or gambling addictions exhibit higher results on self-reported measures of trait impulsivity, such as the Barratt Impulsiveness Scale (BIS) (Barratt, 1965, 1975), the NEO Personality Inventory (NEOPI) (Costa and McCrae, 1985), and the Temperament and Character Inventory (TCI) (Cloninger, 1994). Previous research indicates that impulsivity significantly

influences addictive behaviour, with fun-seeking (Grey, 1991) serving as a predictor of Internet addiction (Park et al., 2013).

Impulsivity is frequently associated with response inhibition or inhibitory control within executive functioning, often resulting from frontal lobe dysfunction. Numerous patients with addiction demonstrate deficits in executive functioning and impulse control (Crews and Boettiger, 2009). Research on behavioural addictions predominantly centres on pathological gambling, indicating that individuals with this condition demonstrate compromised executive functioning, as evidenced by reduced performance in tasks involving inhibition, time estimation, cognitive flexibility, planning, and decision-making (Brand et al., 2007).

Numerous studies have indicated that substance abuse often leads to impairments in neuropsychological functions, particularly those associated with attention, memory, and executive control (Baldacchino et al., 2012). In relation to the abuse of the internet, results from the Stroop task suggest that heavy Internet users demonstrate impaired executive control functioning concerning interference control (Wright et al., 2003). This finding has been corroborated by electrophysiological brain potential and functional brain imaging studies (Dong et al., 2011, 2012).

Repetitive detrimental behaviour and lack of control have been identified as unique characteristics of Internet Gaming Disorder in both the DSM-5 and ICD-11 (Király and Demetrovics 2017). Numerous executive control deficits are linked to internet gaming disorder, including impaired response inhibition (Ding et al. 2014), compromised error monitoring (Dong et al. 2013), and cognitive rigidity (Dong et al. 2014). High levels of impulsivity is also associated with Internet Gaming Disorder (Cao et al. 2007). Research assessing neurocognitive processes suggests that impulsivity in Internet Gaming Disorder (IGD) is more significant than in other behavioural addictions, such as gambling disorder (Choi et al. 2014). Thus, heightened impulsivity is incorporated in the majority of Internet addiction models, including Dual System Models (Bechara 2005) and the Interaction of Person-Affect-Cognition-Execution (I-PACE) Model (Brand et al. 2016) which we have included in

the past chapters.

Neuroimaging studies indicate that disruptions in cognitive control systems lead to impulsivity (Steinberg et al. 2008), and diminished executive control may significantly contribute to the emergence of addictive behaviours (Brand et al. 2016). Research has shown that during activities related to impulse control, addicted individuals have atypical activations in the frontal, insular, temporal, and parietal cortices as compared to healthy controls (Dong et al. 2012). Moreover, impulsivity correlates with depression (Granö et al. 2007; Swann et al. 2008) and indirectly contributes to loneliness and deficiencies in interpersonal connections (Savci and Aysan 2016). Consequently, impulsivity may contribute to subsequent emotional and social functioning (Ryu et al. 2018).

Impulsivity is characterised by actions taken without adequate assessment of alternatives and by rapid, unpremeditated responses to internal and external stimuli, often disregarding possible adverse consequences for oneself and others (Güzel et al., 2012; Moeller et al., 2001). Impulsivity is not addressed as an independent action but as a component of a behavioural pattern and a genetic disposition (Moeller et al., 2001). While impulsivity may occur in typical communities, it adversely affects individuals' quality of life and diminishes their usefulness (Moeller et al., 2001). Simultaneously, people reporting Internet-related issues were shown to have increased impulsivity following Internet exposure (Reed et al., 2015). Individuals characterised by impulsivity often exhibit traits such as impatience, carelessness, heightened excitement, extroversion, and deficiencies in their capacity for harm potential assessment (Güzel et al., 2012; Peluso et al., 2007).

One feature of addictive behavior is the inclination toward impulsivity, or the inability to wait pleasure even when doing so may bring more beneficial long-term effects. For instance, alcoholics may opt to consume alcohol, and heroin addicts may elect to inject the substance, despite the potential repercussions for their future sobriety. Likewise, a smoker may opt to light a cigarette, fully aware that such usage might elevate his risk of developing emphysema or lung cancer in the future. A

compulsive gambler may opt to allocate his funds to gambling despite the potential for financial hardship. Informal observation indicates that a comparable issue may exist with excessive Internet usage.

When individuals spend huge amounts of time engaged in immediately satisfying Internet activities, they may have less time to invest in social connections, career growth, and other activities that presumably yield bigger but more delayed advantages (Saville et al.,2010). While the above findings imply that Internet addiction tends to contain impulsive tendencies, further study is needed to explain the association underlying Internet addiction and impulsivity. One established theoretical framework posits that impulsivity manifests when an organism opts for a smaller, immediate reward instead of a larger, delayed reward; in contrast, self-control is exhibited when an organism selects the larger, delayed reward (Ainslie, 1975; Logue, 1988; Mischel & Ebbeson, 1970; Rachlin, 2000; Skinner, 1953). Several studies have hypothesised that delaying, discounting, or the subjective depreciation of a reward that happens when its delivery is delayed in time, may be one mechanism that drives impulsive action (Bickel & Marsch, 2001; Critchfield & Kollins, 2001; Green & Myerson, 2004; Logue, 1988).

CHAPTER II
REVIEW OF LITERATURE

1. Introduction to Problematic Internet Use (PIU)

1.1 Historical Development of Internet Use

Once created to be a tool for exchanging information and communication amongst academics and researchers, the internet has revolutionized, so to speak, the modern life by changing the way people connect, work, learn and entertain themselves. Advancements in technology over the last few decades have seen internet access spring up across the world (Lee, 2017). In the mid 2000's, internet then became not only a source of information but as well as a multifunctional platform for communication, education, commerce and social interaction. Global internet usage at all levels has soared in proportion to the ubiquity of devices like smartphones, tablets, and laptops that have made the internet available to everyone.

In 2017, 2.4 billion people in the world's 50 most mobile phone using countries had internet access through smartphones alone (Newzoo, 2017). Along with this exponential growth of the Internet, there has been a massive shift in the way people are using the Internet, with people logging in more times and for longer periods performing different activities, be it social networking, gaming and media consumption. However, with the help of internet, there has been progress in various fields but, it has also introduced a new set of behavioural and psychological problems. Problematic Internet Use (PIU) is the phenomenon of excessive and uncontrolled use of internet (Kuss & Lopez-Fernandez, 2016).

1.2 Defining Problematic Internet Use (PIU)

According to Kuss and Lopez-Fernandez (2016), problematic Internet Use (PIU) entails excessive, albeit dysfunctional, use of the Internet, which negatively influences daily life, relationships or personal wellbeing. Historically, similar patterns of behavior have been termed "Internet Addiction," or "Pathological Internet Use." Yet, because there is ongoing debate regarding if PIU meets clinical addiction criteria, researchers often choose the term Problematic Internet Use which includes maladaptive patterns of internet use without necessitating addiction (Aboujaoude, 2010; Shapira et al., 2003).

Several definitions of PIU have been proposed through time, although they are basically characterized by having in common the following features: compulsive or uncontrollable use, inability to discontinue use even in the face of harmful consequences, and associated significant distress or impairment. For example, Young (1998) discussed key dimensions of PIU like social isolation, mood regulation, and impulsivity to define the conceptual differences of PIU from healthy or normative internet use. However, due to the lack of standard diagnostic criteria for PIU, it has been inconsistently measured and reported. In addition, contextual differences, for example cultural attitudes towards technology, and internet access, may make definitions of PIU change across studies, some of which focus on behaviours such as online gaming or social media use (American Psychiatric Association, 2013).

The most recent editions of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) have acknowledged Internet Gaming Disorder as a condition in need of further research, on the grounds of growing agreement that PIU shows itself in specific activities like gaming (APA, 2018). This move also draws attention to the way the understanding of PIU has changed from a broad notion to one that sees certain online activities as independent of each other and potentially risked to mental health.

1.3 Prevalence and Demographics of PIU

According to studies on prevalence of PIU, it is a widespread phenomenon especially among the younger generations raised in a digitally connected world. However, estimates of the number of people affected by PIU vary, with research revealing that 2–8% of the general population are affected, with rates in adolescent and young adult samples as high as 20% (Kuss, et al., 2013). However, some of the reasons that make young adults, especially college and university students, more susceptible to PIU include increased independence, academic stress, and the frequent use of social media and the internet as a tool for social interaction.

According to Lopez-Fernandez et al. (2023), PIU rates also vary across countries based upon their demographics, for example based upon internet accessibility or

cultural norms around technology use. For example, countries with high smartphone penetration and strong digital framework tend to have higher PIU rates as they have higher chances for providing frequent and long internet use. Gender differences in prevalence of PIU have also been reported as males are more likely to be PIU in certain forms (e.g., gaming), and females more likely to be PIU in social media.

The relationship between PIU and the variables age, gender, socioeconomic status, etc. indicates that demographic attributes are very important in influencing internet use behavior. However, given the rapid evolution of the digital technologies used and internet platforms, PIU is a dynamic condition which is not only determined by predisposed individuals, but by evolution in the online landscape. Understanding these demographic trends is important to developing targeted interventions; and in identifying populations at higher risk of suffering from the negative effects of PIU.

2. Cognitive Predictors of Problematic Internet Use

2.1 Role of Loneliness and Depression

A frequent finding is that loneliness and depression are important emotional predictors of PIU and have been found in many studies to predict internet behaviours. As with loneliness also depression is a psychological state of lack of social fulfilment and prevalence of sadness or emptiness, which people seeking other ways of emotion relief, for example use of the internet (Zhou et al., 2021). To many, the internet is a medium to connect with other people, engage in social media or get lost in activities online to trick the mind from feeling isolated and sad. While this can be a coping mechanism, however, this mechanism can become dependent and compulsive, becoming compulsive internet behaviors defining PIU.

A consistent research body links PIU to loneliness, and especially among young adults and adolescents who may be socially isolated during crucial periods of development. For example, Morrison and Gore (2010) discovered that more lonely people also expressed increased internet dependency, leading them to search for valid online environments for activity, as they feel isolated. Stavropoulos et al. (2017) found that, similar to loneliness, loneliness and PIU are related, as being

lonely is associated with increased likelihood to replace face-to-face contact with internet usage. In particular, this trend is important in populations where physical social interactions are limited; here, people may develop online personae and participate in online communities in order to fulfil social needs that remain unfulfilled offline.

Depression too is a strong predictor of PIU, as individuals with symptoms of depression may use the internet to escape from hopelessness and anhedonia (loss of pleasure). The internet offers the distraction and engagement that might take someone's mind off their negative thoughts for a little while, and this can give depressed people a bit of a reprieve (Peterka-Bonetta et al., 2018). Studies have shown that depression and PIU are bidirectionally related, in which depressive symptoms are more likely to trigger PIU, and vice versa. Perhaps most concerning about this bidirectionality is that there seems to be a cycle of sorts, in which depressive states drive internet dependence which aggravate the depressive symptoms (Romano et al., 2017).

A key question when assessing how loneliness, depression and PIU are related is one of causality: does PIU emerge because of these psychological states, or does the use of the internet over the long-term lead to a subsequent state of loneliness and depression? PIU may exacerbate pre-existing psychological conditions as a result of face-to-face interactions being reduced, social isolation being encouraged and increased opportunity for negative social comparison online, some researchers argue (Peterka-Bonetta et al., 2018). Thus, PIU may worsen loneliness and depression. In contrast, there are other studies recommending that loneliness and depression are antecedents to PIU as these emotional states predispose people to seek online engagement as a way out of their emotional voids.

In the end, while loneliness and depression are widely viewed as the PIU predictors; the causes are complex, and are probably the result of a combination of several variables, such as the person's personality traits, life situation, and the way that he or she approaches the internet. More research is needed to separate these relationships

and to determine if addressing loneliness and depression may reduce PIU tendencies.

2.2 Impulse Control Issues

Extensive literature links impulsivity to excessive online behaviour and diminished impulse control is a critical predictor of problematic internet use (PIU). Impulsivity is the tendency to act without thinking about potential consequences and commonly appears as difficulty in delaying gratification (Andreassen et al., 2016). High impulsivity individuals have difficulties controlling their internet use, considering how the internet is so instant and rewards are unlimited, from social validation, to entertainment to sensory stimulation. Diminished impulse control, therefore, can result in compulsive internet use, and thereby contribute to the development of PIU.

According to Vargas et al. (2019), individuals with impulse control issues are defenceless to PIU because they are profoundly inclined to looking for a sensation and have issues with self-regulation. For instance, Meena et al. (2012) discovered that young adults having high impulsivity scores used excessive internet, that in turn had negative consequences in their life, personal, academic and social. Research also shows that impulsive people can derive more reinforcement from very internet-oriented activities like online gaming or social media because this kind of activity gives instant feedback and gratification. As a result, they have trouble controlling impulse and reward, driving them back to the internet on repeat.

Further insight into the link between impulsivity and PIU is provided not only by empirical studies, but also by psychological theories of impulse control disorders. Maladaptive pattern of behaviour in which individuals feel driven to perform repetitive, reward-seeking behaviours despite adverse outcome are associated with impulse control disorders (Pettorruso et al., 2020). PIU is characterized by compulsive behaviours whose behaviour is driven by the desire to experience pleasure or to relieve distress – as is seen in traditional impulse control disorders, a phenomenon that impulsive individuals may find difficulty in moderating. The theoretical framework of this paper suggests that those with a predisposition to PIU may be more impulsive because they are more sensitive to rewards and less able to

think through long term consequences.

The Barratt Impulsiveness Scale (BIS) is a measurement tool that has been effective in evaluating PIU and its relationship to impulsivity. The BIS measures several dimensions of impulsivity: attentional, motor, and non-planning impulsivity, all of which constitute a full profile of an individual's impulse control (Liu et al., 2019). While the central role of impulsivity in PIU has been shown using the BIS, higher BIS scores predict more frequent and intense PIU behaviours. Another assessment, known as the Delay Discounting Task, which evaluates an individual's preference for either immediate or delayed gratification, has found that those with PIU tend to prefer immediate gratification and this also follows patterns that are common to other impulsive behaviours (Li et al., 2016).

Finally, diminished impulse control is an overall powerful predictor of PIU, because impulsive individuals are more prone to chase the internet's instant reward without thinking of the long-term effects to their life. To inform the development of interventions aimed at enhancing self-regulation and reducing impulsive internet use it is important to understand the role of impulse control in PIU.

2.3 Seeking Social Comfort and Distraction

The space of the internet has become a critical sphere for individuals in-search for social comfort and a means of escape on the daily. Social media and online environments become a place for users to find a sense of connection, share stories, and validate themselves, especially among those who are socially isolated (Hammour et al., 2015). The phenomenon is believed to be fuelled by an individuals need for social acceptance and comfort, which has been tied to greater internet use for the purpose of connection that may not be possible offline. Jin (2013) points out that social media platforms provide a platform for users to create an online identity and being a part of a community, even with limited physical interactions.

Additionally, distraction is important in connection with problematic internet use (PIU), since individuals are going to the internet for stress, boredom, or loneliness.

To many it is simply a quick route to relief and a convenient escape from negative emotions. Consistent with the distraction hypothesis, people behaviourally substitute for these situations via activities that shift their attention away from stressful or unpleasant situations (Hammour et al., 2015). Digital distraction may seem like an unhealthy activity when we're expected to work from home or in an office for eight or more hours a day, but it's actually one of the ways we cope with uncomfortable feelings of boredom, the inability to focus, or the weight of anxiety. Nevertheless, this habit of distraction seeking habit can be associated with compulsive internet using, which can even worsen PIU.

Social media platforms and online forums provide the "safe" space to users in which they feel connected, understood and accepted are illustrated through case studies. For instance, research on adolescents demonstrates that they frequently use social media as a form of issuing and seeking support in communities, which gradually leads to their dependency on online communications (Bitton & Medina, 2015). Due to this dependency, people are repeatedly drawn back to online spaces to get their social needs met, which can heighten use, leading to addiction. Therefore, social comfort seeking and distraction are not just active triggers for PIU, but continue to reinforce patterns that decrease the willpower of people to restrict internet use.

2.4 Implications of Cognitive Predictors

According to Moreno et al. (2021), several cognitive predictors for problematic internet use (PIU), such as loneliness, depression, lack of impulse control and social comfort seeking behaviour, interacted and significantly increased the severity of PIU. Each factor is a psychological state or trait that can predispose someone to excessive internet use, on its own. These predictors, although often interrelated, however, contribute to the complexity of psychological environment within which multiple vulnerabilities lead to PIU. For example, those who are lonely might also have poor impulse control, so they'll spend hours on the internet as a way to make both their emotional discomfort and cravings for instant gratification disappear (Faghani et al., 2019). This makes the compounded effects of the such as the depth of the dependency on the internet to a person which, in turn, exacerbates PIU.

The interactions of these cognitive predictors point to future exploration within broader psychological and social frameworks. Studies have confirmed some correlations between predictors such as loneliness or impulse control and PIU, although they have largely left unexplained the causal relationships between predictors and PIU. It is not known if PIU worsens underlying cognitive vulnerabilities, or if the amygdala hyperactivation is a result of the Internet over use (Faghani et al., 2019). However, current literature is often limited to cross sectional designs, which restrict inferences to determining causality. To determine how cognitive predictors also act upon PIU over time, and how changes in internet usage may itself affect these psychological states, a longitudinal approach is necessary.

Moreover, little is known about the diversity of internet activities, and their potentially different impacts on different kinds of cognitive profiles of internet users. For example, whether or not social media platforms affect people who are in pursuit of social comfort may be different to the effects of online gaming on its impulsive users (Bitton & Medina, 2015). To inform the development of targeted interventions that would account for the nuanced relations between cognitive predictors and PIU and reduce dependency and increase mental wellbeing, this research gap must be addressed.

3. Psycho-social Impact of PIU

3.1 Attention Deficits and Distractibility

The consistent link that problem internet use has had with attention deficits and increased distractibility are frequent lapses in attention that interfere with an individual's daily functioning. Also, research by Hadlington (2015) shows that individuals who regularly spend too much time on the internet have more frequent cognitive failures like memory lapses, frequent difficulty staying in focus, and often difficulty completing tasks. As users become accustomed to the rapid, transient feedback provided by online environments, they can develop cognitive patterns in which short term stimulation takes precedence over sustained concentration, and PIU can encourage the development of such cognitive patterns.

In the short term, the cognitive consequences of PIU are proliferation of attentional shifts and problems with sustained attention. With constant distraction through the internet, especially on social media, online games, and instant messaging, it's hard for a user to focus his offline tasks (Augner et al., 2023). A constant bombardment of online stimuli can lead to a fragmented attention span in which people lose their ability to focus on a single thing for a long time. Research shows that those with PIU tend to say that they are less able to focus on school or work responsibilities because they're compelled to repeatedly return to online communication, notifications, or materials.

In addition to immediate attention lapses, PIU has long term cognitive consequences that can impact cognitive processing capabilities for many years. Excessive exposure to the digital distractions can change neural pathways, resulting in pathways which have been associated with focus and the ability to remember. Faghani et al. (2019) shown a relationship between PIU and declines in executive functioning including a reduction in self-regulation, loss of impulse control and poor decision-making capacity all of which are required to allow for sustained attention. Additionally, the excessive use of the internet leads to shrinking the working memory capacity and therefore it is difficult to process and preserve information over a period. These cognitive impairments are their own kind of cascade — affecting academic and professional performance, and general life satisfaction and mental health (Ioannidis et al., 2019).

In the end, PIU and attention deficits are inextricably linked together in a vicious circle where the more they use the internet, the more they need to go online — even though that has a negative effect on their overall cognitive health. The relationship is especially pronounced in adolescents and young adults, for whom excessive internet use may cause long term cognitive setbacks at precisely the time when there are critical stages of cognitive development to complete (Bitton & Medina, 2015). Investigation of whether such targeted interventions, e.g., cognitive behavioral therapy, can moderate these impacts by enhancing attention control and minimizing distractibility in those with PIU, requires further research.

3.2 Social Relationships and Academic Impacts

PIU creates a huge impact on social relationship and learning because it distracts from both social interactions and academic duties. The way that PIU can reduce face to face interaction is one of the main ways in which PIU can affect social relationships. People who spend a lot of time online may have less of a craving for real social interaction, leading to problems with family and friends. A study shows that people with PIU often feel estranged from their loved ones, as they spend all of their time on online activities, which left them less time and quality of time spend with their loved ones (Andangsari et al., 2018). The Bittersweet side of this shift towards digital communication is that by relying more on virtual interactions we become prone to what is often referred to as social isolation as they fail to foster depth and quality of those offline relationships.

Similarly, the effect of PIU on academic performance is equally important; studies repeatedly establish the connection between PIU and academic procrastination and underachievement. Students with high levels of PIU often report that they delay assignments, study less effectively and are less academically motivated. The reason being, online activities like gaming or social media give immediate gratification which sometimes compete with the time allotted for the academic tasks and leave you feel unsatisfied and unable to focus on academic tasks, as a result of which poor grades are received (Moretta & Buodo, 2020). More concerning though, is that this link between PIU and academic procrastination occurs at an institution where self-discipline and effective time management are key to success.

Furthermore, the PIU is also connected to lower academic outcomes since its influence on critical cognitive functions such as attention and memory is indispensable for learning and finishing the academic work. Individuals with PIU say they often cannot concentrate during study blocks or lectures because they are constantly distracted by the internet (Ilesanmi et al., 2021). Distractibility in addition to lowered capacity for sustained academic work leads to piecemeal learning experiences, lower information retention, and ultimately poorer academic outcomes. Furthermore, PIU has been associated with preferring short-term rewards, as students

tend to place more importance on online commitment than their long-term academic goals that consistently prolongs the cycle of procrastination and disengagement from studies.

In terms of social aspect, PIU makes us dependent on online validation, which makes a person trust social media for comfort and acceptance and is losing the value of a real-life connection. In the digital world, social rewards are instant and you feel like you belong, however, depending solely on virtual relationships keeps you from promoting development of authentic offline relationships. Micheni and Muketha (2019) indicate that people with PIU feel more comfortable to engage in online interactions, which they can control better in terms of self-presentation, than face-to-face interactions, which is more complex and unpredictable.

3.3 Health and Lifestyle Consequences

Impacts are also extensive on health and lifestyle, impacting many aspects of physical, mental, wellbeing. One of the most notable effects of PIU is becoming a sedentary person as they spend too long online than physically active. With little physical movement, there are many health risks linked to this such as increased chance of obesity, cardiovascular problems and musculoskeletal problems associated with prolonged sitting (Klavina et al., 2021). According to studies, people with PIU often forego physical exercise and unhealthy eating, like excessive snacking during online activity or eating calorie dense foods, increase the risk of putting on weight and decrease their physical fitness.

Sleep disruption is another important consequence of PIU, especially in people who spend long hours online, often until late in the night. It's no secret that screens emit blue light, which can suppress production of the sleep-inducing hormone melatonin and delay sleep onset and reduce sleep quality. Lakkunarajah et al. (2022) demonstrate that people with PIU tend to have reduced sleep duration, reduced sleep quality and signs of sleep deprivation including daytime sleepiness, irritable mood and trouble concentrating (Zusa, et al., 2021). Chronic sleep problems have long term consequences; insufficient sleep compromises cognitive functions, emotional

control and general health, which all amplify the detrimental effects of PIU on all aspects of an individual's well-being.

In addition, PIU individuals also have high rates of depression and anxiety. People with high PIU tend to feel lonely, have low self-esteem and be isolated, because being dependent on the internet removes them from real life interactions and enhances the tendency to engage in social comparison and self-evaluation on the internet (Lakkunarajah et al., 2022). PIU is also associated with heightened stress also, as participants feel like they need to be constantly connected in online communities or uphold certain online personas, respectively. Together with a lack of offline social support, this pressure results in a negative feedback loop in which PIU exacerbates stress and negative emotions, which in turn strengthen internet dependency as a way of dealing with the problem (Gecaite-Stonciene et al., 2021).

PIU also affects cognitively the functioning in everyday life, for example, work productivity, time management and life satisfaction. PIU individuals have a problem with self-discipline and productivity, as web-based distractions get in the way of being able to set their priorities. As such, this could lead to missed time management and productivity; in academic or professional setting and may set off a spin of dissatisfaction and procrastination.

4. Internet Use and Academic Procrastination

4.1 Link Between PIU and Academic Procrastination

Problematic Internet Use (PIU) is widely recognized as a contributor to academic procrastination, intentional delay of academic tasks even with foreseeable negative outcomes. Studies have repeatedly found that students who have difficulty with PIU also tend to experience higher levels of academic procrastination due to the effect of internet overuse on time management, the distraction of study goals, and the availability of immediate gratification that competes with long term academic goals (Balhara et al., 2018). Aiming to be among the first to determine the link between PIU and procrastination, understanding this relationship provides the ability to design interventions that could reduce academic delays and increase student outcomes.

According to Andangsari et al. (2018), excessive internet use encourages habits that are diverts time and attention away from academic work and as a result exacerbates procrastination behaviours, according to the literature on PIU and academic procrastination. The studies indicate when the PIU encourages students to avoid the study and use online distraction in the form of social media, games and video streaming. For example, Balaji and Indradevi (2017) also found a strong correlation between increased Facebook usage and academic procrastination suggesting that social media in general can be a very strong inhibitor of academic productivity. According to their research, people who had spent too much time on Facebook were more inclined to procrastination; social media was an easy way to escape academic pressures and provided students the chance to 'avoid concentrating on a task for long periods of time.'

Often, the instant gratification of internet activities mediates the relationship between PIU and procrastination, thereby demotivating the individual to do tasks that require delayed rewards (e.g. academic work). Online platforms tend to grab attention immediately and give feedback quickly, all of which make it difficult for students to avoid these distractions, especially when they have to do something that isn't as immediately gratifying to them as eating Cheetos or watching YouTube videos (Balhara et al., 2019). Temporal discounting is in close alignment with PIU, a psychological phenomenon, where people prefer smaller immediate rewards over larger future rewards. Students tend to trade off the time they have to do their academic work with the appeal of doing internet stuff, creating a self-fulfilling procrastination cycle of avoidance by internet.

Further research has quantified the impact of frequency of internet use on academic delays, with studies suggesting that the more a student uses the internet, the more likely that student is to procrastinate. In a sample of university students, Brate (2017), found that those who reported having a high use of the internet tend to have a high level of procrastination in academic work. This study found that the frequency of internet use had a powerful predictive value for procrastination, that students who had greater contact with the internet procrastinated more often in completing

assignments, in last minute cramming for exams, and in keeping up with coursework. These findings show that PIU can be an all-encompassing issue to a student's ability to manage tasks of an academic nature properly, as the excessive use of internet takes away the time students have to study and to prepare.

It is also found that PIU academic procrastination is associated with psychological factors including lack of self-regulation and impulse control which aggravate the tendency to procrastinate. PIU students often display self-discipline problems, as internet-based distracters are particularly difficult to deny because of the momentary accessibility and sensory appeal (Faghani et al., 2019). Studies are suggesting that PIU is as well associated with weakened impulse control, which places people at greater risk for putting immediate enjoyment over long term goals. For example, students may enter a study session, intending to perform a task, but soon go off track by social media notifications or online videos due to their limited ability to resist those distractions (Hammour et al., 2015).

In addition, there may be cognitive factors (e.g., attentional control and goal-setting efficacy) that mediate the relationship between PIU and academic procrastination, in addition to impulse control. It has been demonstrated that PIU leads to a decreased capacity in attentional processing causing PIU students to find it harder to concentrate on academic related tasks (e.g., reading, homework). Using the internet fragments attention, but because the interruptions and multitasking involved with surfing the web are constant, a person becomes less efficient on tasks, and more prone to procrastination (Ilesanmi et al., 2021). Students with PIU may have difficulty concentrating on a single activity for a prolonged time, because their attention gravitates to online activities. This process of attentional fragmentation interferes with their ability to finish assignments in time, because they can't fully devote themselves to completing the academic tasks that are necessary to get work done by due dates (Gecaite-Stonciene et al., 2021).

Not only that, but the cognitive link between internet use and reward seeking behaviour amplifies PIU's effect on academic procrastination. Internet can be a

readily available reward for students, especially opportunities for the social validation, entertainment and participation in the virtual communities. A connection is made here to procrastination in students working as they tend toward activities that offer instant gratification instead of delayed effort (Ilesanmi et al., 2021). This pattern leads students over time to prefer online engagement to academic commitment, with students beginning to view the internet as a more rewarding experience than doing school work. Herein is the reason the internet reinforces procrastination: it offers social and emotional gratification, which students postpone to stay online.

The problem with the link between PIU and academic procrastination is more pronounced in higher education students who largely depend on self-discipline, motivation and efficient time management to achieve academic success (Balhara et al., 2019). For example, university students have many deadlines, and are supposed to be self-directed study, which may be difficult to maintain if PIU is messing with those habits. For students with high PIU, the switch to independent study can actually intensify the problem of procrastination because they are constantly balancing internet use with assignments (Hammour et al., 2015). Additionally, the more complex academic tasks become, the more students with PIU would start to distract themselves on the internet as a coping mechanism to deal with academic stress, keeping their procrastination pattern up.

The literature supports a strong link between PIU and academic procrastination, indicating that the internet can lead to behaviours, and cognitive patterns, that inhibit academic productivity. PIU interferes with students' ability to handle their academic tasks effectively, by encouraging short term gratification, impulsive habits, and diminishing attentional focus, all of which encourage procrastination. Therefore, to alleviate these effects, interventions that attempt to improve students' self-regulation, attention management and time allocation as they relate to Internet use versus their academic demands are necessary to help students achieve a balance between Internet use and academic demands. This is important for educators and mental health professionals to understand, since that relationship helps to shed light on how we can

combat procrastination stemming from PIU, which in turn can positively influence both academic outcomes and student wellbeing.

4.2 Attentional Control as a Mediator

According to Chang et al. (2024), attentional control prevents the influence of Problematic Internet Use (PIU) on the academic procrastination. According to the theory, people with good attentional control are better able to hold out from the allure of online distractions (such as social media or games) and so are less likely to procrastinate. PIU has a measurable negative influence on academic performance when attentional control is low; however, when attentional control is high students are more able to keep focus when faced with academic tasks in the presence of external distractions, weakening the negative impact of PIU (Shahrajabian et al., 2023). On the other hand, those with a lower control of attention may find it hard to keep their concentration rammed, in which case they are more prone to procrastination when interacting online.

The Mindful Attention Awareness Scale (MAAS) is used to measure attentional control by measuring a person's ability to notice and attend to the present moment. Academic productivity is reliant upon less mind wandering and better focus and high MAAS scores relate to these qualities. Theories such as the dual process model explain this control of attentional focus better by stating that people use automatic or controlled processes while trying to focus (Gámez-Guadix & Calvete, 2016). Though they can't overcome all PIU-driven procrastination, controlled processes are capable of doing so in high demand scenarios, as they allow directed attention, against procrastination. Models such as the Goal Shielding Theory also talk about how attentional control allows for goals to be more important than what is in front of us right at the moment.

Calvete et al. (2017) show that building up attentional control, with mindfulness training, or attention regulation exercises, can actually buffer the negative impact of PIU on academic tasks. For example, studies have shown that when attentional

control is improved—when students can pay attention more selectively, attend longer to assignments, and do a better job completing tasks, impulsivity decreases as well, leading to less procrastination for those who spend too much of their study time on the internet. Through the development of attentional control students could potentially achieve long term academic objectives opposed to such immediate gratification of online activities.

4.3 Influence of Social Media Use on Procrastination

By design and the instant gratification, it provides, social media is a specific drive for procrastination, especially with academic work. Instagram, Facebook, TikTok and others platforms are set up to get the most attention from the users by creating infinite scrolling, sending notifications, showing personalized content by the algorithms — which causes students to divert their attention from academic work (Shaibani, 2020). Social media provides a never-ending supply of new information and social validation, which can strengthen one's attitudes to put off things that need to be done.

Social media platforms by default challenge users with time management. Because likes, comments, and shares supply variable rewards, they are known to trigger a release of dopamine, making it hard to log off, diverting users from academic goals (Andreassen et al., 2016). This feedback loop can turn off users' motivation for tasks with delayed rewards (e.g., studying) and move towards activities for which gratification is immediate. In addition, social media's real time nature brings the effect of FOMO (Fear of Missing Out) in students, who prefer having interaction online over studying (Alt & Boniel-Nissim, 2018).

Studies have shown a very strong link between heavy use of social media and academic procrastination, especially among students who use social media to fill the social void, or for stress relief. Social media takes a lot of time away from academic time, and frequent notifications provide a lot of interruptions (APA, 2018). This ultimately just puts students into a cycle where social media is both a source of distraction and a way for student to handle academic stress, which in turns further

instigates procrastination. In order to solve this problem, research recommends that students try self-regulation strategies, like setting usage limits, to more successfully manage social media's effect on their academic performance.

5. Cognitive Mechanisms Linking Internet Use to Attention and Procrastination

5.1 Distractibility and Attention Shifting

The cognitive mechanisms (i.e. distractibility and attention shifting) that mediate the relationship between internet use and attentional lapses are also responsible for the underlying problematic behaviours (e.g. academic procrastination) (Augner et al., 2023). The presence of the stimuli online constantly available (because of the availability of notifications and multimedia content) contributes to the high cognitive load and habitual attention shifting. According to cognitive load theory, when cognitive resources exceed capacity, individuals are more vulnerable to distraction, including by those things that promise instant gratification, such as social media or entertainment sites (Chang et al., 2024). Online engagement in itself is frequent, and hence promotes divided attention; the users continuously engage on to one task and then another, which causes weakening of sustained concentration and leads to problems in maintaining attention on academic tasks.

Attention control theories like the Supervisory Attentional System (SAS), show us that in order to successfully focus on tasks, distractions must be overridden. But internet use often reduces this control, instead promoting behaviours of the automatic attentional system that are quick to respond to interruptions. Shahrajabian et al. (2023) show that high internet users shift their attention by default and have more difficulty returning to a task after an interruption. Attention shifting is a habitual process and related to the attentional control deficit theory that less attentional resources to resist distraction, making an individual prone to develop a cycle of procrastination. This help to procrastinate and make it hard to resist the short-term appeal of online activities and thus keep a cycle of disengagement from academic responsibilities going. To prevent mounting of cognitive toll from internet distractions it is imperative to grasp these processes for devising solutions like reducing screen time, or practicing mindfulness.

5.2 Attentional Control and Academic Outcomes

Attentional control is the ability to impose focus control and distracting stimuli suppression and is a crucial predictor of academic success in the context of PIU. Students having strong attentional control will be task focused and less likely to succumb to academic procrastination. Evidence shows that people with better attentional control are able to better resist the appeal of internet distractions and continue academically (Augner et al., 2023). Attentional control functions through two primary processes: either top-down processing (when goal directed attention is used) or bottom-up processing (when we respond to environmental stimuli). Those with good top-down attentional control can manage distractions and increase task completion rates, as well as grades in the academic setting.

In recent studies, deriving from the tools of the Attention Control Scale (ACS) and Mindful Attention Awareness Scale (MAAS), a connection between lowered procrastination behaviours and heightened attentional awareness has been made. For example, studies show that the students who scored higher on attentional control scales generally have less of a problem procrastinating and better time management skills, as well (Chang et al., 2024). In PIU, attentional control reduces the effect of online distractions on individuals by allowing them to focus on longer term academic goals rather than fleeting gratifications mediated by online activities.

Training in mindfulness and self-regulation has shown promise at strengthening attentional control and reducing procrastination and improving academic outcomes. These interventions promote awareness of attentional lapses allowing students to reengage with their academic tasks (Vargas et al., 2019). The finding that attentional control plays a role in minimizing the negative academic outcomes of PIU highlights the need to include attention management strategies in educational settings in order to help students mitigate, or counter, procrastination related to excessive internet use.

5.3 Impact of Internet Use Frequency

Internet use frequency has a large impact on attentional control and academic performance; the more time spent online, the less focused and the more likely a student will put off studying. Internet use that's frequent, such as for entertainment

purposes or to socialize, can inhibit the development of attentional control because people get used to short bursts of quick feedback, rather than continuous effort (Negin et al., 2017). Research in cognitive overload affirms high internet use engulfs the ability to focus on long academic tasks, as it demands continuous cognitive shifts. The more individuals use internet-based activities, the greater the chance that they will develop a preference for immediate gratification, which can then lead to problems with delaying gratification for academic work, and therefore increase procrastination.

According to Vigna-Taglianti et al. (2017), people who use the internet extensively, including social media or gaming, report more attentional lapses and a lower productivity while studying in the academic setting. For instance, such findings show that students who have a large amount of time spent on the internet have a high probability of failing to complete assignments, and tend to postpone doing study activities for online activities. This relationship is important because we know that repeated instant rewards on the internet reinforce maladaptive behaviours because when a student experiences instant rewards in the internet, it becomes difficult to sustain motivation towards tasks that have delayed outcomes such as studying (Machimbarrena et al., 2019).

Results show the influence of internet use frequency on attentional control and academic outcomes highlighting the moderation role of digital engagement. Time-management training and self-regulated internet use have proved promising interventions to help students regulate internet related distractions. Through equilibration between online student engagement and offline responsibilities, students' attentional control is better maintained, leading to academic success and less procrastination.

6. Moderating Factors in PIU and Cognitive Outcomes

6.1 Impact of Internet Usage Level

Internet usage level moderates the effect of Problematic Internet Use (PIU) on cognitive beliefs and outcomes, exerting different effects for different levels of

intensity and purpose of internet use. Internet usage at high levels, especially unregulated, has been shown to worsen maladaptive cognitive patterns that characterize PIU, such as impulsivity, low self-regulation and impulsive tendencies for immediate gratification. In contrast, the internet may also act as a tool for cognitive engagement, when used moderately or well managed, depending on how internet is used (Machimbarrena et al., 2019).

Internet usage at high levels often leads to cognitive overload when the brain is overloaded with unending stimuli and the tedious demands of multitasking, causing a decline in cognitive focus and a decrease in the ability to prioritize jobs. The overload that creates habituated behaviour, such as constant attention shift and over reliance on digital means of information retrieval, weakens memory and the ability to think. Gecaite-Stonciene et al. (2021) suggest excessive internet use is linked to impulsivity and problems with attentional control as social media and other online activities trigger reward mechanisms that create a feedback loop that continues to pull us away from academic or work-related tasks into a spiral that often causes damage. As a result, the people who use the internet most heavily develop cognitive beliefs that encourage immediate rather than long-term benefits leading to reinforced procrastination and distractibility.

In addition, cognitive outcomes depend on the level of internet usage, since it influences self-efficacy beliefs in settings where one needs to validate or interact socially through digital platforms. People who use the internet more are more likely to lose self-efficacy offline because they get used to easy immediate online engagement. The more this reliance is used, however, the more it weakens confidence in offline problem-solving capabilities and breaks down the motivation to tackle these problems realistically, opting instead for instant gratification that comes from within the digital environments themselves (Ilesanmi et al., 2021). Academic contexts often see high internet users exhibiting lower motivation and higher rates of procrastination because the internet gradually becomes a preferable short-term distraction over a useful resource for a focused academic pursuit.

Nevertheless, strategic internet use can induce positive cognitive beliefs and results. For example, the work of moderate users is often underpinned by the exploitation of online resources to aid learning, self-directed study and the acquisition of knowledge to enhance cognitive engagement and increase a sense of control over the learning process (Klavina et al., 2021). According to the self-regulation theory, those that use the internet in moderation are able to set boundaries, to practice goal directed behaviours and avoid distractions, creating a healthy relationship between digital engagement and the individual. For moderate users the internet is a tool for cognitive expansion not an escape, leading to greater attentional control and enhanced academic performance (Tokunaga, 2015).

The effect of usage level on cognitive beliefs and outcomes is also moderated by the purpose of internet engagement. Although Internet usage for educational or informational uses at high levels may have less detrimental cognitive effects than Internet usage for entertainment or social media purposes, which are typically low effort and high reward interactions (Ioannidis et al., 2019). When educational machine learning is used in moderate levels of engagement, it enhances active learning, critical thinking, and memory retention by forcing users to deeply process information and think about the application of it. On the other hand, entertainment-oriented usage, and especially at high levels of usage, is related to decreased attentiveness and a tendency to passively consume information, which can in turn affect later cognitive outcomes (Lakkunarajah et al., 2022).

To defeat these moderating effects, we need time management strategy, mindfulness practice and self-regulation training enforcement to promote healthier internet usage habits. The use of time limits, limiting academic to entertainment-based internet use, practicing with digital detox to allow time to focus attention and build cognitive resilience. Structured internet use in students for academic purpose and then boundary set on social media engagement is very useful for students; it reduces PIU tendencies and enhances the cognitive beliefs related to delayed gratification, self-efficacy and goal achievement.

6.2 Role of Age and Gender

There is growing evidence that age and gender are moderators in the relationship between Problematic Internet Use (PIU) and academic procrastination. Both the prevalence of PIU and the experience and reaction to internet distraction are influenced by these demographic factors (Balhara et al., 2019). Insights of how other groups are affected by PIU are examined in terms of age and gender as moderating variables in academic context in which procrastination can compromise success.

Age as a Moderator in PIU and Academic Procrastination

PIU moderates effects of age, with younger individuals (adolescents, young adults), and in particular students, being more susceptible to drawing upon the internet as a distraction from study, leading to procrastination (Dufour et al., 2017). However, adolescents and college students have more PIU compared to older adults, according to the studies carried out by varying institutions, attributed to heightened accessibility and fluency in the use of the internet, and also a tendency of adolescents and college students to use internet for social and entertainment purposes. For example, students between 18–25 years old (including the age group with the highest incidence to academic pressure and digital environment) tend to use the internet as a tool of avoiding their academic obligations leading to a high extent to procrastination. Younger users are increasingly likely to be more impulsive and have less self-regulation – making them more susceptible to external distractions online (Fernández-Villa et al., 2015).

In addition, developmental factors underlie this age-based susceptibility. Youth meet certain social forces during their identity's development and social exploration phase, yearning for validations and social connection through social media. As a result, excessive use of social media by this age group is often included in PIU and offers instant social gratification and causes the students to procrastinate from academic tasks by taking away attention from it (Augner et al., 2023). Conversely, older adults use the internet in more goal directed, and more information and professional oriented manner, employing lower rates of academic procrastination related to PIU.

Gender as a Moderator in PIU and Academic Procrastination

In addition, gender moderates the relationship between PIU and academic procrastination, since previous research has shown that men and women demonstrate different patterns of internet use that also produce differences in procrastination behaviours. Research points to men using the internet for gaming and information gathering, and women using the internet more for social media and communication (Touloupis & Campbell, 2023). The distinction of social media use as interactive and reward based allows for this distinction to affect procrastination as well as social media use is highly correlated with procrastination itself.

Variations in animal feeding behaviour are also explained by gender differences in impulsivity and self-regulation. In men, frequent gaming or browsing behaviours associated with PIU are generally reported to be driven by higher levels of impulsivity. On the academic side, these movements become distraction and procrastination because users take to activities online that give instant gratification instead of focusing on study session (Andangsari et al., 2018). In contrast, women are more likely to report higher levels of conscientiousness, which might temper the procrastination effect caused by PIU, but the social validation you receive from Instagram and Facebook is still likely to be strong especially when there is academic stress. Social media may be used among women as a coping mechanism for stress, but this is done to the expense of time spent on academic work and aggravates tendencies to procrastinate.

Interplay Between Age, Gender, and PIU's Academic Impact

Age and gender in combined influence manifests PIU-related academic procrastination in nuanced patterns. For example, young men often have greater risk of game related PIU, leading to great deal of procrastination, as gaming can bring the feeling of accomplishment and escape from school pressure (Touloupis & Campbell, 2023). On the other hand, young women are more affected by social aspects of PIU, and they tend to use social media as a mean of the connection and stress relief. Each pattern reenforces procrastination by turning students into dependent consumers of internet activities that takes their attention from academics.

Interestingly recent studies suggest that gender gap for PIU behaviours is narrowing as the Internet becomes ubiquitous in demographics (Balhara et al., 2019). As young men and women become more dependent on social media and gaming in their daily lives, the ways in which PIU contributes to procrastination may be less gender specific and possibly both young men and women display similar rates of academic procrastination symptoms related to internet overuse.

Implications for Interventions

As moderators in PIU related academic procrastination, age and gender need to be considered while designing targeted interventions. Strategies to help young adults, especially students, control impulse and self-regulate are useful in reducing procrastination that may lead to PIU. Stints of social media suspension for women and restrictions for male gamers have also helped (Neging et al., 2017). Greater age and gender groups may be able to navigate the internet productively rather than counterproductively when attaining educational goals after exposure to educational programs that incorporate digital literacy and time management skills along with an awareness of PIU's risks.

6.3 Interaction of Cognitive Beliefs and Moderating Factors

Age and gender are main psychological variables that significantly affect the cognitive beliefs individuals have about online activity, including social validation, escapism and self – efficacy, and differentially influence Problematic Internet Use (PIU) outcomes (Pettorruso et al., 2020). These individuals' beliefs influence their motivations to venture into the internet which in turn determine their vulnerability to PIU and academic and psychological repercussions relating to PIU. By looking at these variations, we learn how demographic factors interact with cognitive beliefs to moderate the effect of PIU.

Age-Related Variations in Cognitive Beliefs and PIU

Cognitive beliefs about internet use are shaped by age, with younger users especially adolescents and younger adults more likely to believe that internet activity is the

primary source for social validation and identity formation. Younger users are driven by social media to seek approval, express identity and gain peer recognition — studies show (Moreno et al., 2021). Social validation intensifies PIU by continually seeking positive feedback and validation by likes, comments and shares. Those likes, comments and shares are actually like payment in a sense. The dependence on online validation enhances internet overuse tendencies and consequently, discounts academic competitions for young users to spend more time online than on academics. Furthermore, escapism is a major cognitive belief among youths who use the internet, where they could unexpectedly resort to either gaming or social media to relieve study or personal stress. Research shows that users of younger age often perceive the internet as a space that lets them escape reality and that certain online spaces can be a place of comfort for them while they grapple with issues off line (Peterka-Bonetta et al., 2018). The tendency to escape via the internet can reinforce PIU tendencies by using the internet first as a tool to distract from stressful tasks with the consequence being more procrastination.

But the internet is seen as less for social validation or escapism amongst older adults who are less likely to rely on it. In general, they're less likely to view the internet in such a leisurely manner, and are more likely to see it as a means of information, communication, and productivity. Hence, they tend to have lower PIU rates and are not susceptible to cognitive beliefs that predisposes them to internet dependency (Micheni & Muketha, 2019). Although escapism is a possible factor in PIU development in adults, it is more subtle and fleeting than with younger populations and is therefore not a source of distraction from day-to-day tasks or productivity, as with the younger populations.

Gender-Related Variations in Cognitive Beliefs and PIU

The moderation of cognitive beliefs regarding on line activity by gender was also observed, as men and women tended to differ in using the internet and the PIU experience. Women tend to have a particularly strong social validation cognitive belief, therefore also engaging in social media more than men, on social media platforms that emphasize interaction, sharing, peer feedback and validation (Dufour et al., 2017). As a space for connection and self-expression women often rely on

social media for emotional support and validation. This reliance is shown in studies to cause PIU, as women would spend more time on social media in order to meet up social needs and often tend to neglect academic or work-related commitments.

On the other hand, men are more likely to see the online activity as a competition, in particular, in scenarios where you're competing like gaming. Achievement oriented cognitive belief can play a role in PIU since men may spend hours on the Internet to reach goals, level up or be better than others in Virtual games (Fernández-Villa et al., 2015). Consequently, such pursuits cause a feeling of reward and satisfaction with a possibility of acquiring it in offline settings, that attribute to the development of PIU. For male users, the internet may be a channel for self-efficacy and accomplishment that spurs time on the web that could only be devoted to an academic or professional goal, thus increasing procrastination.

Combined Influence of Age, Gender, and Cognitive Beliefs on PIU Outcomes

Distinct patterns of PIU emerge from the age, gender, and cognitive beliefs interaction. For example, the social validation needs approach has shown younger women will spend a lot of time on social media for self-expression and peer support, making them more likely to engage in PIU (Fernández-Villa et al., 2015). Due to this pattern, they are particularly vulnerable to academic procrastination because they usually want to engage in online social interaction more than they want to do their academic duties. On the other hand, young men usually treat gaming as escapism and achievement and develop PIU patterns that are based on competitively or immersivity online activities. Gendered patterns represent how cognitive beliefs together with PIU vary across demographics.

On the other hand, older adults usually present lower rates of PIU, because their cognitive beliefs about internet use are not so associated with validation or escapism. Older males and females are less dependent on the internet and experience fewer negative impacts on productivity (at least in older age groups) because the internet is seldom used by the older adults as a tool to achieve their identity needs and satisfy their social needs (Dufour et al., 2017).

Implications for Intervention and Support

Further understanding of how cognitive beliefs differ by gender and age can inform targeted lens to reduce the impact of PIU. Interventions for younger individuals, those who are susceptible to looking for validation or who undervalue their time spent online, might look at ways to enhance self-awareness about internet habits and inspire offline socialization. Interventions focused on social media use could have a gender specific approach to young women and gaming focused to young men.

Educators and mental health professionals can also play a role in decreasing PIU related procrastination by offering the development of strategies to fight procrastination and aid in development of self-regulation skills and goal setting strategies (Faghani et al., 2019). It is found that by taking into account the moderating effects of age, gender, and cognitive beliefs, we can tailor support to help people engage in healthier patterns of internet use for academic and personal well-being.

7. Theoretical Frameworks and Models Related to PIU

7.1 Overview of PIU Models

Several psychological and sociological models explain PIU by illuminating why people can get caught in unsustainable maladaptive online behaviours. Two well-known models, i.e. the Compensatory Internet Use Model (CIUM) and Problem Behaviour Theory (PBT), can offer useful constructs to explain PIU drivers and consequences.

The Compensatory Internet Use Model (CIUM) proposes that people use the internet to cope with unmet psychological needs — such as loneliness, stress, or low self-esteem. PIU is a disorder that appears when the internet becomes a means to control negative emotion or satisfy social needs which an individual cannot manage in the real world, said CIUM (Griffiths et al., 2024). A classic example would be social anxiety people using the online platform for validation and connection because they feel it is ‘safer’ and more ‘controllable’ than face to face encounters. Online engagement that trumps offline coping strategies can lead to PIU because it helps

depend on the internet as the means of emotional relief, and the internet gratification turns into cycles of temporary gratification and escape from actual life problems.

According to Jessor and Jessor, Problem Behavior Theory (PBT) conceptualizes PIU as one of several risk behaviours in which individuals engage as part of a general pattern of problem behaviour. PIU, substance abuse, and academic procrastination are caused by a complex interaction between personality, the environment, and social norms, PBT reported. PIU in this framework is not an isolated behaviour, but is a product of sensation-seeking tendencies, weak self-regulation, and social modelling (Hayixibayi, 2023). An important aspect of PBT is the impact of peer influence, with a person's internet use a possible imitation of the behaviour of those in the person's surrounding where use of the internet is accepted or promoted. PIU can [turn into a] socially reinforced habit for young adults and adolescents that fits in with a broader pattern of impulsive or avoidance based behaviours.

CIUM and PBT work together to illustrate how PIU can emerge as either an emotional coping mechanism, or a socially conditioned behaviour based not only on individual factors but environmental ones as well. These models make it clear that successful interventions with regard to PIU must address both the personal motivation and the social context and behaviour patterns which sustain it, providing key frameworks for understanding and addressing PIU.

7.2 Theories on Attentional Control and Procrastination

Key areas of study for PIU include attentional control and procrastination, which have been successfully framed by theories, such as the Theory of Planned Behaviour (TPB) and Goal-Setting Theory, in explaining why individuals find themselves unable to maintain control over their use of the internet in favour of academic or personal goals.

The Theory of Planned Behaviour (TPB), developed by Ajzen, suggests that behaviour is guided by three primary factors: The three determinants for performing the behaviour are attitudes, subjective norms, and perceived behavioural control

(Awi et al., 2020). Regarding PIU, TPB suggests that intentions to restrict Internet use are determined by beliefs about Internet use (e.g., whether it is regarded as beneficial or harmful), social norms (e.g., how much they regard excessive Internet use as acceptable) and perceived control over Internet habits. Procrastination in PIU is explainable by TPB in such a way that people with positive attitudes to internet use and low perceived behavioural control may not be able to limit their online activity resulting in delay in academic activities and lower productivity (Andreassen et al., 2016). According to this theory, increasing people's perceptions of control and awareness of internet use outcomes might help to alleviate procrastination related to PIU.

Locke and Latham's Goal-Setting Theory states that goal that are specific, challenging and attainable increase motivation and productivity. The theory implies that in PIU and procrastination it is easier for individuals to remain oriented on achievable goals and thus cede to distraction, including internet distraction, since they have a clear and structured goal. But without strong goals, we are tempted by the more tangible immediate gratifications, such as social media or gaming, that fuel procrastination (Balhara et al., 2019). In the academic environment, students with goals tend to be able to place tasks in order of importance and avoid drifting into internet distractions. On the other hand, those with no clarity of goal are prone to procrastination and delay and thus prone to PIU as a procrastination tool.

8. Summary of Findings and Research Gaps

8.1 Synthesis of Key Findings

In research on Problematic Internet Use (PIU), the development and maintenance of PIU is shown to be a complex interaction of cognitive, psychological, and demographic factors. In PIU, emotional vulnerabilities — loneliness, depression, low self-esteem — are key predictors of the problem. These are emotions people feel, and so they seek social validation, escapism, or relief from negative emotions through the internet. Impulsivity and poor attentional control are the cognitive predictors and are associated with unregulated internet use for the sake of immediate gratification. These psychological predictors indicate that PIU tends to be motivated by an attempt

to deal with unmet psychological needs or to control negative emotions.

Attentional control has been identified as a critical mediator in the extent to which PIU impacts academic procrastination and academic productivity. Individuals with strong attentional control are able to keep their attention on academic or work-related tasks and buffer the effects of online distractions. Additionally, people with weaker attentional control are more likely to succumb to internet related interruptions that perpetuate procrastination. Beyond cognitive beliefs regarding internet use (e.g., regarding social validation or which regards escapism), other cognitions mediate the association between PIU and academic outcomes, such as sharing with the internet at the expense of offline responsibilities.

PIU's effects are also moderated by demographic moderators, especially age and gender. Because developmentally individuals after adolescence and young adulthood that are younger, are more likely to develop PIU related to identity exploration and social connection needs. Differences in gender traits also indicate that women engage social media more than men do, while men are more likely to use it to play games that are also associated with separate PIU related procrastination patterns. These findings highlight that PIU is not merely a matter of personally determined cognitive and emotional characteristics, but that there are social and developmental contexts, some groups being more at risk than others due to differing patterns of motivation and use.

The literature detailed finding that, as a whole, there is a multi-faceted relationship between PIU and academic procrastination, whereby both the individual vulnerabilities and the broader social influences are of significance. To that end, there is now scope for effective interventions to concentrate on promoting attentional control, as well as promoting positive coping mechanisms, whilst also adjusting the approach to suit an individual's age and gender to reduce the impact of PIU on academic and personal outcomes.

8.2 Identified Gaps

Though research has been steadily growing on PIU, there are several critical gaps in the literature, including demographic diversity, longitudinal research, and having a better understanding of the emerging impact of new internet technologies. While PIU

has most often been studied in young adults, particularly college students, the gap in understanding PIU behaviour across different age groups and cultures remains unresolved. However, the narrow demographic focus of studies into PIU limits the generalizability of findings, given that PIU may look differently socially and culturally. For instance, technology habits in culture or variation of access of internet radiates effects of PIU and cognitive impacts. To fully understand how demographic variables shape PIU, research is especially needed on older adults, adolescents who are not in college contexts, and individuals from non-Western cultures.

There is also a significant research gap in our knowledge of long-term longitudinal studies of PIU. Most current research to date is based on cross sectional data, which although they can help tease out correlations, cannot prove causality. Since PIU behaviours and their downstream implications on attention, academic procrastination, and mental health will be followed up longitudinally, researchers will be able to examine how these behaviours develop with time. In order to better understand if the impact of PIU on cognitive and academic outcomes is transient or long lasting, research is necessary with these populations. Second, longitudinal data could help to clarify the directionality of the relation of PIU with psychological factors, e.g., whether PIU causes or exacerbates mental health conditions (e.g., depression and anxiety) or whether PIU results from these conditions over time (Gecaite-Stonciene et al., 2021).

Moreover, if we want to grasp PIU more deeply, we must consider that internet technologies evolve rapidly, and new platforms and new adaptations of old features will emerge that might affect PIU in ways that have never been seen before. Virtual reality, the metaverse and more sophisticated social media algorithms are emerging technologies that could make PIU experiences immersive and addictive, or change what PIU is. The current models of PIU do not fully capture the cognitive and behavioral impacts of these technologies, and thus require revision of theoretical frameworks and empirical research. This gap necessitates studies of how these emerging technologies affect PIU, particularly with vulnerable populations.

By addressing these research gaps there will be a better understanding of PIU, and understanding its impact on gender, age, time period, and technology. This research will be crucial to follow the ever-evolving digital landscape and help individuals

monitor internet use in a way that supports mental health and academic success.

CHAPTER III
STATEMENT OF THE PROBLEM

Research on Internet addiction developed in the United States. Nonetheless, the issue of Internet addiction has emerged as a worldwide concern. Research has recorded Internet addiction in an increasing number of nations (Ferraro et al., 2007). In previous decades, several studies have been undertaken by researchers in the domain of Internet addiction. Nonetheless, a broadly agreed characterisation of the cognitions and behaviours linked to addictive or problematic Internet usage remains elusive. Terms such as problematic Internet usage, compulsive Internet use, Internet addiction, and Internet reliance are used interchangeably to denote addictive or problematic Internet behaviour. (Özdemir et al., 2012; Huang et al., 2014). Given that addictive or problematic Internet use appears to be a moral panic regarding technology and certain online activities, prior research has seemingly endorsed the definition of problematic Internet use rather than the designation of Internet addiction as a psychiatric disorder (Yellowlees and Marks 2007). For the sake of simplicity and unification, the term "Internet addiction," widely utilised by researchers in China (Li et al. 2014), was adopted to define the cognitive and behavioural symptoms linked to addictive or problematic Internet usage as referenced in the above literature.

Internet usage peaks among individuals aged 16–24 (Kandell, 1998; Öztürk et al., 2007), indicating that university students, during a pivotal phase of social and emotional development, constitute a potential risk group for internet dependency (Odacı & Kalkan, 2010). The enhanced accessibility and speed of internet connection in the university setting heightens the probability of university students experiencing adverse effects associated with the internet. Prolonged engagement in online activities, without awareness of time elapsing, might result in the unreasonable postponement of necessary tasks (Lay, 1988). Significant discrepancies exist between the objectives and actions of persons with procrastination issues. Individuals of this kind seem to undertake projects with commendable intentions and resolve; yet, they ultimately struggle to fulfil these objectives consistently throughout time and often do not initiate them punctually (Schouwenburg et al., 2004). Academic procrastination, a specific kind of general procrastination, poses challenges in areas such as test preparation, homework completion, meetings with student counsellors, and project fulfilment (Lay, 1988;

Milgram et al., 1998).

The psychosocial distress model is particularly noteworthy in the psychological roots of Internet addiction, positing that individuals may become addicted to the Internet as a coping mechanism to alleviate underlying psychological issues (Kandell 1998). Research concerning preexisting psychosocial characteristics and Internet addiction is limited. Individuals with pre-existing psychological issues, including loneliness, social anxiety, and difficulties in interpersonal relationships, are particularly susceptible to Internet addiction (Ceyhan and Ceyhan 2008; Tian et al. 2017), which theoretically elucidates the origins and pathogenesis of this addiction (Davis 2001).

Several protective as well as risk variables of Internet addiction have been found. A meta-analysis has emphasized psychosocial elements, particularly interpersonal characteristics, in relation to Internet addiction (Koo and Kwon 2014). According to the cognitive behavioral paradigm, the quality of social interactions and loneliness might be considered preexisting psychosocial characteristics associated with Internet addiction (Kandell 1998; Tian et al. 2017). Nevertheless, the mechanisms connecting the quality of social interactions, loneliness, and Internet addiction remain mostly unexplored. Furthermore, psychological qualities like dispositional optimism may elucidate why certain individuals are more susceptible to Internet addiction, whilst others exhibit greater resilience against it. The relationship between the quality of social connections and Internet addiction, particularly in regard to personality traits like dispositional optimism, remains poorly unexplored. Erikson's theory of psychosocial development posits that a significant psychological challenge faced by college students is the conflict between intimacy vs isolation (Moore and Abell 2017). It appears that college students in less committed relationships may withdraw from conventional social interactions and seek virtual socialisation online, resulting in reduced face-to-face engagement, so heightening their risk of developing Internet addiction. The transition in college students' dependence on interpersonal interactions from familial to peer and other social connections may result in Internet addiction (Tian et al. 2017). Studies have shown that individuals with deficient teacher-student and peer interactions are more inclined to seek solace in the Internet

to address unmet emotional needs (Jia et al. 2017; Savci and Aysan 2016).

Additionally, Internet addiction can disrupt academic performance and daily routines (Chou & Hsiao, 2000; Scherer, 1997; Yoo et al., 2004). Previous research indicates that students are susceptible to Internet addiction, potentially leading to excessive Internet use and neglect of their academic responsibilities (Chou, 2001; Nalwa & Anand, 2003; Tsai & Lin, 2003). In Young's (1998b) study, she discovered that student respondents had work or school-related issues due to excessive time spent on the Internet.

The gender imbalance is another domain that has captivated scholars. Despite several studies examining this subject, academics remain unable to concur on which gender constitutes a high-risk category for Internet-related compulsive behaviours. Some studies indicate that Internet addiction is more prevalent among females (Leung, 2004; Young, 1998b), while other research suggests that males are more likely to acquire Internet addiction than females (Chou & Hsiao, 2000; Liang, 2003; Scherer, 1997). Moreover, earlier studies have indicated that individuals may not be hooked to the Internet specifically, but rather to certain online behaviours. Research findings indicated that the interactive features of the Internet correlated with the adverse effects of excessive Internet usage, and individuals engaged in online interactive programs often displayed addictive behaviours (Davis et al., 2002; Leung, 2004; Li & Chung, 2006). Young (1998b) observed that individuals with Internet addiction were drawn to the social support features of the Internet. Thatcher and Goolam (2005a) discovered that individuals in the high-risk category for Internet addiction tended to engage in online interactive gaming and utilise Internet communication tools. They also discovered that internet gambling was a preferred activity among the high-risk category.

Crawford (2015) says, "Distractibility appears to show that we are skeptical on the topic of what is worth paying attention to—that is, what to value". According to the distraction hypothesis, distraction is caused by an inability to pay attention, a drop in interest in the main job or item, and/or a desire to focus on anything other than the object of attention. Distractions can also arise from both external (such as social media connections, music, texts, and phone calls) and

internal (such as hunger, exhaustion, sickness, and daydreaming) (Union of International Associations, 2020).

Web 2.0 has increased people's communication and social relationships by allowing them to use social networking websites such as Facebook, Twitter, and LinkedIn (Lai & Gwung, 2017). The Internet has evolved into a crucial tool for exchanging knowledge, and as a result, it has overt or covert consequences on university students' academic achievement. These platforms have exploded in popularity, and a growing body of research shows that they have a detrimental influence on their users' behaviour. There are links between poorer academic achievement (Junco, 2012), unsafe conduct (Riordan et al, 2015), and aided laziness (Riordan et al, 2015). The Internet's educational and entertainment capabilities need an increase in time commitment, which leads to social and psychological issues such as sadness, loneliness, social isolation, and a drop in academic performance (Shen, Liu, & Wang, 2013). Concerns concerning the influence of digital technology on academic achievement are heightened when such equipment is used in conjunction with negative behavioral patterns such as internet addiction or problematic internet use (PIU) (Hawi & Samaha, 2016).

Students' motivation to learn has been discovered to be affected by psychological and social factors (Froiland et al., 2012). As a result, it's possible that these psychological characteristics, rather than PIU itself, will play a part in influencing the impact of PIU on learning motivation. Given that it's uncertain if PIU affects learning motivation directly or indirectly, a secondary goal of the study was to explore the relationship between PIU and learning motivation is mediated by psycho-social states.

Since the widespread use of digital technology, its impact on users' cognitive processes has received little attention, and only a few research have been undertaken on the topic. Despite the data suggesting a potential relationship between internet use and a loss in attention during tasks performance, it is still unclear which mechanism is to blame for this condition. Individuals with problematic internet use had increased impulse control issues, attention deficiency, and forgetfulness in their daily lives, according to a few research. Since there has been a number of studies done on adolescents, there is a significant neglect or lack of information regarding

problematic internet use, its predictors and its effects on young adults in Mizoram as youths have become more indulged on the Internet as we live in the era of smartphones and social media. As depicted in Maslow's 3rd hierarchy of needs, we human beings are social animals, and as social animals we crave belongingness, friendship and other social support & needs. The fear of being left out may play a crucial role in individuals who started using the Internet and who continue to use it as it has become a crucial platform for maintaining connections and conversations. Increased reports have been observed regarding attention, concentration and distraction issues during their academic lives. Therefore, this study will aim to elucidate the levels of problematic internet use among Mizoram college and University students and find out the predicting, mediating and moderating factors for problematic internet use.

OBJECTIVES OF THE STUDY

Based on the available literature of Internet addiction, the following objectives were framed for the study as follows:

- 1) To examine the overall and unique predictive role of cognitions behind Internet use (loneliness/depression, impulse control, social comfort, and distraction) in determining the severity of problematic Internet use.
- 2) To examine the mediating effects of the level of attention control between internet use and academic procrastination.
- 3) To examine the moderating role of gender and age between cognitive beliefs related to online activity and cognitive outcomes and academic procrastination.
- 4) To examine the mediating effects of distractibility and attention shifting between internet use and daily attention lapses.

HYPOTHESIS

- 1) Individuals who are lonely, depressive, have poor impulse control, seek the Internet for social comfort, and have significantly higher chances of becoming Internet addicts.
- 2) The level of attention control will significantly mediate and moderate the relationship between internet use and academic procrastination.
- 3) The level of problematic internet use, gender, and age will significantly moderate the relationship between cognitive beliefs related to online activity and cognitive outcomes and academic procrastination.
- 4) Distractibility and attention shifting will significantly mediate the relationship between internet use and daily attention lapses.

CHAPTER IV
METHODS AND PROCEDURES

Sample: The process of choosing 200 males and 200 females for the sample was done in multi-stage sampling methods. Three colleges were randomly selected from twelve colleges located in Aizawl city, and the total students was 6610. Informed consent was sought, only 1268 students have given written consent for participating in the psychological evaluation. Internet addiction test was administered through online and offline, incomplete, missing response and outliers were screened out that comprises of 600 samples. From the 600 samples, 460 samples comprise of 234 low and high 226 ($M \pm 2$) were screened out using the Internet addiction test (Young, 1998). To control the extraneous variables which can influence the results other than the observed variables were again checked using Demographic profiles. Then the final count for the sample was 400 samples (200 males and 200 females of youth internet users). . The inclusion and exclusion criteria for the selection of the samples is as given below:

Inclusion criteria

- i) Students studying in colleges located in Aizawl City and affiliated to Mizoram University
- ii) Students age 18-24 years old
- iii) Who has access to the internet
- iv) Female and male gender
- v) Only who gave consent will be included
- vi)

Exclusion criteria

- i) Students studying in colleges not located Aizawl City and not affiliated to Mizoram University
- ii) Students who are below 18 years of age and above 24 years of age
- iii) Who has no access to the internet
- iv) Transgender or not belonging to the Female and male gender
- v) Not giving consent.

Psychological Tools used:

1. Internet Addiction Test (IAT2): Developed by Kimberly Young (1998) , this tool has been widely used to research and detect internet addictive problems in individuals. This is a 20-item questionnaire on which respondents are asked to rate items on a five-point Likert scale, examining how their Internet use impacts their everyday routines, social lives, productivity, sleeping patterns, and feelings. The minimum score is 20, and the maximum is 100; the higher the score, the greater the problems Internet use causes. Young suggests that a score of 20–39 points is an average online user who has complete control over his/her usage; a score of 40–69 signifies frequent problems due to Internet usage; and a score of 70–100 means that the Internet is causing significant problems. IAT has shown strong internal consistency ($\alpha = 0.90\text{--}0.93$) and good test-retest reliability ($r = 0.85$) values (7–12).

2. Online Cognition Scale (OCS). The OCS is a 36-item questionnaire developed by Davis, Flett & Besser in 2002 that measures problematic Internet use. Items were developed from related measures of procrastination, depression, impulsivity, and pathological gambling, as well as symptoms identified in the literature on problematic Internet usage, with an emphasis on cognitions rather than activities. On a seven-point Likert scale, respondents score the agreeability of statements such as: “I often keep thinking about something I experienced online well after I have logged off;” “I get more respect online than in real life;” and “Using the Internet is a way to forget about the things I must do but really don’t want to do.” The OCS contains four subscales: loneliness/depression, diminished impulse control, social comfort, and distraction. In addition, the OCS can be scored as a global measure of problematic Internet use.

3. Mindful attention awareness scale-lapses only (MAASLO) The MAAS-LO (Carriere et al., 2008) developed by Brown and Ryan in 2003 is a 12-item questionnaire that assesses the frequency with which an individual experiences lapses of attention in everyday situations. Higher scores reflect greater frequencies of attention lapses.

4. Attentional control: switching (AC-S) and distractibility (AC-D) Attentional control developed originally by Derryberry & Reed in 2002 will be measured using the AC-S and AC-D questionnaires (Carriere et al., 2013). Both scales included four items. Items are answered using a five-point Likert scale with responses ranging from (1) almost never to (5) always, with higher scores reflecting the more incredible difficulty in switching one's attention or greater distractibility. the APS-S (McCloskey, 2011) is a five-item Likert-type scale with anchors 1: Agree to 5: Disagree, with the items for the short form of the scale originally selected from the 25-item full length scale. Instructions for completing the scale consisted of asking participants "How much do you, yourself agree to the following statements?" (McCloskey, 2011). Higher scores on the scale indicate a greater tendency to procrastinate on academic tasks.

5. Academic Procrastination Scale (short form Year): The short form developed by Justin. D. McCloskey contains 5 items measured on a 5 point Likert scale. In the original study Cronbach's α was .86 (Tuckman, 1991), and in a more recent study Tuckman (2007) reported Cronbach's α to be .89. Higher scores indicate higher levels of procrastination.

6. Socio Demographic Profiles (Lalduhsaka, E, 2021). The researcher constructed for the present research work which to be used for screening the true representative of the samples and also may be used for controlling extraneous variables.

7. Informed Consent Form (Lalduhsaka, E, 2021). The researcher constructed the Informed consent form by following the guidelines of UGC and MZU which include the nature and purpose of the study, expected participation, assurance of confidentiality on their details and responses, voluntary nature of participation, expected time taken, etc. which will be taken before the administration of psychological tools.

Designs:

The design employed a Cross Sectional design. The study entailed 400 College Students comprising 400 internet users on loneliness, impulse control, distractibility, online social comfort, attention control, attentional lapse, and academic procrastination.

Procedures:

Looking at the topic of the study, the appropriate psychological test was constructed (sociodemographic form and consent form was constructed) and selected psychological tests such as (i) Internet Addiction Test (IAT2), (ii) Online Cognition Scale, (iii) Attention Control, (iv) Mindfulness attention awareness scale and (v) academic procrastination scale were readily prepared. The appropriateness of the scales was tested to the target population under study through a pilot study. Then, necessary permission from the authorities and the ethics committee, and informed consent was obtained from samples. The administration of the psychological tests was conducted in individual conditions. A quiet, well-lit room was selected and the participants were seated far from each other to avoid distraction from others. They were given all the selected scales and instructions were given as per the manual. Careful instructions were given to ask any questions or items that are not understood and were clarified to ensure accurate outcomes. After the participants finished answering the answers were checked and scrutinized for any missing or mistakes.

Ethics

The study protocol was presented for ethical clearance from the Human Ethics Committee of Mizoram University.

Statistical Analysis:

To test the hypotheses set forth to determine “Cognitions in Problematic Internet use: A Cross-sectional Study on Predicting, Mediating and Moderating Effects” the following statistical analysis were employed when required:

The psychometric properties of the items, scale, and sub-scales of the psychological measures were ascertained to warrant their applicability for use in the population of the proposed study.

Descriptive statistics (Mean, Standard-Deviation, Skewness, Kurtosis, & graphical method) was used to look in internet use effects on dependent variables.

The assumptions underlying univariate, bivariate, and multivariate statistics (like Logistic Regression Analysis) may be ascertained, and wherein necessary permissible transformation and standardization of the comprehensive score on the scale and sub-scales of psychological measures was performed.

Univariate, bivariate, and multivariate statistics, wherein applicable, was employed to test the occurrence of differences and relationships for drawing inferences.

Mediation and moderator analysis was done using PROCESS MACRO v4.

CHAPTER V
RESULTS AND DISCUSSION

The present study entitled “**cognitions in problematic internet use: a cross-sectional study on predicting, mediating, and moderating effects**” aimed to study various cognitive functions, affect and behaviour that may predict problematic use of the internet as well as the unique and the complicated relationship and interplay of mediating and moderating variables that may change the direction of each outcome. It was hypothesized that the sub scales of Online Cognition Scale such as loneliness, online social comfort, diminished impulse control and distractibility will predict problematic use of the internet in the proposed sample of the study. It was also proposed that poor attention control will significantly mediate the relationship between Internet use and Academic Procrastination. It was also hypothesized that level of internet use, age and gender will significantly moderate the relationship between cognitive beliefs related to online activity and cognitive outcomes and academic procrastination. It was also hypothesized that distractibility and attention shifting will significantly mediate the relationship between internet use and daily attention lapses.

To achieve the objectives and hypotheses put forth, 400 participants comprising 200 male internet users and 200 female internet users consisting of equal representation and having equally matched socio-demographic profiles were selected from 5 colleges affiliated to Mizoram University, Aizawl by using a multi-stage random sampling method. The age group of the participants was between 18-24 years. Internet Addiction Test (IAT2)(Kimberly Young 1998), Online Cognition Scale (OCS)(Davis, Flett & Besser 2002), Mindful attention awareness scale-lapses only (MAASLO) (Brown and Ryan 2003), Attentional control: switching (AC-S) and distractibility (AC-D)(Brown & Ryan 2003), Academic Procrastination Scale (short form Year)Justin. D. McCloskey 2008), Socio Demographic Profiles (Lalduhsaka, E, 2021), Informed Consent Form (Lalduhsaka, E, 2021) were employed for psychological evaluation to the samples. The administration was done with due care to the instructions provided in the manual and APA (2014).

Sample characteristics

The samples of the study were selected cautiously trying to get equal representation of high internet addiction and low internet addiction, male and female gender (male and female), age level (18-24 years), ecology (living in Aizawl city) to control extraneous variable which can influence the results other than internet addiction. The results (dependent variable)

Checking raw data

The raw data collected using psychological test were checked on any missing data and outlier data. The Researcher carefully conducted and no such kind of missing and outliers are not found and is ready for further analysis.

Checking Psychometric Properties of the Psychological Scales:

Psychological test used in the study were constructed for other culture and needed to check their appropriateness to the target population of the study. Accordingly, the psychometric properties of all the scales were done on normality, reliability and homogeneity. The reason being that:

- (i) Normality- There is not much variation between mean and SD, all kurtosis and skewness levels falls within ± 2 showing the normality of the data.
- (ii) Reliability- Cronbach alpha reliability was calculated and the results showed that all the scales reliabilities fall between .85-.91 (addiction scale $\alpha=.85$; Social Comfort $\alpha=.91$;Loneliness $\alpha=.86$; Diminish Impulse control $\alpha=.89$;Distraction $\alpha=.84$; Attention Lapse $\alpha=.88$; Distractibility $\alpha=.87$; Work Engagement $\alpha=.91$; Academic Procrastination $\alpha=.71$) showing the applicability of the scales to the target population.
- (iii) Homogeneity- Test of Homogeneity of Variances was calculated and the results showed non significant on all the test scales showing the applicability to the target population.

The psychometric property check confirmed the applicability of all the psychological

test for the population of the study; and also provided the appropriateness of parametric statistics for further analysis.

Table -1: Psychometric Properties of the Psychological scales for the samples.

Internet addiction Level		Addiction Scale	Social Comfort	Loneliness	Diminish Impulse control	Distraction	Attention Lapse	Attention Control	Academic Procrastinate
High Users	Mean	69.19	46.41	27.86	34.57	21.48	39.94	16.95	19.58
	SD	5.128	4.161	4.704	4.299	4.060	4.238	3.937	3.298
	Kurtosis	-0.880	-0.929	-	-0.654	-0.899	-0.777	-0.744	-0.720
				0.704					
	Skewness	0.697	0.781	0.674	0.783	0.747	0.747	0.668	0.754
	Mean	57.19	38.37	22.71	26.13	15.35	32.32	10.56	15.13
	SD	5.977	4.957	3.838	4.225	3.995	3.696	2.668	3.093
	Kurtosis	-0.972	-0.943	-	-0.844	-0.899	-0.984	-0.776	-0.995
Low Users				0.980					
	Skewness	-0.345	-0.762	-	-0.755	-0.793	-0.707	-0.646	-0.697
				0.757					
	Mean	63.19	42.39	25.29	30.35	18.42	36.13	13.75	17.35
Total	SD	7.244	7.265	6.734	7.543	7.284	7.044	6.442	3.905
	Kurtosis	-0.817	-0.820	-	-0.841	-0.811	-0.861	-0.737	-0.786
				0.854					
	Skewness	0.037	0.046	-	-0.009	0.019	0.094	0.058	0.096
				0.038					
Reliability (α)		.85	.91	.86	.89	.84	.88	.87	.71
Homogeneity		.65	.44	.46	.38	.36	.07	.32	.39
(Test of Homogeneity of Variances)									

Mean difference between high and low internet users on dependent variables:

The significant mean difference between the high and low internet users was examined using independent T-TEST on Online Social Comfort, Loneliness,

Diminish Impulse control, Distractibility, Attention Lapse, Attention Control, Work Engagement and Academic Procrastinate as presented in Table -2.

The results evinced that significant difference between high internet users and low internet users:

- (i) Online social comfort: The result shows that individuals who scores higher on Internet addiction scale also shows higher levels of online social comfort as compared to individuals who scores lower on the internet addiction test. ($M=46.41, M=38.37; t=29.65; p=>.01$) and is significant at .01 level.
- (ii) Loneliness: The result shows that individuals who scores higher on Internet addiction scale also reported higher levels of feelings of loneliness in their lives as compared to individuals who scores lower on the internet addiction test. This has been mentioned as a looping effect as problematic internet use may cause individuals to become more lonely or individuals who have already faced loneliness in their lives uses the internet more as a means of coping ($M=27.86, M=22.71; t=28.56; p=>.01$) significant at .01 level.
- (iii) Diminished Impulse control: The result table shows individuals who scores higher on internet addiction scale shows diminished impulse control as compared to the normal internet users and have poor control over their internet use ($M=34.57, M=26.13; t=29.18; p=>.01$) significant at .01 level.
- (iv) Distraction: The result table shows that individuals who scores higher on internet addiction scale also shows higher levels of distraction while doing activities in their daily lives ($M=21.48, M=15.35; t=30.12; p=>.01$) significant at .01 level. This shows that individuals who shows higher levels of internet use tends to get distracted more easily and lose focus of the task at hand causing them to use more time than intended.
- (v) Attention Lapse: The result table shows that individuals scoring higher on internet use also reported higher levels of involuntary attentional lapses during

the day as compared to individuals who uses the internet fairly (M=39.94, M=32.32: t=24.22: p=>.01) significant at .01 level.

(vi) Attention Control: The result table shows that individuals who uses the internet more shows higher levels of issues related to attention control as compared to healthy users (M=16.95, M=10.56: t=25.31: p=>.01) significant at .01 level.

(vii)Academic Procrastination: The result table shows that individuals who scores higher in internet addiction scale shows higher levels of procrastination in their academic duties as compared to healthy users (M=19.58, M=15.13: t=26.35: p=>.01) significant at .01 level.

Table 2: Showing the Mean,Standard Deviation, Kurtosis, Skewness and t-test of the proposed psychological tools on the selected sample.

Internet addiction Level	Statistics	Online social Comfort	Loneliness	Diminished Impulse control	Distraction	Attention Lapse	Attention Control	Engagement	Academic Procrastinate
High Users	Mean	46.41	27.86	34.57	21.48	39.94	16.95	20.95	19.58
	SD	4.161	4.704	4.299	4.060	4.238	3.937	4.016	3.298
	Kurtosis	-0.929	-	-0.654	-0.899	-	-0.744	-.975	-0.720
			0.704			0.777			
	Skewness	0.781	0.674	0.783	0.747	0.747	0.668	0.646	0.754
Low Users	Mean	38.37	22.71	26.13	15.35	32.32	10.56	16.88	15.13
	SD	4.957	3.838	4.225	3.995	3.696	2.668	2.207	3.093
	Kurtosis	-0.943	-	-0.844	-0.899	-	-0.776	-.846	-0.995
			0.980			0.984			
	Skewness	-0.762	-	-0.755	-0.793	-	-0.646	-.739	-0.697
t-test between high and low internet users		29.65	28.56	29.18	30.12	24.22	25.31	27.36	26.35

The results of the study presented and discussed following the sequence of objectives

Objective 1: To examine the overall and unique predictive role of cognitions behind Internet use (loneliness/depression, impulse control, social comfort, and distraction) in determining the severity of problematic Internet use.

To examine the predictive role of cognitions behind internet use, linear regression was employed and the results are presented in Table 3.

The results demonstrated that:

- (i) Online social Comfort predicted 28% of internet use ($F=842.653; df=1/398; R^2=.279; p=>.01$). This maybe due to the fact that individuals with low self esteem or confidence may seek out connections indirectly through the internet with less negative repercussions as perceived by them. As noted in literature reviews individuals with poor interpersonal skills or communication skills may also compensate their fear of physical interactions with virtual online connections. A study involving 286 undergraduates (Ellison et al., 2007) indicated that Facebook usage corroborated a Social Compensation hypothesis, termed "poor get richer." This phenomenon suggested that students with low self-esteem and diminished satisfaction with their college experience benefited from enhanced 'bridging social capital,' a concept referring to resources obtained from extended, weak-tie social networks. A recent research (Zywica and Danowski, 2008) indicated that a subset of users, characterised by extroversion and elevated self-esteem, may support the Social Enhancement theory, since they exhibit more popularity both offline and on Facebook. A distinct sample of users, specifically those who are less popular in offline settings, yielded data that corroborated the Social Compensation hypothesis, indicating that those with lower social standing tend to benefit more, as they exhibit greater introversion, diminished self-esteem, and a heightened desire to seem popular on Facebook. A related research (Tong et al., 2008) assessed the social attractiveness of individual Facebook users based on observers' evaluations of

their number of Facebook connections. The quantity of friends possessed by profile owners and external perceptions of their social appeal generally varied, ranging from least attractive for individuals with minimal friends to most attractive for those with a substantial number of friends, subsequently declining for users with an excessive quantity of Facebook friends. A disproportionately high number of friends results in perceptions that profile owners are neither social and extroverted, but rather more introverted. The results suggest an empirical hypothesis among SN users, specifically that those who excessively engage in social networks may be compensating for deficiencies in face-to-face communication and social interaction. This idea was corroborated in a recent study including a small sample of 183 college students (Kujath, 2011).

- (ii) Online social Comfort & loneliness predicted 54% of internet use ($F=1776.368; df=1/398; R^2=.541; p=>.01$). This may be due to the fact that more online socialization may cause higher levels of loneliness in individuals or individuals who are lonely tend to use the internet as a coping mechanism. This looping effect as mentioned can further perpetuate the cause of problematic internet use in individuals. A frequent finding is that loneliness and depression are important emotional predictors of PIU and have been found in many studies to predict internet behaviours. As with loneliness also depression is a psychological state of lack of social fulfilment and prevalence of sadness or emptiness, which people seeking other ways of emotion relief, for example use of the internet (Zhou et al., 2021). To many, the internet is a medium to connect with other people, engage in social media or get lost in activities online to trick the mind from feeling isolated and sad. While this can be a coping mechanism, however, this mechanism can become dependent and compulsive, becoming compulsive internet behaviors defining PIU. A consistent research body links PIU to loneliness, and especially among young adults and adolescents who may be socially isolated during crucial periods of development. For example, Morrison and Gore (2010) discovered that more lonely people also expressed increased internet dependency, leading them to search for valid online environments for activity, as they feel isolated.

Stavropoulos et al. (2017) found that, similar to loneliness, loneliness and PIU are related, as being lonely is associated with increased likelihood to replace face-to-face contact with internet usage. In particular, this trend is important in populations where physical social interactions are limited; here, people may develop online personae and participate in online communities in order to fulfil social needs that remain unfulfilled offline.

- (iii) Online social Comfort, loneliness & impulse control predicted 60% of internet use ($F=2108.949; df=1/398; R^2 =.591; p=>.01$). As mentioned in the above results a combination of loneliness and seeking social comfort may cause significant issues in regulating control of internet use. Further insight into the link between impulsivity and PIU is provided not only by empirical studies, but also by psychological theories of impulse control disorders. Maladaptive pattern of behaviour in which individuals feel driven to perform repetitive, reward-seeking behaviours despite adverse outcome are associated with impulse control disorders (Pettorruso et al., 2020). PIU is characterized by compulsive behaviours whose behaviour is driven by the desire to experience pleasure or to relieve distress – as is seen in traditional impulse control disorders, a phenomenon that impulsive individuals may find difficulty in moderating. The theoretical framework of this paper suggests that those with a predisposition to PIU may be more impulsive because they are more sensitive to rewards and less able to think through long term consequences.
- (iv) Online social Comfort, loneliness, impulse control & distraction predicted 60% of internet use ($F=691.798; df=1/398; R^2 =.597; p=>.01$). Finally the unique interaction of the sub-scales of the Online Cognition Scale ie; Online social Comfort, loneliness, impulse control & distraction significantly predicted 60% of issues related to internet use. This unique affective, behavioral and cognitive outcome can be explained in a way that loneliness and online social comfort may cause an individual to gradually lose regulated use of the internet for socialization. This may further cause an individual to lose focus of the real world stimuli causing higher chances of involuntary loss of attention control or

distractibility. The space of the internet has become a critical sphere for individuals in-search for social comfort and a means of escape on the daily. Social media and online environments become a place for users to find a sense of connection, share stories, and validate themselves, especially among those who are socially isolated (Hammour et al., 2015). The phenomenon is believed to be fuelled by an individuals need for social acceptance and comfort, which has been tied to greater internet use for the purpose of connection that may not be possible offline. Jin (2013) points out that social media platforms provide a platform for users to create an online identity and being a part of a community, even with limited physical interactions.

- (v) Additionally, distraction is important in connection with problematic internet use (PIU), since individuals are going to the internet for stress, boredom, or loneliness. To many it is simply a quick route to relief and a convenient escape from negative emotions. Consistent with the distraction hypothesis, people behaviourally substitute for these situations via activities that shift their attention away from stressful or unpleasant situations (Hammour et al., 2015). Digital distraction may seem like an unhealthy activity when we're expected to work from home or in an office for eight or more hours a day, but it's actually one of the ways we cope with uncomfortable feelings of boredom, the inability to focus, or the weight of anxiety. Nevertheless, this habit of distraction seeking habit can be associated with compulsive internet using, which can even worsen PIU.

Table 3: Showing the predictive role of cognitions behind Internet use (loneliness/depression, impulse control, social comfort, and distraction) in determining the severity of problematic Internet use.

Predictor	Criterion	R ²	F Change	df	Sig.
social comfort	Internet addiction	0.279	842.653	1/398	0.004
social comfort & loneliness		0.541	1776.368	1/398	0.002
impulse control, social comfort & loneliness		0.591	2108.949	1/398	0.001
Distraction, impulse control, social comfort & loneliness		0.597	691.798	1/398	0.000

Results in Table 2 & 3 has proved that we can accept hypothesis no 1.

Objective 2: The level of attentional control will significantly mediate and moderate the relationship between internet use and academic procrastination.

Mediation analysis: A mediation analysis was conducted using Hayes' Process Macro (Model 4) to examine whether attention control (operationalized as distractibility) mediated the relationship between internet addiction (X) and academic procrastination (Y).

Table 4: Showing the model summary of mediating effect of attention control between internet addiction and academic procrastination for the samples

Attention control- Shifting & Distractibility							
Outcome variable	R	R-sq	MSE	F	Df1	Df2	P
Attention Control	.896	.803	8.213	1617.932	1.000	398.000	.000
Academic Procrastination	.995	.991	.146	20700.885	2.000	397.000	.000

Table 5: Showing the mediating effect of attention control-shifting & distractibility between internet addiction and academic procrastination for the samples (N=400)

Predictor	Beta	SE	T	P	LLCI	ULCI	Standardized coefficient
Distractibility							
Internet Addiction	0.797	0.020	40.224	.000	0.758	0.836	.896
(a)							
Academic Procrastination							
Addiction	0.519	0.006	87.512	.000	0.508	0.531	.963
(c')							
Attention control-distractibility	0.021	0.007	3.221	.001	0.008	0.035	.035

The results for the first regression model, with impairments in attention control (distractibility) as the outcome, indicated that internet addiction significantly predicted loss of attention control, $b=0.797$, $SE=0.020$, $t(398)=40.224$, $p<.001$, 95% CI [0.758,0.836]. The model was significant, $R^2=.803$, $F(1,398)=1617.932$, $p<.001$, explaining 80.3% of the variance in loss of attention control.

The second model, predicting academic procrastination, revealed that both internet addiction and loss of attention control significantly predicted academic procrastination. Internet addiction was a stronger predictor, $b=0.519$, $SE=0.006$, $t(397)=87.512$, $p<.001$, 95% CI [0.508,0.531], while loss of attention control also had a small but significant effect, $b=0.021$, $SE=0.007$, $t(397)=3.221$, $p<.005$, 95% CI [0.008,0.035].

This model explained 99.1% of the variance in academic procrastination, $R^2=.991$, $F(2,397)=20700.885$, $p<.001$.

Table 6: Test of direct, indirect and total effect.

Direct and indirect effects of X on Y	Effect	SE	t	p	LLCI	ULCI	Standardized coefficient
Total effect	.536	.003	201.094	.000	.531	.542	.995
Direct Effect	.519	.006	87.512	.000	.508	.531	.963
Indirect effect	0.17	-	-	-	0.14	.054	.029

In the third regression model, which tested the direct effect of internet addiction on academic procrastination, internet addiction was a significant predictor, $b=0.536$, $SE=0.003$, $t(398)=201.094$, $p<.001$, 95% CI [0.531,0.542].

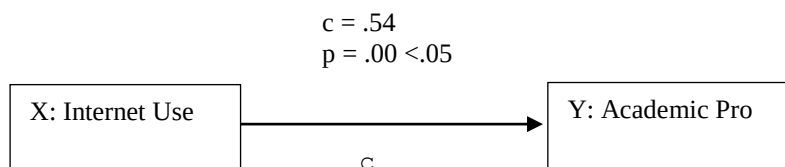
The total effect of internet addiction on academic procrastination was significant, $b=0.536$, $SE=0.003$, $t(398)=201.094$, $p<.001$, 95% CI $[0.531,0.542]$, as was the direct effect, $b=0.519$, $SE=0.006$, $t(397)=87.512$, $p<.001$, 95% CI $[0.508,0.531]$.

The indirect effect of internet addiction on academic procrastination through attentional control was small but significant, $b=0.017$, 95% CI $[0.008,0.029]$. The completely standardized indirect effect was also significant, $b=0.032$, 95% CI $[0.014,0.054]$, indicating a partial mediation effect.

Moderation analysis:

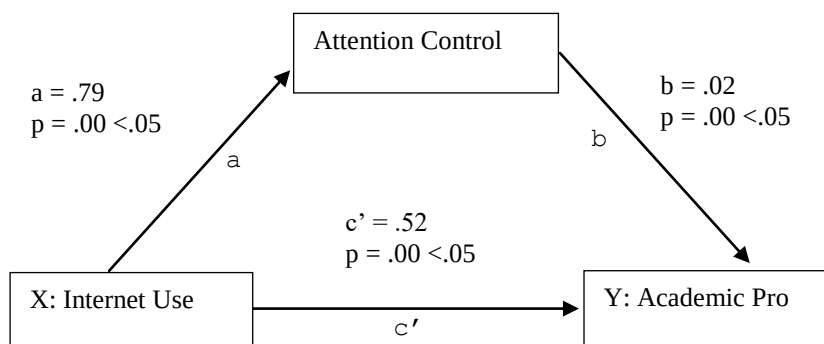
To further confirm the mediation effect, a Sobel test was conducted. The Sobel test statistic was significant, $Z=3.11$, $p=.0019$, supporting the conclusion that attention control significantly mediates the relationship between internet addiction and academic procrastination.

Figure 1: Internet Control total effect = 54% on academic procrastination sig >.05



Mediation (attention Control effect) : Internet use on attention control.79 (sig at .05);
Attention Control on Academic Proc = $b=.02$ sig at .05.

Figure 2: Showing the Path Diagram of the mediation of attention control between Internet use and Academic Procrastination



A mediation analysis using Model 4 of Hayes' PROCESS Macro was conducted to assess whether the level of attention control mediates the relationship between internet use and academic procrastination. The total effect of internet use on academic procrastination was significant, $B=0.54$, $SE=0.00SE$, $\beta=0.99$, $t(398)=201.09$, $p<.001$, 95% CI [0.53,0.54].

The path from internet use to level of attention control (path a) was significant, $B=0.79$, $SE=0.02$, $\beta=0.89$, $t(398)=40.22$, $p<.001$, 95% CI [0.76,0.83]. Additionally, the path from level of attention control to academic procrastination (path b) was also significant, $B=0.02$, $SE=0.01$, $\beta=0.04$, $t(397)=3.22$, $p=.001$, 95% CI [0.01,0.03].

The direct effect of internet use on academic procrastination (path c') remained significant after accounting for the mediator, $B=0.52$, $SE=0.01$, $\beta=0.04$, $t(398)=87.51$, $p<.001$, 95% CI [0.01,0.03]. The indirect effect through attention control was significant but small, $B=0.02$, $SE=0.01$, $\beta=0.03$, $z=1.99$, $p=.05$, 95% CI [0.01,0.03], based on a Sobel test.

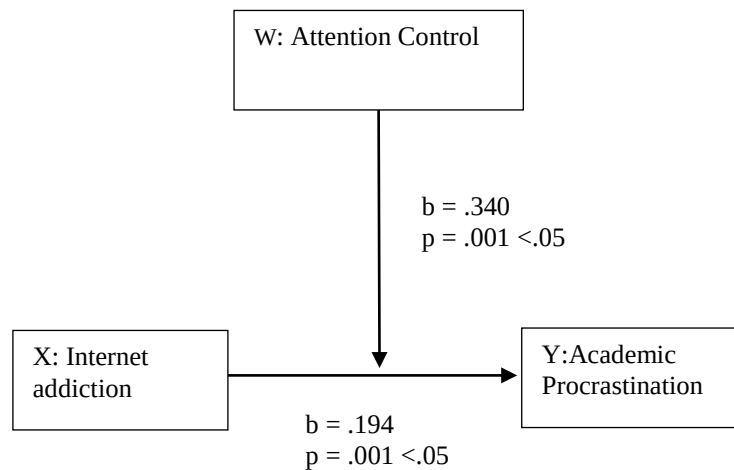
These results suggest that attention control partially mediates the relationship between internet use and academic procrastination.

Table 7: Showing moderation Analysis of the Effect of Internet Use on Academic Procrastination with Attention Control as a Moderator.

Predictor	b	SE	t	p	95% CI (LLCI, ULCI)
Internet Addiction	.194	.040	4.897	<.001	[.116, .273]
Attention Control	.340	.039	8.620	<.001	[.263, .418]
Internet Addiction × Attention Control	.001	.000	4.302	<.001	[.001, .002]

Figure 3: Showing moderation pathway of the effect of Internet Use on Academic Procrastination with Attention Control as a Moderator

A moderated regression analysis was conducted using the Hayes Process Macro (Model 1) to examine the moderating effect of attention control on the relationship between internet addiction and academic procrastination. The overall model was statistically significant, $F(3,396)=16374.73, p<.001$, with the predictors accounting for approximately 99.2% of the variance in academic procrastination, $R^2=.99$.



Main Effects Of Internet addiction

As shown in Table 1, the results indicated that both internet addiction and attention control were significant predictors of academic procrastination. Specifically, internet addiction was positively associated with academic procrastination, $b=.194$, $t(396)=4.90$, $p<.001$, 95% CI [.116, .273]. Attention control also significantly predicted academic procrastination, $b=.340$, $t(396)=8.62$, $p<.001$, 95% CI [.263, .418].

Interaction Effect of internet addiction and attention control

The interaction between internet addiction and attention control was also statistically significant, $b=.001$, $t(396)=4.30$, $p<.001$, 95% CI [.001, .002], suggesting that attention control moderates the relationship between internet addiction and academic procrastination.

Conditional Effects Internet Addiction on Academic Procrastination (when low, mean or high is significant = all sig thereby attention control significantly effect on Academic procrastination)

Further analysis revealed that the effect of internet addiction on academic procrastination varied as a function of attention control. When attention control was low (-1 SD), internet addiction had a significant effect on academic procrastination, $b=.185$, $t(396)=4.62$, $p<.001$, 95% CI [.106, .263]. At the mean level of attention control, the effect remained significant, $b=.194$, $t(396)=4.90$, $p<.001$, 95% CI [.116, .273]. When attention control was high ($+1$ SD), the effect of internet addiction on academic procrastination was still significant, $b=.204$, $t(396)=5.16$, $p<.001$, 95% CI [.126, .282].

According to Chang et al. (2024), attentional control prevents the influence of Problematic Internet Use (PIU) on the academic procrastination. According to the theory, people with good attentional control are better able to hold out from the allure of online distractions (such as social media or games) and so are less likely to procrastinate.

PIU has a measurable negative influence on academic performance when attentional control is low; however, when attentional control is high students are more able to keep focus when faced with academic tasks in the presence of external distractions, weakening the negative impact of PIU (Shahrajabian et al., 2023). On the other hand, those with a lower control of attention may find it hard to keep their concentration rammed, in which case they are more prone to procrastination when interacting online.

Table 8: Conditional Effects of Internet Use on Academic Procrastination at Different Levels of Attention Control

Attention Control (SD)	Effect	SE	t	p	95% CI (LLCI, ULCI)
-1 SD (Low: -7.284)	.185	.040	4.622	<.001	[.106, .263]
Mean (0.000)	.194	.040	4.897	<.001	[.116, .273]
+1 SD (High: 7.284)	.204	.040	5.160	<.001	[.126, .282]

Calvete et al. (2017) show that building up attentional control, with mindfulness training, or attention regulation exercises, can actually buffer the negative impact of PIU on academic tasks. For example, studies have shown that when attentional control is improved—when students can pay attention more selectively, attend longer to assignments, and do a better job completing tasks, impulsivity decreases as well, leading to less procrastination for those who spend too much of their study time on the internet. Through the development of attentional control students could potentially achieve long term academic objectives opposed to such immediate gratification of online activities.

Objective 3: To examine the moderating role of gender and age between cognitive beliefs related to online activity and cognitive outcomes and academic procrastination.

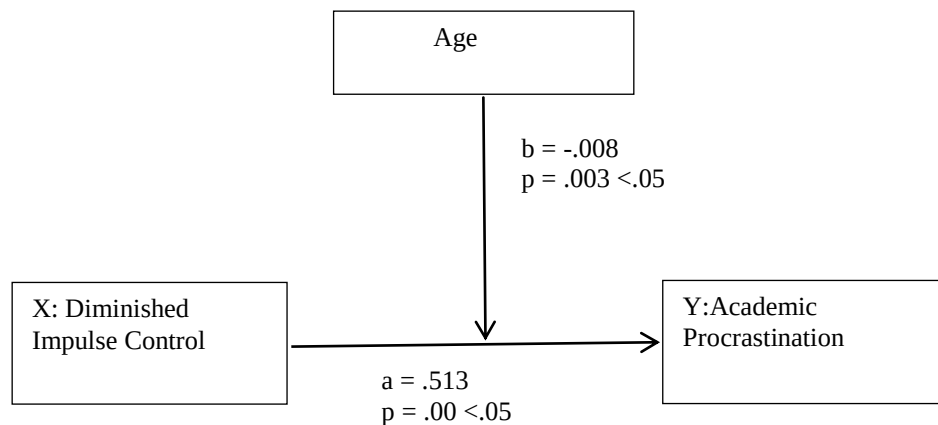
Table 9: Showing the model summary of the moderating effect of age between Diminished impulse control and academic procrastination for the samples (N=400).

Academic Procrastination

Model Summary							
Outcome variable	R	R-sq	MSE	F	Df1	Df2	P
Academic Procrastination	.991	.983	.266	7498.794	3.000	396.000	.000

Predictor	Beta	SE	T	P	LLCI	ULCI
Diminished impulse control	.513	.004	146.618	.000	.507	.520
Age	-.008	.017	-.472	.003	.042	.026

Figure 4: Showing the model summary of the moderating pathway of the effect of Diminished Impulse Control on Academic Procrastination with age as a Moderator.



Moderation analysis: A moderation analysis was conducted using Hayes' Process Macro (Model 1) to examine whether age moderated the relationship between Diminished Impulse Control (X) and academic procrastination (Y).

The results for the first regression model (Table 8), with Academic procrastination as the outcome, indicated the pathway of diminished impulse control(X) to Academic procrastination was significant, $b=.513$, $SE=.004$, $t(398)=146.618$, $p<.005$, 95% CI [.507,.520]. The model was significant, $R^2=.983$, $F=7498.794$, $p<.005$, explaining 98% of the variance in age. The moderating effect of age also proves significant $b=-.008$, $SE=.007$, $t=-.472$, $p<.005$, 95% CI [.042,.026] leaving the moderation pathway of age a significant moderator between Diminished Impulse Control and Academic Procrastination.

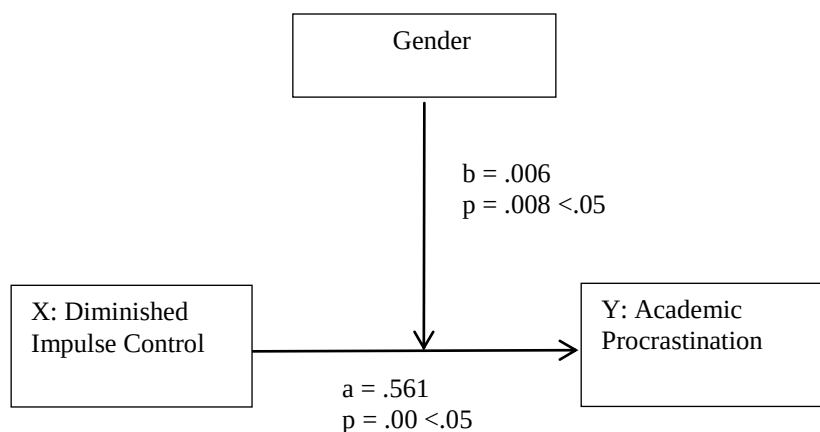
Academic procrastination affects students of all ages, whether they are enrolled in school or working toward a degree. It is the tendency to postpone educational tasks and habits, such as putting off assignments or not complete projects until the deadline and so on (McCloskey, 2011).

According to Steel (2007), procrastination reduces with age. This is due to improved time and emotional management skills. A study of undergraduates found that older students tend to procrastinate less, possibly due to their maturity and life experience (Jackson, 2003). Beutel et al. (2016) found that procrastination was higher in younger adults and decreased with age. Harriott and Ferrari (1996) found that procrastination was more common among young people.

Table 10 : Showing the model summary of the moderating effect of gender between Diminished impulse control and academic procrastination for the samples (N=400).

Academic Procrastination							
Model Summary							
Outcome variable	R	R-sq	MSE	F	Df1	Df2	P
Academic Procrastination	.992	.983	.225	7818.727	3.000	396.000	.000
Predictor							
Predictor	Beta	SE	T	P	LLCI	ULCI	
Diminished Impulse Control	.561	.012	46.495	.000	.538	.585	
Gender	.006	.057	.103	.008	.107	.119	

Figure 5: Showing mediation pathway of the effect of Diminished Impulse Control on Academic Procrastination with gender as a Moderator.



Moderation analysis: A moderation analysis was conducted using Hayes' Process Macro (Model 1) to examine whether gender moderated the relationship between Diminished Impulse Control (X) and academic procrastination (Y).

The results for the second regression model (Table 8.1), with Academic procrastination as the outcome, indicated the pathway of diminished impulse control(X) to Academic procrastination(Y) with Gender(M) as a moderating factor was significant, $b=.006$, $SE=.057$, $t=.103$, $p<.005$, 95% CI [.107,.119].

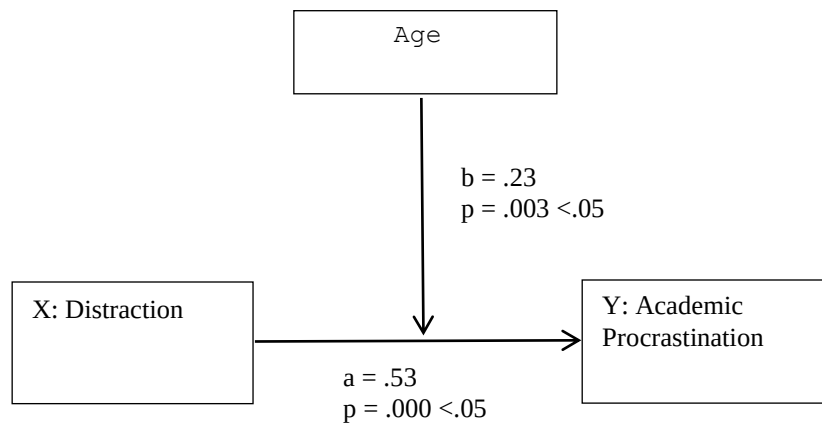
In gender variations in academic procrastination and performance, a large amount of empirical research focuses on gender disparities in academic life satisfaction. Previous studies (Kim & Sax, 2009; Macel et al, 2011; Tessem et al, 2012) indicate that female students are more satisfied with their academic lives than male students. A meta-analysis by Voyer and Voyer (2014) indicated that female students outperformed male students in all course content areas. According to Chapell et al. (2005), female college students reported higher total GPAs than their male counterparts. However other studies suggests that females may be more likely to procrastinate (Doyle & Paludi, 1998; Washington, 2004). According to Özer et al. (2009), Steel (2007), and Steel & Ferrari (2013), males are more likely to procrastinate. Steel and Ferrari's (2013) large-scale investigation found that males tend to procrastinate more than females.

Research on differences between genders in procrastination has been inconsistent, making it a widely discussed problem. Some studies (Hess et al, 2000; Şirin, 2011) did not detect gender differences in procrastination. Some scholars suggest that females are more likely to procrastinate (Doyle & Paludi, 1998; Washington, 2004). Previous studies have found inconsistent findings on gender differences in procrastination. However, there is evidence of gender differences in academic achievement among undergraduate students (Chapel et al. 2005; Dayioğlu & Türuk-Aşık, 2007; Khwaileh & Zaza, 2011; Voyer & Voyer, 2014).

Table 11: Showing the model summary of the moderating effect of age between Distraction and academic procrastination for the samples (N=400).

Academic Procrastination							
Model Summary							
Outcome variable	R	R-sq	MSE	F	Df1	Df2	P
Academic Procrastination	.996	.991	.135	14845.213	3.000	396.000	.000
Predictor	Beta	SE	T	P	LLCI	ULCI	
Distraction	.533	.003	206.311	.000	.528	.538	
Age	.023	.002	1.845	.003	.000	.006	

Figure 6: Showing the model summary of mediation pathway of the effect of Distraction on Academic Procrastination with Age as a Moderator.



Moderation analysis: A moderation analysis was conducted using Hayes' Process Macro (Model 1) to examine whether age and gender moderated the relationship between Diminished Impulse Control (X) and academic procrastination (Y).

The results for the first regression model (Table 9), with age(M) as the moderator, indicated the pathway of Distraction(X) to Academic Procrastination(Y) was significant, $b=.533$, $SE=.003$, $t=1.845$, $p<.005$, 95% CI [.528,.538]. The pathway (a) was significant, $R^2=.991$, $F=14845.213$, $p<.005$, explaining 99% of the variance in age. The moderating pathway analysis of Age between Distraction (X) and Academic Procrastination (Y) proves significant $b=.023$, $SE=.002$, $t=1.845$, $p=0.066$, 95% CI [.000,.006] leaving the moderating effect pathway of age a significant moderator between Diminished Impulse Control and Academic Procrastination. PIU moderates effects of age, with younger individuals (adolescents, young adults), and in particular students, being more susceptible to drawing upon the internet as a distraction from study, leading to procrastination (Dufour et al., 2017).

However, adolescents and college students have more PIU compared to older adults, according to the studies carried out by varying institutions, attributed to heightened accessibility and fluency in the use of the internet, and also a tendency of adolescents and college students to use internet for social and entertainment purposes. For example, students between 18–25 years old (including the age group with the highest incidence to academic pressure and digital environment) tend to use the internet as a tool of avoiding their academic obligations leading to a high extent to procrastination. Younger users are increasingly likely to be more impulsive and have less self-regulation – making them more susceptible to external distractions online (Fernández-Villa et al., 2015).

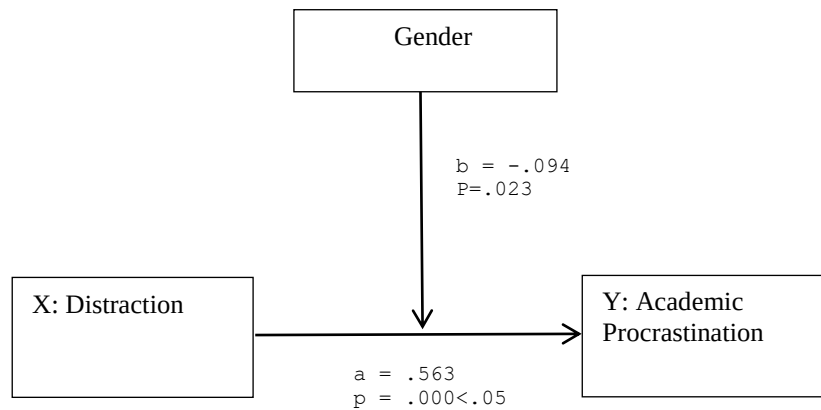
Cognitive beliefs about internet use are shaped by age, with younger users especially adolescents and younger adults more likely to believe that internet activity is the primary source for social validation and identity formation. Younger users are driven by social media to seek approval, express identity and gain peer recognition — studies show (Moreno et al., 2021). Social validation intensifies PIU by continually seeking positive feedback and validation by likes, comments and shares. Those likes, comments and shares are actually like payment in a sense. The dependence on online validation enhances internet overuse tendencies and consequently, discounts academic competitions for young users to spend more time online than on academics.

Furthermore, escapism is a major cognitive belief among youths who use the internet, where they could unexpectedly resort to either gaming or social media to relieve study or personal stress. Research shows that users of younger age often perceive the internet as a space that lets them escape reality and that certain online spaces can be a place of comfort for them while they grapple with issues off line (Peterka-Bonetta et al., 2018). The tendency to escape via the internet can reinforce PIU tendencies by using the internet first as a tool to distract from stressful tasks with the consequence being more procrastination.

Table 12: Showing the model summary of the moderating effect of gender between Distraction and academic procrastination for the samples (N=400).

OUTCOME VARIABLE- AcademicProcrastination							
Model Summary							
Outcome variable	R	R-sq	MSE	F	Df1	Df2	P
Academic	.996	.991	.131	15362.677	3.000	396.000	.000
Procrastination							
Predictor	Beta	SE	T	P	LLCI	ULCI	
Distraction	.563	.009	63.646	.000	.545	.580	
Gender	-.094	.041	-2.289	.023	-.174	-.013	

Figure 7: Showing model summary of the effect of Distraction on Academic Procrastination with gender as a Moderator.



Moderation analysis: A moderation analysis was conducted using Hayes' Process Macro (Model 1) to examine whether gender moderated the relationship between Diminished Impulse Control (X) and academic procrastination (Y).

The results for the second regression model (Table 9.1), with gender as the outcome, indicated the pathway of Distraction (X) to gender(Y) was significant, $b=.563$, $SE=.009$, $t=63.646$, $p<.005$, 95% CI [.545,.580]. The pathway was significant, $R^2=.996$, $F=15362.677$, $p<.005$, explaining 99% of the variance in gender. The pathway analysis of Gender (X) to Academic Procrastination (Y) proves to a significant moderator between Distraction and Academic Procrastination.

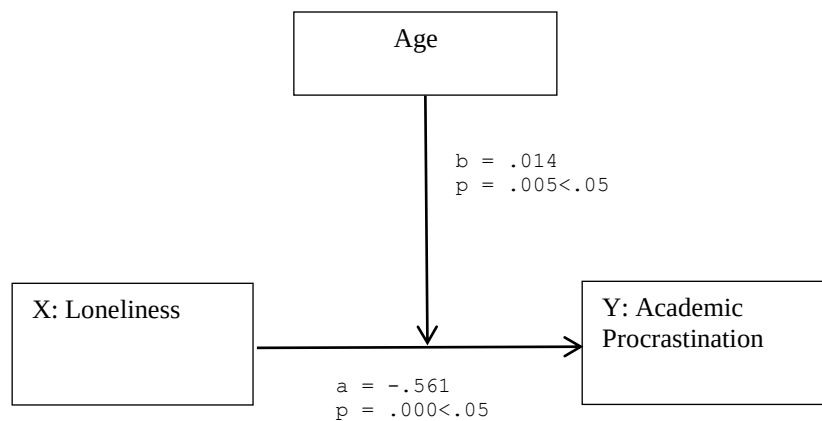
There is growing evidence that age and gender are moderators in the relationship between Problematic Internet Use (PIU) and academic procrastination. Both the prevalence of PIU and the experience and reaction to internet distraction are influenced by these demographic factors (Balhara et al., 2019). Insights of how other groups are affected by PIU are examined in terms of age and gender as moderating variables in academic context in which procrastination can compromise success.

Table 13: Showing the model summary of the moderating effect of age between Loneliness and academic procrastination for the samples (N=400).

OUTCOME VARIABLE- Academic Procrastination

Model Summary							
Outcome variable	R	R-sq	MSE	F	Df1	Df2	P
Academic Procrastination	.969	.939	.945	2014.573	3.000	396.000	.000
Predictor	Beta	SE	T	P	LLCI	ULCI	
Loneliness	.561	.007	75.905	.000	.547	.576	
Age	.014	.033	.420	.005	.050	.078	

Figure 8: Showing moderation pathway of the effect of Loneliness on Academic Procrastination with age as a Moderator.



Moderation analysis: A moderation analysis was conducted using Hayes' Process Macro (Model 1) to examine whether age and gender moderated the relationship between Loneliness (X) and academic procrastination (Y).

The results for the first regression model (Table 10), with age(M) as the moderator, indicated the pathway of Loneliness(X) to Academic Procrastination(Y) was

significant, $b=.561$, $SE=.007$, $t=75.905$, $p<.005$, 95% CI [.547,.576].

The pathway (a) was significant, $R^2=.969$, $F=2014.573$, $p<.005$, explaining 97% of the variance in age. The moderating effect of age(M) between Loneliness(X) and Academic Procrastination(Y) also proves significant $b=.014$, $SE=.033$, $t=-.420$, $p=.675$, 95% CI [-.050,.078] leaving the moderation pathway of age an significant moderator between Loneliness and Academic Procrastination.

According to the Report on the Development of Youths in China, nearly 30 million children under the age of 17 have poor mental health, which manifests as emotional and behavioral issues. According to research, junior high school students are more likely than high school students to have mental health illnesses (Huang et al., 2023), and rural kids have much higher detection rates than their urban counterparts (Lixia et al., 2025).

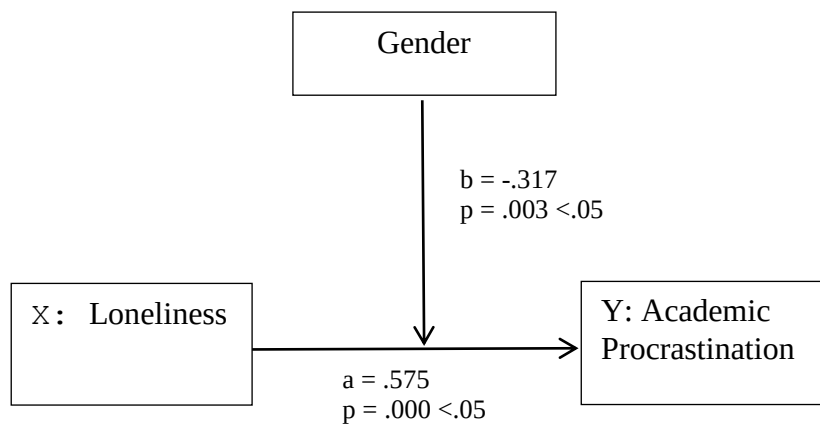
These findings highlight the importance of emphasizing the mental health of rural junior high school students, which is a major health concern for future generations (Zhang et al., 2020). Depressive symptoms may be a manifestation of affective discomfort, but loneliness is defined by a lack of social connection, which may directly decrease behavioral motivation.

Among psychological diseases, these two characteristics appear to be the most common psychological correlates of problematic internet use and academic procrastination in adolescents (Huang et al., 2025; Malinauskas and Malinauskiene, 2019). Individuals with problematic internet use may experience uncontrollable desires to engage in online activities, which can exacerbate negative emotions (e.g., depressed symptoms and loneliness), promote pessimistic expectations about academic assignments, and lead to academic procrastination (Huang et al., 2022).

Table 14: Showing the model summary of moderating effect of gender between Loneliness and academic procrastination for the samples (N=400).

OUTCOME VARIABLE- Academic Procrastination							
Model Summary							
Outcome variable	R	R-sq	MSE	F	Df1	Df2	P
Academic Procrastination	.969	.940	.923	2065.235	3.000	396.000	.000
Predictor	Beta	SE	T	P	LLCI	ULCI	
Loneliness	.575	.026	22.387	.000	.524	.625	
Gender	-.317	.108	-2.994	.003	-.529	-.105	

Figure 9: Showing moderation pathway of the effect of Loneliness on Academic Procrastination with gender as a Moderator.



Moderation analysis: A moderation analysis was conducted using Hayes' Process Macro (Model 1) to examine whether gender moderated the relationship between Loneliness (X) and academic procrastination (Y).

The results for the second regression model (Table 10.1), with gender as the outcome, indicated the pathway of Loneliness (X) to Academic Procrastination(Y) was significant, $b=.575$, $SE=.026$, $t=22.387$, $p<.005$, 95% CI [.524,.625]. The pathway was significant, $R^2=.969$, $F=2065.235$, $p<.005$, explaining 97% of the

variance in gender. The pathway analysis of Gender (X) to Academic Procrastination (Y) proves to be a significant moderator between Loneliness and Academic Procrastination.

The moderation of cognitive beliefs regarding on line activity by gender was also observed, as men and women tended to differ in using the internet and the PIU experience. Women tend to have a particularly strong social validation cognitive belief, therefore also engaging in social media more than men, on social media platforms that emphasize interaction, sharing, peer feedback and validation (Dufour et al., 2017). As a space for connection and self-expression women often rely on social media for emotional support and validation. This reliance is shown in studies to cause PIU, as women would spend more time on social media in order to meet up social needs and often tend to neglect academic or work-related commitments.

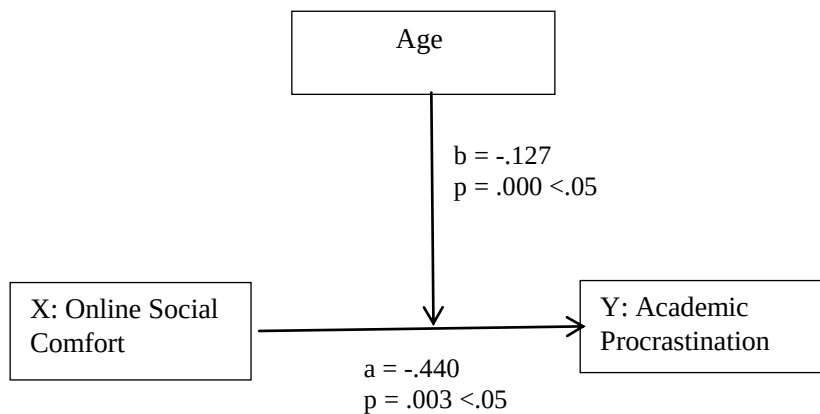
On the other hand, men are more likely to see the online activity as a competition, in particular, in scenarios where you're competing like gaming. Achievement oriented cognitive belief can play a role in PIU since men may spend hours on the Internet to reach goals, level up or be better than others in Virtual games (Fernández-Villa et al., 2015). Consequently, such pursuits cause a feeling of reward and satisfaction with a possibility of acquiring it in offline settings, that attribute to the development of PIU. For male users, the internet may be a channel for self-efficacy and accomplishment that spurs time on the web that could only be devoted to an academic or professional goal, thus increasing procrastination

Table 15: Showing the model summary of the moderating effect of age between Online Social Comfort and academic procrastination for the samples (N=400).

OUTCOME VARIABLE- Academic Procrastination

Model Summary							
Outcome variable	R	R-sq	MSE	F	Df1	Df2	P
Academic Procrastination	.827	.685	4.843	286.703	3.000	396.000	.000
Predictor	Beta	SE	T	P	LLCI	ULCI	
Online social comfort	-.440	0.15	-28.387	.000	-.470	-.409	
Age	.127	.073	1.740	.003	.016	.270	

Figure 10: Showing mediation pathway of the effect of Online Social Comfort on Academic Procrastination with Age as a Moderator.



Moderation analysis: A moderation analysis was conducted using Hayes' Process Macro (Model 1) to examine whether age and gender moderated the relationship between Online Social Comfort (X) and academic procrastination (Y).

The results for the first regression model (Table 10), with age(M) as the moderator, indicated the pathway of Online Social Comfort(X) to Academic Procrastination(Y) was significant, $b=-.440$, $SE=.015$, $t=-28.387$, $p<.005$, 95% CI $[-.470,-.409]$. The pathway was significant, $R^2=.827$, $F=286.703$, $p<.005$, explaining 83% of the variance in age. Also the moderating effect of age(M) between Online Social Comfort(X) and Academic Procrastination(Y) also proves significant $b=.127$, $SE=.073$, $t=-1.740$, $p<.005$, 95% CI $[-.016,.270]$ leaving the moderation pathway of age a significant moderator between Online Social Comfort and Academic Procrastination.

Aitken (2004) discovered that there was a mixed relationship between age, gender, and students' academic procrastination. Ng and Feldman (2008) discovered a moderately positive link between age and students' academic procrastination. Parker et al. (2004) found that there was no significant and unfavorable link between age, gender, and academic procrastination among students.

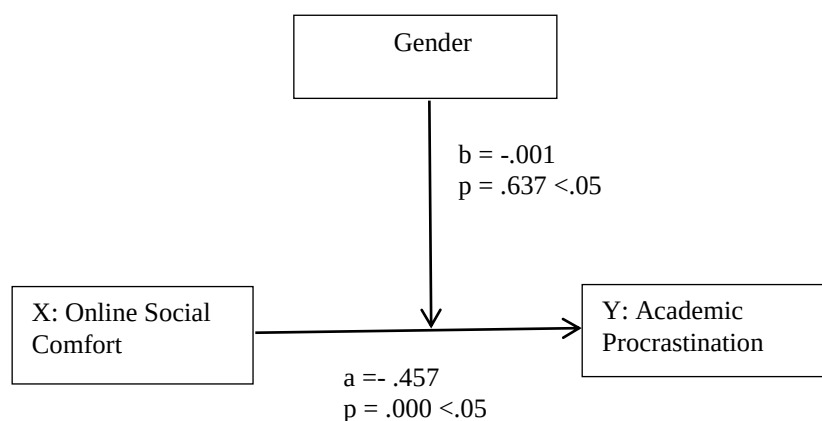
High levels of procrastination at the university level lead to students dropping out and failing to fulfill academic goals (Aznar-Díaz et al., 2020). Furthermore, because undergraduate students are separated from their families and must engage in new self-learning behaviors, they are more likely to exhibit these behaviors than graduate students.

This abrupt change to a new setting and unexpected freedom effects their behavior and causes them to spend their time furiously. Although some studies have highlighted various reasons associated with the aftermath of the pandemic period, such as difficulty adapting to online learning, financial difficulties in obtaining internet access, and interruptions in internet connections (Peixoto et al., 2021; Prasetyanto et al., 2022).

Table 16: Showing the model summary of the moderating effect of gender between Online Social Comfort and academic procrastination for the samples (N=400).

OUTCOME VARIABLE- Academic Procrastination							
Model Summary							
Outcome variable	R	R-sq	MSE	F	Df1	Df2	P
Academic Procrastination	.829	.687	4.808	289.771	3.000	396.000	.000
Predictor	Beta	SE	T	P	LLCI	ULCI	
Online social comfort	-.457	.055	-8.371	.000	-.565	-.350	
Sex	-.844	.249	-3.395	.001	-1.332	-.355	

Figure 11: Showing the model summary of the moderating effect of Online Social Comfort on Academic Procrastination with gender as a Moderator.



Moderation analysis: A moderation analysis was conducted using Hayes' Process Macro (Model 1) to examine whether gender moderated the relationship between Online Social Comfort (X) and academic procrastination (Y).

The results for the second regression model (Table 10.1), with gender as the outcome, indicated the pathway of Online Social Comfort (X) to Academic Procrastination(Y) was significant, $b=-.457$, $SE=.055$, $t=-8.371$, $p<.005$, 95% CI $[-.565, -.350]$. The pathway was significant, $R^2=.687$, $F=289.771$, $p<.005$, explaining 69% of the variance in gender. The pathway analysis of Gender (X) to Academic Procrastination (Y) proves to be a significant moderator between Online Social Comfort and Academic Procrastination.

Distinct patterns of PIU emerge from the age, gender, and cognitive beliefs interaction. For example, the social validation needs approach has shown younger women will spend a lot of time on social media for self-expression and peer support, making them more likely to engage in PIU (Fernández-Villa et al., 2015).

Due to this pattern, they are particularly vulnerable to academic procrastination because they usually want to engage in online social interaction more than they want to do their academic duties. On the other hand, young men usually treat gaming as escapism and achievement and develop PIU patterns that are based on competitively or immersivity online activities. Gendered patterns represent how cognitive beliefs together with PIU vary across demographics.

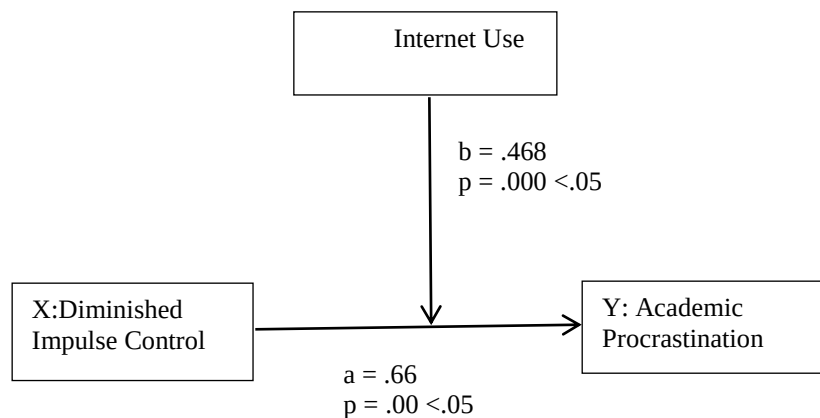
On the other hand, older adults usually present lower rates of PIU, because their cognitive beliefs about internet use are not so associated with validation or escapism. Older males and females are less dependent on the internet and experience fewer negative impacts on productivity (at least in older age groups) because the internet is seldom used by the older adults as a tool to achieve their identity needs and satisfy their social needs (Dufour et al., 2017).

Table 17: Showing the model summary of the moderating effect of internet use between diminished impulse control and academic procrastination for the samples (N=400).

OUTCOME VARIABLE- Academic Procrastination

Model Summary							
Outcome variable	R	R-sq	MSE	F	Df1	Df2	P
Academic Procrastination	.995	.991	.144	13977.279	3.000	396.000	.000
Predictor	Beta	SE	T	P	LLCI	ULCI	
Diminished Impulse Control	.066	.026	2.540	.011	.015	.117	
Internet Use	.468	.027	17.354	.000	.415	.521	

Figure 12: Showing the model summary of the moderating effect of Diminished Impulse Control on Academic Procrastination with internet use as a Moderator.



Moderation analysis: A moderation analysis was conducted using Hayes' Process Macro (Model 1) to examine whether internet use moderated the relationship between Diminished Impulse Control (X) and academic procrastination (Y).

The results for the second regression model (Table 10.1), with gender as the outcome, indicated the pathway of Diminished impulse control(X) to Academic Procrastination(Y) was significant, $b=.066$, $SE=.026$, $t=2.540$, $p<.05$, 95% CI [.015,-.117]. The pathway was significant, $R^2=.991$, $F=13977.279$, $p<.005$, explaining 99% of the variance in Internet use. The pathway analysis of Internet (X) to Academic Procrastination (Y) proves to be a significant moderator between Diminished Impulse Control and Academic Procrastination.

Academic procrastination, an illogical tendency, can cause task delays and significantly impair academic performance (Steel, 2007; Cormack et al., 2020). Positive psychology has generated interest in learning engagement, which includes eagerness, participation, attentiveness, and emotions when learning (D'Mello et al. 2017).

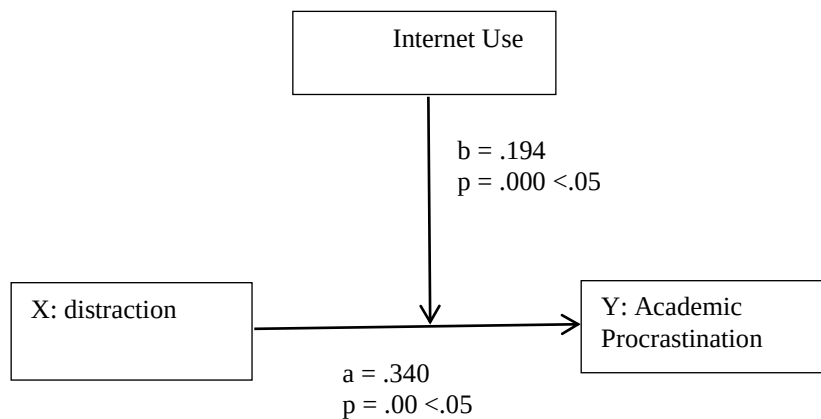
Positive psychology has sparked interest in learning engagement, encompassing eagerness, participation, focus, and emotions during learning (D'Mello et al., 2017). Internet addiction diverts time from learning, disrupts routines, increases fatigue, and reduces learning efficiency (Closson & Boutilier, 2017), resulting in lower learning engagement and academic performance (Salmela-Aro et al., 2017) as well as increased academic procrastination (Wei, 2023a). Self-control improves cognition, state of mind, and behavior (Meldrum et al., 2016). It additionally contributes to academic procrastination (Steel, 2007).

Table 18: Showing the model summary of the moderating effect of internet use between distraction and academic procrastination for the samples (N=400).

OUTCOME VARIABLE- Academic Procrastination

Model Summary							
Outcome variable	R	R-sq	MSE	F	Df1	Df2	P
Academic Procrastination	.996	.992	.123	16374.731	3.000	396.000	.000
Predictor	Beta	SE	T	P	LLCI	ULCI	
distraction	.340	.039	8.620	.000	.263	.418	
Internet Use	.194	.040	4.897	.000	.001	.002	

Figure 13: Showing the model summary of the moderating effect of distraction on Academic Procrastination with internet use as a Moderator.



Moderation analysis: A moderation analysis was conducted using Hayes' Process Macro (Model 1) to examine whether internet use moderated the relationship between loneliness (X) and academic procrastination (Y).

The results for the regression model (Table 18), with internet use as the outcome, indicated the pathway of loneliness (X) to Academic Procrastination(Y) was significant, $b=.340$, $SE=.039$, $t=8.620$, $p<.05$, 95% CI [.263,.418]. The pathway was significant, $R^2=.992$, $F=16374.731$, $p<.005$, explaining 99% of the variance in Internet use. The pathway analysis of Internet use(X) to Academic Procrastination (Y) proves to be a significant moderator between loneliness and Academic Procrastination.

According to Davis et al. (2002), the internet is a significant contributor to students' academic procrastination due to its perceived distraction value. Previous research has linked excessive internet use to academic procrastination among university students (Aznar-Díaz et al., 2020; Hayat et al., 2020).

According to Hayat et al. (2020), as university students' internet use becomes more troublesome, they are more likely to postpone academic tasks. Understanding the link between problematic internet use and academic procrastination is crucial, especially as young adults are at the highest risk of developing problematic internet habits during their university years.

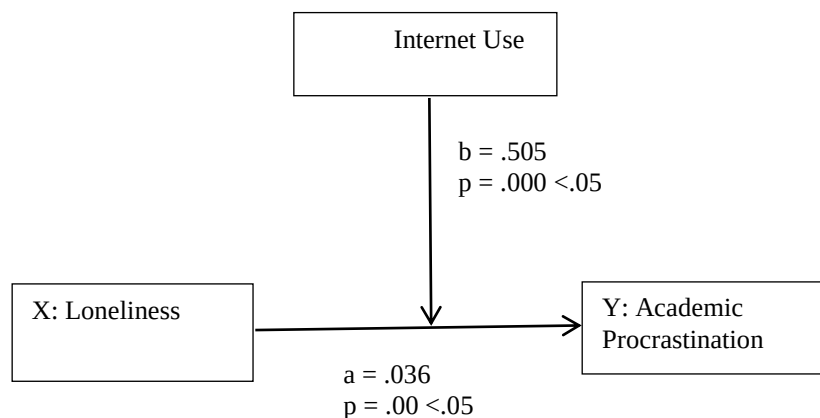
Academic procrastination can hinder work efficiency, lead to poor academic achievement, and negatively impact mental health (Kim & Seo, 2015; Klingsieck, 2013; Onwuegbuzie, 2004; Peixoto et al., 2021; Steel 2007; Zhao & Elder, 2020).

Table 19: Showing the model summary of the moderating effect of internet use between loneliness and academic procrastination for the samples (N=400).

OUTCOME VARIABLE- Academic Procrastination							
Model Summary							
Outcome variable	R	R-sq	MSE	F	Df1	Df2	P
loneliness	.995	.991	.140	14324.322	3.000	396.000	.000

Predictor	Beta	SE	T	P	LLCI	ULCI
Loneliness	.036	.011	3.130	.002	0.12	.058
Internet Use	.505	.011	47.667	.000	.484	.526

Figure 14: Showing the model summary of the moderating effect of Loneliness on Academic Procrastination with Internet Use as a Moderator.



Moderation analysis: A moderation analysis was conducted using Hayes' Process Macro (Model 1) to examine whether internet use moderated the relationship between Loneliness (X) and academic procrastination (Y).

The results for the regression model (Table 18), with internet use as the outcome, indicated the pathway of Loneliness(X) to Academic Procrastination(Y) was significant, $b=.036$, $SE=.011$, $t=3.130$, $p<.05$, 95% CI [.012,.058]. The pathway was

significant, $R^2=.995$, $F=14324.322$, $p<.005$, explaining 99% of the variance in Internet use. The pathway analysis of Internet use(X) to Academic Procrastination (Y) proves to be a significant moderator between Diminished Impulse Control and Academic Procrastination.

Young individuals require social contact, yet those experiencing loneliness may struggle to maintain it. They require media, such as the internet, to meet their demand for social interaction. Unfortunately, people with this psychological susceptibility have faulty cognition, which leads to maladaptive behaviors. Having PIU and relying on the internet can cause academic issues. Leung and Lee (2012) found that negative life consequences and fixation with the Internet are markers of PIU, which can lead to poor academic performance during adolescence. Overuse of the Internet can lead to pupils skipping school and negatively impacting academic performance (Kubey et al, 2001; Leung & Lee, 2012).

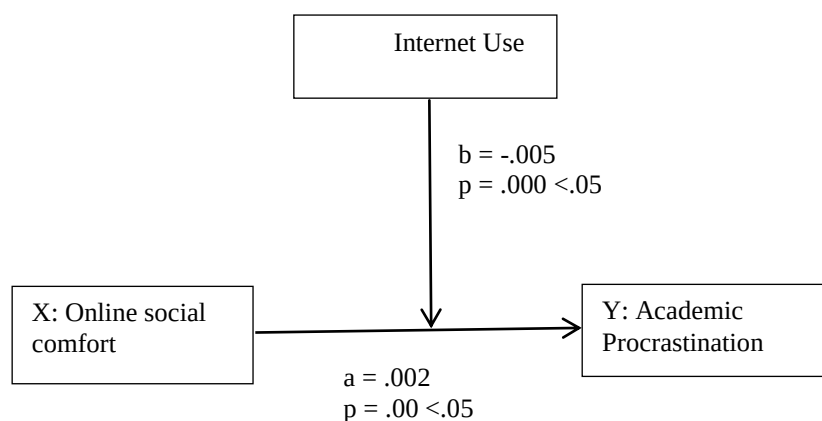
Excessive internet use among undergraduate students can negatively effect academic performance (Derbyshare et al., 2013). According to Davis et al, (2002), individuals with PIU tend to procrastinate and have a lower GPA. According to Davis (2001), individuals with PIU symptoms rely only on the Internet for self-understanding. Individuals who spend too much time on the internet may overlook other duties, such as academics.

Excessive Internet use or reliance among students may lead to Problematic Internet Use (PIU). Several studies have linked loneliness to PIU (Caplan, 2002; Morahan-Martin & Schumacher, 2003; Song et al., 2014; Andangsari & Dhowi, 2016). According to Davis (2001), Caplan (2002), and Griffiths et al. (2016), loneliness can precede or contribute to PIU.

Table 20: Showing the model summary of the moderating effect of internet use between Online Social Comfort and academic procrastination for the samples (N=400).

OUTCOME VARIABLE- Academic Procrastination							
Model Summary							
Outcome variable	R	R-sq	MSE	F	Df1	Df2	P
Academic Procrastination	.995	.990	.147	13686.856	3.000	396.000	.000
Predictor	Beta	SE	T	P	LLCI	ULCI	
Online Social Comfort	-.005	.005	-1.170	.002	.015	.004	
Internet Use	.532	.005	-2.637	.009	.002	.000	

Figure 15: Showing the model summary of the moderating effect of Online Social Comfort on Academic Procrastination with internet use as a Moderator.



Moderation analysis: A moderation analysis was conducted using Hayes' Process Macro (Model 1) to examine whether internet use moderated the relationship between Online Social Comfort (X) and academic procrastination (Y).

The results for the regression model (Table 20), with internet use as the moderator, indicated the pathway of Online Social Comfort(X) to Academic Procrastination(Y) was significant, $b=-.005$, $SE=.005$, $t=-1.170$, $p<.05$, 95% CI $[0.15,.004]$. The pathway was not significant, $R^2=.995$, $F=14324.322$, $p<.005$.

The pathway analysis of Online Social Comfort (X) to Academic Procrastination (Y) proves to be a significant moderator between Online social comfort and Academic Procrastination.

Adolescents increasingly utilize social media to construct public and private profiles, managing material and profiles, promoting interactions in virtual communities. According to Rozgonjuk et al. (2020), these media include social networking sites and messaging apps such as WhatsApp, Instagram, and Facebook. Using internet platforms is not dangerous and has numerous benefits. Empirical study shows that adolescents frequently use many social media apps simultaneously. Bányai et al. (2017) found that excessive usage of social media can negatively effect users' personal, social, and professional lives.

Research indicates that perceived social support has a greater influence on mental health than received support. Gülaçtı (2010) found that close personal contacts generate more enjoyment for individuals in need of support in numerous areas of life. Inadequate social support can lead to undesirable consequences such as maladjustment, substance addiction, criminal activity, anxiety, and unpleasant emotions (Gülaçtı, 2010). Individuals who feel socially isolated may turn to the Internet as a coping method. According to Andangsari et al. (2018), individuals may use social media apps to fulfill their need for connection, which might lead to negative behaviors. According to Davis (2001), individuals with limited relations with others and weak interpersonal skills tend to seek connections through the internet, and their inappropriate mental processes might lead to problematic use of these platforms.

Objective 4: Distractibility and attention lapse will significantly mediate the relationship between internet use and daily attention lapses.

To examine the mediating effects of Distractibility and Attention Lapse between internet use and academic procrastination

Mediation analysis: A mediation analysis was conducted using Hayes' Process Macro (Model 4) to examine whether Distractibility and Attention Lapse mediated the relationship between internet addiction (X) and academic procrastination (Y).

Table 21: Showing the model summary of mediating effect of Distractibility and Attention Lapse between internet use and academic procrastination for the samples.

Outcome variable	R	R-sq	MSE	F	Df1	Df2	P
Distractibility	.896	.803	8.213	1617.932	1.000	398.000	.000
Attention Lapse	.981	.962	1.883	5058.256	2.000	397.000	.000

Table 22: Showing the mediating effect of Distractibility and Attention Shifting between internet addiction and academic procrastination for the samples (N=400)

Predictor	Beta	SE	T	P	LLCI	ULCI	Standardized coefficient
Attention Lapse Outcome							
Addiction (a)	.981	.020	40.224	.000	0.758	0.836	.896
Attention Outcome							
Addiction	.780	.021	36.556	.000	.738	.822	.802
Distractibility	.213	.024	8.885	.000	.166	.260	.195

The results for the first regression model, with distractibility as the outcome, indicated that internet addiction significantly predicted distraction, $b=.981$, $SE=0.020$, $t(398)=40.224$, $p<.001$, 95% CI [0.758,0.836]. The model was significant, $R^2=.89.6$, $F(1,398)=1617.932$, $p<.001$, explaining 80% of the variance in Distractibility.

The second model, predicting Attention Lapse, revealed that both internet addiction and Distractibility significantly predicted Attention Lapse. Internet addiction was a stronger predictor, $b=.780$, $SE=.021$, $t=36.556$, $p<.001$, 95% CI [.822,.802], while Distractibility also had a small but significant effect, $b=.213$, $SE=.024$, $t=8.885$, $p=.001$, 95% CI [.260,.195]. This model explained 80% of the variance in attention lapse, $R^2=.803$, $F(2,397)=20700.885$, $p<.001$.

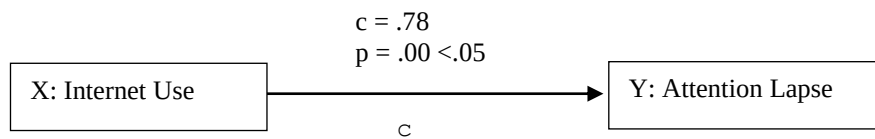
Table 23: Test of direct, indirect and total effects.

Direct and indirect effects of X on Y	Effect	SE	t	p	LLCI	ULCI	Standardized coefficient
Total effect	.950	.010	91.617	.000	.930	.970	.977
Direct Effect	.780	0.21	36.556	.000	.738	.822	.802
Indirect effect	0.17	.083	-	-	0.18	.336	-

In the third regression model, which tested the direct effect of internet addiction on attention lapse, internet addiction was a significant predictor, $b=.780$, $SE=0.21$, $t=36.556$, $p<.005$, 95% CI [.738,.822]. The total effect of internet addiction on academic procrastination was significant, $b=.950$, $SE=0.010$, $t=91.617$, $p<.005$, 95% CI [.930,.970], as was the direct effect, $b=.780$, $SE=0.21$, $t=36.556$, $p<.005$, 95% CI [.738,.822]

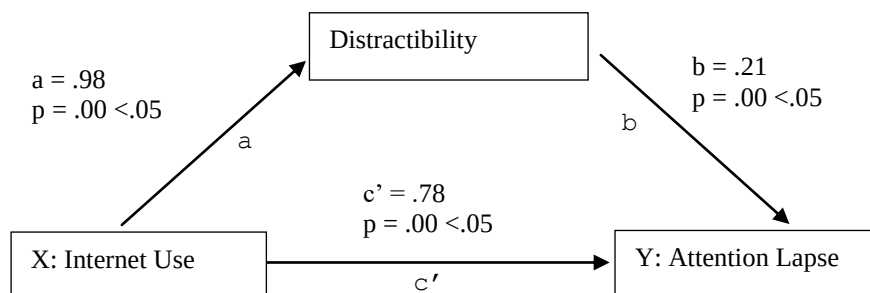
The indirect effect of internet addiction on academic procrastination through attention control was small but significant, $b=0.017$, 95% CI $[0.008,0.029]$. The completely standardized indirect effect was also significant, $b=0.17$, 95% CI $[0.18,.336]$, indicating a partial mediation effect.

Figure 17: Internet Control total effect = 95% on academic procrastination sig >.05



Mediation (attention Control effect) : Internet use on attention control.79 (sig at .05);
 Attention Control on Academic Procrastination = $b=.02$ sig at .05.

Figure 16: Showing the Path Diagram of the mediation of Distractibility between Internet use and Attention Lapses.



A mediation analysis using Model 4 of Hayes' PROCESS Macro was conducted to assess whether Distractibility mediates the relationship between internet use and attention lapse. The total effect of internet use on attention lapse was significant, $b=.950$, $SE=0.010$, $t=91.617$, $p<.005$, 95% CI $[.930,.970]$.

The path from internet use to distractibility (path a) was significant, $B=0.79$, $b=.981$, $SE=0.020$, $t(398)=40.224$, $p<.001$, 95% CI $[0.758,0.836]$.. Additionally, the path from level of distractibility to academic procrastination (path b) was also significant, $b=.213$, $SE=.024$, $t=8.885$, $p=.001$, 95% CI $[.260,.195]$.

The direct effect of internet use on academic procrastination (path c') remained significant after accounting for the mediator, $B=.780$, $SE=0.21$, $t=36.556$, $p<.005$, 95% CI $[.738,.822]$. The indirect effect through attention control was significant but small, $B=0.17$, $SE=0.83$, $\beta=0.03$, $p=.05$, 95% CI $[0.18,.336]$. These results suggest that attention control partially mediates the relationship between internet use and academic procrastination.

The Mindful Attention Awareness Scale (MAAS) is used to measure attentional control by measuring a person's ability to notice and attend to the present moment. Academic productivity is reliant upon less mind wandering and better focus and high MAAS scores relate to these qualities. Theories such as the dual process model explain this control of attentional focus better by stating that people use automatic or controlled processes while trying to focus (Gámez-Guadix & Calvete, 2016). Though they can't overcome all PIU-driven procrastination, controlled processes are capable of doing so in high demand scenarios, as they allow directed attention, against procrastination. Models such as the Goal Shielding Theory also talk about how attentional control allows for goals to be more important than what is in front of us right at the moment.

The cognitive mechanisms (i.e. distractibility and attention shifting) that mediate the relationship between internet use and attentional lapses are also responsible for the underlying problematic behaviours (e.g. academic procrastination) (Augner et al., 2023). The presence of the stimuli online constantly available (because of the availability of notifications and multimedia content) contributes to the high cognitive load and habitual attention shifting. According to cognitive load theory, when cognitive resources exceed capacity, individuals are more vulnerable to distraction, including by those things that promise instant gratification, such as social media or

entertainment sites (Chang et al., 2024). Online engagement in itself is frequent, and hence promotes divided attention; the users continuously engage on to one task and then another, which causes weakening of sustained concentration and leads to problems in maintaining attention on academic tasks.

Attention control theories like the Supervisory Attentional System (SAS), show us that in order to successfully focus on tasks, distractions must be overridden. But internet use often reduces this control, instead promoting behaviours of the automatic attentional system that are quick to respond to interruptions. Shahrajabian et al. (2023) show that high internet users shift their attention by default and have more difficulty returning to a task after an interruption. Attention shifting is a habitual process and related to the attentional control deficit theory that less attentional resources to resist distraction, making an individual prone to develop a cycle of procrastination. This help to procrastinate and make it hard to resist the short-term appeal of online activities and thus keep a cycle of disengagement from academic responsibilities going. To prevent mounting of cognitive toll from internet distractions it is imperative to grasp these processes for devising solutions like reducing screen time, or practicing mindfulness.

CHAPTER VI
SUMMARY AND CONCLUSION

The present study entitled “**cognitions in problematic internet use: a cross-sectional study on predicting, mediating, and moderating effects**” aimed to study various cognitive functions, affect and behaviour that may predict problematic use of the internet as well as the unique and the complicated relationship and interplay of mediating and moderating variables that may change the direction of each outcome.

It was hypothesized that the sub scales of Online Cognition Scale such as loneliness, online social comfort, diminished impulse control and distractibility will predict problematic use of the internet in the proposed sample of the study. It was also proposed that poor attention control will significantly mediate the relationship between Internet use and Academic Procrastination. It was also hypothesized that level of internet use, age and gender will significantly moderate the relationship between cognitive beliefs related to online activity and cognitive outcomes and academic procrastination. It was also hypothesized that distractibility and attention shifting will significantly mediate the relationship between internet use and daily attention lapses.

To achieve the objectives and hypotheses put forth, 400 participants comprising 200 male internet users and 200 female internet users consisting of equal representation and having equally matched socio-demographic profiles were selected from 5 colleges affiliated to Mizoram University, Aizawl by using a multi-stage random sampling method. The age group of the participants was between 18-24 years. 5 psychological tests including Internet Addiction Test (IAT2)(Kimberly Young 1998), Online Cognition Scale (OCS)(Davis, Flett & Besser 2002), Mindful attention awareness scale-lapses only (MAASLO) (Brown and Ryan 2003), Attentional control: switching (AC-S) and distractibility (AC-D)(Brown & Ryan 2003), Academic Procrastination Scale (short form Year)Justin. D. McCloskey 2008), Socio Demographic Profiles (Lalduhsaka, E, 2021), Informed Consent Form (Lalduhsaka, E, 2021) were employed for psychological evaluation to the samples. The administration was done with due care to the instructions provided in the manual and APA (2014).

The samples of the study were selected cautiously trying to get equal representation of high internet addiction and low internet addiction, male and female gender (male and female), age level (18-24 years), ecology (living in Aizawl city) to control extraneous variable which can influence the results other than internet addiction. The results (dependent variable)

The raw data collected using psychological test were checked on any missing data and outlier data. The Researcher carefully conducted routine test and no such kind of missing and outliers were found and is ready for further analysis.

Psychological test used in the study were constructed for use in other culture and as a result was checked in their appropriateness to the target population of the study. Accordingly, the psychometric properties of all the scales were done on normality, reliability and homogeneity.

(iv) Normality- There is not much variation between mean and SD, all kurtosis and skewness levels falls within ± 2 showing the normality of the data.

(v) Reliability- Cronbach alpha reliability was calculated and the results showed that all the scales reliabilities fall between .85-.91 (addiction scale $\alpha=.85$; Social Comfort $\alpha=.91$; Loneliness $\alpha=.86$; Diminish Impulse control $\alpha=.89$; Distraction $\alpha=.84$; Attention Lapse $\alpha=.88$; Distractibility $\alpha=.87$; Academic Procrastination $\alpha=.71$) showing the applicability of the scales to the target population.

(iii) Homogeneity- Test of Homogeneity of Variances was calculated and the results showed non significant on all the test scales showing the applicability to the target population.

The psychometric property check confirmed the applicability of all the psychological test for the population of the study; and also provided the appropriateness of parametric statistics for further analysis.

Subject-wise scores on the specific item of the scales were separately prepared and analysed to check their psychometric adequacy for measurement purposes across the samples. The psychometric adequacies of the behavioural measures were analysed by employing SPSS 23 (Statistical Package for Social Sciences). Firstly, to check the psychometric adequacy of each scale used in the target population included i) Reliability coefficients (Cronbach's Alpha) ii) Descriptive statistics consisting of Mean, SD, Skewness and Kurtosis were included for comparison of the test scores between the groups.

The first objective was to examine the overall and unique predictive role of cognitions behind Internet use (loneliness/depression, impulse control, social comfort, and distraction) in determining the severity of problematic Internet use.

Social media platforms and online forums provide the "safe" space to users in which they feel connected, understood and accepted are illustrated through case studies. For instance, research on adolescents demonstrates that they frequently use social media as a form of issuing and seeking support in communities, which gradually leads to their dependency on online communications (Bitton & Medina, 2015). Results showed that individuals who reported to be more comfortable in online socialization has higher chances of being internet addicts. Due to this dependency, people are repeatedly drawn back to online spaces to get their social needs met, which can heighten use, leading to addiction. Therefore, social comfort seeking and distraction are not just active triggers for PIU, but continue to reinforce patterns that decrease the willpower of people to restrict internet use.

Loneliness, a predictor for many other psychological issues has been identified as a potential for problematic internet use. This has been mentioned as a looping effect as problematic internet use may cause individuals to become more lonely or individuals who have already faced loneliness in their lives uses the internet more as a means of coping. The result also shows that individuals who reported higher levels of loneliness shows higher levels of internet use, thereby acting as a significant

predictor. A frequent finding is that loneliness and depression are important emotional predictors of PIU and have been found in many studies to predict internet behaviours. As with loneliness also depression is a psychological state of lack of social fulfilment and prevalence of sadness or emptiness, which people seeking other ways of emotion relief, for example use of the internet (Zhou et al., 2021). To many, the internet is a medium to connect with other people, engage in social media or get lost in activities online to trick the mind from feeling isolated and sad. While this can be a coping mechanism, however, this mechanism can become dependent and compulsive, becoming compulsive internet behaviors defining PIU.

Another important significant predictor of internet addiction is low impulse control as with all other kinds of addiction. According to Vargas et al. (2019), individuals with impulse control issues are defenceless to PIU because they are profoundly inclined to looking for a sensation and have issues with self-regulation. For instance, Meena et al. (2012) discovered that young adults having high impulsivity scores used excessive internet, that in turn had negative consequences in their life, personal, academic and social. The findings in the study shows that individuals who reported having diminished impulse control shows higher level of internet use, thereby making it a significant predictor. Research also shows that impulsive people can derive more reinforcement from very internet-oriented activities like online gaming or social media because this kind of activity gives instant feedback and gratification. As a result, they have trouble controlling impulse and reward, driving them back to the internet on repeat.

Distractibility or a fleeting attention span, refers to lapses in the ability to concentrate on a stimulus or task and sustain the requisite degree of focused attention to persevere with information processing or task attainment has also been identified and hypothesized to be a significant predictor of student's higher levels of internet use. The result of the study shows that individuals who tends to get distracted more easily and lose focus of the task at hand causes them to use the internet more than intended.

The cognitive consequences of PIU are proliferation of attentional shifts and problems with sustained attention. With constant distraction through the internet, especially on social media, online games, and instant messaging, it's hard for a user to focus his offline tasks (Augner et al., 2023). A constant bombardment of online stimuli can lead to a fragmented attention span in which people lose their ability to focus on a single thing for a long time. Research shows that those with PIU tend to say that they are less able to focus on school or work responsibilities because they're compelled to repeatedly return to online communication, notifications, or materials.

The second objective was to examine the mediating effects of the level of attention control between internet use and academic procrastination.

A mediating variable is a variable which can explain the process through which two variables are related whereas a moderating variable explains the strength and direction of the relationship between the independent variable and the dependent variable. In this objective the level of attention control was hypothesized as a significant mediator and moderator in the relationship between internet use and academic procrastination. This unique interplay of variables could further and deeper explain the relationship between internet use and academic procrastination.

The result of the regression model shows that internet addiction directly affects attention control which was pathway (path a) of the model. This means that the individuals in the studies sample reported higher levels of internet use to be a significant predictor of loss of attention control during various tasks activities. The pathway (path a) was significant. The result also shows that the pathways (path b) from attention control to academic procrastination was also significant. This means that individuals in the studied sample reported loss of attention control as a result of problematic internet use which directly affects academic procrastination. The second pathway (path b) was also significant meaning that individuals who as a result of higher levels of internet use, faces reduction in attention control and are more likely to procrastinate away from academic duties and tasks.

The regression analysis also revealed that internet addiction itself directly predicts academic procrastination (path c) meaning that even without the the effects of attention control, internet addiction still has an independent effect on academic procrastination. However, the presence of the direct effect and the indirect effect shows that there is a total effect as a whole. Internet addiction with or without the mediator predicts academic procrastination proving the first part of the objective. As a result we can reject the null hypothesis. A sobel test further confirms this result.

The second regression model shows the pathway of internet addiction(X) to Academic Procrastination(Y) with attention control as a moderator(M). The results show that attention control significantly mediates the relationship between internet addiction and academic procrastination proving the pathway to be significant. This proves that internet addiction affects academic procrastination significantly greater with the moderating role of attention control.

The third objective was to examine the moderating role of gender and age between cognitive beliefs related to online activity and cognitive outcomes and academic procrastination.

The analysis reveals that age and gender has a significant moderating effect on the relationship between Diminished Impulse Control and Academic procrastination. Also, Diminished Impulse Control directly affects academic procrastination.

Age and gender also shows significance in the relationship between distraction and academic procrastination, this is inline with previous literature which shows age and gender as a significant moderator in the relationship between distraction and academic procrastination.

A similar effect was found on the relationship between online social comfort and academic procrastination where age was significant and gender plays a significant role in moderating the relationship between online social comfort and Academic Procrastination.

Age and gender also shows significance in the relationship between loneliness and academic procrastination, this is inline with previous literature which shows age and gender as a significant moderator in the relationship between loneliness and academic procrastination.

The moderating role of level of internet use was significant in the relationship between diminished impulse control and academic procrastination, the mediating role of internet use was also significant in the relationship between loneliness and academic procrastination, the mediating role of internet use was also significant in the relationship between distraction and academic procrastination. Also evidently in conjunction with the previous findings the moderating pathway of internet use proves significant in the relationship between online social comfort and academic procrastination.

The fourth objective was to examine the mediating effects of distractibility and attention shifting between internet use and daily attention lapses. The findings of the study reveals that internet use significantly predicted distractibility (pathway a), individuals in the studied sample who reported higher levels of internet use also reported higher levels of distractibility in their daily lives and activities. The pathway was significant. The pathway b from distractibility to attention lapse also shows significant showing that distractibility significantly predicted attention lapses. Individuals in the studies sample showing distractibility as a result of high levels of internet addiction also reported frequent involuntary lapses of attention during the day.

The result also shows that internet use directly affect attention lapse even without the mediator. However the mediating pathway also proved significant so as a result there was a total effect.

Limitations of the study

Although, it was designed to be the systematic and authentic research, the present study is not free from limitations.

1. Firstly possible limitation of the study is that since self-report questionnaire were used, participant's moral and social desirability could have influenced their reporting.
2. Secondly, the limitation of sociodemographic variables limits the findings of the study.
3. Another possible limitation of the study is that the study was conducted only on 3 colleges affiliated to Mizoram University students, which raise some methodological issues concerning the external validity of the findings for the general population.
4. The narrow demographic focus of studies into PIU limits the generalizability of findings, given that PIU may look differently socially and culturally.
5. The limited mediators and moderators in the study could be another limitation as integration of more variables could better explain the outcome of the study.

Suggestions for further research

For further research the inclusion of more demographic information to get valuable insights into the factors that contribute to why individuals use the internet more with comprehensive information and its complexities should be considered.

The use of professionally administered tools rather than self report questionnaires could influence better outcomes and insights into the complex relationship among the variables.

The study could incorporate more number of colleges and also university students to get a wider view of the complexities of internet use at a broader age and other variables.

Addition of more sophisticated mediators and moderators to find out a broader complexities of the issues related to internet use.

Significance of the study

The present study will be the first of its kind and will highlighted the level of Internet Use and its associated problems faced by various college students studying in Aizawl, Mizoram. The area of substance addiction has been widely studied in the context of Mizoram for many years, however addiction not relating to substance is widely still untapped into. As the advancement of technology arises, the number of addictions relating to technologies and the internet has increased rapidly.

The findings of the proposed study will be the first endeavor; it will not only satisfy academic interest but it is also expected to provide theoretical basis for suggesting the prevention, and intervention of negative impact of internet use among the target population.

This study also proved the use of Internet Addiction Test by Young to be a reliable indicator and a diagnostic tool for people with internet related issues in Mizoram.

The findings will contribute better insights to mental health professionals into the treatment of internet addiction and its related interplay of psychological variables in clinical settings, which is crucial for clinical practice because it is a prevalent public health issue linked to negative outcomes like depression, anxiety, and poor academic performance. Understanding the condition helps clinicians identify patients at risk, develop targeted interventions, and create prevention programs to mitigate its detrimental effects on mental and physical health.

CONSENT FORM

We are studying and researching levels of internet use, and its effects on attention, concentration, memory and its relation with academic procrastination among college/university students.

In this context, we invite you to fill up several screening tools which will take very few minutes of your time. YOUR IDENTITY AND OTHER DETAILS ARE ENTIRELY CONFIDENTIAL IN EVERY CASE. We will not be collecting names, but we will collect emails in case you wish to know your results. Participation in this study is entirely voluntary. There are no physical and/or long-term emotional risks involved in taking part in this study. If at any time you wish to withdraw from this study, you may do so without any hesitation. If you have any questions regarding this study, please feel free to contact Ebenezer Laldusaka, Clinical psychologist & Ph.D. Scholar (ph-8886819855) email id: elworkmail21@gmail.com, Dept of Clinical Psychology, School of Medical & Paramedical Science, Mizoram University or Zokaitluangi, Prof (ph- 9436151606) email id: prof.zokaitluangi@gmail.com, Dept of Clinical Psychology.

By completing this screening, you affirm that you have read and understood the above information and consent to participate in the study.

INTERNET ADDICTION TEST

Name: _____ Gender: male/female

Age _____ Years Online _____

Do you use the Internet for work? Yes No

This questionnaire consists of 20 statements. After reading each statement carefully, based upon the 5-point Likert scale, please select the response (0, 1, 2, 3, 4 or 5) which best describes you. If two choices seem to apply equally well, circle the choice that best represents how you are most of the time during the past month. Be sure to read all the statements carefully before making your choice. The statements refer to offline situations or actions unless otherwise specified.

		Not Applicable	Rarely	Occasionally	Frequently	often	Always
1	How often do you find that you stay online longer than you intended?	0	1	2	3	4	5
2	How often do you neglect household chores to spend more time online?	0	1	2	3	4	5
3	How often do you prefer the excitement of the Internet to intimacy with your partner?	0	1	2	3	4	5
4	How often do you form new relationships with fellow online users?	0	1	2	3	4	5
5	How often do others in your life complain to you about the amount of time you spend online?	0	1	2	3	4	5
6	How often do your grades or school work suffer because of the amount of time you spend online?	0	1	2	3	4	5
7	How often do you check your email before something else that you need to do?	0	1	2	3	4	5
8	How often does your job performance or productivity suffer because of the Internet?	0	1	2	3	4	5
9	How often do you become defensive or secretive when anyone asks you what you do online?	0	1	2	3	4	5
10	How often do you block out disturbing thoughts about your life with soothing thoughts of the Internet?	0	1	2	3	4	5
11	How often do you find yourself anticipating when you will go online again?	0	1	2	3	4	5
12	How often do you fear that life without the Internet would be boring, empty, and joyless?	0	1	2	3	4	5
13	How often do you snap, yell, or act annoyed if someone bothers you while you are online?	0	1	2	3	4	5
14	How often do you lose sleep due to being online?	0	1	2	3	4	5
15	How often do you feel preoccupied with the Internet when off-line, or fantasize about being online?	0	1	2	3	4	5
16	How often do you find yourself saying "just a	0	1	2	3	4	5

	few more minutes" when online?						
17	How often do you try to cut down the amount of time you spend online and fail?	0	1	2	3	4	5
18	How often do you try to hide how long you've been online?	0	1	2	3	4	5
19	How often do you choose to spend more time online over going out with others?	0	1	2	3	4	5
20	How often do you feel depressed, moody, or nervous when you are off-line, which goes away once you are back online?	0	1	2	3	4	5

Online Cognition Scale

Name: _____ Gender: male/female

Age _____ Years Online _____

Do you use the Internet for work? Yes No

This questionnaire consists of 36 statements. After reading each statement carefully, based upon the 5-point Likert scale, please select the response (1, 2, 3, 4, 5, 6 or 7) which best describes you. If two choices seem to apply equally well, circle the choice that best represents how you are most of the time during the past month. Be sure to read all the statements carefully before making your choice.

		Strongly disagree	Somewhat disagree	Disagree	Neutral	Agree	Somewhat agree	Strongly agree
1	I am most comfortable online	1	2	3	4	5	6	7
2	Few people love me other than those I know online	1	2	3	4	5	6	7
3	I feel safest when I am on the Internet	1	2	3	4	5	6	7
4	I often keep thinking about something I experienced online well after I have logged off	1	2	3	4	5	6	7
5	When I am on the Internet, I often feel a kind of "rush" or emotional high	1	2	3	4	5	6	7
6	You can get to know a person better on the Internet than in person	1	2	3	4	5	6	7
7	I often find it peaceful to be online	1	2	3	4	5	6	7
8	I can be myself online	1	2	3	4	5	6	7
9	I get more respect online than "in real life"	1	2	3	4	5	6	7
10	I use the Internet more than I ought to	1	2	3	4	5	6	7
11	People complain that I use the Internet too much	1	2	3	4	5	6	7
12	I never stay on longer than I had planned	1	2	3	4	5	6	7
13	People accept me for who I am online	1	2	3	4	5	6	7
14	Online relationships can be more fulfilling than offline ones	1	2	3	4	5	6	7
15	When I am not online, I often think about the Internet	1	2	3	4	5	6	7
16	I am at my best when I am online	1	2	3	4	5	6	7
17	The offline world is less exciting than what you can do online	1	2	3	4	5	6	7
18	I wish my friends and family knew how people regard me online	1	2	3	4	5	6	7
19	The Internet is more "real" than real life	1	2	3	4	5	6	7
20	When I am online I do not think about my responsibilities	1	2	3	4	5	6	7
21	I cannot stop thinking about the Internet	1	2	3	4	5	6	7
22	I am less lonely when I am online	1	2	3	4	5	6	7
23	I cannot see myself ever without the Internet for too long	1	2	3	4	5	6	7

24	The Internet is an important part of my life	1	2	3	4	5	6	7
25	I feel helpless when I do not have access to the Internet	1	2	3	4	5	6	7
26	I say or do things on the Internet that I could never do offline	1	2	3	4	5	6	7
27	When I have nothing better to do, I go online	1	2	3	4	5	6	7
28	I find that I go online more when I have something else I am supposed to do	1	2	3	4	5	6	7
29	When I am online, I do not need to think about offline problems	1	2	3	4	5	6	7
30	I sometimes use the Internet to procrastinate	1	2	3	4	5	6	7
31	When I am online, I can be carefree	1	2	3	4	5	6	7
32	I often use the Internet to avoid doing unpleasant things	1	2	3	4	5	6	7
33	Using the Internet is a way to forget about the things I must do but really do not want to do	1	2	3	4	5	6	7
34	Even though there are times when I would like to, I cannot cut down on my use of the Internet	1	2	3	4	5	6	7
35	I am bothered by my inability to stop using the Internet so much	1	2	3	4	5	6	7
36	My use of the Internet sometimes seems beyond my control	1	2	3	4	5	6	7

Attention Control; Shifting & Distraction

Name: _____ Gender: male/female

Age _____ Years Online _____

Do you use the Internet for work? Yes No

For the following statements, please select the response that most accurately reflects your everyday attentional control ability.

		Almost never	Rarely	Sometimes	Very often	Always
1	I have difficulty concentrating when there is music in the room around me.	1	2	3	4	5
2	When I am working hard on something, I still get distracted by events around me.	1	2	3	4	5
3	It's very hard for me to concentrate on a difficult task when there are noises around.	1	2	3	4	5
4	When I am reading or studying, I am easily distracted if there are people talking in the same room.	1	2	3	4	5
5	I am slow to switch from one task to another.	1	2	3	4	5
6	It takes me a while to get really involved in a new task.	1	2	3	4	5
7	It is difficult for me to alternate between two different tasks.	1	2	3	4	5
8	After being interrupted, I have a hard time shifting my attention back to what I was doing before	1	2	3	4	5

Mindfulness Attention Awareness Scale (Lapses only)

Name: _____ Gender: male/female

Age _____ Years Online _____

Do you use the Internet for work? Yes No

		Almost Never	Very infrequently	Somewhat infrequently	Somewhat frequently	Very frequently	Almost always
1	I have gone to the fridge to get one thing (e.g., milk) and taken something else (e.g., juice)	1	2	3	4	5	6
2	I go into a room to do one thing (e.g., brush my teeth) and end up doing something else (e.g., brush my hair)	1	2	3	4	5	6
3	I have lost track of a conversation because I zoned out when someone else was talking	1	2	3	4	5	6
4	I have absent-mindedly placed things in unintended locations (e.g., putting milk in the pantry or sugar in the fridge)	1	2	3	4	5	6
5	I have gone into a room to get something, got distracted, and wondered what I went there for	1	2	3	4	5	6
6	I begin one task and get distracted into doing something else	1	2	3	4	5	6
7	When reading I find that I have read several paragraphs without being able to recall what I read	1	2	3	4	5	6
8	I make mistakes because I am doing one thing and thinking about another	1	2	3	4	5	6
9	I have absent-mindedly mixed up targets of my action (e.g., pouring or putting something into the wrong container)	1	2	3	4	5	6
10	I have to go back to check whether I have done something or not (e.g., turning out lights, locking doors)	1	2	3	4	5	6
11	I have absent-mindedly misplaced frequently used objects, such as keys, pens, glasses, etc.	1	2	3	4	5	6
12	I fail to see what I am looking for even though I am looking right at it	1	2	3	4	5	6

Academic Procrastination Scale

Name: _____

Gender: male/female

Age _____ Years Online _____

Do you use the Internet for work? Yes No

For the following statements, please select the response that most accurately reflects how much you put off your academic tasks.

		Strongly Disagree	Disagree	Undecided	Agree	Strongly agree
1	I put off projects until the last minute.	1	2	3	4	5
2	I know I should work on schoolwork, but I just don't do it.	1	2	3	4	5
3	I get distracted by other, more fun, things when I am supposed to work on schoolwork.	1	2	3	4	5
4	When given an assignment, I usually put it away and forget about it until it is almost due.	1	2	3	4	5
5	I frequently find myself putting important deadlines off.	1	2	3	4	5

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BRIEF BIO-DATA OF THE CADIDATE

Name of the Candidate : Ebenezer Lalduhsaka
Father's Name : C. Zabiaka
Mother's Name : Lalduhawmi
Date of Birth : 11.04.1993
Address : V-98, Bungawn Nursery Road, Aizawl, Mizoram,
796005.
Contact no : 8886819855

Educational Qualification :

Degree	School/College/University	Year
HSLC	Home Missions School(Mizoram)	2009
HSSLC	St.Peters (Shillong)	2011
B. A	Loyola Academy, Degree and PG College	2014
M. A	Mizoram University	2016

Professional Qualification

M. Phil Clinical Psychology	The Institute of Chartered Financial Analysts of India	2020
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PROFESSIONAL REGISTRATION:

1. Registered with the Rehabilitation Council of India (RCI).Registration no: A72297
2. Indian School Psychology Association (INSPA) . Registration no: LM2020/531

WORK EXPERIENCE

Sl	Designation	Employers	Year
1	Guest Lecturer	Pachhunga University College	2018
2	Guest Lecturer	Govt Aizawl West College	2021
3	Clinical Psychologist	Damdai Healthcare	2021
4	Clinical Psychologist	Rosewood Hospital	2021
5	Counsellor	Addiction Treatment Facility, Kulikawn Hospital	2022-

PARTICULARS OF THE CANDIDATE

Name of the candidate	: Ebenezer Laldusaka
Degree	: Doctor of Philosophy
Department	: Clinical Psychology
Title of Thesis	: “Cognitions in problematic internet use: A cross-sectional study on predicting, mediating, and moderating effects”
Date of Admission	: 14.08.2021
Approval of Research Proposal	
1. Board of Studies	: 27/05/2022
2. School Board	: 05/07/2022
MZU Registration No.	: 2200067
Ph.D. Registration No and Date	: MZU/Ph.D./1847 of 14.8.2021
Extension (if any)	: nil

HEAD

Department of Clinical Psychology

ABSTRACT

COGNITIONS IN PROBLEMATIC INTERNET USE: A CROSS-SECTIONAL STUDY ON PREDICTING, MEDIATING, AND MODERATING EFFECTS

**AN ABSTRACT SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF
PHILOSOPHY**

EBENEZER LALDUHSAKA

MZU REGISTRATION NO.:2200067

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**DEPARTMENT OF CLINICAL PSYCHOLOGY
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**COGNITIONS IN PROBLEMATIC INTERNET USE: A CROSS-
SECTIONAL STUDY ON PREDICTING, MEDIATING, AND
MODERATING EFFECTS**

BY

EBENEZER LALDUHSAKA
Department of Clinical Psychology

Supervisor

Prof. ZOKAITLUANGI

Joint Supervisor

Dr. Narendra Nath Samantaray

Submitted

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INTRODUCTION

The current research studies various cognitive variables that arise due to problematic internet use. The widespread usage of the internet by the younger generation is having a negative impact on their ability to perform in social, intellectual, and psychological domains. Web users, and especially students engage in a wide range of online activities that could cause them to neglect their crucial daily duties. Digital gadgets like computers, tablets, and smartphones are great tools in academic settings that improve the level of instruction and learning in the classrooms (Chen et al., 2014; Aagaard, 2015), but they can cause disruptions amongst class-going students (Akbulut et al., 2017; Seemiller, 2017; Wu et al., 2018). About one-third (35.3%) of American post - secondary students were taking at least one remote learning course as of 2018, with 16.6% enrolling only in online courses (Distance Learning, 2019).

What we mean by "healthy use of the internet" is using it to get things done in a reasonable amount of time without causing any intellectual or emotional issues (Davis, 2001). While there are some people who limit their use of the internet to things that are absolutely essential, there are others who find it difficult to impose any kind of constraints on their online consumption. Excessive internet usage, referred to as uncontrolled internet use, pathological internet use, net addiction, or internet addiction, results in challenges in both professional and interpersonal settings (Whang, Lee, & Chang, 2003a; Widyanto, 2007).

Griffiths (1998) points out that although most people's Internet usage isn't an issue, there are others whose dependency to the Internet is a serious issue to worry about, based on the limited investigation data. The consumption of food, tobacco use, engaging in gambling, shopping, work, leisure, and sexual activity are all examples of things that people are considered to be "addicted" to (Truan, 1993). Addictions to technologies that entail human-machine interaction falls under the operational definition of non-chemical (behavioral) addictions. They can be either active or passive (like television or computer games), and they typically have cues and rewards that can encourage the development of addictive behaviors

(Griffiths, 1995). Early studies, such as the one that Shotten (1991) carried out, investigated the phenomenon of "computer addiction" among people who worked in the field of computer science and technology. A young "independent bachelor introvert" who had an ongoing passion in science and technological advances was the usual candidate in the empirical study. As a subclass of behavioral addictions, Internet addiction is considered by Griffiths (1998) to be similar to addiction to computers and obsession with gambling, both of which are forms of technology addiction.

According to Kandell (1998), "a psychological dependency on the Internet, regardless of the type of activity once logged on" is what defines Internet addiction.

Kimberly Young, PhD, made the initial suggestion for Text Revision in her groundbreaking 1996 work when she realises the concept that problematic computer use fulfills the criteria for an addiction and suggested that it should be added in the Diagnostic and Statistical Manual of Mental Disorders (DSM), 4th edition, when it is revised. As a result, the negative effects of spending too much time online are affecting more people than before. An individual's personal, professional, and physical lives are all negatively impacted by an addiction to the internet (Young, 2004).

As a result, internet-gaming disorder, one particular type of Problematic internet use, has previously been added to section III of the Diagnostic and Statistical Manual (DSM-5) (APA, 2013), emphasizing that it is most likely that this disorder has clinical implications yet additional study is required to guarantee its clinical significance and the precise phenomenology.

History, Terminology and growth of internet addiction

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Based on the findings of online gambling disorder, many scholars have advocated for the addition of Internet addiction to DSM-5 (Kuss et al., 2013). The acceptance of this proposition occurred not too long ago. In addition, the number of people who are addicted to the Internet is growing at a rapid rate, which coincides with the considerable annual increase in the number of people who use the internet and the faster connection times (Hawi (2012). Although it is still debatable to what degree the Internet serves as a centre for addiction or encourages addictive behaviour. Playing games has been thoroughly examined as a web-based program with significant addictive potential (Huang, 2006; Kuss & Griffiths, 2012b; Leung, 2004).

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Problematic internet use; features and outcomes

Kimberly Young (1996) reported the first account of a patient exhibiting signs of Problematic internet use. According to Young (1999a,b), the phrase "Problematic internet use" is broad and encompasses a wide range of behaviors and issues with control of impulses. She says there are five distinct subtypes that fit this description:

- Cyber sexual addiction: compulsive use of adult websites for cybersex and cyber porn.
- Cyber-relationship addiction: Over-involvement in online relationships.
- Net compulsions: Obsessive online gambling, shopping or day-trading.

- Information overload: Compulsive web surfing or database searches.
- Computer addiction: Obsessive computer game playing (e.g., Doom, Myst, Solitaire etc.).
-

Disordered behaviour related to Internet use qualify as behavioral addiction according to these criteria (Chou et al., 1999). Since it is classified as a behavioral addiction (Holden, 2001; Kuss, 2012), it is characterized by the same symptoms that are often associated with substance-related addictions. These symptoms include mood modulation, salience, tolerance, withdrawal, conflict, and relapse (Griffiths, 2005). There is a multitude of neurological data that supports the resemblance with other addictions which further supports the similarity (Kuss & Griffiths, 2012a). According to the findings of a subsequent study (Chou and Hsiao, 2000), investigators discovered that the participants of an addictive group devoted a greater amount of time on BBSs as well as emails than participants of a group that did not have an addiction. Additionally, the group that was hooked to the internet spent a greater amount of time on the internet compared to the group that was not addicted. The amount of minutes spent using mail and bulletin boards (BBSs) is a factor for assessing whether or not someone is addicted to the Internet, according to this research.

Revision into the DSM 5

There is significant agreement regarding the various uses of the Internet that can lead to addictive behaviours, including gaming, gambling, pornography, social networking, and online shopping. However, only Internet Gaming Disorder has been recently recognised in the appendix of the DSM-5 (APA, 2013), indicating a need for further research to establish its clinical significance and underlying mechanisms.

The proposed criteria show notable similarities to those utilised in diagnosing other types of addiction and encompass:

- preoccupation with Internet games

- withdrawal symptoms of irritability, anxiety, or sadness
- development of tolerance
- unsuccessful attempts to control the behavior
- loss of interest in other activities
- continued excessive use despite knowledge of psychosocial problems
- deceiving others regarding the amount of time spent gaming
- use of this behavior to escape or relieve a negative mood
- jeopardizing/losing a significant relationship/job/educational opportunity
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The APA has now directed its attention towards Internet gaming. We contend, however, that other applications may also be utilised in an addictive manner (Young et al., 1999; Meerkerk et al., 2006). We summarise the results of prior studies on Internet addiction in a comprehensive manner, noting that a significant number of published studies have focused primarily on Internet gaming. While not all criteria need to be met, we wish to emphasise one particular criterion that appears to be significant and is most commonly observed in patients with Internet addiction. This criterion is defined as "unsuccessful attempts to control behaviour," or more concisely, "loss of control." This criterion has been frequently identified in the analysis of the factorial structure of questionnaires designed to evaluate Internet addiction (Chang and Law, 2008; Korkeila et al., 2010; Widyanto et al., 2011; Lortie and Guitton, 2013; Pawlikowski et al., 2013).

Loneliness and internet addiction; a looping effect

According to Peplau and Perlman (1982), an individual experiences loneliness when there is a discrepancy between his desired social relationships and the ones he really maintains. Everyone, regardless of age, gender, religion, race, or financial status, is capable of describing the sour taste of loneliness they've experienced (Rokach, 2004).

Despite this, studies have shown that young adults and teenagers are more likely to experience loneliness than older persons (Jones & Carver, 1991;

Ostrov & Offer, 1980; Hartog, 1980; Rubenstein & Shaver, 1982). Despite this, being lonely is inherently a subjective experience that may be measured according to how fulfilling interpersonal relationships are for the individual (Ilhan, 2012). According to Weiss (1973), a person experiences loneliness when their social connections are lacking in qualities like honesty, openness, and intimacy. Weiss views loneliness as a problem with the quality of relationships with other people rather than the quantity.

Furthermore, Weiss (1987) has examined familial and private friendship interactions in the area of emotion and friendship connections in social situations in the social dimension, both of which pertain to the topic of loneliness. Russel et al., (1980) posited that loneliness possesses a singular dimension, characterizing it as a universal phenomenon encountered at varying levels and intensities, influencing all facets of existence (social, psychological, cultural, etc.). (Cecen, 2008). Various literary works (Russell et al., 1980; DiTommaso & Spinner, 1997) have explored the unpleasant sensation of loneliness and its associated emotions, such as grief, anger, fear, and concern.

The social needs perspective and the cognitive discrepancy model: Prominent theoretical frameworks for understanding loneliness encompass the social needs perspective and the cognitive discrepancy model (Heinrich & Gullone, 2006; Marangoni & Ickes, 1989). The social needs perspective asserts a clear correlation between objective social deficiencies and the subjective sensation of loneliness (Heinrich & Gullone, 2006; Marangoni & Ickes, 1989; Sullivan, 1953).

Practitioners of this viewpoint assert that relationship-specific forms of loneliness emerge when a partnership fails to fulfil its fundamental social demands (DiTommaso & Spinner, 1997; Weiss, 1973). The cognitive discrepancy model, in contrast to the social needs standpoint, emphasises individuals' subjective assessment of their connections rather than the requirements satisfied by such interactions (Heinrich & Gullone, 2006; Marangoni & Ickes, 1989; Russell et al., 2012). It is presumed that all persons employ an internal criteria to assess their interactions (de Jong-Gierveld et al., 2006; Marangoni & Ickes, 1989; Perlman &

Peplau, 1981; Russell et al., 2012). This internal criteria pertains to the expected amount and quality of social ties (de Jong-Gierveld et al., 2006) and is partially founded on a comparison between an individual's interpersonal connections and those of comparable people (Russell et al., 2012).

Loneliness from the Evolutionary Theory Perspective

A novel idea that has lately gained traction in loneliness studies is the ETL (Evolutionary Theory of Loneliness). This hypothesis posits that both genetic factors and the social environment significantly influence the sensation of loneliness. Furthermore, it examines both the adverse and beneficial aspects of loneliness.

Forming and sustaining social connections with conspecifics is crucial for reproduction and the survival of social organisms, including humans. Social groups can collectively assume the responsibilities of procuring food, nurturing babies, and safeguarding against predators. Biological warning mechanisms have developed to promote behaviours that enhance the probability of survival (J. T. Cacioppo et al., 2014; J. T. Cacioppo & Patrick, 2008). The ETL posits that the sensation of social isolation, or loneliness, persists even in the presence of others and functions as a biological alert system, prevalent among all social species, indicating that beneficial social connections are threatened or compromised (J. T. Cacioppo et al., 2015; S. Cacioppo et al., 2014). The unpleasantness of loneliness compels individuals to restore or substitute inadequate beneficial connections, and the resultant alleviation of bad emotions is gratifying.

Furthermore, beneficial social interactions constitute inherently good and gratifying experiences (J. T. Cacioppo et al., 2006; S. Cacioppo, 2018).

Problematic internet use; attention control and attentional lapses

Attention is a multi-faceted mental process that relies on the interplay of several brain networks. Posner and his colleagues put out the attentional network model, which has been significant in the field of attention theory (Fan et al., 2002; Posner and Petersen, 1990). Human attention, in accordance to this model, is divided into

three parts: alertness, which is being awake and ready to respond to signals; orienting, which is moving focus from one place to another to pick out information from sensory input; and conflict network, which is resolving conflicts in response. Notably, according to research conducted by Fan et al. using the attentional network test (ANT) paradigm, key areas of the brain involved in alerting, orienting, and conflicting attention include the temporal parietal junction, the superior parietal lobe, and the frontal eye fields, respectively (Fan et al., 2003).

Selective filter & Attenuation theory

The premise that attention is directed to a single message at any given moment is fundamentally inherent in all contemporary theories of attention. Broadbent's (1958) research on the memory of dichotically given brief messages led him to infer that the cognitive capacity necessary for understanding one spoken word inhibits the concurrent processing of a second message. His filter model of selective attention (1958) was subsequently revised (Treisman, 1960) upon discovering that significant recognition of secondary signals transpired.

However, not even substantial secondary message detection is incompatible with Broadbent's single-channel hypothesis. Instead of assuming that a single input channel can process all data at once, regardless of type, it suggests that several input channels merge into a single, limited channel that can process as many input channels as its capacity allows, with the maximum number of channels depending on the data carried by each. It is possible to reframe the results of secondary message identification as proof of surplus capacity following primary signal analysis, rather than as proof that the model is false.

Furthermore proof suggesting there may be spare capacity after processing one spoken communication has been put forward by Shaffer and Hardwick (1969). When asked to monitor two voice messages at once, both of which contained target words, respondents were unable to identify all of them but were able to identify over 50% of them. According to their reasoning, these findings contradict theories that propose selective attention tasks either completely ignore sensory data

or partially block it. Since it is not necessary to block the entire "non-attended" message according to Broadbent's idea, detection rates above 50% need not be in contradiction with filter theory (Shaffer and Hardwick, 1969).

.Problematic Internet Use; a student's cause of academic procrastination

During the development of the 21st century, the change of multiple spheres of social life transpired as a result of the Internet's effect. The uncertain nature of its influence and the emergence of both beneficial and harmful social repercussions stimulate curiosity and concern from academics across several fields (Arshinova & Bartsalkina, 2010; Gubanov & Chkhartishvili, 2009; Khil'ko, 2015; Khutornoi, 2013). The utilisation of the Internet on educational campuses and within society has surged significantly in recent years.

The academic utilisation of the Internet is mostly aimed at learning and research; nevertheless, it has also become a significant aspect of student life. Students have been recognized as a risk demographic for many reasons (Widyanto & Griffiths, 2006). They possess an inherent inclination towards the Internet (Veen & Vrakking, 2006), and their notable Internet literacy has been associated with Internet addiction (Leung & Lee, 2012). Furthermore, they generally possess (i) unrestricted and boundless access, (ii) adaptable timetables, and (iii) autonomy from the oversight of their parents. Moreover, their online actions are not subject to external regulation; university authorities anticipate the use of technology, and academic environments may promote societal fear and detachment (Moore, 1995; Young, 2004).

Addiction to the Internet is rampant among students at institutions of higher education, according to Wallace (2014), because of the easy access to computers, laptops, and computer laboratories on campus. The occurrence is supposedly a major worry on a worldwide scale, increasing daily since 4% of youth and 1% of the overall population display disorder in their everyday lives (Rumpf et al., 2014). Occasionally, instances of excessive Internet engagement have been noted across several schools. The Internet has engendered severe social and psychological repercussions, notably the issue of Internet addiction, which has been a focal point of

scholarly discourse for the last two decades, influenced by advancements in information technology and its accessibility.

Within the framework of Asian culture, Chou et al. (1999) found that certain Taiwanese college students who were perceived to be "addicts" implemented the messaging and conversation capabilities of electronic Bulletin Board Systems (BBSs) the most often. This was subsequently followed by the usage of the World Wide Web, the File Transfer Protocol (FTP), Newsgroups, electronic mail, and gaming. The effects of computers and the Internet, as well as new ways for teens and young adults to have fun and talk to each other, need to be looked at in the context of larger cultural changes if we want to lessen their effects. Teenagers who are addicted to the internet additionally develop a number of mental health issues, which make their interpersonal issues and lack of social experience even worse. Teenagers and young adults often feel like they can do whatever they want in cyberspace, which has a big effect on how they develop as individuals (Davydov, Neverkovich & Samoukina, 1994; Malygin, Khomeriki & Smirnova, 2011; Minicheva & Khrustova, 2017; Objorin, 2011).

6. Internet use and memory lapses

Working memory is an executive function that facilitates the retention of knowledge necessary for executing higher-order plans, which is crucial for teenagers' reasoning, learning, and language understanding. Numerous research indicate that persons with Internet Addiction (IA) have working memory deficits akin to those observed in behavioural and chemical addictions, including alcohol dependence (Zhou et al., 2014) and compulsive gambling (Zhou et al., 2016). An overview of recently neuropsychological studies indicates that internet-related cues disrupt control processes governed by the prefrontal cortex, adversely affecting functions such as working memory and other executive functions (Brand et al., 2014).

For example, focussing on the overconsumption of online pornography, a type of IA, one study indicated that healthy adults had worse working memory performance for pornographic stimuli compared to positive, negative, and

neutral images (Laier et al., 2013). It has been proposed that working memory performance may be variably influenced when persons with Internet Addiction (IA) encounter internet-related stimuli.

6.1 Multi store or Dual process model of memory

In 1968, Richard Atkinson and Richard Shiffrin proposed the Atkinson-Shiffrin model, often known as the multi-store model or dual process model of memory. The concept is referred to as "stage theory" and posits that knowledge advances in a succession of discrete stages. This model elucidates the functioning of memory mechanisms. An individual may perceive numerous stimuli through sight, sound, and touch; yet, only a limited portion can be effectively retained and recalled (Atkinson & Shiffrin, 1968; Miller, 1956).

The approach has a three-store idea and asserts that memory in humans is composed of three different sections. They consist of a sensory registration, a short-term store/working memory (STM), and a long-term store (LTM). Sensory information is received by the sensory register and thereafter persists in the working memory for a duration. Ultimately, the data are transferred to the long-term storage and retained permanently.

The multi-store model is simplistic, basic, and severely restricted in its capacity to elucidate the intricate, varied, and perplexing phenomenon of "memory." However this psychological model fails to elucidate the non-linear dynamics of activity in the brain between anatomical regions, hence contradicting its linear framework. This model neglects to include prior experience with learning procedures or an individual's cognitive capacity, and it does not address a tri-partite memory structure (Baddeley, 1986). This concept is exceedingly simplistic; nonetheless, the operation and significance of memory are inadequately elucidated. Long-term memory cannot be a singular repository as it contains a plethora of memories and information.

7. Internet Addiction & Impulsivity

Problematic Internet Use isn't simply a behavioral addiction; it is also an impulse control problem (Sadock et al., 2007). A research revealed that individuals in the IA group exhibited more impulsivity compared to the control group, as assessed by self-reports and the Go–Stop impulsivity paradigm (Cao et al., 2007).

Impulsivity is acknowledged as multidimensional and categorised into five dimensions: negative urgency (acting rashly under intense negative emotions), positive urgency (acting rashly under intense positive emotions), lack of premeditation (acting without contemplating consequences), lack of perseverance (inability to sustain focus on tedious or challenging tasks), and sensation seeking (engaging in thrilling activities) (Cyders and Smith 2008). It is characterised by a failure to evaluate alternative options, acting on the first thought that arises without considering the implications (D’Zurilla et al. 2003), and a lack of self-regulation in response to rewards or punishments (Stewart et al. 2004).

Consequently, impulsivity is acknowledged as a predictive factor in the emergence of maladaptive behaviours that alleviate unpleasant feelings (Cyders and Smith 2008).

The latest research indicated that trait impulsivity serves as a predictor of susceptibility to Internet Addiction (IA) and compulsive gambling (Lee et al., 2012). Impulsivity is a significant personality feature that can forecast an individual's loss of control and propensity for addictive behaviours (Blaszczynski et al., 1997). Individuals with substance or gambling addictions exhibit higher results on self-reported measures of trait impulsivity, such as the Barratt Impulsiveness Scale (BIS) (Barratt, 1965, 1975), the NEO Personality Inventory (NEOPI) (Costa and McCrae, 1985), and the Temperament and Character Inventory (TCI) (Cloninger, 1994). Previous research indicates that impulsivity significantly influences addictive behaviour, with fun-seeking (Grey, 1991) serving as a predictor of Internet addiction (Park et al., 2013).

Impulsivity is frequently associated with response inhibition or inhibitory control within executive functioning, often resulting from frontal lobe dysfunction. Numerous patients with addiction demonstrate deficits in executive functioning and impulse control (Crews and Boettiger, 2009). Research on behavioural addictions predominantly centres on pathological gambling, indicating that individuals with this condition demonstrate compromised executive functioning, as evidenced by reduced performance in tasks involving inhibition, time estimation, cognitive flexibility, planning, and decision-making (Brand et al., 2007).

Numerous studies have indicated that substance abuse often leads to impairments in neuropsychological functions, particularly those associated with attention, memory, and executive control (Baldacchino et al., 2012). In relation to the abuse of the internet, results from the Stroop task suggest that heavy Internet users demonstrate impaired executive control functioning concerning interference control (Wright et al., 2003). This finding has been corroborated by electrophysiological brain potential and functional brain imaging studies (Dong et al., 2011, 2012).

REVIEW OF LITERATURE

Defining Problematic Internet Use (PIU)

According to Kuss and Lopez-Fernandez (2016), problematic Internet Use (PIU) entails excessive, albeit dysfunctional, use of the Internet, which negatively influences daily life, relationships or personal wellbeing. Historically, similar patterns of behavior have been termed "Internet Addiction," or "Pathological Internet Use." Yet, because there is ongoing debate regarding if PIU meets clinical addiction criteria, researchers often choose the term Problematic Internet Use which includes maladaptive patterns of internet use without necessitating addiction (Aboujaoude, 2010; Shapira et al., 2003).

Several definitions of PIU have been proposed through time, although they are basically characterized by having in common the following features: compulsive or uncontrollable use, inability to discontinue use even in the face of harmful consequences, and associated significant distress or impairment. For example, Young (1998) discussed key dimensions of PIU like social isolation, mood regulation, and impulsivity to define the conceptual differences of PIU from healthy or normative internet use. However, due to the lack of standard diagnostic criteria for PIU, it has been inconsistently measured and reported. In addition, contextual differences, for example cultural attitudes towards technology, and internet access, may make definitions of PIU change across studies, some of which focus on behaviours such as online gaming or social media use (American Psychiatric Association, 2013).

The most recent editions of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) have acknowledged Internet Gaming Disorder as a condition in need of further research, on the grounds of growing agreement that PIU shows itself in specific activities like gaming (APA, 2018). This move also draws attention to the way the understanding of PIU has changed from a broad notion to one that sees certain online activities as independent of each other and potentially risked to mental health.

Historical Development of Internet Use

Once created to be a tool for exchanging information and communication amongst academics and researchers, the internet has revolutionized, so to speak, the modern life by changing the way people connect, work, learn and entertain themselves. Advancements in technology over the last few decades have seen internet access spring up across the world (Lee, 2017). In the mid 2000's, internet then became not only a source of information but as well as a multifunctional platform for communication, education, commerce and social interaction. Global internet usage at all levels has soared in proportion to the ubiquity of devices like smartphones, tablets, and laptops that have made the internet available to everyone.

In 2017, 2.4 billion people in the world's 50 most mobile phone using countries had internet access through smartphones alone (Newzoo, 2017). Along with this exponential growth of the Internet, there has been a massive shift in the way people are using the Internet, with people logging in more times and for longer periods performing different activities, be it social networking, gaming and media consumption. However, with the help of internet, there has been progress in various fields but, it has also introduced a new set of behavioural and psychological problems. Problematic Internet Use (PIU) is the phenomenon of excessive and uncontrolled use of internet (Kuss & Lopez-Fernandez, 2016).

Prevalence and Demographics of PIU

According to studies on prevalence of PIU, it is a widespread phenomenon especially among the younger generations raised in a digitally connected world. However, estimates of the number of people affected by PIU vary, with research revealing that 2–8% of the general population are affected, with rates in adolescent and young adult samples as high as 20% (Kuss, et al., 2013). However, some of the reasons that make young adults, especially college and university students, more susceptible to PIU include increased independence, academic stress, and the frequent use of social media and the internet as a tool for social interaction.

According to Lopez-Fernandez et al. (2023), PIU rates also vary across countries based upon their demographics, for example based upon internet accessibility or cultural norms around technology use. For example, countries with high smartphone penetration and strong digital framework tend to have higher PIU rates as they have higher chances for providing frequent and long internet use. Gender differences in prevalence of PIU have also been reported as males are more likely to be PIU in certain forms (e.g., gaming), and females more likely to be PIU in social media.

The relationship between PIU and the variables age, gender, socioeconomic status, etc. indicates that demographic attributes are very important in influencing internet use behavior. However, given the rapid evolution of the digital technologies used and internet platforms, PIU is a dynamic condition which is not only determined by predisposed individuals, but by evolution in the online landscape. Understanding these demographic trends is important to developing targeted interventions; and in identifying populations at higher risk of suffering from the negative effects of PIU.

Cognitive Predictors of Problematic Internet Use

Role of Loneliness and Depression

A frequent finding is that loneliness and depression are important emotional predictors of PIU and have been found in many studies to predict internet behaviours. As with loneliness also depression is a psychological state of lack of social fulfilment and prevalence of sadness or emptiness, which people seeking other ways of emotion relief, for example use of the internet (Zhou et al., 2021). To many, the internet is a medium to connect with other people, engage in social media or get lost in activities online to trick the mind from feeling isolated and sad. While this can be a coping mechanism, however, this mechanism can become dependent and compulsive, becoming compulsive internet behaviors defining PIU.

A consistent research body links PIU to loneliness, and especially among young adults and adolescents who may be socially isolated during crucial periods of

development. For example, Morrison and Gore (2010) discovered that more lonely people also expressed increased internet dependency, leading them to search for valid online environments for activity, as they feel isolated. Stavropoulos et al. (2017) found that, similar to loneliness, loneliness and PIU are related, as being lonely is associated with increased likelihood to replace face-to-face contact with internet usage. In particular, this trend is important in populations where physical social interactions are limited; here, people may develop online personae and participate in online communities in order to fulfil social needs that remain unfulfilled offline.

Depression too is a strong predictor of PIU, as individuals with symptoms of depression may use the internet to escape from hopelessness and anhedonia (loss of pleasure). The internet offers the distraction and engagement that might take someone's mind off their negative thoughts for a little while, and this can give depressed people a bit of a reprieve (Peterka-Bonetta et al., 2018). Studies have shown that depression and PIU are bidirectionally related, in which depressive symptoms are more likely to trigger PIU, and vice versa. Perhaps most concerning about this bidirectionality is that there seems to be a cycle of sorts, in which depressive states drive internet dependence which aggravate the depressive symptoms (Romano et al., 2017).

Impulse Control Issues

Extensive literature links impulsivity to excessive online behaviour and diminished impulse control is a critical predictor of problematic internet use (PIU). Impulsivity is the tendency to act without thinking about potential consequences and commonly appears as difficulty in delaying gratification (Andreassen et al., 2016). High impulsivity individuals have difficulties controlling their internet use, considering how the internet is so instant and rewards are unlimited, from social validation, to entertainment to sensory stimulation. Diminished impulse control, therefore, can result in compulsive internet use, and thereby contribute to the development of PIU.

According to Vargas et al. (2019), individuals with impulse control issues are

defenceless to PIU because they are profoundly inclined to looking for a sensation and have issues with self-regulation. For instance, Meena et al. (2012) discovered that young adults having high impulsivity scores used excessive internet, that in turn had negative consequences in their life, personal, academic and social. Research also shows that impulsive people can derive more reinforcement from very internet-oriented activities like online gaming or social media because this kind of activity gives instant feedback and gratification. As a result, they have trouble controlling impulse and reward, driving them back to the internet on repeat.

The Barratt Impulsiveness Scale (BIS) is a measurement tool that has been effective in evaluating PIU and its relationship to impulsivity. The BIS measures several dimensions of impulsivity: attentional, motor, and non-planning impulsivity, all of which constitute a full profile of an individual's impulse control (Liu et al., 2019). While the central role of impulsivity in PIU has been shown using the BIS, higher BIS scores predict more frequent and intense PIU behaviours. Another assessment, known as the Delay Discounting Task, which evaluates an individual's preference for either immediate or delayed gratification, has found that those with PIU tend to prefer immediate gratification and this also follows patterns that are common to other impulsive behaviours (Li et al., 2016).

Finally, diminished impulse control is an overall powerful predictor of PIU, because impulsive individuals are more prone to chase the internet's instant reward without thinking of the long-term effects to their life. To inform the development of interventions aimed at enhancing self-regulation and reducing impulsive internet use it is important to understand the role of impulse control in PIU.

Seeking Social Comfort and Distraction

The space of the internet has become a critical sphere for individuals in-search for social comfort and a means of escape on the daily. Social media and online environments become a place for users to find a sense of connection, share stories, and validate themselves, especially among those who are socially isolated (Hammour et al., 2015). The phenomenon is believed to be fuelled by an individual's need for

social acceptance and comfort, which has been tied to greater internet use for the purpose of connection that may not be possible offline. Jin (2013) points out that social media platforms provide a platform for users to create an online identity and being a part of a community, even with limited physical interactions.

Additionally, distraction is important in connection with problematic internet use (PIU), since individuals are going to the internet for stress, boredom, or loneliness. To many it is simply a quick route to relief and a convenient escape from negative emotions. Consistent with the distraction hypothesis, people behaviourally substitute for these situations via activities that shift their attention away from stressful or unpleasant situations (Hammour et al., 2015). Digital distraction may seem like an unhealthy activity when we're expected to work from home or in an office for eight or more hours a day, but it's actually one of the ways we cope with uncomfortable feelings of boredom, the inability to focus, or the weight of anxiety. Nevertheless, this habit of distraction seeking habit can be associated with compulsive internet using, which can even worsen PIU.

Attention Deficits and Distractibility

The consistent link that problem internet use has had with attention deficits and increased distractibility are frequent lapses in attention that interfere with an individual's daily functioning. Also, research by Hadlington (2015) shows that individuals who regularly spend too much time on the internet have more frequent cognitive failures like memory lapses, frequent difficulty staying in focus, and often difficulty completing tasks. As users become accustomed to the rapid, transient feedback provided by online environments, they can develop cognitive patterns in which short term stimulation takes precedence over sustained concentration, and PIU can encourage the development of such cognitive patterns.

In the short term, the cognitive consequences of PIU are proliferation of attentional shifts and problems with sustained attention. With constant distraction through the internet, especially on social media, online games, and instant messaging, it's hard for a user to focus his offline tasks (Augner et al., 2023). A constant bombardment of

online stimuli can lead to a fragmented attention span in which people lose their ability to focus on a single thing for a long time. Research shows that those with PIU tend to say that they are less able to focus on school or work responsibilities because they're compelled to repeatedly return to online communication, notifications, or materials.

Implications of Cognitive Predictors

According to Moreno et al. (2021), several cognitive predictors for problematic internet use (PIU), such as loneliness, depression, lack of impulse control and social comfort seeking behaviour, interacted and significantly increased the severity of PIU. Each factor is a psychological state or trait that can predispose someone to excessive internet use, on its own. These predictors, although often interrelated, however, contribute to the complexity of psychological environment within which multiple vulnerabilities lead to PIU. For example, those who are lonely might also have poor impulse control, so they'll spend hours on the internet as a way to make both their emotional discomfort and cravings for instant gratification disappear (Faghani et al., 2019). This makes the compounded effects of the such as the depth of the dependency on the internet to a person which, in turn, exacerbates PIU.

The interactions of these cognitive predictors point to future exploration within broader psychological and social frameworks. Studies have confirmed some correlations between predictors such as loneliness or impulse control and PIU, although they have largely left unexplained the causal relationships between predictors and PIU. It is not known if PIU worsens underlying cognitive vulnerabilities, or if the amygdala hyperactivation is a result of the Internet over use (Faghani et al., 2019). However, current literature is often limited to cross sectional designs, which restrict inferences to determining causality. To determine how cognitive predictors also act upon PIU over time, and how changes in internet usage may itself affect these psychological states, a longitudinal approach is necessary.

Social Relationships and Academic Impacts

PIU creates a huge impact on social relationship and learning because it distracts from both social interactions and academic duties. The way that PIU can reduce face to face interaction is one of the main ways in which PIU can affect social relationships. People who spend a lot of time online may have less of a craving for real social interaction, leading to problems with family and friends. A study shows that people with PIU often feel estranged from their loved ones, as they spend all of their time on online activities, which left them less time and quality of time spend with their loved ones (Andangsari et al., 2018). The Bittersweet side of this shift towards digital communication is that by relying more on virtual interactions we become prone to what is often referred to as social isolation as they fail to foster depth and quality of those offline relationships.

Similarly, the effect of PIU on academic performance is equally important; studies repeatedly establish the connection between PIU and academic procrastination and underachievement. Students with high levels of PIU often report that they delay assignments, study less effectively and are less academically motivated. The reason being, online activities like gaming or social media give immediate gratification which sometimes compete with the time allotted for the academic tasks and leave you feel unsatisfied and unable to focus on academic tasks, as a result of which poor grades are received (Moretta & Buodo, 2020). More concerning though, is that this link between PIU and academic procrastination occurs at an institution where self-discipline and effective time management are key to success.

Furthermore, the PIU is also connected to lower academic outcomes since its influence on critical cognitive functions such as attention and memory is indispensable for learning and finishing the academic work. Individuals with PIU say they often cannot concentrate during study blocks or lectures because they are constantly distracted by the internet (Ilesanmi et al., 2021). Distractibility in addition to lowered capacity for sustained academic work leads to piecemeal learning experiences, lower information retention, and ultimately poorer academic outcomes. Furthermore, PIU has been associated with preferring short-term rewards, as students

tend to place more importance on online commitment than their long-term academic goals that consistently prolongs the cycle of procrastination and disengagement from studies.

Health and Lifestyle Consequences

Impacts are also extensive on health and lifestyle, impacting many aspects of physical, mental, wellbeing. One of the most notable effects of PIU is becoming a sedentary person as they spend too long online than physically active. With little physical movement, there are many health risks linked to this such as increased chance of obesity, cardiovascular problems and musculoskeletal problems associated with prolonged sitting (Klavina et al., 2021). According to studies, people with PIU often forego physical exercise and unhealthy eating, like excessive snacking during online activity or eating calorie dense foods, increase the risk of putting on weight and decrease their physical fitness.

Sleep disruption is another important consequence of PIU, especially in people who spend long hours online, often until late in the night. It's no secret that screens emit blue light, which can suppress production of the sleep-inducing hormone melatonin and delay sleep onset and reduce sleep quality. Lakkunarajah et al. (2022) demonstrate that people with PIU tend to have reduced sleep duration, reduced sleep quality and signs of sleep deprivation including daytime sleepiness, irritable mood and trouble concentrating (Zusa, et al., 2021). Chronic sleep problems have long term consequences; insufficient sleep compromises cognitive functions, emotional control and general health, which all amplify the detrimental effects of PIU on all aspects of an individual's well-being.

Link Between PIU and Academic Procrastination

Problematic Internet Use (PIU) is widely recognized as a contributor to academic procrastination, intentional delay of academic tasks even with foreseeable negative outcomes. Studies have repeatedly found that students who have difficulty with PIU also tend to experience higher levels of academic procrastination due to the effect of

internet overuse on time management, the distraction of study goals, and the availability of immediate gratification that competes with long term academic goals (Balhara et al., 2018). Aiming to be among the first to determine the link between PIU and procrastination, understanding this relationship provides the ability to design interventions that could reduce academic delays and increase student outcomes.

According to Andangsari et al. (2018), excessive internet use encourages habits that are diverts time and attention away from academic work and as a result exacerbates procrastination behaviours, according to the literature on PIU and academic procrastination. The studies indicate when the PIU encourages students to avoid the study and use online distraction in the form of social media, games and video streaming. For example, Balaji and Indradevi (2017) also found a strong correlation between increased Facebook usage and academic procrastination suggesting that social media in general can be a very strong inhibitor of academic productivity. According to their research, people who had spent too much time on Facebook were more inclined to procrastination; social media was an easy way to escape academic pressures and provided students the chance to 'avoid concentrating on a task for long periods of time.'

Attentional Control as a Mediator

According to Chang et al. (2024), attentional control prevents the influence of Problematic Internet Use (PIU) on the academic procrastination. According to the theory, people with good attentional control are better able to hold out from the allure of online distractions (such as social media or games) and so are less likely to procrastinate. PIU has a measurable negative influence on academic performance when attentional control is low; however, when attentional control is high students are more able to keep focus when faced with academic tasks in the presence of external distractions, weakening the negative impact of PIU (Shahrajabian et al., 2023). On the other hand, those with a lower control of attention may find it hard to keep their concentration rammed, in which case they are more prone to procrastination when interacting online.

The Mindful Attention Awareness Scale (MAAS) is used to measure attentional control by measuring a person's ability to notice and attend to the present moment. Academic productivity is reliant upon less mind wandering and better focus and high MAAS scores relate to these qualities. Theories such as the dual process model explain this control of attentional focus better by stating that people use automatic or controlled processes while trying to focus (Gámez-Guadix & Calvete, 2016). Though they can't overcome all PIU-driven procrastination, controlled processes are capable of doing so in high demand scenarios, as they allow directed attention, against procrastination. Models such as the Goal Shielding Theory also talk about how attentional control allows for goals to be more important than what is in front of us right at the moment.

Influence of Social Media Use on Procrastination

By design and the instant gratification, it provides, social media is a specific drive for procrastination, especially with academic work. Instagram, Facebook, TikTok and others platforms are set up to get the most attention from the users by creating infinite scrolling, sending notifications, showing personalized content by the algorithms — which causes students to divert their attention from academic work (Shaibani, 2020). Social media provides a never-ending supply of new information and social validation, which can strengthen one's attitudes to put off things that need to be done.

Social media platforms by default challenge users with time management. Because likes, comments, and shares supply variable rewards, they are known to trigger a release of dopamine, making it hard to log off, diverting users from academic goals (Andreassen et al., 2016). This feedback loop can turn off users' motivation for tasks with delayed rewards (e.g., studying) and move towards activities for which gratification is immediate. In addition, social media's real time nature brings the effect of FOMO (Fear of Missing Out) in students, who prefer having interaction online over studying (Alt & Boniel-Nissim, 2018).

Distractibility and Attention Shifting

The cognitive mechanisms (i.e. distractibility and attention shifting) that mediate the relationship between internet use and attentional lapses are also responsible for the underlying problematic behaviours (e.g. academic procrastination) (Augner et al., 2023). The presence of the stimuli online constantly available (because of the availability of notifications and multimedia content) contributes to the high cognitive load and habitual attention shifting. According to cognitive load theory, when cognitive resources exceed capacity, individuals are more vulnerable to distraction, including by those things that promise instant gratification, such as social media or entertainment sites (Chang et al., 2024). Online engagement in itself is frequent, and hence promotes divided attention; the users continuously engage on to one task and then another, which causes weakening of sustained concentration and leads to problems in maintaining attention on academic tasks.

Attention control theories like the Supervisory Attentional System (SAS), show us that in order to successfully focus on tasks, distractions must be overridden. But internet use often reduces this control, instead promoting behaviours of the automatic attentional system that are quick to respond to interruptions. Shahrajabian et al. (2023) show that high internet users shift their attention by default and have more difficulty returning to a task after an interruption. Attention shifting is a habitual process and related to the attentional control deficit theory that less attentional resources to resist distraction, making an individual prone to develop a cycle of procrastination. This help to procrastinate and make it hard to resist the short-term appeal of online activities and thus keep a cycle of disengagement from academic responsibilities going. To prevent mounting of cognitive toll from internet distractions it is imperative to grasp these processes for devising solutions like reducing screen time, or practicing mindfulness.

Attentional Control and Academic Outcomes

Attentional control is the ability to impose focus control and distracting stimuli suppression and is a crucial predictor of academic success in the context of PIU. Students having strong attentional control will be task focused and less likely to

succumb to academic procrastination. Evidence shows that people with better attentional control are able to better resist the appeal of internet distractions and continue academically (Augner et al., 2023). Attentional control functions through two primary processes: either top-down processing (when goal directed attention is used) or bottom-up processing (when we respond to environmental stimuli). Those with good top-down attentional control can manage distractions and increase task completion rates, as well as grades in the academic setting.

In recent studies, deriving from the tools of the Attention Control Scale (ACS) and Mindful Attention Awareness Scale (MAAS), a connection between lowered procrastination behaviours and heightened attentional awareness has been made. For example, studies show that the students who scored higher on attentional control scales generally have less of a problem procrastinating and better time management skills, as well (Chang et al., 2024). In PIU, attentional control reduces the effect of online distractions on individuals by allowing them to focus on longer term academic goals rather than fleeting gratifications mediated by online activities.

Role of Age and Gender

There is growing evidence that age and gender are moderators in the relationship between Problematic Internet Use (PIU) and academic procrastination. Both the prevalence of PIU and the experience and reaction to internet distraction are influenced by these demographic factors (Balhara et al., 2019). Insights of how other groups are affected by PIU are examined in terms of age and gender as moderating variables in academic context in which procrastination can compromise success.

Age as a Moderator in PIU and Academic Procrastination

PIU moderates effects of age, with younger individuals (adolescents, young adults), and in particular students, being more susceptible to drawing upon the internet as a distraction from study, leading to procrastination (Dufour et al., 2017). However, adolescents and college students have more PIU compared to older adults, according to the studies carried out by varying institutions, attributed to heightened accessibility and fluency in the use of the internet, and also a tendency of adolescents and college students to use internet for social and entertainment purposes. For

example, students between 18–25 years old (including the age group with the highest incidence to academic pressure and digital environment) tend to use the internet as a tool of avoiding their academic obligations leading to a high extent to procrastination. Younger users are increasingly likely to be more impulsive and have less self-regulation – making them more susceptible to external distractions online (Fernández-Villa et al., 2015).

Gender as a Moderator in PIU and Academic Procrastination

In addition, gender moderates the relationship between PIU and academic procrastination, since previous research has shown that men and women demonstrate different patterns of internet use that also produce differences in procrastination behaviours. Research points to men using the internet for gaming and information gathering, and women using the internet more for social media and communication (Touloupis & Campbell, 2023). The distinction of social media use as interactive and reward based allows for this distinction to affect procrastination as well as social media use is highly correlated with procrastination itself.

Implications for Interventions

As moderators in PIU related academic procrastination, age and gender need to be considered while designing targeted interventions. Strategies to help young adults, especially students, control impulse and self-regulate are useful in reducing procrastination that may lead to PIU. Stints of social media suspension for women and restrictions for male gamers have also helped (Negin et al., 2017). Greater age and gender groups may be able to navigate the internet productively rather than counterproductively when attaining educational goals after exposure to educational programs that incorporate digital literacy and time management skills along with an awareness of PIU's risks.

Implications for Intervention and Support

Further understanding of how cognitive beliefs differ by gender and age can inform targeted lens to reduce the impact of PIU. Interventions for younger individuals, those who are susceptible to looking for validation or who undervalue their time

spent online, might look at ways to enhance self-awareness about internet habits and inspire offline socialization. Interventions focused on social media use could have a gender specific approach to young women and gaming focused to young men.

Educators and mental health professionals can also play a role in decreasing PIU related procrastination by offering the development of strategies to fight procrastination and aid in development of self-regulation skills and goal setting strategies (Faghani et al., 2019). It is found that by taking into account the moderating effects of age, gender, and cognitive beliefs, we can tailor support to help people engage in healthier patterns of internet use for academic and personal well-being.

Summary of Findings and Research Gaps

Synthesis of Key Findings

In research on Problematic Internet Use (PIU), the development and maintenance of PIU is shown to be a complex interaction of cognitive, psychological, and demographic factors. In PIU, emotional vulnerabilities — loneliness, depression, low self-esteem — are key predictors of the problem. These are emotions people feel, and so they seek social validation, escapism, or relief from negative emotions through the internet. Impulsivity and poor attentional control are the cognitive predictors and are associated with unregulated internet use for the sake of immediate gratification. These psychological predictors indicate that PIU tends to be motivated by an attempt to deal with unmet psychological needs or to control negative emotions.

Attentional control has been identified as a critical mediator in the extent to which PIU impacts academic procrastination and academic productivity. Individuals with strong attentional control are able to keep their attention on academic or work-related tasks and buffer the effects of online distractions. Additionally, people with weaker attentional control are more likely to succumb to internet related interruptions that perpetuate procrastination. Beyond cognitive beliefs regarding internet use (e.g., regarding social validation or which regards escapism), other cognitions mediate the association between PIU and academic outcomes, such as sharing with the internet at

the expense of offline responsibilities.

PIU's effects are also moderated by demographic moderators, especially age and gender. Because developmentally individuals after adolescence and young adulthood that are younger, are more likely to develop PIU related to identity exploration and social connection needs. Differences in gender traits also indicate that women engage social media more than men do, while men are more likely to use it to play games that are also associated with separate PIU related procrastination patterns. These findings highlight that PIU is not merely a matter of personally determined cognitive and emotional characteristics, but that there are social and developmental contexts, some groups being more at risk than others due to differing patterns of motivation and use.

The literature detailed finding that, as a whole, there is a multi-faceted relationship between PIU and academic procrastination, whereby both the individual vulnerabilities and the broader social influences are of significance. To that end, there is now scope for effective interventions to concentrate on promoting attentional control, as well as promoting positive coping mechanisms, whilst also adjusting the approach to suit an individual's age and gender to reduce the impact of PIU on academic and personal outcomes.

Identified Gaps

Though research has been steadily growing on PIU, there are several critical gaps in the literature, including demographic diversity, longitudinal research, and having a better understanding of the emerging impact of new internet technologies. While PIU has most often been studied in young adults, particularly college students, the gap in understanding PIU behaviour across different age groups and cultures remains unresolved. However, the narrow demographic focus of studies into PIU limits the generalizability of findings, given that PIU may look differently socially and culturally. For instance, technology habits in culture or variation of access of internet radiates effects of PIU and cognitive impacts. To fully understand how demographic variables shape PIU, research is especially needed on older adults, adolescents who are not in college contexts, and individuals from non-Western cultures.

There is also a significant research gap in our knowledge of long-term longitudinal studies of PIU. Most current research to date is based on cross sectional data, which although they can help tease out correlations, cannot prove causality. Since PIU behaviours and their downstream implications on attention, academic procrastination, and mental health will be followed up longitudinally, researchers will be able to examine how these behaviours develop with time. In order to better understand if the impact of PIU on cognitive and academic outcomes is transient or long lasting, research is necessary with these populations. Second, longitudinal data could help to clarify the directionality of the relation of PIU with psychological factors, e.g., whether PIU causes or exacerbates mental health conditions (e.g., depression and anxiety) or whether PIU results from these conditions over time (Gecaite-Stonciene et al., 2021).

Moreover, if we want to grasp PIU more deeply, we must consider that internet technologies evolve rapidly, and new platforms and new adaptations of old features will emerge that might affect PIU in ways that have never been seen before. Virtual reality, the metaverse and more sophisticated social media algorithms are emerging technologies that could make PIU experiences immersive and addictive, or change what PIU is. The current models of PIU do not fully capture the cognitive and behavioral impacts of these technologies, and thus require revision of theoretical frameworks and empirical research. This gap necessitates studies of how these emerging technologies affect PIU, particularly with vulnerable populations.

By addressing these research gaps there will be a better understanding of PIU, and understanding its impact on gender, age, time period, and technology. This research will be crucial to follow the ever-evolving digital landscape and help individuals monitor internet use in a way that supports mental health and academic success.

Statement of the Problem

Research on Internet addiction developed in the United States. Nonetheless, the issue of Internet addiction has emerged as a worldwide concern. Research has recorded Internet addiction in an increasing number of nations (Ferraro et al., 2007). In previous decades, several studies have been undertaken by researchers in the domain of Internet addiction. Nonetheless, a broadly agreed characterisation of the cognitions and behaviours linked to addictive or problematic Internet usage remains elusive.

Terms such as problematic Internet usage, compulsive Internet use, Internet addiction, and Internet reliance are used interchangeably to denote addictive or problematic Internet behaviour. (Özdemir et al., 2014; Huang et al., 2014). Given that addictive or problematic Internet use appears to be a moral panic regarding technology and certain online activities, prior research has seemingly endorsed the definition of problematic Internet use rather than the designation of Internet addiction as a psychiatric disorder (Yellowlees and Marks 2007). For the sake of simplicity and unification, the term "Internet addiction," widely utilised by researchers in China (Li et al. 2014), was adopted to define the cognitive and behavioural symptoms linked to addictive or problematic Internet usage as referenced in the above literature.

Internet usage peaks among individuals aged 16–24 (Kandell, 1998; Öztürk et al., 2007), indicating that university students, during a pivotal phase of social and emotional development, constitute a potential risk group for internet dependency (Odacı & Kalkan, 2010). The enhanced accessibility and speed of internet connection in the university setting heightens the probability of university students experiencing adverse effects associated with the internet. Prolonged engagement in online activities, without awareness of time elapsing, might result in the unreasonable postponement of necessary tasks (Lay, 1988). Significant discrepancies exist between the objectives and actions of persons with procrastination issues. Individuals of this kind seem to undertake projects with commendable intentions and resolve; yet, they ultimately struggle to fulfil these objectives consistently throughout time and often do not initiate them punctually

(Schouwenburg et al., 2004). Academic procrastination, a specific kind of general procrastination, poses challenges in areas such as test preparation, homework completion, meetings with student counsellors, and project fulfilment (Lay, 1988; Milgram et al., 1998).

Students' motivation to learn has been discovered to be affected by psychological and social factors (Froiland et al., 2012). As a result, it's possible that these psychological characteristics, rather than PIU itself, will play a part in influencing the impact of PIU on learning motivation. Given that it's uncertain if PIU affects learning motivation directly or indirectly, a secondary goal of the study was to explore the relationship between PIU and learning motivation is mediated by psycho-social states.

Since the widespread use of digital technology, its impact on users' cognitive processes has received little attention, and only a few research have been undertaken on the topic. Despite the data suggesting a potential relationship between internet use and a loss in attention during tasks performance, it is still unclear which mechanism is to blame for this condition. Individuals with problematic internet use had increased impulse control issues, attention deficiency, and forgetfulness in their daily lives, according to a few research. Since there has been a number of studies done on adolescents, there is a significant neglect or lack of information regarding problematic internet use, its predictors and its effects on young adults in Mizoram as youths have become more indulged on the Internet as we live in the era of smartphones and social media.

As depicted in Maslow's 3rd hierarchy of needs, we human beings are social animals, and as social animals we crave belongingness, friendship and other social support & needs. The fear of being left out may play a crucial role in individuals who started using the Internet and who continue to use it as it has become a crucial platform for maintaining connections and conversations. Increased reports have been observed regarding attention, concentration and distraction issues during their academic lives. Therefore, this study will aim to elucidate the levels of

problematic internet use among Mizoram college and University students and find out the predicting, mediating and moderating factors for problematic internet use.

OBJECTIVES OF THE STUDY

Based on the available literature of Internet addiction, the following objectives were framed for the study as follows:

- 1) To examine the overall and unique predictive role of cognitions behind Internet use (loneliness/depression, impulse control, social comfort, and distraction) in determining the severity of problematic Internet use.
- 2) To examine the mediating effects of the level of attention control between internet use and academic procrastination.
- 3) To examine the moderating role of gender and age between cognitive beliefs related to online activity and cognitive outcomes and academic procrastination.
- 4) To examine the mediating effects of distractibility and attention shifting between internet use and daily attention lapses.

HYPOTHESIS

- 1) Individuals who are lonely, depressive, have poor impulse control, seek the Internet for social comfort, and have significantly higher chances of becoming Internet addicts.
- 2) The level of attention control will significantly mediate and moderate the relationship between internet use and academic procrastination.
- 3) The level of problematic internet use, gender, and age will significantly moderate the relationship between cognitive beliefs related to online activity and cognitive outcomes and academic procrastination.
- 4) Distractibility and attention shifting will significantly mediate the relationship between internet use and daily attention lapses.

METHODS AND PROCEDURES

Sample: The proposed study sample consist of 400 participants; efforts was made to equal representations of male and female participants. The participants were College students studying in Aizawl City, Mizoram. Multi-stage random sampling was employed to select the final samples. Firstly, five Colleges located in Aizawl under Mizoram University was selected, and necessary permission was taken from the college authorities for the conduction of the data. Secondly, 600 students' equal representation of Male and female students were randomly selected from the register maintained by the selected colleges. Necessary permission and informed consent was taken from authorities and students. Thirdly, 400 college students, comprising 200 high Internet users and 200 low Internet users ($M \pm 02$) with equal representation of gender (male and female gender) were selected. Sociodemographic profiles to control extraneous variables was screened out using the Sociodemographic profiles (which include age, sex, address, name college, stream, semester, etc). The inclusion and exclusion criteria for the selection of the samples is as given below:

Inclusion criteria

- i) Students studying in colleges located in Aizawl City and affiliated to Mizoram University
- ii) Students age 18-24 years old
- iii) Who has access to the internet
- iv) Female and male gender
- v) Only who gave consent will be included
- vi)

Exclusion criteria

- i) Students studying in colleges not located Aizawl City and not affiliated to Mizoram University
- ii) Students who are below 18 years of age and above 24 years of age
- iii) Who has no access to the internet
- iv) Transgender or not belonging to the Female and male gender
- v) Not giving consent.

Psychological Tools used:

1. Internet Addiction Test (IAT2): Developed by Kimberly Young (1998) , this tool has been widely used to research and detect internet addictive problems in individuals. This is a 20-item questionnaire on which respondents are asked to rate items on a five-point Likert scale, examining how their Internet use impacts their everyday routines, social lives, productivity, sleeping patterns, and feelings. The minimum score is 20, and the maximum is 100; the higher the score, the greater the problems Internet use causes. Young suggests that a score of 20–39 points is an average online user who has complete control over his/her usage; a score of 40–69 signifies frequent problems due to Internet usage; and a score of 70–100 means that the Internet is causing significant problems. IAT has shown strong internal consistency ($\alpha = 0.90\text{--}0.93$) and good test-retest reliability ($r = 0.85$) values (7–12).

2. Online Cognition Scale (OCS). The OCS is a 36-item questionnaire developed by Davis, Flett & Besser in 2002 that measures problematic Internet use. Items were developed from related measures of procrastination, depression, impulsivity, and pathological gambling, as well as symptoms identified in the literature on problematic Internet usage, with an emphasis on cognitions rather than activities. On a seven-point Likert scale, respondents score the agreeability of statements such as: “I often keep thinking about something I experienced online well after I have logged off;” “I get more respect online than in real life;” and “Using the Internet is a way to forget about the things I must do but really don’t want to do.” The OCS contains four subscales: loneliness/depression, diminished impulse control, social comfort, and distraction. In addition, the OCS can be scored as a global measure of problematic Internet use.

3. Mindful attention awareness scale-lapses only (MAASLO) The MAAS-LO (Carriere et al., 2008) developed by Brown and Ryan in 2003 is a 12-item questionnaire that assesses the frequency with which an individual experiences lapses of attention in everyday situations. Higher scores reflect greater frequencies of attention lapses.

4. Attentional control: switching (AC-S) and distractibility (AC-D) Attentional control developed originally by Brown & Ryan will be measured using the AC-S and AC-D questionnaires (Carriere et al., 2013). Both scales included four items. Items are answered using a five-point Likert scale with responses ranging from (1) almost never to (5) always, with higher scores reflecting the more incredible difficulty in switching one's attention or greater distractibility. the APS-S (McCloskey, 2011) is a five-item Likert-type scale with anchors 1: Agree to 5: Disagree, with the items for the short form of the scale originally selected from the 25-item full length scale. Instructions for completing the scale consisted of asking participants "How much do you, yourself agree to the following statements?" (McCloskey, 2011). Higher scores on the scale indicate a greater tendency to procrastinate on academic tasks.

5. Academic Procrastination Scale (short form Year): The short form developed by Justin. D. McCloskey contains 5 items measured on a 5 point Likert scale. In the original study Cronbach's α was .86 (Tuckman, 1991), and in a more recent study Tuckman (2007) reported Cronbach's α to be .89. Higher scores indicate higher levels of procrastination.

6. Socio Demographic Profiles (Lalduhsaka, E, 2021). The researcher constructed for the present research work which to be used for screening the true representative of the samples and also may be used for controlling extraneous variables.

7. Informed Consent Form (Lalduhsaka, E, 2021). The researcher constructed the Informed consent form by following the guidelines of UGC and MZU which include the nature and purpose of the study, expected participation, assurance of confidentiality on their details and responses, voluntary nature of participation, expected time taken, etc. which will be taken before the administration of psychological tools.

Designs:

The design employed a Correlational Design which will compare the high and low users of internets. The study will entertain 400 College Students comprising 200

high-internet users and 200 low-internet users on loneliness, impulse control, distractibility, online social comfort, attention control, attentional lapse, and academic procrastination.

Procedures:

Looking at the topic of the study, the appropriate psychological test was constructed (sociodemographic form and consent form was constructed) and selected psychological tests such as (i) Internet Addiction Test (IAT2), (ii) Online Cognition Scale, (iii) Attention Control, (vi) Mindfulness attention awareness scale and (v) academic procrastination scale were readily prepared. The appropriateness of the scales was tested to the target population under study through a pilot study. Then, necessary permission from the authorities and the ethics committee, and informed consent was obtained from samples. The administration of the psychological tests was conducted in individual conditions. A quiet, well-lit room was selected and the participants were seated far from each other to avoid distraction from others. They were given all the selected scales and instructions was given as per the manual. Careful instructions was given to ask any questions or items that are not understood and was clarified to ensure accurate outcomes. After the participants finished answering the answers were checked and scrutinized for any missing or mistakes.

Ethics

The study protocol was presented for ethical clearance from the Human Ethics Committee of Mizoram University.

Statistical Analysis:

To test the hypotheses set forth to determine “Cognitions in Problematic Internet use: A Cross-sectional Study on Predicting, Mediating and Moderating Effects” the following statistical analysis were employed when required:

The psychometric properties of the items, scale, and sub-scales of the psychological measures were ascertained to warrant their applicability for use in the population of the proposed study.

Descriptive statistics (Mean, Standard-Deviation, Skewness, Kurtosis, & graphical method) was used to look in internet use effects on dependent variables.

The assumptions underlying univariate, bivariate, and multivariate statistics (like Logistic Regression Analysis) may be ascertained, and wherein necessary permissible transformation and standardization of the comprehensive score on the scale and sub-scales of psychological measures was performed.

Univariate, bivariate, and multivariate statistics, wherein applicable, was employed to test the occurrence of differences and relationships for drawing inferences.

Mediation and moderator analysis was done using PROCESS MACRO v4.

Results and Discussion

The present study entitled “**cognitions in problematic internet use: a cross-sectional study on predicting, mediating, and moderating effects**” aimed to study various cognitive functions, affect and behaviour that may predict problematic use of the internet as well as the unique and the complicated relationship and interplay of mediating and moderating variables that may change the direction of each outcome.

It was hypothesized that the sub scales of Online Cognition Scale such as loneliness, online social comfort, diminished impulse control and distractibility will predict problematic use of the internet in the proposed sample of the study. It was also proposed that poor attention control will significantly mediate the relationship between Internet use and Academic Procrastination. It was also hypothesized that level of internet use, age and gender will significantly moderate the relationship between cognitive beliefs related to online activity and cognitive outcomes and academic procrastination. It was also hypothesized that distractibility and attention shifting will significantly mediate the relationship between internet use and daily attention lapses.

To achieve the objectives and hypotheses put forth, 400 participants comprising 200 male internet users and 200 female internet users consisting of equal representation and having equally matched socio-demographic profiles were selected from 5 colleges affiliated to Mizoram University, Aizawl by using a multi-stage random sampling method. The age group of the participants was between 18-24 years. 5 psychological tests including Internet Addiction Test (IAT2)(Kimberly Young 1998), Online Cognition Scale (OCS)(Davis, Flett & Besser 2002), Mindful attention awareness scale-lapses only (MAASLO) (Brown and Ryan 2003), Attentional control: switching (AC-S) and distractibility (AC-D)(Brown & Ryan 2003), Academic Procrastination Scale (short form Year)Justin. D. McCloskey 2008), Socio Demographic Profiles (Lalduhsaka, E, 2021), Informed Consent Form (Lalduhsaka, E, 2021) were employed for psychological evaluation to the samples. The administration was done with due care to the instructions provided in the manual and APA (2014).

The samples of the study were selected cautiously trying to get equal representation of high internet addiction and low internet addiction, male and female gender (male and female), age level (18-24 years), ecology (living in Aizawl city) to control extraneous variable which can influence the results other than internet addiction. The results (dependent variable)

The raw data collected using psychological test were checked on any missing data and outlier data. The Researcher carefully conducted routine test and no such kind of missing and outliers were found and is ready for further analysis.

Psychological test used in the study were constructed for use in other culture and as a result was checked in their appropriateness to the target population of the study. Accordingly, the psychometric properties of all the scales were done on normality, reliability and homogeneity.

- (i) Normality- There is not much variation between mean and SD, all kurtosis and skewness levels falls within ± 2 showing the normality of the data.
- (ii) Reliability- Cronbach alpha reliability was calculated and the results showed that all the scales reliabilities fall between .85-.91 (addiction scale $\alpha=.85$; Social Comfort $\alpha=.91$;Loneliness $\alpha=.86$; Diminish Impulse control $\alpha=.89$;Distraction $\alpha=.84$; Attention Lapse $\alpha=.88$; Distractibility $\alpha=.87$; Academic Procrastination $\alpha=.71$) showing the applicability of the scales to the target population.
- (iii) Homogeneity- Test of Homogeneity of Variances was calculated and the results showed non significant on all the test scales showing the applicability to the target population.

The psychometric property check confirmed the applicability of all the psychological test for the population of the study; and also provided the appropriateness of parametric statistics for further analysis.

Subject-wise scores on the specific item of the scales were separately prepared and analysed to check their psychometric adequacy for measurement purposes across the samples. The psychometric adequacies of the behavioural measures were analysed by employing SPSS 23 (Statistical Package for Social Sciences). Firstly, to check the psychometric adequacy of each scale used in the target population included i) Reliability coefficients (Cronbach's Alpha) ii) Descriptive statistics consisting of Mean, SD, Skewness and Kurtosis were included for comparison of the test scores between the groups.

The first objective was to examine the overall and unique predictive role of cognitions behind Internet use (loneliness/depression, impulse control, social comfort, and distraction) in determining the severity of problematic Internet use.

Social media platforms and online forums provide the "safe" space to users in which they feel connected, understood and accepted are illustrated through case studies. For instance, research on adolescents demonstrates that they frequently use social media as a form of issuing and seeking support in communities, which gradually leads to their dependency on online communications (Bitton & Medina, 2015). Results showed that individuals who reported to be more comfortable in online socialization has higher chances of being internet addicts. Due to this dependency, people are repeatedly drawn back to online spaces to get their social needs met, which can heighten use, leading to addiction. Therefore, social comfort seeking and distraction are not just active triggers for PIU, but continue to reinforce patterns that decrease the willpower of people to restrict internet use.

Loneliness, a predictor for many other psychological issues has been identified as a potential for problematic internet use. This has been mentioned as a looping effect as problematic internet use may cause individuals to become more lonely or individuals who have already faced loneliness in their lives uses the internet more as a means of coping. The result also shows that individuals who reported higher levels of loneliness shows higher levels of internet use, thereby acting as a significant predictor. A frequent finding is that loneliness and depression are important emotional predictors of PIU and have been found in many studies to predict internet behaviours. As with loneliness also depression is a psychological state of lack of

social fulfilment and prevalence of sadness or emptiness, which people seeking other ways of emotion relief, for example use of the internet (Zhou et al., 2021). To many, the internet is a medium to connect with other people, engage in social media or get lost in activities online to trick the mind from feeling isolated and sad. While this can be a coping mechanism, however, this mechanism can become dependent and compulsive, becoming compulsive internet behaviors defining PIU.

Another important significant predictor of internet addiction is low impulse control as with all other kinds of addiction. According to Vargas et al. (2019), individuals with impulse control issues are defenceless to PIU because they are profoundly inclined to looking for a sensation and have issues with self-regulation. For instance, Meena et al. (2012) discovered that young adults having high impulsivity scores used excessive internet, that in turn had negative consequences in their life, personal, academic and social. The findings in the study shows that individuals who reported having diminished impulse control shows higher level of internet use, thereby making it a significant predictor. Research also shows that impulsive people can derive more reinforcement from very internet-oriented activities like online gaming or social media because this kind of activity gives instant feedback and gratification. As a result, they have trouble controlling impulse and reward, driving them back to the internet on repeat.

Distractibility or a fleeting attention span, refers to lapses in the ability to concentrate on a stimulus or task and sustain the requisite degree of focused attention to persevere with information processing or task attainment has also been identified and hypothesized to be a significant predictor of student's higher levels of internet use. The result of the study shows that individuals who tends to get distracted more easily and lose focus of the task at hand causes them to use the internet more than intended. The cognitive consequences of PIU are proliferation of attentional shifts and problems with sustained attention. With constant distraction through the internet, especially on social media, online games, and instant messaging, it's hard for a user to focus his offline tasks (Augner et al., 2023). A constant bombardment of online stimuli can lead to a fragmented attention span in which people lose their ability to

focus on a single thing for a long time. Research shows that those with PIU tend to say that they are less able to focus on school or work responsibilities because they're compelled to repeatedly return to online communication, notifications, or materials.

The second objective was to examine the mediating effects of the level of attention control between internet use and academic procrastination.

A mediating variable is a variable which can explain the process through which two variables are related whereas a moderating variable explains the strength and direction of the relationship between the independent variable and the dependent variable. In this objective the level of attention control was hypothesized as a significant mediator and moderator in the relationship between internet use and academic procrastination. This unique interplay of variables could further and deeper explain the relationship between internet use and academic procrastination.

The result of the regression model shows that internet addiction directly affects attention control which was pathway (path a) of the model. This means that the individuals in the studies sample reported higher levels of internet use to be a significant predictor of loss of attention control during various tasks activities. The pathway (path a) was significant. The result also shows that the pathways (path b) from attention control to academic procrastination was also significant. This means that individuals in the studied sample reported loss of attention control as a result of problematic internet use which directly affects academic procrastination. The second pathway (path b) was also significant meaning that individuals who as a result of higher levels of internet use, faces reduction in attention control and are more likely to procrastinate away from academic duties and tasks.

The regression analysis also revealed that internet addiction itself directly predicts academic procrastination (path c) meaning that even without the the effects of attention control, internet addiction still has an independent effect on academic procrastination. However, the presence of the direct effect and the indirect effect shows that there is a total effect as a whole. Internet addiction with or without the

mediator predicts academic procrastination proving the first part of the objective. As a result we can reject the null hypothesis. A sobel test further confirms this result.

The second regression model shows the pathway of internet addiction(X) to Academic Procrastination(Y) with attention control as a moderator(M). The results show that attention control significantly mediates the relationship between internet addiction and academic procrastination proving the pathway to be significant. This proves that internet addiction affects academic procrastination significantly greater with the moderating role of attention control.

The third objective was to examine the moderating role of gender and age between cognitive beliefs related to online activity and cognitive outcomes and academic procrastination.

The analysis reveals that age and gender has no moderating effect on the relationship between Diminished Impulse Control and Academic procrastination. However Diminished Impulse Control directly affects academic procrastination. However age and gender shows significance in the relationship between distraction and academic procrastination, while gender plays a significant role in mediating the relationship between Loneliness and Academic Procrastination, age does not show to be a significant moderator between the two. A similar effect was found on the relationship between online social comfort and academic procrastination where age was not significant but gender plays a significant role in moderating the relationship between Loneliness and Academic Procrastination.

The moderating role of level of internet use was significant in the relationship between diminished impulse control and academic procrastination, the mediating role of internet use was also significant in the relationship between loneliness and academic procrastination, the mediating role of internet use was also significant in the relationship between distraction and academic procrastination. However in conjunction with the previous findings the moderating pathway of internet use proves insignificant in the relationship between online social comfort and academic procrastination.

The fourth objective was to examine the mediating effects of distractibility and attention shifting between internet use and daily attention lapses. The findings of the study reveals that internet use significantly predicted distractibility (pathway a), individuals in the studied sample who reported higher levels of internet use also reported higher levels of distractibility in their daily lives and activities. The pathway was significant. The pathway b from distractibility to attention lapse also shows significant showing that distractibility significantly predicted attention lapses. Individuals in the studies sample showing distractibility as a result of high levels of internet addiction also reported frequent involuntary lapses of attention during the day. The result also shows that internet use directly affect attention lapse even without the mediator. However the mediating pathway also proved significant so as a result there was a total effect.

Limitations of the study

Although, it was designed to be the systematic and authentic research, the present study is not free from limitations.

Firstly possible limitation of the study is that since self-report questionnaire were used, participant's moral and social desirability could have influenced their reporting.

Secondly, the limitation of sociodemographic variables limits the findings of the study.

Another possible limitation of the study is that the study was conducted only on 5 colleges affiliated to Mizoram University students, which raise some methodological issues concerning the external validity of the findings for the general population.

The narrow demographic focus of studies into PIU limits the generalizability of findings, given that PIU may look differently socially and culturally.

The limited mediators and moderators in the study could be another limitation as integration of more variables could better explain the outcome of the study.

Suggestions for further research

For further research the inclusion of more demographic information to get valuable insights into the factors that contribute to why individuals use the internet more with Comprehensive information and its complexities should be considered.

The use of professionally administered tools rather than self-report questionnaires could influence better outcomes and insights into the complex relationship among the variables.

The study could incorporate a wider socio demographic and include more number of colleges and also university students to get a wider view of the complexities of internet use at a broader age and other variables.

A wider look into mediating and moderating variables should be considered.

Significance of the study

The present study will be the first of its kind and will highlighted the level of Internet Use and its associated problems faced by various college students studying in Aizawl, Mizoram. The area of substance addiction has been widely studied in the context of Mizoram for many years, however addiction not relating to substance is widely still untapped into. As the advancement of technology arises, the number of addictions relating to technologies and the internet has increased rapidly.

The findings of the proposed study will be the first endeavor; it will not only satisfy academic interest but it is also expected to provide theoretical basis for suggesting the prevention, and intervention of negative impact of internet use among the target population.

This study also proved the use of Internet Addiction Test by Young to be a reliable indicator and a diagnostic tool for people with internet related issues in Mizoram.

The findings will contribute better insights to mental health professionals into the treatment of internet addiction and its related interplay of psychological variables in clinical settings.

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