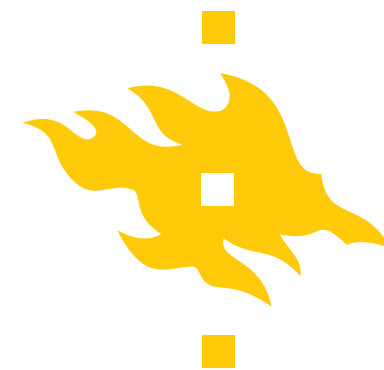


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HELSINGFORS UNIVERSITET  
UNIVERSITY OF HELSINKI



Amandeep Dhir

# On the Nature of Internet Addiction

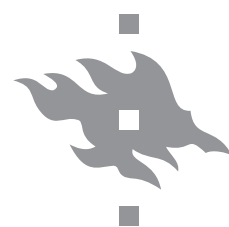
What is it and how is it measured?



Amandeep Dhir: On the Nature of Internet Addiction: What is it and how is it measured ?

371

RESEARCH  
REPORT  
371



HELSINGIN YLIOPISTO  
HELSINGFORS UNIVERSITET  
UNIVERSITY OF HELSINKI

Publisher  
Department of Teacher Education  
Faculty of Behavioural Sciences  
P.O. Box 9  
FI-00014 University of Helsinki

ISBN 978-951-51-1119-7 (print)  
ISBN 978-951-51-1120-3 (pdf)  
ISSN 1799-2508 (e-Thesis)

Picaset Oy  
Helsinki 2015

<http://ethesis.helsinki.fi>

University of Helsinki,  
Faculty of Behavioural Science,  
Department of Teacher Education,  
Research Report 371

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## **ON THE NATURE OF INTERNET ADDICTION**

What is it and how is it measured?

ACADEMIC DISSERTATION

Academic dissertation to be publicly discussed, by due permission of the  
Faculty of Behavioural Sciences at the University of Helsinki  
in the Main Building Hall 5 (Fabianinkatu 33)  
on the 12<sup>th</sup> of June, 2015 at 12 o'clock.

Helsinki 2015



University of Helsinki,  
Faculty of Behavioural Science,  
Department of Teacher Education,  
Research Report 371

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## **ON THE NATURE OF INTERNET ADDICTION**

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Helsinki 2015

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Amandeep Dhir (concept), Shilpi Agrawal (design)

ISBN 978-951-51-1119-7 (pbk.)

ISBN 978-951-51-1120-3 (pdf)

ISSN 1799-2508 (e-Thesis)

Picaset Oy

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**Amandeep Dhir**

**ON THE NATURE OF INTERNET ADDICTION**

**What is it and how is it measured?**

**Abstract**

The purpose of this dissertation is to increase understanding of the nature of Internet Addiction (IA) among adolescents (aged 12 to 18 years), focusing on what IA is and how it is measured. Particular emphasis is given to the measurement of IA, and different variables are considered in order to deepen understanding of its various aspects. Accordingly, five studies have been conducted. Study I examines various Internet uses and gratifications (U&G) among adolescent Internet users by developing a valid and reliable 27-item Internet gratification scale (N = 1,914); Study II investigates the role of adolescents' demographic, technology accessibility, unwillingness to communicate attributes, and sought Internet U&Gs in predicting their tendency to experience IA (N = 1,914); Study III examines the effect of adolescent Internet users' background characteristics (e.g., demographics, technology accessibility, unwillingness to communicate attributes) on predicting different Internet U&Gs and heavy Internet use among adolescents (N = 1,914); Study IV investigates the psychometric properties of the Compulsive Internet Use Scale (CIUS), and the relationship between the CIUS and adolescent Internet users' background characteristics (e.g., demographics, ICT accessibility and Problematic ICT use) (N = 2,369); and Study V focuses on the development and validation of WhatsApp (WA) addiction scales for adolescents (N = 405).

Cross-sectional research and psychometric theory based analysis reveal the following findings. First, a valid and reliable Internet U&G instrument (27-item) addresses six dimensions of Internet U&G, namely information seeking, exposure, connecting, coordination, social influence, and entertainment (Study I). Second, the following are risk factors for adolescent IA: being male, lower academic performance, high daily time spent on Internet use, strict Internet parenting at home, higher approach avoidance and reward seeking, looking for more connecting, coordination and social influence seeking, and pursuing lower information seeking and exposure gratifications (Study II). Third, older females, adolescents with higher academic performance, higher reward seeking and lower daily Internet use content gratifications such as information seeking & exposure; male, adolescents seeking higher approach avoidance and reward seeking tend to seek higher social gratifications such as connecting & coordination; and higher approach avoidance and reward seeking tendencies predicted process gratifications such as social influence & entertainment (Study III). Fourth, the CIUS possesses good psychometric properties with fairly high reliability, homogeneity and validity. Male, older adolescents, those with lower academic performance, lower life satisfaction, active Internet use (including

daily Internet use, excessive Internet use and overall Internet activity) and problematic Internet use significantly predicted compulsive Internet use among adolescents. The study confirmed the findings of Study II (Study IV). Fifth, three original IA scales were adjusted to assess WhatsApp (WA) addiction among adolescents. The data showed that they were valid and reliable self-reporting instruments. In addition, a shorter version of each of the three adapted instruments and a 16-item unified scale were also developed and validated. All five studies (Studies I, II, III, IV, V) examined various perspectives on the conceptualization of IA with a strong focus on the measurement and development of valid and reliable instruments to measure IA.

To conclude, the results indicate that not all adolescents equally experience IA; rather, some are more vulnerable than others. The studies have clarified situations, attributes or behaviors that lead to IA among adolescents. Moreover, new Internet U&Gs have been identified to help to conceptualize IA. In addition, the developed and validated instruments (27-item Internet U&G, 14-item CIUS, 14-item WA addiction test, 8-item and 10-item compulsive WA use) will serve as handy tools for teachers, educational psychologists, and counsellors. By utilizing these instruments, one can easily screen compulsive Internet users from a normal population and provide vulnerable students with timely help and support. The present study confirms the findings of earlier IA literature available in the context of Internet users from a wider age group, and different cultural and demographic settings. The current studies are important, especially because the target user group is adolescent Internet users (aged 12 to 18 years) who have been overlooked in IA and Internet U&G literature. These findings also emphasize the importance of recognizing IA as a problem among adolescents, which many adolescents unknowingly are or become vulnerable to be in daily life settings. The findings are valuable in terms of education and research.

**Keywords:** adolescents, compulsive Internet use, cross-sectional research, Internet addiction, psychometrics, measurement, scale development and validation

**Amandeep Dhir**  
**Internet-riippuvuus teini-ikäisillä**  
**Mitä se on ja miten sitä voi mitata**

**Abstrakti**

Tämän tutkimuksen tarkoituksena oli lisätä ymmärrystä siitä, mitä on Internet-riippuvuus (Internet Addiction, IA) 12 -18 -vuotiailla nuorilla. Keskiössä oli käsitteen määrittely sekä IA-ilmiön mittaaminen. Erilaisia kriteerimuuttujia käytettiin myös, jotta ilmiötä voitaisiin ymmärtää erilaisista näkökulmista. Osatutkimuksessa I tarkasteltiin teini-ikäisten Internetin käyttöä ja siihen liittyvää mielihyvää (U&G) kehittämällä validi ja luotettava 27 kysymyksen 'Internet gratification scale' (N = 1 914). Osatutkimuksessa II tutkittiin nuorten demografisten tietojen, teknologian saatavuuden, kommunikaatiohalukkuuden sekä käytön ja siihen liittyvän mielihyvän ennustearvoa Internet-riippuvuuden kokemisen suhteen (N = 1914). Osatutkimuksessa III tutkittiin teini-ikäisten Internetin käyttäjien taustamuuttujien ennustearvoa (mm. demografiset tiedot, teknologian saatavuus, haluttomuus kommunikoida) suhteessa käyttöön, mielihyvään (U&G) and intensiiviseen Internetin käyttöön teini-ikäisillä (N = 1914). Osatutkimuksessa IV tarkasteltiin mittarin 'Compulsive Internet Use Scale' (CIUS) psykometrisiä ominaisuuksia sekä CIUSin yhteyttä teini-ikäisten Internetin käyttäjien taustamuuttujiin, teknologian saatavuuteen ja ongelmalliseen teknologian käyttöön (N = 2369). Osatutkimus V keskittyi 'WhatsApp (WA) addiction scales for adolescents' -mittarin kehittämiseen ja validointiin (N = 405).

Analyysit perustuivat poikkileikkausasetelmaan ja psykometriseen teoriaan. Tulokset olivat seuraavat: Ensinnäkin havaittiin, että validi and reliaabeli Internet U&G instrument käsitti kuusi Internetin käytön ja mielihyvän ulottuvuutta: informaation hakeminen, altistuminen, yhteydenpito, koordinointi, sosiaalinen vaikuttaminen ja viihde (Osatutkimus I). Toiseksi nuorten Internet-riippuvuutta ennustivat merkittävästi seuraavat muuttujat: sukupuoli (pojat), heikompi akateeminen suoriutuminen Internetissä käytetyn ajan määrä, tiukka Internetin valvonta koton, korkea välttämiskäyttäytyminen, alhainen palkitsemishakuisuus, runsas yhteyden hakeminen muihin, koordinoivan toiminnan ja sosiaalisen vaikuttamisen tarve, vähäisempi informaation hakeminen sekä altistuminen Internetin tuottamalle mielihyvälle (Osatutkimus II). Kolmanneksi ikä, sukupuoli (tytöt), koulussa hyvin menestyminen, korkea palkitsemishakuisuus sekä vähäisempi Internetin päivittäinen käyttö ennustivat sisällöllistä mielihyvää kuten tiedon hakua ja tiedolle altistumista. Sen sijaan sukupuoli (pojat), korkeampi välttämiskäyttäytyminen ja alhaisempi palkitsemishakuisuus olivat yhteydessä sosiaalisen mielihyvän hakuun (kuten yhteydenpito ja



koordinointi). Korkeampi välttämiskäyttäytyminen ja palkitsemishakuisuus ennustivat prosessiin kohdistuvaa mielihyvää kuten sosiaalista vaikuttamista ja viihdekäyttöä (Osatutkimus III). Neljänneksi CIUSin psykometriset ominaisuudet olivat hyvät ja reliabiliteetti vähintään kohtalainen, samoin kuin validiteetti ja homogeenisuus. Pojat, vanhemmat teini-ikäiset, akateemisesti heikommin suoriutuvat, elämäänsä vähemmän tyytyväiset, aktiiviset internetin käyttäjät sekä Internetin käytön ongelmalliseksi kokevat ilmaisivat useammin myös pakonomaista Internetin käyttöä (Osatutkimus IV). Tämä tutkimus myös vahvisti toisen osatutkimuksen tulokset. Osatutkimuksessa V kolme alkuperäistä pakonomaisen Internetin käyttöä koskevaa skaalaa (summamuuttujaa) muokattiin mittaamaan WhatsApp-riippuvuutta (WA) nuorilla. Tämä osoittautui reliabeliksi itsearvioinnin mittariksi. Lisäksi kehitettiin ja validoitiin 16 kysymystä käsittävä lyhyempi versio jokaisesta kolmesta instrumentista. Kaikki viisi osatutkimusta (I, II, III, IV, V) tarkastelivat eri näkökulmia Internet-riippuvuuteen ja auttoivat käsitteellistämään sitä. Tutkimuksissa painottui vahvasti Internet-riippuvuutta koskevien luotettavien mittareiden kehittäminen sekä tämän ilmiön mittaaminen.

Johtopäätöksenä voidaan todeta että kaikki nuoret eivät altistu Internet-riippuvuudelle samalla tavalla, vaan jotkut ovat sille muita alttiimpia. Nämä tutkimukset selvensivät tilanteita, piirteitä ja käyttäytymismalleja jotka voivat johtaa Internet-riippuvuuteen teini-ikässä. Lisäksi uusia Internetin käyttöön ja se tuottamaan mielihyvään liittyviä tekijöitä tuli esille ja ilmiötä voidaan nyt paremmin käsitteellistää. Lisäksi tutkimuksessa kehitetyt ja validoidut mittarit (27-kysymyksen Internet U&G, 14 kysymyksen CIUS, 14 kysymyksen WA addiction test, 8 kysymyksen ja 10 kysymyksen pakonomaisen Whatappin käyttämisen mittarit) voivat toimia kätevinä työvälineinä opettajille, koulupsykologeille ja opinto-ohjaajille. Näiden mittareiden avulla saadaan helposti selville, onko Internetin käyttö pakonomaista ja poikkeako se normaalista populaatiosta. Tällä tavalla on mahdollistaa auttaa Internet-addiktiolle mahdollisesti altistuvia oppilaita.

Tämä tutkimus vahvisti aikaisempia Internet-riippuvuuteen liittyviä tutkimuksia ja auttoi yleistämään niitä laajempiin ikäryhmiin sekä uusiin kulttuureihin ja konteksteihin. Tutkimus on tärkeä, koska kohderyhmä on sellainen, jota ei aiemmin juuri ole tutkittu. Tulokset myös painottavat Internet-riippuvuuden toteamista ja tunnistamista. Kyseessä on potentiaalinen ongelma, jolle lukuisat nuoret voivat altistua jokapäiväisessä elämässään. On myös huomattava, että suurin osa nuorista kokee mielihyvää Internetin käytöstä, mutta ei osoita addiktion oireita.

**Avainsanat:** teini-ikä, nuoret, pakonomainen Internetin käyttö, poikkileikkaustutkimus, Internet-addiktio, psykometriikka, mittaus, kyselytutkimus, mittarin kehittäminen, validiteetti, reliabiliteetti

## ACKNOWLEDGEMENTS

The past three and half years of research and studies have finally concluded in the form of this PhD thesis. Despite the fact that the entire duration of my PhD studies was quite laborious and demanding, I have fully enjoyed every bit of this phase of my life. During this long path, I have experienced many important lessons about research, my own expertise, and the meaning of science in general. Many people, within and outside Finland, have provided invaluable help and support of the work presented in this thesis. I would like to express my gratitude, respect, and sincere thanks to a number of people who have supported me and my work and this laborious research process in the form of guidance, peer support, training, supervision, reviewing, and also participating.

I would like to express my deepest gratitude to my three supervisors, Professor Kirsti Lonka, Professor Sufen Chen, and Professor Marko Nieminen. I was fortunate to work with three well-known experts from three different disciplines (educational psychology, teacher education, and human-computer interaction). They inspired me to prepare this multidisciplinary piece of research. I am thankful to Professor Kirsti Lonka for allowing me to complete this PhD thesis, and also attend the research seminars in the Educational Psychology research group. I am also grateful to Kirsti for her inspiring discussions and valuable contributions to various methodological issues concerning this work. Despite her tight schedule, Kirsti has always helped, encouraged, and supported me during this research process through her timely advice. I am grateful to Sufen Chen for hosting me in the Graduate Institute of Digital Learning and Education, National Taiwan University of Science and Technology (NTUST), Taiwan, during August-November 2013, and teaching me numerous things related to data analysis, study design, data collection, and academic writing. Sufen was always there to help me, especially during the stressful period of this thesis work. Thank you for always inspiring and motivating me throughout this journey. I am indebted to Marko Nieminen for hiring me as a project researcher at the School of Science, Department of Computer Science and Engineering, Aalto University, Finland, where the major part of this PhD thesis work was carried out. Marko has given me an upper hand in making various decisions related to study design, data collection, analysis, and finalizing publication of the study results. Marko has always supported me by believing in me and supporting me through all means. I am really thankful for his warmest support during this research process. I feel deeply honored to have two expert pre-examiners on board, Professor Li-Jen Weng, and Professor Tasuku Igarashi for their willingness to review my thesis. I also appreciate their excellent feedback and valuable comments, which were essential for finalizing this work.

I would like to thank the Academy of Finland for providing me with generous financial support in the form of a Researchers' Mobility Grant. Researchers' mobility grants to Taiwan 2013 (Decision No. 265969), South Africa 2014 (Decision No. 277571), and Mind the Gap (Project Number 1265528), supported me to visit overseas research groups in Taiwan (Taipei), South Africa (Cape Town, Pretoria & Vanderbijlpark), and Japan (Tokyo). My visits to three leading South African universities were also supported by a generous travel grant received from Teknillisen Korkeakoulun Tukisäätiö, Aalto University, Finland. During these research visits, I got the chance to learn new statistical methods of data analysis, new topics of research in educational psychology, and many other interesting opportunities. I also got the chance to meet many other inter-disciplinary researchers with whom I had long academic discussions, which also enabled me to refine and improve my own research work and related process. A major part of this PhD thesis research was supported by research projects carried out at the Strategic Usability Research Group (STRATUS) under the supervision of Marko Nieminen. I acknowledge support received from the Finnish Funding Agency for Technology and Innovation (TEKES) funded research project Mobile Financial Services (MoFS; Project No 211440) and Data to Intelligence (D2I; Project No 21143201). Additionally, I acknowledge the support received from the Future Industrial Services (FutIS) research program (Project No 2113194), managed by the Finnish Metals and Engineering Competence Cluster (FIMECC), and funded by the TEKES, research institutes, and companies.

The role of the both the schools and students that participated in this research must be applauded. I am indebted to all those schools, which provided me with the necessary infrastructure, e.g. classrooms and teachers for observation and administration of the survey answering sessions. Without their approval and participation, this piece of research would never have been completed. Thank you so much for your collaboration, support, and participation.

My colleagues and friends from inside and outside Finland also deserve thanks for their social as well as academic support during this long process. First, I would like to thank my wonderful colleagues from Aalto University, namely Jukka Borgman, Katrine Mahlamäki, Juhi Somani, Pardip Rathi, Aqdas Malik, Kaitai Liang, Mika Nieminen, Petri Mannonen, Naveen Chenna, Kimmo Karhu, and Junying Zhong. Special thanks to Olli Hallamaa and Kari Perenius for their support during the administration and preparation of this thesis document. I would like to thank the truly enthusiastic colleagues that I met during my research visits to Taiwan, South Africa and Japan, namely Pei-Shan Hsieh, Han-Yu Sung, Yoshifumi Nin, Karin Miyamoto, Norito Kawakami, Akihito Shimazu, Tatsuo Nakajima, Helene Gelderblom, and Nobert Jere for their support, care and friendship. I am really thankful to Professor Chin-Chung Tsai and Professor Gwo-Jen

Hwang from NTUST, Taiwan, who introduced me to Professor Sufen Chen, and made every effort to make my stay in Taiwan comfortable and enjoyable. I would also like to thank our family friends Sheetal, Ashu & Tony Patpatia, Kamal and Mukhtar Singh Chandi for their social and emotional support during this phase of my life.

Finally, I would like to express my deep gratitude and words of respect to my family for their support, love, and care provided throughout this time. I warmly acknowledge the love and care received from my parents, my brother and my sisters. I would like to thank my sister, Rakhi Juneja for her support and help during this time. Most importantly of all, I want to knowledge the moral, social and emotional support provided by my wife, Puneet Kaur. I am lucky to have Puneet beside me, who stood with me during the happy, sad, joyous, and angstful phases of this thesis work. Puneet has also encouraged me to “do more” and “do best” while I was cruising through my PhD journey. Many thanks to my extended family, especially my mother-in-law and father-in-law for believing in me and providing the required support. Special thanks go to an important member of the family, Mobis (our three and half year old dog) who was coincidentally born at the same time that I started this PhD research journey in January of 2012. Mobis is truly a “stress buster” who was always happy and cheerful to join me while I was busy preparing manuscripts, writing thesis chapters, performing data analysis, and doing several “minute” yet important aspects of my PhD research. I dedicate this dissertation to my wife, Puneet and my best friend, Mobis. I cannot imagine my PhD journey without the two of you.

Yushima, Bunkyo-ku, Tokyo

Amandeep Dhir

April 2015



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# LIST OF ORIGINAL PUBLICATIONS

This dissertation is based on the following five original publications, which are referred to in the text by their Roman numerals (Studies I–V):

**Study I.** Dhir, A., Chen, S. & Nieminen, M. (2015). Development and Validation of the Internet Gratification Scale for Adolescents (*Currently in review*)

**Study II.** Dhir, A., Chen, S. & Nieminen, M. (2015). Predicting adolescent Internet addiction: The roles of demographics, technology accessibility, unwillingness to communicate and sought Internet gratifications. *Computers in Human Behavior*, 51, 24-33.  
doi:10.1016/j.chb.2015.04.056

**Study III.** Dhir, A., Chen, S. & Nieminen, M. (2015). The Effects of Demographics, Technology Accessibility, and Unwillingness to Communicate in Predicting Internet Gratifications and Heavy Internet Use Among Adolescents. *Social Science Computer Review* (in press), 1-20.  
doi:10.1177/0894439315582854

**Study IV.** Dhir, A., Chen, S. & Nieminen, M. (2015). Psychometric Validation of the Compulsive Internet Use Scale: Relationship with Adolescents' Demographics, ICT Accessibility, and Problematic ICT Use. *Social Science Computer Review*. (in press), 1-18.  
doi:10.1177/0894439315582854

**Study V.** Dhir, A., Chen, S. & Nieminen, M. (2015). Development and Validation of WhatsApp Addiction Scales with Adolescents (*currently in review*)

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# ABBREVIATIONS

ADHD	Adult Attention Deficit Hyperactivity Disorder
BFAS	Bergen Facebook Addiction Scale
BBM	BlackBerry Messenger
CBSE	Central Board of Secondary Education
CSP	Change in School Performance
CCI	Child-Computer Interaction (CCI)
CIUS	Compulsive Internet Use Scale
CIU	Compulsive Internet Use
CFA	Confirmatory Factor Analysis
DSM	Diagnostic and Statistical Manual of Mental Disorders
EFA	Exploratory Factor Analysis
FIS	Facebook Intrusion Scale
FAS	Facebook Addiction Scale
IM	Instant Messaging
IRB	Institutional Review Board
ICSE	Indian Certificate of Secondary Education
ICT	Information and Communication Technologies
IA	Internet Addiction
IAT	Internet Addiction Test
KMO	Kaiser-Meyer-Olkin
ML	Maximization Likelihood (ML)
MAP	Minimum Average Partial
PA	Parallel Analysis
PSEB	Punjab School Education Board
ROC	Receiver-Operating Characteristic
UCS	Unwillingness to Communicate scale
UCS-AA	Unwillingness to Communicate scale - Approach Avoidance
UCS-R	Unwillingness to Communicate scale - Reward Seeking
U&G	Uses and Gratifications
WA	WhatsApp

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# 1 INTRODUCTION

The aim of this thesis work is to enhance the understanding of the nature and conceptualization of Internet addiction (IA) by increasing understanding of its relationship with adolescents' background characteristics and sought gratifications from Internet use. The heart of the work lies in the development of instruments for the assessment of IA and sought Internet gratifications. In order to easily grasp the underlying theoretical framework of this thesis, readers may imagine a scenario where "IA" is represented as "lenses". When adolescents wear these "lenses", then they start experiencing changes in their behaviours and in the activities they perform in their day-to-day routine due to IA. These "lenses" will be utilized throughout this thesis as a starting point to easily explain the conceptualization and nature of IA and its relationship with the other variables of this thesis. The focus of this thesis is to evaluate missing linkages between IA, Internet gratifications, adolescents' demographics, technology accessibility, personality attributes, and problematic technology use. Some Internet users are more vulnerable than others to experiencing IA. Therefore, the present study examines the underlying differences between Internet addicts and non-addicts, and between heavy and light Internet users. The theoretical framework of Uses and Gratifications (U&G) theory was utilized to examine the various gratifications underlying Internet use. Popular IA assessment instruments, including the Internet addiction test (IAT) and the Compulsive Internet Use Scale (CIUS), were utilized to measure IA. A variety of other variables addressing adolescent users' background characteristics were also utilized. The research methodology consists of cross-sectional data and robust data analyses. Prior literature on this research theme has urged the need to clarify the concept of IA through initiatives including examining the relationships among IA, specific Internet activities and an exhaustive set of variables, and developing new or validating existing assessment IA instruments. The theoretical framework developed in this thesis is used as a guiding source for making sense of the relationships shared between IA, Internet U&Gs, and Internet users' background characteristics. In the following, I open the introduction section of this thesis by explaining in sequence the important concepts of the developed theoretical framework.

## **1.1 WHAT IS INTERNET ADDICTION?**

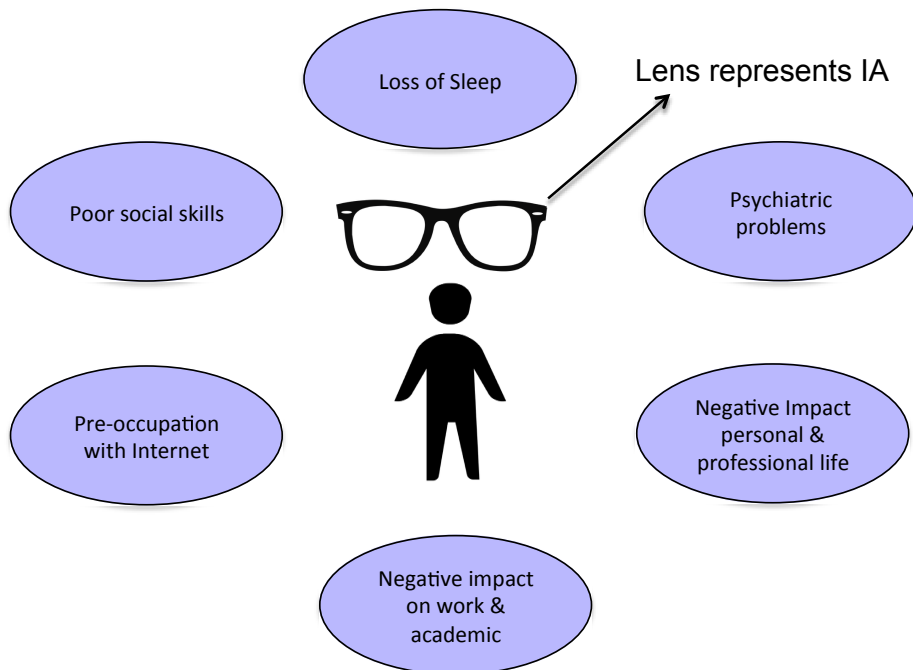
The use of the Internet has become part and parcel of our daily lives. It has influenced the way we manage our daily routines, including: connecting and communicating with friends and family, searching for online content, seeking entertainment, shopping, processing information, and carrying out work-related activities (Khazaal et al., 2011). Some of the prominent positive changes brought by Internet use are the promotion of psychological wellbeing (Chen, Boase, & Wellman, 2002; Kang, 2007), the expansion of social networks (Hampton & Wellman, 2003; Katz & Aspden, 1997), and the betterment of living conditions (Bauer, Gai, Kim, Muth, & Wildman, 2002). Despite the fact that the Internet has brought several positive changes to our lives, the negative implications of Internet use cannot be ignored (see Figure 1).

Prior literature suggests that uncontrollable and excessive Internet usage can result in various mental well-being related problems, e.g. loss of sleep, poor social skills, and preoccupation with the Internet (Griffiths & Wood, 2000; Liu & Potenza, 2007; Young, 1996; Young & Case, 2004), negative impact on work, academic performance, personal and professional life (Krajewska-Kulak et al., 2011; Young, 1999), psychiatric problems (Yen et al., 2008), depression and social phobias (Yen, Ko, Yen, Wu, & Yang, 2007), and substance misuse (Batthyany, Muller, Benker, & Wolfling, 2009).

Despite the fact that research on IA is as old as the Internet itself, there is not yet a consensus on the definition of IA. Furthermore, there has been no agreement on the appropriate terminology to describe the condition of IA (Kim & Haridakis, 2009). Due to this missing definition, it has become difficult to predict or even judge if any psychopathological state is associated with this phenomenon (Shaffer, 2004). To date, IA researchers have coined various terminologies to describe this phenomenon, including Internet dependence (Lu, 2008), Internet addiction (Ghassemzadeh, Shahraray, & Moradi, 2008; Young, 1998), compulsive Internet use (Greenfield, 1999; Meerkerk, Van Den Eijnden, Vermulst, & Garretsen, 2009), problematic Internet use (Caplan, 2002), and pathological Internet use (Davis, 2001). Clarification of the exact boundary between these interrelated concepts is currently missing (Kim & Haridakis, 2009). For consistency reasons, I have utilized the terms Internet addiction (IA) and compulsive Internet use (CIU) interchangeably in this thesis to describe the pathological state associated with Internet abuse and overuse. Here, IA or CIU is defined as a pathological state in which an Internet user tends to spend more time on Internet use than originally intended, despite knowing the obvious consequences (Young, 1996).

The initial conceptualization of IA has progressed in several directions because several empirical studies have been conducted in different contexts (Pontes, Kuss & Griffiths, 2015). Furthermore, due to this ongoing development, behavioral addictions are now officially recognized in

Diagnostic and Statistical Manual of Mental Disorders 5th edition (DSM-5) (American psychiatric association, 2013). Internet addiction has been recognized as a technological addiction (Griffiths, 1996; Griffiths, 1998; Griffiths, 1995), which is non-chemical (behavioral) in nature, and occurs due to excessive human-machine interaction (Griffiths, 1995). Internet addiction is also type of technological addiction, which is subset of behavioral addiction. In addition, IA has six core components, which are theoretically and empirically related to behavioral addiction (Pontes et al., 2015). These components are (i) salience, (ii) tolerance, (iii) mood modification, (iv) withdrawal, (v) tolerance, (vi) relapse, and (v) conflict (Griffiths, 2005; Marks, 1990).



**Figure 1** Symptoms of Internet addiction<sup>12</sup>

### 1.1.1 ASSESSMENT OF INTERNET ADDICTION

For more than a decade now, several instruments for the assessment of IA have been developed. These instruments enable researchers and practitioners to quickly assess IA among a target population of Internet users. Relatively recent IA research has stressed the need to develop verified, valid and reliable IA assessment instruments by examining their psychometric properties (Chang & Law, 2008; Wartberg, Petersen, Kammerl,

<sup>1</sup> Adolescent icon created by Ludovic Riffault <https://thenounproject.com/term/child/61254/>

<sup>2</sup> Lens icon created by Okan Benn <https://thenounproject.com/term/glasses/1486/>

Rosenkranz, & Thomasius, 2014). In the most recent literature review of existing IA assessment instruments, Laconi, Rodgers, & Chabrol (2014) examined 45 different instruments. The review concluded with three important observations. Firstly, most previously developed IA instruments have rarely been used, and have not received adequate attention from IA researchers regarding psychometric validations, thus lack sufficiently reliable psychometric properties. Laconi et al. (2014) recommended that IA researchers investigate the psychometric properties of existing assessment instruments with different user groups, cultures, and populations, instead of continuing to develop new assessment instruments. This would also enable IA research to move towards developing a 'gold standard' for IA assessment (Beard, 2005; Huang, Wang, Qian, Zhong, & Tao, 2007; Jia & Jia, 2009; Wallace & Masiak, 2011). Secondly, despite the fact that the number of IA assessment instruments is growing, there is still no consensus on a unified process of assessment, e.g. different researchers adopt different techniques to confirm psychometric properties. Therefore, there is a need to establish a unified process of performing psychometric validations of IA instruments, so that findings of different instruments can be compared and synthesized. Finally, the majority of the earlier studies have utilized small sample sizes (Guertler et al., 2014; Huang et al., 2007). There is a need to examine the psychometric properties of IA instruments using large samples and diverse user groups (Byun et al., 2009; Huang et al., 2007; Pezoa-Jares, Espinoza-Luna, & Vasquez-Medina, 2012).

Among the different available IA assessment instruments, two have received the most attention from IA researchers and practitioners in terms of psychometric validations: Kimberly Young's IAT (Young, 1998) and the CIUS (Meerkerk et al., 2009). In the present thesis, the IAT and CIUS are considered the most suitable instruments for IA assessment. This is because empirical findings on IAT and CIUS from the available literature can be utilized to cross-examine the validity and reliability of the present study findings with regard to these IA assessment instruments.

### **1.1.2 INTERNET ADDICT VERSUS NON-ADDICT**

IA researchers and practitioners have defined cut-off scores for the dichotomization of Internet addicts and non-addicts. A cut-off score is defined as a threshold limit for an IA assessment instrument, beyond which an Internet user is classified as an Internet addict, i.e. someone who is experiencing a psychopathological state due to Internet overuse and abuse. Prior IA literature has shown that based on the cut-off score dichotomization, Internet addict and non-addict cohorts have shown significant differences in their sought Internet U&Gs, and their background characteristics (Chou & Hsiao, 2000; Leung, 2003; Yang & Tung, 2007). Some of the prominent findings were: non-addicts mainly use the Internet to gather information (Leung, 2003), Internet addicts experience difficult family relationships due

to excessive Internet use (Yang & Tung, 2007), and they spend more time on Internet use (Yang & Tung, 2007) and in chat rooms (Leung, 2003). However, addicts are not different from non-addicts with respect to their socio-economic status or education (Leung, 2003). On the issue of determining a cut-off score for classifying Internet addicts and non-addicts, two recommendations are available in the prior IA literature. First, a behavior or symptom that occurs more than “sometimes” is considered as a compulsive behavior, e.g. a score of “three” on a five-point Likert scale is referred to as CIU (Meerkerk et al., 2009). Second, a cut-off of 70 or above out of 100 classifies an Internet addict (Young, 1998). However, it should be noted that both of these classification criteria are arbitrary and do not have any strong statistical justifications. In addition, prior IA literature has suggested that differences in background characteristics and Internet U&Gs between Internet addicts and non-addicts have been poorly examined.

### **1.1.3 HEAVY VERSUS LIGHT INTERNET USERS**

Just before the beginning of the new millennium, debate on the classification of heavy and light Internet users started in the field of Internet research. In simple terms, users who utilize the Internet for long durations are referred to as heavy Internet users. The Internet offers an attractive and absorbing psychological space, due to which, users may resort to heavy use (Wallace, 1999). Furthermore, various Internet gratifications including showing encouragement, connecting, affection, socialization, and escapism lead to heavy use (Leung, 2003). Heavy Internet users are conceptualized as “innovators” due to their active participation in the online offerings of different Internet-based services in terms of the time spent on their use (Stafford, 2003). Therefore, heavy Internet users are considered “loyal customers” of various Internet-based offerings (Stafford, 2003). In comparison, “light Internet users” are referred to as “non-innovators,” since their mode of participation in Internet-based services is mostly passive. Companies are interested in heavy Internet users because they are considered early adopters of emerging market solutions; they can provide feedback on service offerings and possibly also help with improvement and further development of Internet services. Prior literature has shown that heavy and light Internet users are significantly different in terms of their sought Internet U&Gs (Stafford & Gonier, 2004; Korgaonkar & Wolin, 1999). Ko (2000) found that heavy users have more positive attitudes and are motivated, are more involved in the content of the websites, and access informational content more than light users. Similarly, Roy, (2009) found that heavy Internet users are more user-friendly, and seek career opportunities or exposure gratifications more than light users. Despite the fact that research examining heavy and light Internet users is over a decade old, there is still limited understanding of the difference between heavy and light users and which factors lead to heavy Internet use.



## 1.2 WHAT ARE INTERNET GRATIFICATIONS?

The widespread growing popularity of Internet use has motivated media researchers and practitioners to understand potential motivations or gratifications behind Internet use. Internet use has become an important part of our daily routines, and Internet users are now spending a great deal of time on the Internet every day. This has led to a series of empirical investigations into why people use the Internet. What kinds of needs or gratifications are behind Internet use (Diddi & LaRose, 2006; Kim & Haridakis, 2009; Roy, 2009)? The majority of such investigations are carried out based on the U&G theory (Kim & Haridakis, 2009; Leung, 2004; Leung, 2014; Song, Larose, Eastin, & Lin, 2004). The U&G theory is a well-known theoretical framework utilized in the media and communication discipline, which offers a psychological communication perspective on media use. The U&G theory examines an individual's attitude towards a given medium and its content (Fagerlind & Kihlman, 2000), and the various reasons and motives behind media use (Roy, 2009), while also helping with the identification of different positive and negative implications of individuals' media use (Lin, 1999). The U&G theory has been utilized in the past to understand the gratifications of the use of a variety of media including Instant Messaging (IM) apps (Lo & Leung, 2009), the Internet (Korgaonkar & Wolin, 1999; Leung, 2009; Papacharissi & Rubin, 2000; Stafford, Stafford, & Schkade, 2004), social networking sites (Park, Kerk, & Valenzuela, 2009), television (Rubin, 1983), text messaging (Thurlow, 2002), and web-blogs (Shao, 2009).

According to the U&G theory, users have different uses and gratifications from media use and, due to this, different users utilize a given media platform for different reasons (Severin & Taknard, 1997). Furthermore, the psychological needs of users actually influence their motivation and decisions behind using a given media platform (Rubin, 1983). Similarly, individuals have their own social and psychological needs for media use, e.g. information seeking, exposure, connecting, coordination, and so on (Dimmick, Sikand, & Patterson, 1994; Lin, 1999; Rubin, 1983). According to the earlier literature on motivation, individuals' psychological needs are often emotional and cognitive in nature (Maslow, 1970), in contrast, the gratifications of media use are goal and utility driven (Palmgreen & Rayburn, 1979). For this reason, media researchers have recommended that utility-driven media use can explain the gratifications of specific media use (Leung, 2014).

### 1.2.1 ASSESSMENT OF INTERNET GRATIFICATIONS

A review of prior Internet U&G literature has been carried out in this thesis in order to understand how different Internet U&Gs were assessed in previous studies. The review concluded with a total of 23 empirical studies that were carried out between 1998 and 2014 (see Table 1). These studies

discussed two to seven Internet U&Gs, the most common of which were entertainment, information seeking, escapism, relationship maintenance, exposure, and social reasons.

Most prior Internet U&G literature has considered a broad range of ages in the Internet user group, e.g. 16-75 years (e.g., Kaye, 1998; Leung, 2001; Johnson & Kaye, 2003; Kaye & Johnson, 2004; Stafford et al, 2004; Leung, 2009; Roy, 2009). Furthermore, the majority of the studies have been carried out with college students as the sample (e.g., Leung, 2003; Diddi & LaRose, 2006; Kim & Haridakis, 2009). However, developmental literature has found that adolescents are different from adults since they are in a developing psychosocial state with various personality and cognitive differences (Leontjev, 1978; Piaget, 1970). Thus, there is still limited understanding of the potential Internet U&Gs of adolescent Internet users (aged 12-19 years).

**Table 1** Comparison of different Internet U&G proposed by earlier Internet U&G studies

Authors & Year	Main gratifications*									Other gratifications**
	E	ES	S	SI	PT	IS	G	SOI		
Leung, 2001	X	X	X	X						AR, AF, EX
Kaye, 1998	X	X		X	X	X				CO, PR
Ko et al., 2000		X			X	X				IC, DC
Papacharissi & Rubin, 2000	X				X	X	X			CO, PR
Johnson & Kaye, 2003	X			X		X	X			EM, S, FC, P
Leung, 2003	X	X	X	X	X			X		AR, AF, EX
Cho et al., 2003			X	X			X	X		PA/K/SD/E
Johnson & Kaye, 2002	X		X	X		X	X			
Leung, 2009										PC/WE, SE, IC/DC
Diddi & LaRose, 2006	X	X	X		X					
Korgaonkar & Wolin, 1999		X		X						EM/SF, IC/DC, TSP, NTP
Kaye & Johnson, 2004	X					X	X			CO, PR, PA/K/SD/E
Stafford et al., 2004						X	X			
Grace-Farfaglia et al., 2006	X	X		X				X		EM/SF, R/CO, PC/K/SD/E
Kim & Haridakis, 2009	X	X				X				AR, AF, EX, IC, DC, R, CO
Roy, 2009					X					PC/K/SD/E/PC/WE
Leung, 2014	X				X	X	X	X		PA/K/SD/E

Note (main gratifications\*): Entertainment (E), Escape (ES), Surveillance (S), Social interaction/recreational social connection/social bonding (SI), Pass time/Relax (PT), Information seeking (IS), Guidance-learning, expressing opinions, Interpersonal utility (G) and Social identity, fame & aesthetic, status gaining/consumption use, identity experimentation (SOI).

Note (other gratifications\*\*): Affection (AF), Arousal (AR), Excitement (EX), Convenience (CO), Preference (PR), Interactive control (IC), Desired for control (DC), Economic motivation (EM), Shopping Finance (SF), Preference (P), Personal acquisition (PA), Knowledge (K), Self-

development (SD), Education (E), Respect (R) caring for others (CO), Perceived competence (PC), Wide exposure (WE), Self-efficacy (SE), Transactional security and privacy (TSP) and Non-transactional privacy (NTP)

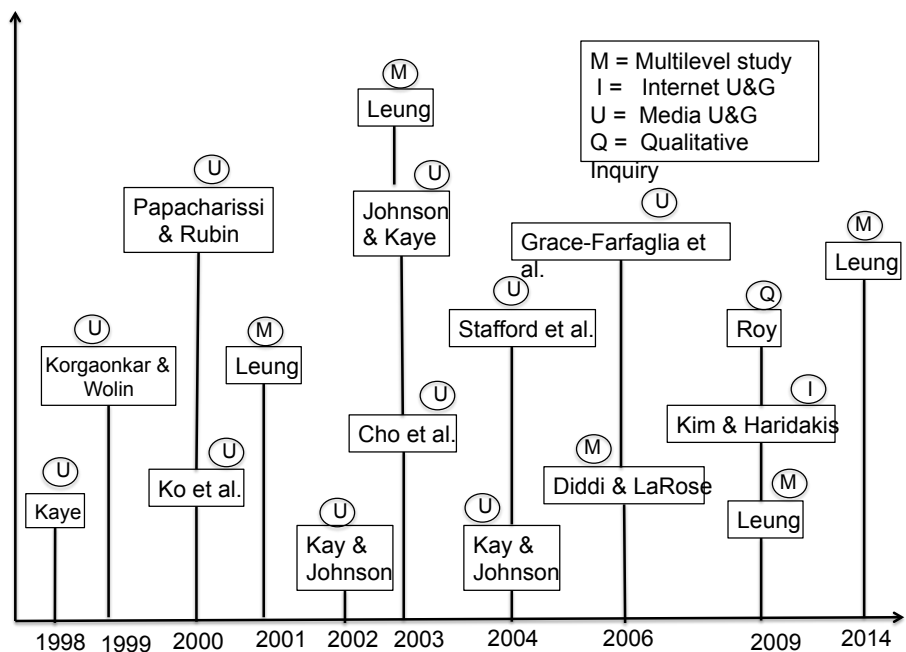
The development and utilization of gratification constructs in the prior literature can be grouped into four main categories (see Figure 2). First, constructs were developed based on a qualitative inquiry (e.g., open-ended questionnaires, focus group discussions and interviews) (Roy, 2009). Second, they were based on prior media U&G studies (e.g., Cho, Zúñiga, Rojas, & Shah, 2003; Kaye, 1998; Ko, 2000; Papacharissi & Rubin, 2000; Grace-Farfaglia, Dekkers, Sundararajan, Peters, & Park, 2006; Johnson & Kaye, 2003; Kaye & Johnson, 2002; Korgaonkar & Wolin, 1999; Kaye & Johnson, 2004; Stafford et al., 2004). Third, they utilized previously developed gratification instruments, such as the 27-item Internet motives scale (Kim & Haridakis, 2009). Fourth, construct development was based on a multi-level approach, e.g. the combination of prior U&G literature and a qualitative inquiry with target users (e.g., Diddi & LaRose, 2006; Leung, 2001; Leung, 2003; Leung, 2009; Leung, 2014).

Each of the four approaches to developing U&G constructs has merits and demerits. The third and fourth approaches are more holistic compared to the first and second in terms of capturing the possible number of gratifications among the target user groups. However, most of these existing examinations did not try to utilize a holistic Internet U&G scale to address the possible gratifications among target groups of Internet users. Furthermore, the utilized gratification constructs have unknown psychometric properties.

Despite the fact that research investigating Internet U&Gs is over two decades old, the assessment of different Internet U&Gs has not received deserved attention from the research community. Almost all existing studies have merely mirrored the gratifications provided by existing U&G literature. Possible reasons behind this approach could be: the development of new instruments or constructs based on post-hoc exploratory research is a lengthy, complex and time-consuming task, constraints in the length of the questionnaire, and participant fatigue. Due to over-reliance on prior Internet U&G literature by selectively picking only a few gratification constructs, it is quite likely that there is bias in the findings of the prior Internet U&G studies. The selective picking of gratification constructs might have omitted some important gratifications.

To the best of my knowledge, Papacharissi and Rubin's work (2000) is the only available empirical study that has tried to develop and validate an instrument to examine Internet U&Gs with known psychometric properties. A 27-item Internet motive scale was developed and later utilized in some of the subsequent literature (e.g., Yang & Tung, 2007; Kim & Haridakis, 2009). Other than this, an adapted version of the 18-item Television viewing motivation scale (Rubin, 1983) has been utilized for the examination of Internet U&Gs (e.g., Kaye, 1998; Kim & Haridakis, 2009). However, both the

27-item Internet motives scale and the 18-item Television viewing scale suffer from a major limitation. The former was developed over a decade ago, and the latter was designed three decades ago. As the Internet and Internet-based services have undergone an ongoing process of evolution since its emergence, it is likely that these instruments are not able to assess the gratifications of contemporary Internet use. Both of these instruments require revision and updating per the social, psychological, and communication needs of present day Internet users. Unfortunately, over the last decade, no attempt has been made to develop a new scale or even validate existing Internet U&G scales for examining Internet U&Gs. Regarding this issue, Song et al. (2004) criticized most of the earlier Internet U&G studies for their over-reliance on a few U&G instruments (e.g., the Television viewing scale and the Internet motives scale), due to which newer gratification constructs have not been developed or utilized. Consequently, Song et al. (2004) recommended that Internet U&G researchers depart from the existing operational and conceptual approaches to U&G theory. This is possible only if newer U&G topologies are prepared based on post-hoc exploratory factor analysis compared to a priori theoretical frameworks (Song et al., 2004).



**Figure 2** Review of prior Internet U&G literature

### 1.3 WHAT IS ADDICTION DUE TO SPECIFIC INTERNET ACTIVITIES?

Only recently have researchers suggested that IA research should focus on specific Internet-based activities that are potentially addictive, since people do not get addicted to the medium per se (i.e., the Internet), but to specific Internet-based applications or activities in which they engage in cyberspace (Guertler et al., 2014). For this reason, IA researchers must examine if any psychopathological state is associated with a particular Internet-specific activity, e.g. online chatting, IM, blogging, Facebook use, etc. To address this need, the present thesis examines whether any psychopathological state is associated with the use of WhatsApp (WA), a popular mobile IM application. Recent years have witnessed the widespread popularity of various mobile IM applications (e.g., WA, WeChat, Line, Viber, and SnapChat). Possible motivations to use IM applications include media richness, self-expression and self-presentation (Sheer, 2010), change of mood, and escape from real life problems (Wellman, 1996).

Among the various mobile IM applications, WA is the most popular, with over 600 million active users (Olson, 2014), of which 70 million are in India alone (Neeraj, 2014). WA is a cross-platform application that runs over smartphones and selected feature phones with Internet connectivity. On average, 600 million photos, 200 million voice messages, and 100 million video messages are uploaded to WA every day (Pepitone, 2014). The growing popularity of WA use can be judged from the fact that only recently, about 64 billion messages (44 billion incoming and 20 billion outgoing) were exchanged on WA in a single day (Woollaston, 2014). Any mobile phone number can be used to register as a WA user, and after successful registration, the WA user can send or receive messages to and from other WA users. WA differs from traditional IMs available for mobile phones in a variety of ways. First, it utilizes Internet connectivity to send and receive text messages, audio, videos, and photos, while traditional IMs utilize the mobile phone network to process content. Second, WA operations are based purely on Internet connectivity; therefore, WA users do not pay any usage fee, except for the normal cost of Internet data usage. In the case of traditional mobile IMs, telecom companies usually charge for each message sent (text, photo, video, or audio content), and sometimes also for incoming content, e.g. photos, videos, and audio messages. Due to this difference, it is likely that traditional mobile IM users are reluctant to resort to heavy use of traditional IMs, since the user has to bear the cost of content sharing and reception. In contrast, WA users can afford heavy WA use, since they pay only for the Internet data, which is cheaper, compared to paying per incoming and outgoing message as in the case of traditional IMs. Third, WA users can create or join WA groups to which other WA users can be added. WA groups are very popular among adolescents, and serve as a platform for mass content sharing, e.g. a WA user can broadcast any content to all other

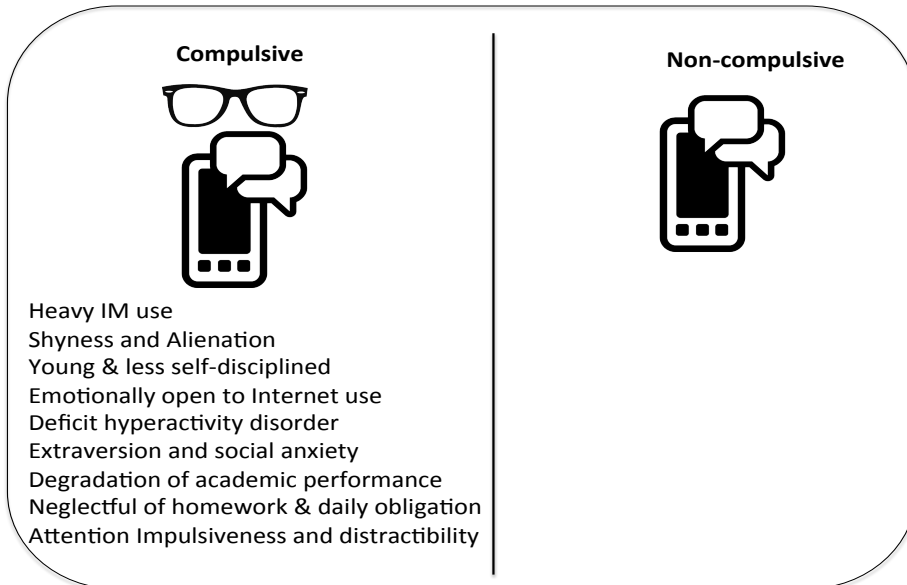
members of the same WA group. In addition, WA groups have opened new avenues to connect, share, coordinate, and seek information. It is also believed that due to participation in WA groups, the users experience peer pressure, social influence, and even want to garner social capital by sharing more and more content with others. These factors possibly drive WA users towards heavy WA use. In contrast, traditional mobile IMs do not support such features.

WhatsApp (WA) is most popular among 16-18 year-old adolescent users (Jivanda, 2013; Olson, 2013), and an increasing number of adolescents are already shifting from Facebook to WA (Jivanda, 2013). Usage of WA has already penetrated deep into the lives of adolescents, and is expected to grow further. This growth has fueled concerns about possible technological addiction among adolescents, due to prolonged use of WA. Prior IA literature has shown that technological addiction can have adverse effects on social, academic, personal, and career well-being (Young, 1998). During my intensive field studies in December 2013 with over ten junior and senior-high schools in India, I made various important observations of WA use. I found that WA is very popular among young Indian adolescents. The percentage of WA users is rising at an alarming rate. Adolescents are resorting to heavy WA use in order to fulfill various psychosocial needs, e.g. connecting, information seeking, sharing, coordination, escape from real problems, and social status seeking. Parents and teachers are concerned that adolescent WA users might be addicted to WA use, which might result in various negative implications for the mental and academic well-being of adolescents.

A review of the prior literature has revealed that excessive use of IMs causes IA and IM addicts to suffer from various societal, mental, and academic problems (Widyanto & Griffiths, 2006; Leung, 2004; Rosenbaum & Wong, 2012; Kuss, Griffiths, & Binder, 2013) (see Figure 3). Approximately 9.7% of adolescents were IM addicts who spent significantly more hours on IM than non-addicts (Huang & Leung, 2009). Other important findings are: Internet addicts are more likely to embrace Internet-based IMs than non-addicts (Yuen & Lavin, 2004; Scherer, 1997; Anderson, 1999; Young, 1996). IM addicts are vulnerable to adult attention deficit hyperactivity disorder (ADHD) (Rosenbaum & Wong, 2012). Adolescent IM addicts were relatively young, less self-disciplined, not able to monitor or control their time spent on IMs, neglectful of homework and other daily obligations, and eventually tended to show degraded academic performance (Huang & Leung, 2009).

Two main predictors of IM addiction are heavy use of IM, and being emotionally open on the Internet (Leung, 2004). Similarly, Levine, Waite and Bowman (2013) found that high levels of attention impulsiveness and distractibility are associated with IM use. Huang and Leung (2009) found that IM addiction is positively associated with shyness and alienation. In the most recent study, Sultan (2014) found that 53% of the study respondents considered themselves either BlackBerry Messenger (BBM) or WA addicts, or

they did not know if they were actually addicts; extraversion and social anxiety were found to be significantly related to IM addiction.



**Figure 3** Differences between Compulsive and non-compulsive IM users<sup>3</sup>

### 1.3.1 ASSESSMENT OF ADDICTION DUE TO SPECIFIC INTERNET ACTIVITIES

Almost all previous psychometric validations of the IA assessment instruments were carried out assuming that the Internet itself causes addiction. However, only recently have IA researchers suggested that people get addicted to specific Internet activities or behaviors (Guertler et al., 2014). This has motivated IA researchers to examine whether any psychopathological state of IA is associated with the use of specific Internet applications. Some of the notable investigations include addiction due to video gaming (Mehroof & Griffiths, 2010; Wan & Chiou, 2006), Facebook use (Andreassen, Torsheim, Brunborg, & Pallesen, 2012; Elphinston & Noller, 2011; Hong, Huang, Lin, & Chiu, 2014; Koc & Gulyagci, 2013), online pornography (Meerkerk, Van den Eijnden, & Garretsen, 2006), IM (Van den Eijnden, Meerkerk, Vermulst, Spijkerman, & Engels, 2008; Leung, 2004; Yuen & Lavin, 2004; Rosenbaum & Wong, 2012) and online video games (Van Rooij, Schoenmakers, Van den Eijnden, & Van de Mheen, 2010). All these investigations have concluded that a strong relationship exists between IA and specific Internet activities.

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<sup>3</sup> Created by Benny Forsberg, <https://thenounproject.com/term/chat/14953/>

Since the research investigating addiction due to specific Internet activities is still in the early stages, only recently have IA researchers started developing assessment instruments for Internet-specific activities. Some of these early stage investigations include the Bergen Facebook Addiction Scale (BFAS) (Andreassen et. al., 2012), the Facebook Intrusion Scale (FIS) (Elphinston & Noller, 2011), the Facebook Addiction Scale (FAS) (Koc & Gulyagci, 2013), and an online video gaming instrument (Van Rooij et al., 2010). Among these assessment instruments, only the BFAS and the online video gaming scale have known psychometric properties. It is important to ensure that newly developed instruments possess sufficient psychometric properties since an instrument without it could potentially result in misleading findings, which might also add bias to the IA literature. In addition, instruments with unknown validity and reliability can hinder and even obstruct the future development of new understanding of the IA phenomenon due to specific Internet activities.

Recently, IA researchers have favored adapting existing IA assessment instruments in order to understand the addictive behavior of specific Internet activities. There could be a variety of reasons for this approach, e.g. the development of new instruments requires a great deal of time, effort and money (incurred due to data collection activities), the process itself is lengthy, tedious and laborious, and prior IA research has shown that adapted instruments are effective in terms of assessing the addictive behavior of specific Internet activities. In addition, the adapted assessment instruments are likely to showcase good psychometric properties since the original IA assessment instruments have been psychometrically validated with different languages, cultures and user groups. Some of the prominent attempts in this regard are the IAT, which has been adapted to study Facebook addiction (Cam & Isbulan, 2012; Balci & Gölcü, 2012; Hong et al., 2014; Sherman, 2011) and IM use (Huang & Leung, 2009), the CIUS, which was adapted to examine addiction to sexually explicit media (Downing, Antebi, & Schrimshaw, 2014) and video gaming (Van Rooij, Schoenmakers, van den Eijden, Vermulst, & van de Mheen, 2012), and the BFAS, which was utilized to study addiction due to Facebook use (De Cock, et al., 2014; Marcial, 2013; Uysal, Satici, & Akin, 2013).

Prior research has confirmed that adolescents who use traditional IMs excessively become addicted to IM use. WA is different from traditional IMs, since it is an Internet-based application, free of charge, and supports various ways of sharing, connecting, and information seeking through WA groups. Therefore, the findings of prior literature concerning IA due to traditional IMs are not applicable to excessive WA use. The use of WA is more related to Internet use than mobile phone use, since WA is an Internet-based application whose main activities, i.e. sharing, information seeking, connecting, and coordination, are supported by the Internet. Although mobile phones do support traditional IMs, the mobile phone network carries the operations. Furthermore, careful examination of the mobile phone



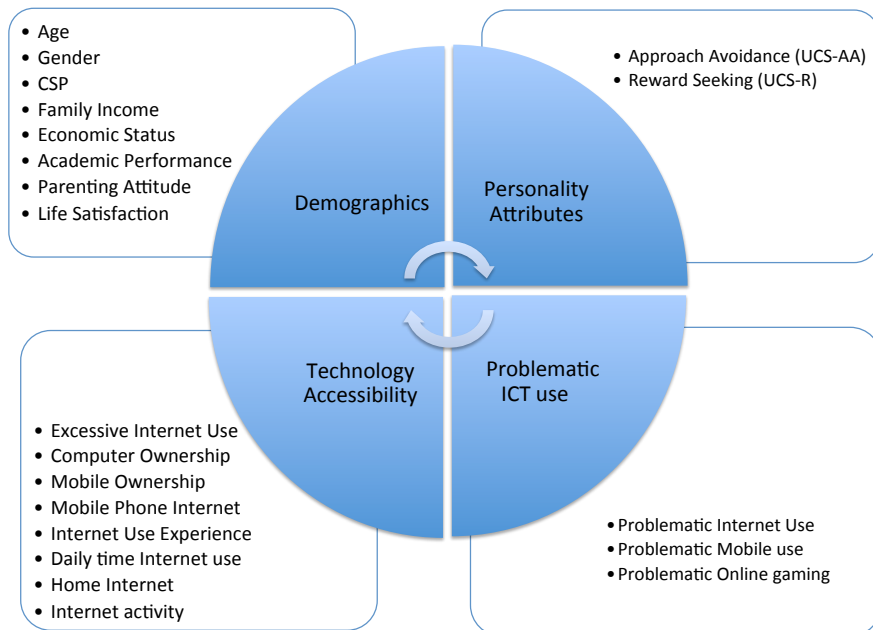
addiction literature reveals that most of the mobile phone addiction instruments, e.g. the 4-item problematic mobile phone use scale (Takao, Takahashi & Kitamura, 2009), the 20-item mobile phone addiction scale (Koo, 2009), and the 27-item mobile phone usage scale (Bianchi & Phillips, 2005) deal with the psychopathological states associated with heavy use of mobile phones, e.g. excessively using phones for talking, and reading and writing text messages. Therefore, I decided that these mobile phone addiction instruments are not sufficient to examine WA addiction among adolescents (psychopathological states that occur due to excessive use of WA). Therefore, I have utilized IA scales rather than mobile phone addiction scales to examine WA addiction.

#### **1.4 WHAT ARE INTERNET USERS' BACKGROUND CHARACTERISTICS?**

Prior IA literature has shown that the background characteristics of Internet users can either enhance or alleviate the Internet's effect on the individual (Rubin, 2002). Similarly, background characteristics also act as a differentiating agent between Internet addicts and non-addicts (Leung, 2004). Therefore, prior literature has suggested the need to examine the relationship between IA and background characteristics, and between Internet U&Gs and Internet users' background characteristics (Kim & Haridakis, 2009). In addition, earlier research has stressed the need to investigate the differences between Internet addicts and non-addicts, and heavy and light Internet users in terms of their background characteristics, i.e. what background characteristics make an Internet user vulnerable to IA and heavy Internet use (Kim & Haridakis, 2009). During the review of prior IA literature, it was noticed that most research has adopted a narrow focus when it comes to background characteristics, where age, gender, socio-economic status and daily time spent on Internet use were mostly studied. Therefore, limited understanding is available of how other background characteristics are related to IA and Internet U&Gs, and how background characteristics result in the condition of IA symptoms.

To address these limitations of the existing research, the present thesis has considered an exhaustive number of variables that represent Internet users' background characteristics (see Figure 4). These variables address four categories of characteristics, namely Internet users' demographic profile, technology accessibility status, personality attributes and tendency to experience problematic ICT use. A total of eight demographic variables were considered: age, gender, family monthly income, family economic situation, academic performance, parental attitudes towards Internet use, perceived change in school performance after starting Internet use (CSP) and satisfaction with life. Similarly, a total of eight variables represent the technology accessibility of adolescent Internet users such as Internet

connectivity at home, computer ownership, mobile phone ownership, mobile phone Internet, Internet use experience, daily time spent on Internet use, Internet activity, and frequency of excessive Internet use. For the personality attributes, I considered the Unwillingness to Communicate scale (UCS), which measures the “chronic tendency of any human being to avoid and/or devalue oral communication” (Burgoon, 1976). The UCS assesses the tendency to experience approach avoidance (UCS-AA) and reward seeking (UCS-R) among individuals, and is associated with alienation, self-esteem and hesitation to communicate with others (Burgoon, 1976). The UCS-AA refers to the tendency to avoid communication, anxiety and introversion, while UCS-R denotes the tendency to remain isolated and to distrust others. Finally, problematic ICT use was assessed using three variables, namely problematic Internet use, problematic mobile phone use and online gaming use.



**Figure 4** Overview of Internet user’s background Characteristics

The findings from prior literature on the relationship between demographics and Internet U&Gs are as follows. Relatively young and high socioeconomic status users tend to utilize the Internet for the satisfaction of internal needs, information seeking, computer-mediated communication, learning, and connecting with others (Cho et al., 2003). Young and low socioeconomic status users seek connecting gratification from the Internet (Cho et al., 2003). Demographics, culture and type of Internet connectivity are some of the reasons behind why the Internet is adopted differently in different countries (Grace-Farfaglia et al., 2006). Gratifications of web and chat forums did not share any correlation with the gender or the income of the

Internet users (Kaye & Johnson, 2004). Compulsive Internet users tend to experience low life satisfaction (Wartberg et al., 2014). Demographic variables (e.g., age, gender, income and education) did not share any significant relationship in predicting different Internet U&Gs (Leung, 2003).

For technology accessibility, the prior literature suggests that daily time spent on Internet use and prior Internet use experience were positively correlated with Internet U&Gs (LaRose & Eastin, 2004), in contrast, Kaye and Johnson (2004) claimed that Internet experience shared no correlation with the U&Gs of web and chat forums. Prior literature on UCS suggests that individuals with high UCS-AA and UCS-R scores are more inclined to see the Internet as convenient and comfortable, to seek Interpersonal gratifications, life satisfaction, and social well-being (Papacharissi & Mendelson, 2000), to avoid meeting new people face to face, and to have fewer friends on social media (Sheldon, 2008).

## **1.5 THE PRESENT STUDY**

### **1.5.1 GAPS IN PRIOR RESEARCH AND THE CONTRIBUTION OF THE PRESENT STUDY**

Despite the fact that research examining IA is nearly two decades old, there are several limitations to and gaps in the existing research. Some of these existing gaps are complemented and addressed in the present study (see Figure 5). First, the definition and conceptualization of IA is unclear at present. IA researchers have utilized different definitions for IA including psychopathological state, excessive Internet use, Internet abuse and overuse. In addition, the nature and conceptualization of IA is also unclear at the moment. To address this gap, the present study has attempted to bring greater understanding of “what IA is and how it should be measured”. In order to bring more clarity to this phenomenon, the present study has examined the relationship of IA with gratifications sought from Internet use and Internet users’ background characteristics (see Study I, II & III). In addition, the research process for examining the psychometric properties of IA assessment instruments was outlined (see Study IV), compulsive use of specific Internet activities was investigated (see Study V), and assessment instruments for examining compulsive use of specific Internet activities were developed and validated (see Study V).

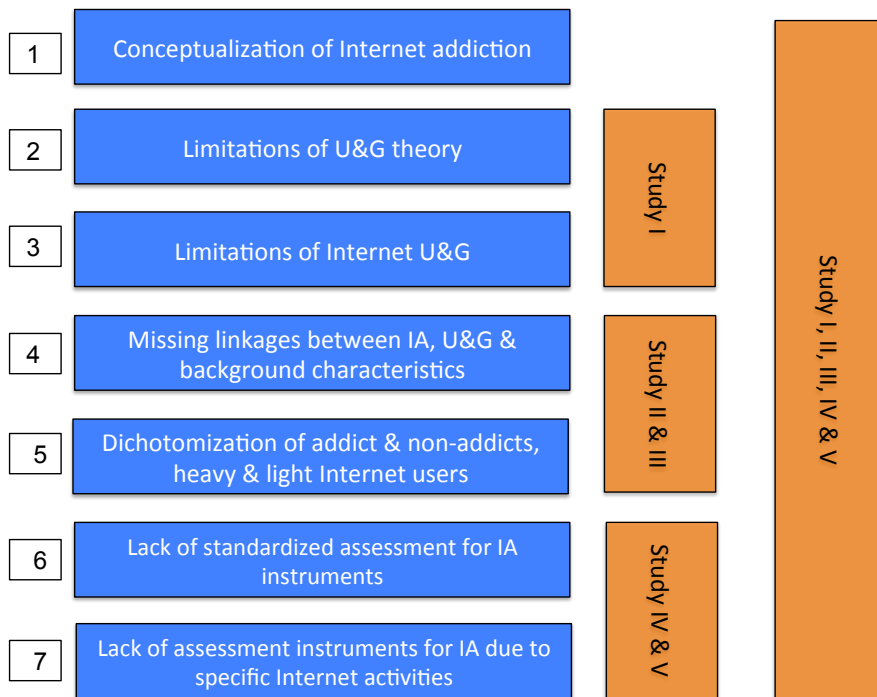
Second, despite the fact that U&G theory is one of the most popular and well-documented theoretical frameworks utilized for studying media gratifications, it suffers from various inherent limitations. Three important limitations of U&G theory are addressed in the present study: (1) U&G theory provides only a broad conceptual framework to the researchers, rather than specific constructs or items. The focus is to inform, “what are the reasons behind media use” instead of “what should be asked from a user.” (2) The

U&G theory-based items could be problematic for users to comprehend, i.e. users might find it difficult to easily explain what their reasons behind media use and continuation are, why they started using a particular media, and why they are using it (McQuail, 1984; Ruggiero, 2000). (3) The majority of the Internet U&G research is based on mirroring the gratification constructs developed or utilized in prior research. For example, researchers have “cherry picked” the popular gratifications from prior U&G literature and utilized it in their own research. This selective choosing of gratification constructs has resulted in limited understanding of all of the possible gratifications that could be supported by a given media platform. According to Song et al. (2004), U&G theoretical research must depart from the existing operational and theoretical conceptual approaches to construct utilization, and instead, newer gratification constructs may be explored based on post hoc exploratory research. Furthermore, only a few attempts have been made in prior research to develop valid and reliable instruments to examine the U&Gs of the media platforms.

Third, the aforementioned limitations of the U&G theory and research have resulted in various negative implications for Internet U&G research. These implications are: (1) Due to the lack of clarity on the possible gratification constructs and non-availability of the validated U&G instruments, most of the existing Internet U&G research has selectively utilized certain gratification constructs from prior U&G literature with unknown psychometric properties. Therefore, not only has it become difficult to compare the findings of different empirical investigations, this limitation has also resulted in partial or incomplete research findings. (2) The obvious heterogeneity in the chosen “Internet U&G constructs” has resulted in different Internet U&Gs that not only confuse young researchers, but also act as a barrier to further understanding of media gratifications, e.g. “information exchange”, “surveillance” and “information seeking” all represent the same phenomenon with different titles. (3) Only a few prior Internet U&G studies have developed psychometrically tested, validated and reliable instruments. The second and third limitations have been addressed in the present study in several ways. First, we developed a new Internet U&G instrument based on an exhaustive pool of gratification constructs/items. We examined the psychometric properties of the developed U&G instrument including validity and reliability. This examination included large-scale data collection in order to minimize sampling errors, drawing constructs/items from previous media U&G literature, and generating newer ones by utilizing a qualitative enquiry with target users, and carrying out a pilot study with target users in order to ensure the face validity of the utilized constructs (see Study I).

Fourth, the conceptual linkages shared between IA, Internet U&G, and user background characteristics are only superficially examined in the prior IA literature. At present, only scarce research is available where an exhaustive set of variables was utilized for better understanding of IA and related

conceptualization. For-example, a review of the existing IA literature has shown that most Internet background characteristics were limited to age, gender, socio-economic status, time spent on Internet use, and Internet use experience. In contrast, the present study has utilized over 21 variables representing Internet users’ background characteristics. Additionally, these background characteristics were classified into three categories, namely demographics (e.g., age, gender and academic performance), technology accessibility (e.g., Internet and computer ownership), and personality related attributes (e.g., unwillingness to communicate). Due to these missing relationships in the prior research, only a limited understanding is available of what factors lead to the conditioning of IA, and which factors lead to the seeking of different Internet U&Gs among adolescents. To address these open research questions, the present study has examined how IA is linked to the Internet U&Gs adolescents seek, and their background characteristics (see Study II & III).



**Figure 5** Overview of the limitations of studies in prior Literature and which studies in the present thesis address them

Fifth, the dichotomization of Internet addicts and non-addicts and heavy and light user cohorts suffers from two main limitations. Prior IA literature has dichotomized addicts and non-addicts, and heavy and light users based on the arbitrary cut-off scores and criteria suggested by earlier IA literature.

Statistical techniques (such as receiver-operating characteristic (ROC) and hierarchical cluster analysis) were not adopted for their dichotomization, which could possibly have even led to the misrepresentation of the characteristics of Internet addicts and heavy Internet users. Moreover, the factors or aspects on which Internet addicts and non-addicts and heavy and light Internet users differ are less studied in the prior IA literature. Most earlier work focused on understanding the various factors that lead to IA conditioning among Internet users. However, only a few studies have examined the differences between Internet addicts and non-addicts, heavy and light Internet users, how Internet addicts are different from non-addicts, or how heavy Internet users are different from light Internet users. To address these gaps, the present study has utilized an extensive number of Internet users' background characteristics, which were used for understanding the differences between addicts and non-addicts and heavy and light Internet users. Additionally the study results were compared with the findings in existing IA literature. However, similar to the prior IA literature, the present study also does not utilize any statistical criteria for the dichotomization; instead, the prior cut-off score and criteria were utilized. The main reason behind this approach was to compare the present study results with the prior available findings and to investigate their validity and reliability (see Study II & III).

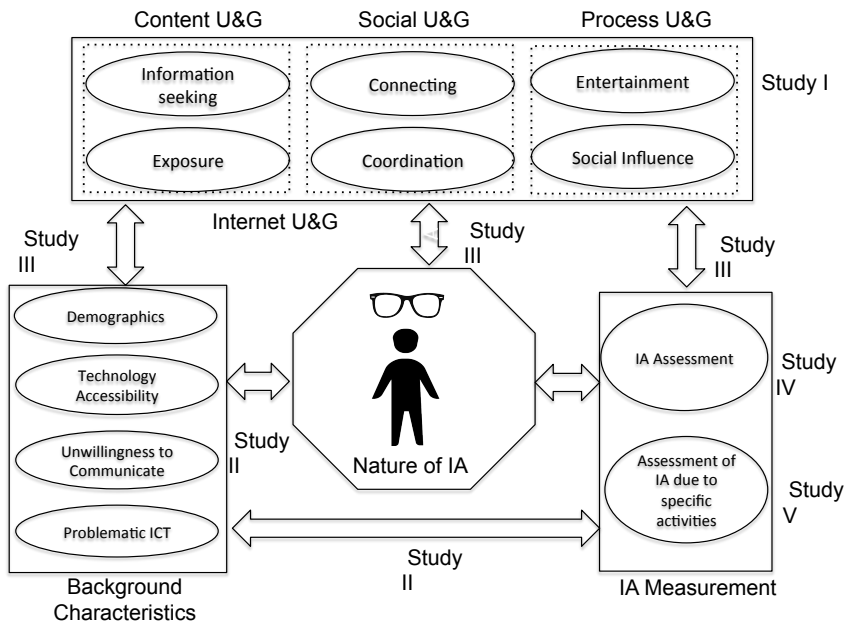
Sixth, review of prior IA assessment instruments has revealed various limitations including lack of a standard process to examine psychometric properties of IA instruments, overestimation of the factors, utilization of small samples, and limited focus on college and university level students or on a broad age range of Internet users, e.g. 16-75 years, instead of specific age groups, e.g. adolescent Internet users. To address these limitations, the present study has examined the psychometric properties of the 14-item CIUS, a popular IA assessment instrument, along with adolescent Internet users (i.e., 12-19-year-olds, a specific age group of Internet users). A detailed research process for performing the psychometric validation of IA assessments was also developed which might act as a guiding source for other IA researchers and practitioners (see Study IV).

Seventh, to date, the majority of IA research has conceptualized that Internet users get addicted to the Internet. In contrast, relatively recent research has argued that individuals get addicted to specific Internet activities rather than to the Internet itself. However, the field of research is still young and in its early stages. Only few investigations have been carried out with the aim of understanding the addiction or compulsive use of specific Internet activities (e.g., online gaming, Facebook, IM and online porn). To address this research need, the present study has examined compulsive use of WA, a mobile IM application that is considered very popular among adolescent users. To the best of our knowledge, the present study is the first research investigation that has developed assessment instruments for compulsive use of specific Internet activities (i.e., WA in the present study) (see Study V).

### **1.5.2 A SUMMARY OF RESEARCH FRAMEWORK**

The research framework of this thesis addresses the main aims and research questions of this study, which aims to increase understanding of the underlying nature of the IA and also to bring more clarity to its conceptualization. As mentioned before, the theoretical framework of the U&G theory has been adopted to understand the underlying gratifications of Internet use, and later to utilize them to understand their role in the conditioning of IA among adolescents. In addition, the theoretical foundations of Internet users' background characteristics and assessment of IA from prior IA literature were utilized. The relatively recent research has emphasized the need to thoroughly investigate the relationships among IA, Internet U&Gs and Internet users' background characteristics in order to bring more clarity and understanding of IA or CIU phenomenon. Furthermore, certain Internet users tend to experience higher IA or CIU than others. Therefore, understanding of the underlying difference in the background characteristics becomes essential. The research framework of this thesis (see Figure 6) investigates the relationship between six Internet U&Gs and four different aspects of Internet users' background characteristics (i.e., demographics, technology accessibility, unwillingness to communicate, and problematic ICT use).

The research framework presents the interaction between the different underlying variables and IA, with an aim to bring those missing relationships to light. Here, the research framework is visualized as a conceptual and interpretative framework that incorporates five research aims and five sub-studies of this thesis on a theoretical as well as on a much more abstract level to the readers. Furthermore, the research framework provides more understanding of the underlying study constructs and concepts, and how they relate to the "nature of IA." The research framework makes use of several assumptions, namely that IA is a psychopathological state that can be assessed or measured through popular IA assessment instruments, that cross-sectional surveys are effective in gauging the underlying Internet U&Gs among adolescent Internet users, and that arbitrary cut-off scores proposed by the earlier IA literature are effective in dichotomizing Internet addicts and non-addicts and heavy and light Internet users. Furthermore, the most important assumption is that the relationships shared among the different concepts, variables or constructs can be measured on an empirical level using cross-sectional data. Finally, returning to the "lenses", the research framework presents "lenses" along with an adolescent Internet user, to showcase the situation of CIU experience.



**Figure 6** Overview of Research Framework

### 1.5.3 MAIN AIMS

The present thesis work represents a multidisciplinary viewpoint on the conceptualization of the IA phenomenon experienced by adolescent Internet users in their day-to-day routines. Concepts from multiple disciplines, including educational psychology, media and communication, educational psychology, human-computer interaction, psychiatry and public health were utilized to address the underlying research questions. The combination of sought Internet U&Gs, adolescent demographic profile, technology accessibility status, personality attributes, and problematic ICT experience as variables provides new perspectives on the nature of IA. The measurement of IA alone is not sufficient to understand this complex and open research problem; rather, there is a need to investigate those factors that lead to the conditioning of IA among adolescents. Furthermore, there is also a need to determine the relationships shared between IA and various other variables. Therefore, the aim of this work is to provide a more comprehensive picture of the interactions among IA, Internet U&Gs and adolescent users' background characteristics. Not all aspects of this thesis work are addressed by each of the sub-studies; rather, five studies in combination serve the aims of this thesis. Additionally, these five empirical studies present a coherent approach to the conceptualization of IA, and hence they complement each other in a scientifically meaningful manner (see Table 2). The overall aim of this thesis work is to examine the nature of IA specifically addressing what it is and how



to measure it. The aim of this thesis is achieved through the following open research questions:

1. What are the Internet U&Gs sought by adolescent Internet users from Internet use (Study I)?
2. How are Internet U&Gs and adolescents' background characteristics related to IA among adolescents and the classification of Internet addicts and non-addicts (Studies I & II)?
3. How are adolescents' background characteristics related to Internet U&Gs and the classification of heavy and light Internet use (Studies I & III)?
4. How can the psychometric properties of IA assessment instruments be measured (Study IV)?
5. How can the IA experienced by adolescents due to specific Internet activities be measured (Study V)?

**Table 2** summarizes the main aims of each study, participants, measures and analyses

Studies	Main aims	Participants	Measures	Analysis
Study I	To develop a valid and reliable instrument to examine Internet U&Gs among adolescent Internet users	1,914 adolescent Internet users aged 12 to 18 years	<ul style="list-style-type: none"> <li>• 78-item pool representing different Internet U&amp;Gs among adolescent Internet users</li> </ul>	<ul style="list-style-type: none"> <li>• Psychometrics analysis</li> <li>• EFA</li> <li>• CFA</li> <li>• Second order CFA</li> <li>• Validity &amp; reliability</li> </ul>
Study II	To investigate the conceptual linkages shared between adolescents' background characteristics, sought Internet U&Gs and IA	1,914 adolescent Internet users aged 12 to 18 years	<ul style="list-style-type: none"> <li>• 27-item Internet U&amp;G instrument</li> <li>• Six measures on demographics</li> <li>• Four measures on technology accessibility</li> <li>• 20-item UCS</li> <li>• 20-item IAT</li> </ul>	<ul style="list-style-type: none"> <li>• Pearson correlation</li> <li>• Independent sample t-test</li> <li>• Logistic regression</li> <li>• Hierarchical multiple regression</li> </ul>
Study III	To examine the conceptual links between Internet U&G, adolescent's background characteristics and heavy versus light Internet users	1,914 adolescent Internet users aged 12 to 18 years	<ul style="list-style-type: none"> <li>• 27-item Internet U&amp;G instrument</li> <li>• Four measures of technology accessibility</li> <li>• 20-item UCS</li> </ul>	<ul style="list-style-type: none"> <li>• Pearson correlation</li> <li>• Independent sample t-test</li> <li>• Logistic regression</li> <li>• Hierarchical multiple regression</li> </ul>
Study IV	To examine the psychometric properties of 14-item CIUS with adolescents	2,369 adolescent Internet users aged 12 to 19 years	<ul style="list-style-type: none"> <li>• 20-item IAT</li> <li>• 14-item CIUS</li> <li>• Five measures of demographics</li> <li>• Seven measures of ICT accessibility</li> <li>• Three measures of Problematic ICT use</li> </ul>	<ul style="list-style-type: none"> <li>• EFA</li> <li>• CFA</li> <li>• Pearson correlation</li> <li>• Independent sample t-test</li> <li>• Hierarchical multiple regression</li> </ul>
Study V	To develop WhatsApp (WA) addiction scales to examine compulsive WA use among adolescents	405 adolescent WA users, aged 12 to 19 years	<ul style="list-style-type: none"> <li>• 20-item IAT was adapted to access WA addiction among adolescents</li> <li>• 14-item CIUS was adapted to compulsive WA use</li> <li>• 18-item BFAS was adapted to access WA addiction</li> </ul>	<ul style="list-style-type: none"> <li>• Psychometrics analysis</li> <li>• EFA</li> <li>• CFA</li> <li>• Validity &amp; reliability</li> </ul>

Note: BFAS = Bergen Facebook Addiction Scale, Confirmatory Factor Analysis = CFA, Exploratory Factor Analysis = EFA, ICT = Information and Communication Technologies, UCS = Unwillingness to Communicate

## 2 RESEARCH CONTEXT

In this chapter, the research context of this thesis work is presented. The first important aspect of the research context is the framework of research ethics developed by myself to ensure various ethical considerations have been met in the context of children participating in research activities. Afterwards, a brief overview of the Indian educational system and Indian schools is presented. All study participants were adolescents' aged 12 to 19 years old attending junior and senior high schools in India. Finally, information on the research process, including contacting schools, participant recruitment, and various other aspects of the practiced research process are outlined.

## 2.1 OUR FRAMEWORK OF RESEARCH ETHICS

The study participants were adolescent Internet users, due to which, special emphasis was placed on ensuring various ethical norms and standards were met with regard to the young children in our research process. There were two main challenges to ensure the desired research ethics were upheld in the present study. First, most of the work in the present study was carried out at Aalto University, Finland, which does not have an Institutional Review Board (IRB). For to this reason, the ethical approval of an IRB was not received. Second, I did not find any published framework in India regarding guidelines or norms for obtaining ethical approval or ensuring ethical considerations. Furthermore, the existing literature on the subject is mostly available in the context of western countries (mainly North-American and European), or far-east Asian countries. For these reasons, I developed my own framework to ensure various ethical norms and practices were upheld in the research activities of the present study. Special attention has been given to the available theoretical frameworks to ensure ethical practices in research involving young children, and to the existing discourse in the field of research ethics and children. Before presenting my framework to the readers of this work, I would like to provide definitions and summaries of certain prominent debates concerning children's participation in research, and related ethical considerations.

### 2.1.1 ETHICS

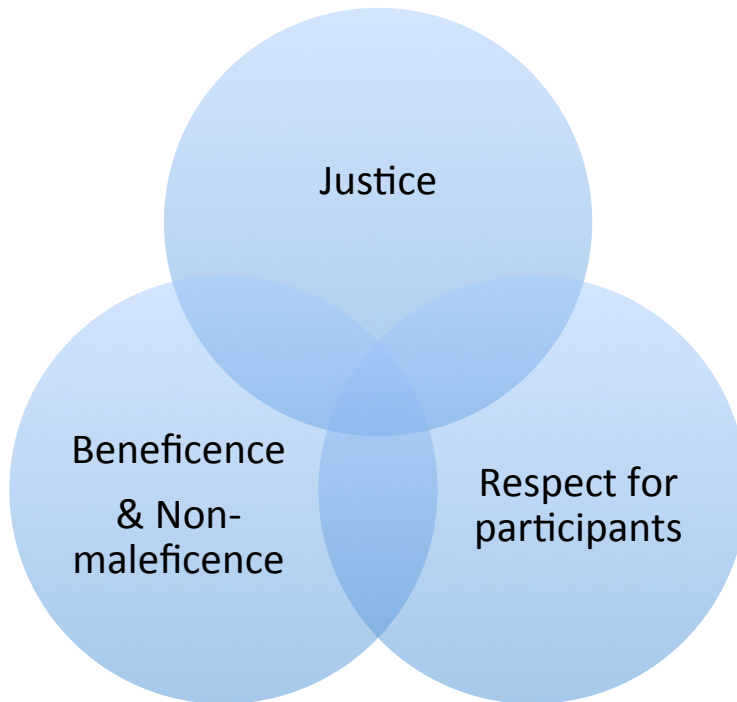
Ethics is defined as the “study of proper action” where ethical behavior stands for the rightful act in a given cultural context (Markopoulos, Read, MacFarlane, & Hoysniemi, 2008). However, it remains unclear as to who will judge whether a given behavior or act is ethical or not. What kind of behavior is termed as rightful? What kind of action is termed as proper in a given research context? On this issue, Markopoulos et al. (2008) cautioned that ethics and ethical practices are very subjective and dependent on the person who is dealing with them. For example, certain behaviors or acts are completely ethical to “person A” at a given time and in a given context, but the same act might look unethical to “person B.” Due to the subjectivity in the decision-making concerning ethical issues, two researchers may not come to a consensus when it comes to making decisions regarding complex ethical issues. Possible reasons for this subjectivity could be that researchers possess different demographic profiles, educational qualifications, and different views on children and their desired needs and expectations (Markopoulos et al., 2008). Therefore the question arises as to who will guide us, or at least inform us about the various ethical considerations, rightful or wrongful ethical conduct, and proper or improper research conduct with a given user group.

### **2.1.2 RESEARCH ETHICS AND CHILDREN**

Prior literature suggests that working with children involves different ethical as well as legal issues (Markopoulos et al., 2008). Relatively recent literature has argued that the main challenge in ensuring ethical considerations is to strike a perfect balance between the protection of children's rights, and bringing positive consequences for all (Singer, 2011). Ethical issues become a concern for researchers because of the age of the participants, which puts restrictions on them for providing their own consent for participation (White, 2012). For this reason, researchers must take responsibility for ensuring ethical practices are followed in research involving children, while also safeguarding and protecting their interests. However, the fundamental question remains unanswered as to what the proper ethical considerations are. Who can judge if the given considerations are ethical or not? Is there any framework that can guide researchers regarding rightful ethical considerations? Are there any ethical norms and standards that can guide researchers? In order to answer these questions, the literature relating to ethical principles, norms, and standards from the field of Child-Computer Interaction (CCI) was reviewed. The main reason for reviewing the CCI literature in particular was that it deals primarily with empirical investigations involving young children, so it provides the norms, standards and experiences of a variety of CCI researchers and practitioners on this subject.

### **2.1.3 VARIOUS FRAMEWORKS OF ETHICS & CHILDREN**

The starting point of the review was Farrell's Framework, which sets out three principles governing ethical practices and norms for research involving children (Farrell, 2005) (see Figure 7). The framework includes Justice: transferring benefits to the children, while at the same time minimizing any avoidable harm as much as is possible. Respect for participants: All children participating in the research must be considered independent and autonomous individuals. Beneficence and Non-maleficence: distributing maximum possible benefits to the children, and minimizing the possible harm to the participating children. These three principles can guide researchers and ensure various ethical norms and standards are followed. In addition, Farrell (2005) provides three different viewpoints, namely: the Utilitarian view which prioritizes the outcomes over the research processes, the rights-based approach which focuses on the child's moral rights, e.g. privacy, safety, etc., and the virtue based approach which deals with various moral traits such as goodness, sympathy, kindness, and generosity.

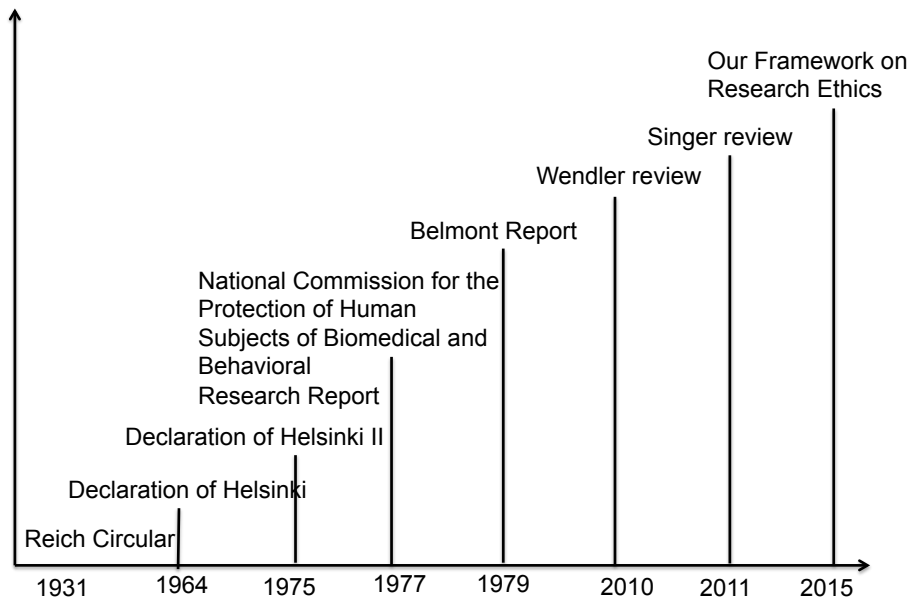


**Figure 7** Farrell's Framework of Ethical Principles

#### **2.1.4 DISCOURSE ON INFORMED CONSENT & CHILDREN**

In 1931, The Reich Circular recognized the importance of informed consent before conducting any research involving young participants while ascertaining research rules prior to World War II (Post, 2003). In response to the atrocities of Nazi doctors, the Nuremberg code came into existence, which has restricted participation of young participants, mainly due to their inability to give consent for themselves (Nuremberg, 2015). Later, in 1964, the Declaration of Helsinki proposed the idea of taking consent from a legal guardian in the case of a special population (e.g., young children) who are not able to provide consent for themselves (Williams, 2008). Afterwards, in 1975, the Declaration of Helsinki specifically included “young children” as special population participants (Shephard, 1976). In 1977, The National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research released a report entitled ‘Research Involving Children’ (NCPHBBR, 1977). It gave a new definition of “assent” in research involving young children. Assent refers to making young participants understand developmentally appropriate reasoning behind their participation and the associated research process, that participation should be voluntary, and that participants have the freedom to quit and withdraw their participation at any stage. Later in 1979, the Belmont report suggested three founding principles addressing the

considerations for ethical research, namely: Respect for persons, beneficence, and justice (Belmont Report, 1979). It should be noted that Farrell’s model is also influenced by these principles. Interestingly, the authority of legal guardians to give consent on the behalf of children has also been questioned. According to Singer (2011), it is thought that legal guardians might reach the decision on whether to participate out of altruistic motivations for helping others without giving consideration to how it benefits the child him/herself. Also, the legal guardian's authority has been challenged because of the possibility of paying less attention to the momentary discomfort of the child participation may cause (Singer, 2011). However, in comparison, Wendler (2010) argues that making contributions to the welfare of others enhances the self-esteem and satisfaction of young children. Therefore, even if the decision to participate was actually their parent’s choice, participating children have still contributed to the research. On the same issue, Singer (2011) argues that parents should give consent to their child’s participation in research when it has positive consequences for their own children, and the participation causes minimal discomfort for their child. In addition, participation of a child in research should be denied if it is likely to cause severe pain, harm, or make a child vulnerable to a possible risk. Figure 8 presents the timeline of the informed consent discourse.



**Figure 8** Timeline of the informed consent discourse

### 2.1.5 OUR FRAMEWORK

The framework developed to ensure various ethical considerations of this study were adhered to consists of four main stages (see Figure 9). **First,**

**Study design:** It is the first step of any research examination, and researchers working with special user groups such as young children and adolescents should pay attention to the various ethical considerations from this phase onwards. In order to address the three important principles of Farrell (Justice, respect for participants, beneficence and non-maleficence), steps were initiated during the instrument design phase to address the safety of the participants (e.g., reducing any risk and avoidable harm). In the designed survey, no personally identifiable information (except age and gender) was requested from the study participants. The entire process of research collection, including survey design, data processing, and analysis was designed in such a way that it was made impossible for the involved researchers (including myself) to associate the findings of the research with any specific participant. The study participation was kept voluntary, i.e. there were no negative consequences for those who did not wish to participate or who withdrew their participation while answering the survey questionnaire. In addition, participation was confidential and anonymous. During the survey answering exercise, the participants were clearly instructed to avoid writing their name or other identifying information (except gender and age) such as phone number, email address, or other information that could be used to identify the participant. Finally, the designed instrument was cross-examined by three professors to ensure that participation in the study would not put the study participants at risk in any way.

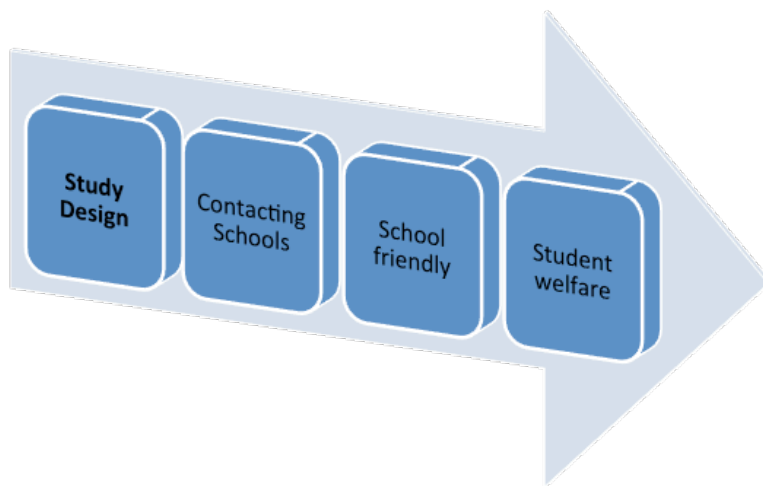
**Second, contacting schools:** This is considered the first point of contact between the external researcher and the school. Therefore, it is very important that the invited schools should be provided with all the information related to the proposed research study and related setup in a lucid, clear, and transparent manner. Based on my own experience, I found that it is likely that schools will deny participation if the research process, expected outcome, and school's role in the research are unclear. I started by first contacting the schools via email and/or a phone call (depending on availability), and later followed up by submitting a formal written request to each of the selected schools. These requests were issued by one of the supervising Professors and invited schools to participate in our research. This written request contained information about our research process, aims and objectives, research questions, and other practical information. Later, a face-to-face meeting was agreed with the school principals or management to present information on the proposed research and related practicalities (e.g., various ethical considerations and norms followed in this research, and written assurance protecting the privacy and anonymity of the participants and the school identity). Such initiatives helped to build confidence and establish trust with the schools. A copy of the survey instrument was also submitted to the participating schools for the necessary study approvals. Based on this formal request, approval was granted by the participating schools.

**Third, school friendly research:** I consider this one of the most important aspects of any research examination involving schools. I define school-friendly research as an investigation that causes minimum disruption to the normal functioning of the schools. During my extensive field studies with schools, I directly observed some of the obvious concerns among the schools including: What is the overall impact of this research on the wellbeing of the students? Is the proposed research school friendly? Does it disturb the normal school functioning? Do external researchers challenge the authority of the teachers? What sort of message does this research study give to the students? What is the positive impact of the research? I believe that if researchers address these genuine concerns, then schools will be more willing to participate in and contribute to research investigations. To address these concerns, I have the following recommendations for researchers and practitioners interested in working with children. One, schools are keener to conduct survey-answering sessions in the first half of the school day (early morning) than in the middle of the day, or at the end of the school day. The morning session is less intrusive and does not disturb the normal functioning of the school. Two, researchers must plan the study well in advance, e.g. prior meetings with the school and teachers so that the survey-answering session is completed in the stipulated time period (i.e., the time permitted or reserved by the school for the research exercise). This becomes even more important since schools have tight schedules, teachers often complain of running behind schedule, and have trouble meeting course work and examination deadlines. Three, one or two meetings with those teachers who are going to assist the researcher during the evaluation are essential to break the ice and build a level of trust. I observed that teachers might feel that the external researchers are challenging their authority; therefore, the researcher should make them realize their importance, and that they are needed in the research evaluation. Fourth, researchers must detach themselves from how the proposed research benefits their own research and instead focus on how this research or related process can benefit the participating students. What kind of incentives can be provided to the participants so that they feel encouraged to participate? I observed that recognition of participants' effort and resulting self-esteem serves as good motivation for them, e.g. in the information sessions, I made the study participants aware of why their participation was needed, how they could contribute to critical and useful research examining the "nature of IA", and what kind of objectives this research was likely to achieve. In addition, after the data collection, the study results were either shared or presented to those participants, so as to make them realize that the time they spent answering the survey had resulted in a positive change. Other researchers can innovate other creative means of addressing similar needs of students and schools.

**Fourth, student welfare:** During the face-to-face meeting, interested schools were asked to inform the researchers what issues or concerns the external researcher can address while conducting the research. It was noticed



that most schools in India do not have an active interface with researchers, and thus Indian schools work mostly in an isolated or even closed space. Therefore, external researchers can provide new insights and knowledge, not only to students, but also to teachers and school management. In this way, a symbiotic relationship could be established between researchers and schools. In May 2012 (first research study), I organized informational workshops with the interested students and teachers of the participating schools. Students were given first-hand information on what research is, what public universities perform research, and what our research, process, and related practicalities were. Later, in December 2012, a workshop on “teachers’ technology acceptance” was organized with all the teachers of the participating schools. This workshop made teachers aware of the recent research investigations on the use of computers, the Internet, and mobile phones for learning purposes. Similarly, in 2013, a three-day training program (total duration three hours) entitled the ‘Hi-Tech student connect program’ was designed and carried out for students of the participating schools. The content of this interactive program was IA, creative use of ICT, and open educational resources. More than 2,000 students participated in the program, and successful completion earned a certificate of participation from Aalto University, Finland. Later, in 2014, a similar program entitled “Preparing students for tomorrow” was organized with the participating schools with various content from the previous year. The feedback from the students, teachers, and later, schools revealed that such interactive workshop programs provide exposure to the latest knowledge from the technology domain to the students. These initiatives are consistent with the recommendations of Farrell (2005), Singer (2011) and Wendler (2010).



**Figure 9** Our Framework of Research Ethics

## 2.2 CONTEXT: THE INDIAN EDUCATIONAL SYSTEM

According to the recent statistics on Internet adoption and penetration, over 2.4 billion people are connected with the Internet, which accounts for 34.3% of the entire world population (World Internet Usage, 2013). Interestingly, 1.076 billion Internet users (nearly half of the world's total Internet users) are from Asia (Asia Internet Usage, 2013). India is a fast progressing and developing Asian economy, with a consumer population of over 1.2 billion. According to relatively recent Internet statistics, India hosts over 155 million Internet users and ranks only behind the US and China in terms of total populations of Internet users (India Internet usage, 2013). Since the target population of this study was adolescent Internet users, junior and senior high schools were contacted and later participated in this study. In this section, brief information about the Indian education system is provided.

India has 29 small and large states that comprise a population of 1.22 billion. This study was carried out in the state of Punjab, which is located in the northwestern region of India, has a population of about 27.7 million people, and an average literacy rate of 76.68%, slightly higher than the national average literacy rate of 74.4% (Basic Statistics of Punjab, 2013). The state of Punjab accounts for 2.29% of the total population of India (Basic Statistics of Punjab, 2013). At present, about 29.7% of the 1.3 billion population of India are below 14 years of age, and about 50% of the total population are below 25 years of age, while one-sixth of India's population are in the 15-24 age group (Population composition, 2011). These statistics reflect that a large number of youth are dwelling in this part of the world.

The education sector in India offers education from Grade 1 to Grade 12 through various state and national education boards. Every state has its own local education board that is responsible for managing education-related matters such as examinations, curriculum design, pedagogy, and instruction at the schools (both public and private) they are affiliated with. These state level education boards are called state education boards. The state of Punjab has its own educational board referred to as the "Punjab School Education Board (PSEB)," which is managed and controlled by the Punjab state education department. Similar to state boards, there are two national education boards, namely the Central Board of Secondary Education (CBSE) and the Indian Certificate of Secondary Education (ICSE) that operate at an India-wide level. National education boards have similar duties and responsibilities as state education boards. In the state of Punjab, all public schools are PSEB affiliated, while private schools are affiliated with any of the three educational boards (i.e., PSEB, CBSE or ICSE). The majority of English private schools, where attending students are from the lower to upper middle economic strata, are CBSE or ICSE affiliated schools. During field studies, it was observed that adolescents attending public schools are mainly from very low socio-economic strata, and thus are unlikely to use the Internet as of May 2012. For this reason, the present study was carried out

with only CBSE and ICSE affiliated private schools. The main differences between private and public school attending students were that the former had easy access to the Internet, computers, and mobile phones. Furthermore, private school adolescents possess higher proficiency in reading and comprehension of English than public schools students (e.g., six out of ten participating schools used English as the mandatory language of instruction and communication inside the school premises). For this reason, the surveys were administered in English.

## 2.3 RESEARCH PROCESS

The research process for this study is explained in eight steps (see Figure 10). **First**, a total of 25 schools were randomly drawn from an online directory and were contacted via email and/or phone (depending on the validity of the email address and phone number available on the Internet) in January 2012 (e.g., in Studies I, II & III). The contacted schools were informed of the research objectives, process, and anticipated benefits of the underlying research. A total of 14 junior and senior high schools positively responded to our request and invited me for face-to-face discussion.

**Second**, a face-to-face meeting was organized with the school principal and/or management, and the schools were again briefed on the research objectives and associated process in the first week of May 2012. In the meeting, approval to administer the questionnaire survey was obtained from 10 schools. That is, out of the 14 visited schools, only 10 from four cities finalized agreement to participate in the study. There were no differences between those schools that agreed and those who refused to participate. The pool of schools represents private English speaking schools that cater to students from low middle to upper middle class families and follow similar educational curricula.

**Third**, after receiving the study approval from the respective participating schools, the proposed study was advertised to the target user group of participants, i.e. adolescent Internet users, via various communication channels (in the second week of May, 2012). The study aims and objectives were advertised via the school administration, e.g. through teachers, notice boards, morning school announcements, and five-minute in-classroom announcements by me in each of the participating schools.

**Fourth**, before answering the actual instrument, an informational workshop was run for the students from each participating school who were interested in, or at least considering participating in the survey (in the second week of May 2012). In this workshop, brief information about the survey, related aims and objectives, the research process, and various ethical norms and standards (e.g., ensuring the privacy and anonymity of their identity) to be practiced in the research were discussed with the students, either in a classroom setting or in a large lecture hall (depending upon availability).

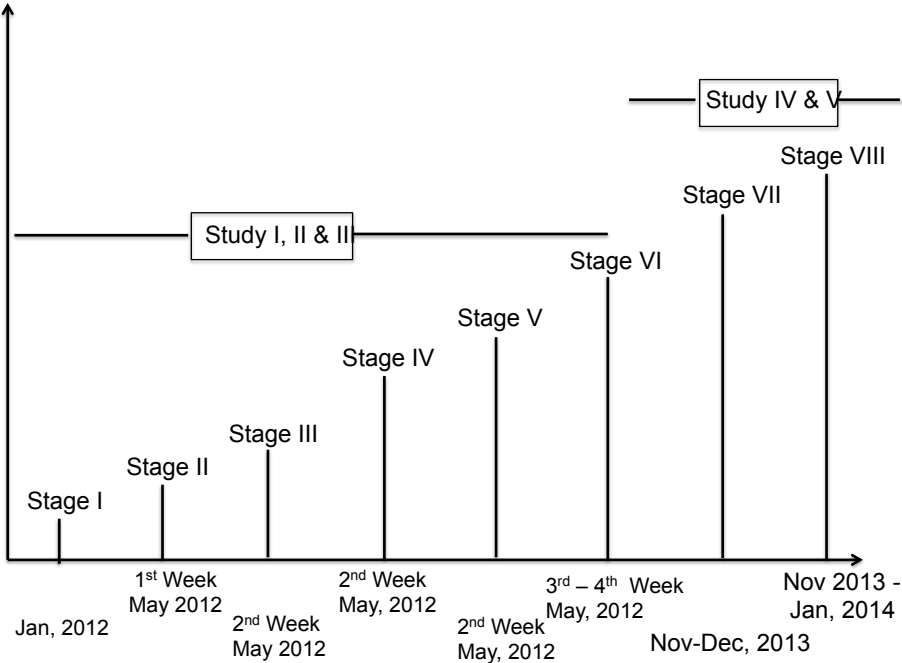
Schoolteachers also attended these workshops, and they were strongly encouraged to educate students and their parents about our study, its objectives, and process. After completion of the information session, students were encouraged and given opportunities to ask questions regarding their doubts, if any.

**Fifth**, before the actual study, a pilot study was organized with the target user group, i.e. adolescent Internet users, in order to determine the confusing, difficult to understand and/or irrelevant instrument items (also in the second week of May, 2012). The pilot testing was followed with an informal interview in order to understand the reason for difficult and unclear items. The survey instrument was updated accordingly. For example, for Studies I, II, & III, a pilot study with 12 female and 13 male adolescent Internet users was run in the first week of May 2012.

**Sixth**, all participating schools allocated one or more time-slots specifically to carry out the study, which ensured everyone received an equal chance to participate. Along with one or more schoolteachers, I managed and administered the survey answering sessions (in the third and fourth weeks of May, 2012). Markopoulos et al. (2008) have suggested that teachers should be present in the evaluation sessions along with external researchers since their presence acts as a deterrent against possible child abuse, and is also important for the children's safety and risk assessment. Furthermore, the presence of teachers can help the external researchers in a variety of ways, e.g. helping them arrange students in the classrooms and manage related logistics. The obvious drawback of the presence of teachers in the research evaluation is that their presence can potentially lead to coercion of the students to participate. During our field studies, it was directly observed that teachers' authority and supremacy over students and minimum freedom of speech for students are a few of the big challenges that every researcher has to deal with when conducting research in Indian schools. In order to overcome these challenges, two specific steps were taken. First, the schoolteachers were briefed twice about our research's ethical considerations, and the voluntary, anonymous, and confidential nature of the study. School principals were taken into confidence on this matter, and then teachers were informed that participating students could withdraw their participation anytime while answering the self-reporting instrument.

**Seventh**, during November-December 2013, awareness or exposure workshops were run for students from participating schools (as informed in Steps III and IV of our research framework, namely the school friendly and student welfare approaches).

**Eighth**, during November 2013-January 2014, similar to stage V, pilot studies were carried out with the target users, e.g. for Study IV, a pilot study with 25 adolescents was organized, and for Study V, 10 male and 5 female WA users (12 to 19 years old) participated in the pilot study. After the exposure workshops (as mentioned in Stage VII), interested students were invited to participate in the survey answering sessions.



**Figure 10** Research process of the present study

### **3 AN OVERVIEW OF THE ORIGINAL ARTICLES**

The overall aim of this dissertation was to examine the nature of IA by explaining what it is and how it can be measured. The dissertation consists of five empirical studies which focus on the conceptualization and measurement of IA. Studies I, II & III investigated the conceptual linkages shared between IA, Internet U&G and Internet users' background characteristics in order to bring more clarity to the complex notion of IA. Studies IV & V examined the measurement of IA by first proposing the process of psychometric validation of IA assessment instruments and later utilizing it for developing new instruments for the assessment of addiction due to specific Internet activities. In this chapter, a brief overview of all five empirical studies is presented.

## 3.1 STUDY I

### 3.1.1 AIMS

The purpose of Study I was to develop a valid and reliable instrument for examining Internet U&Gs among adolescent Internet users. A 27-item Internet gratification instrument was developed that represents six Internet U&Gs, namely information seeking, exposure, connection, coordination, entertainment, and social influence. The instrument satisfied different types of construct validity and reliability, and possesses excellent internal consistency ( $\alpha = 0.92$ ). The developed gratification instrument was later utilized in Studies II & III to examine the relationship between Internet U&Gs and IA.

### 3.1.2 PARTICIPANTS AND PROCEDURE

A total of 1,914 adolescent Internet users from 10 junior and senior high schools participated in this study in May 2012. The schools were typical private English schools that cater to students from low to upper income groups representing four cities from North-western India. A pen-and-paper-survey was administered in the classroom environment in each participating school. The interested students filled in a self-report questionnaire that included a 78-item pool representing different Internet U&Gs as well as their demographic information, e.g. age, gender and daily time spent on Internet use. A total of 2,000 survey copies were distributed, of which 1,942 adolescents returned the completed forms. The effective response rate was 97.1%, which is considered normal for paper-based studies (Malhotra, 2007). Of these 1,942 responses, a total of 1,914 were usable and were utilized for later analysis. The mean age of the participants was 14.88 years ( $SD = 1.44$ ) where 61.3% ( $n = 1173$ ) were male and 38.7% ( $n = 739$ ) were female adolescents.

### 3.1.3 MEASURES

#### *Internet gratifications*

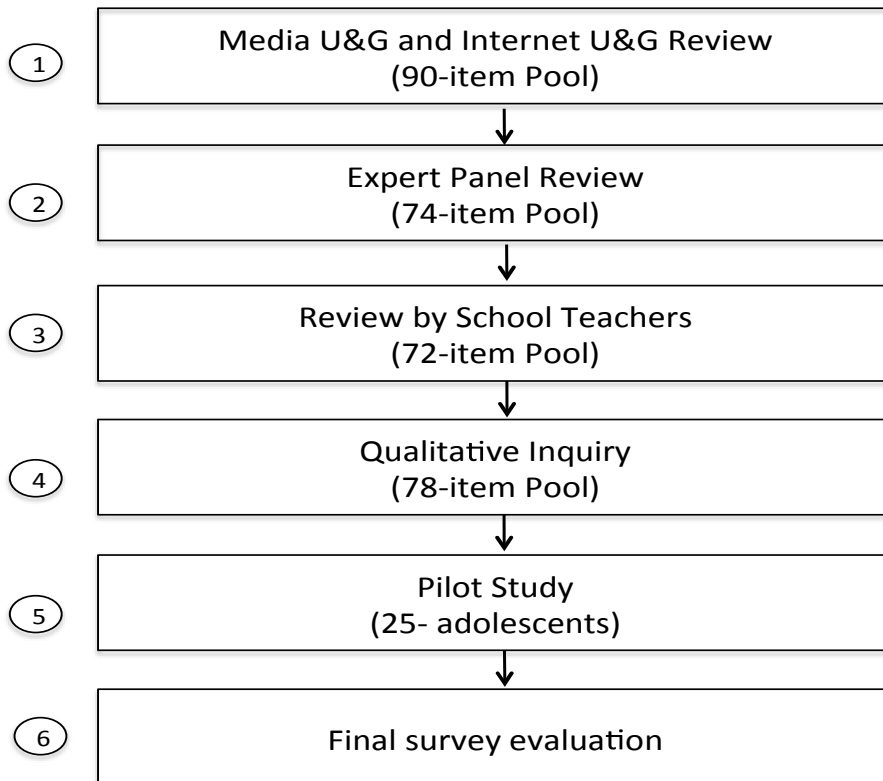
In order to develop a comprehensive instrument that addresses the various Internet U&Gs among adolescents, a multi-stage process for the development of the intended instrument was followed (see Figure 11). First, prior media and Internet U&G literature was reviewed, and a 90-item pool representing different Internet U&Gs was chosen. At this stage, different possible gratifications of media use among adolescents were taken into consideration for deciding on the pool of items. Second, a team of researchers and professors reviewed the pool of items, and several iterations were carried out.

This stage resulted in the selection of 74 items, since 16 were deleted mainly due to either duplicity or lack of relevance for the target audience. This pool of 74 items represented fifteen Internet U&Gs, namely affection (Leung, 2001; Leung, 2003), connection (Cho et al., 2003; Johnson & Kaye, 2003), convenience and economy (Leung, 2007), coordination (Leung, 2007), entertainment (Diddi & LaRose, 2006; Grace-Farfaglia et al., 2006; Kaye, 1998; Leung, 2001; Leung, 2003; Leung, 2014; Johnson & Kaye, 2003; Kaye & Johnson, 2002; Kaye & Johnson, 2004; Kim & Haridakis, 2009; Papacharissi & Rubin, 2000), escape (Grace-Farfaglia et al., 2006; Leung, 2001; Leung, 2003; Kaye, 1998; Kim & Haridakis, 2009), exposure (Roy, 2009), global exchange (Roy, 2009), information seeking (Johnson & Kaye, 2003; Kaye & Johnson, 2002; Kaye & Johnson, 2004; Kim & Haridakis, 2009; Leung, 2014; Papacharissi & Rubin; Stafford et al., 2004), self-efficacy (Leung, 2009), social influence (Leung, 2007), socialization (Cho et al., 2003; Grace-Farfaglia et al., 2006; Johnson & Kaye, 2003; Kaye, 1998; Kaye & Johnson, 2002; Kaye & Johnson, 2004; Korgaonkar & Wolin, 1999; Leung, 2001; Leung, 2003; Stafford et al., 2004), social needs (Leung, 2004; Leung, 2009), user friendliness (Roy, 2009) and utility (Kaye & Johnson, 2004; Papacharissi & Rubin, 2000; Kaye & Johnson, 2002; Johnson & Kaye, 2003). Three high school teachers later reviewed the 74-item pool from which a further two items were deleted due to lack of relevance, leaving a total of 72 items. Fourth, a qualitative inquiry in the form of qualitative essays, focus discussions and informal interviews and observations was carried out in order to generate possible new items, if any. After this stage, 6 new items were added to the existing pool, which resulted in a 78-item pool, representing fifteen Internet U&Gs. Fifth, the developed pool of items was evaluated with the target population via a short pilot study with 25 adolescent Internet users (12 male and 13 female). Based on the pilot study feedback, the survey was updated and evaluated on a five-point Likert-scale ranging from 1 (strongly disagree) to 5 (strongly agree). It was felt that "Internet use" is a broad concept that might be difficult for young adolescents to interpret. Therefore, specific instructions were given to the study participants on the type of Internet use to be taken into consideration. The study participants were asked to consider overall Internet use while evaluating the instrument items, i.e. Internet use for academic as well as leisure purposes in a typical day.

### ***Demographics***

The study participants were asked to provide their demographic details, namely age (assessed using an open-ended question), gender (evaluated as Male = 1, Female = 2) and daily time spent on Internet use (evaluated using a fill-in question assessing daily Internet usage in hours and/or minutes). The mean age of the respondents was 14.88 (SD = 1.44) years where 61.3% (n = 1173) were male and 38.7% (n = 739) were female.





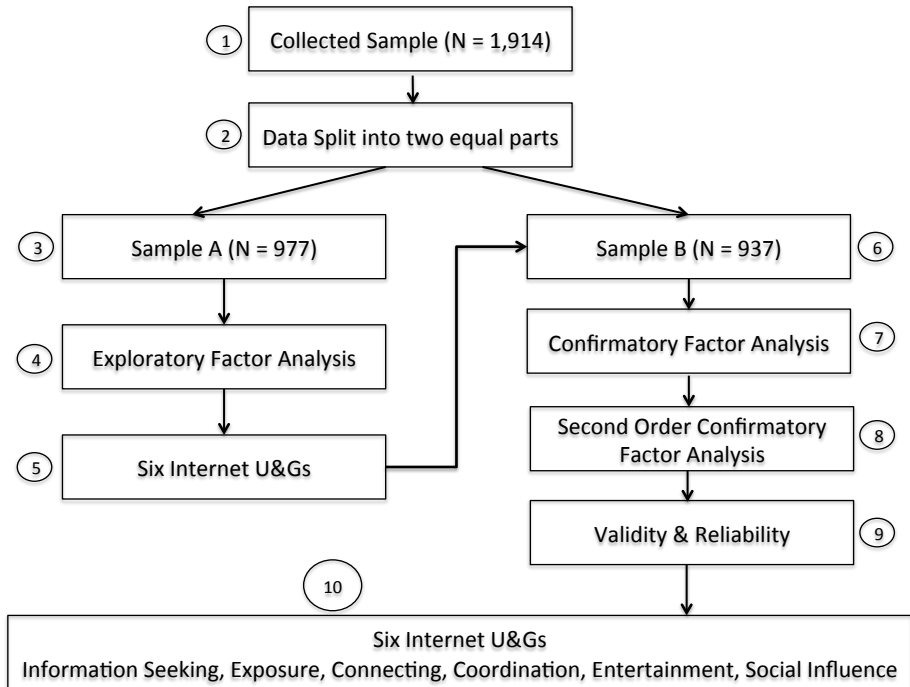
**Figure 11** Process of Internet U&G Instrument development

### 3.1.4 ANALYSES

A two-step approach suggested by Anderson and Gerbing (1988) was practiced for the development of the proposed gratification instrument. The collected sample was randomly split into two equal halves, namely sample A (n = 977), and sample B (n = 937). Sample A was utilized for performing EFA using the maximization likelihood (ML) method with “Promax rotation,” while sample B (n = 937) was used for confirming the six-factor solution using CFA with ML Estimation. Later, sample B was also utilized for second-order factor analysis, commonly utilized in instrument development (Parasuraman, Zeithaml, & Malhotra, 2005; Wu, Tao, Yang, & Li, 2012). Finally, different types of instrument validity and reliabilities, namely content, face, discriminant, convergent, concurrent validity, internal construct, and composite reliability were examined (see Figure 12).

### 3.1.5 RESULTS

Sample A was considered fit for performing EFA since it returned significant values ( $X^2 = 16469.5$ ,  $df = 496$ ,  $p < 0.01$ ) for the Bartlett's statistic test (Bartlett, 1954) and 0.93 (excellent) for the Kaiser-Meyer-Olkin (KMO) test (Kaiser, 1970). Afterwards, EFA was performed where the minimum threshold for the factor loadings was 0.50 (Chin, 1998; Hair, Anderson, Tatham, & Black, 2006). The EFA concluded a six-factor solution based on the Kaiser Criterion (eigenvalue  $> 1.0$ ) where the solution explained 67.58% of the total variance for Internet U&Gs. The six-factor solution was confirmed using sample B, and it also returned a good model fit ( $X^2/df = 3.74$ , CFI = 0.93, GFI = 0.91, TLI = 0.93, RMSEA = 0.05) (Anderson & Gerbing, 1988; Byrne, 2001; Hu & Bentler, 1999). Later, the second-order factor analysis confirmed that the second-order construct "Internet gratification" could represent six underlying first order constructs (i.e., Internet U&Gs) because of a good model fit ( $X^2/df = 3.98$ , CFI = 0.93, GFI = 0.90, TLI = 0.92, RMSEA = 0.06). All six gratifications had satisfactory  $\alpha$  values and the 27-item instrument had excellent ( $\alpha = 0.92$ ) internal reliability (DeVellis, 2003; Tavakol & Dennick, 2011). It was also found that the 27-item scale possesses strong discriminant, convergent, and concurrent validity, and excellent internal, construct, and composite reliability.



**Figure 12** Different phases of analysis

### 3.1.6 DISCUSSION

The present study has examined the prior U&G literature and outlined various limitations of the U&G theory in general, and the Internet U&G literature specifically. To address some of the open research gaps, a 27-item instrument for examining different Internet U&Gs among adolescent Internet users was developed and psychometrically validated with 1,914 adolescent Internet users. The developed instrument consisted of six gratifications that also satisfy the three dimensional classification (i.e., content, process, and social gratifications) of Internet U&Gs proposed by Stafford, et al. (2004). According to this framework, information seeking and exposure are termed content, entertainment and social influence are referred to as process, and connection and coordination gratifications are termed social gratifications. The present study sought to find new gratifications of a specific medium, i.e. the Internet, instead of just mirroring gratifications identified in earlier media U&G studies. Comparing our instrument with prior available instruments, e.g. the Internet motives scale (Papacharissi & Rubin, 2000) and the Television viewing motivation scale (Rubin, 1983), it was found that the prior counterparts did not address exposure, social influence, or coordination gratifications. In addition, the gratifications of information seeking, entertainment and connecting continue to dominate the Internet U&Gs landscape since they are relevant for both the newly developed as well as the older gratification instruments. Study I utilized one of the most comprehensive pools of items for developing an instrument that examines the gratifications of adolescent Internet users, who are less studied according to a review of the prior Internet U&G research.

The main limitation of this study was that the instrument was developed three years ago, and the structure of Internet U&Gs might also have changed with time. The Internet has been continuously evolving, and newer Internet-based services are emerging. For example, when this study was undertaken in May 2012, synchronous communication agents such as mobile IM applications (e.g., Viber, WA) were not visible in the Indian market. However, at present, IMs such as WA are very popular and play a dominant role in the adolescent Internet user market. Therefore, there is a need to update this instrument based on the changing nature of services available on the present day Internet.

## 3.2 STUDY II

### 3.2.1 AIMS

The aim of Study II was to investigate the conceptual linkages shared between adolescent users' background characteristics, sought Internet U&Gs, and IA. The specific objectives of this study were to examine adolescent users' background characteristics and Internet U&Gs in discriminating Internet addicts and non-addicts. In addition, the relative influences of adolescents' demographic profile, technology accessibility status, unwillingness to communicate attributes and Internet U&Gs in predicting IA were examined.

### 3.2.2 PARTICIPANTS AND PROCEDURE

A total of 1,914 adolescent Internet users representing 10 junior and senior high schools from four cities in North-western India participated in a cross-sectional study. The study sample was the same as that used in Study I.

### 3.2.3 MEASURES

#### *Internet Gratifications*

The 27-item Internet gratification instrument developed in Study I was used as the study measure. The instrument represents six Internet U&Gs, namely information seeking ( $\alpha = 0.86$ ), exposure ( $\alpha = 0.87$ ), connecting ( $\alpha = 0.87$ ), coordination ( $\alpha = 0.87$ ), social influence ( $\alpha = 0.83$ ) and entertainment ( $\alpha = 0.88$ ) where the model fit was good ( $X^2/df = 3.74$ , CFI = 0.93, TLI = 0.93, RMSEA = 0.05). The instrument possesses excellent internal reliability ( $\alpha = 0.91$ ). Items are rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

#### *Demographics*

The study participants were asked to respond to six items addressing the demographic profile of adolescent Internet users. These items include age, gender (Male = 1, Female = 2), monthly family income (evaluated as below 20,000 INR = 1; 20,001 - 40,000 INR = 2; 40,001 - 60,000 INR = 3; Above 60,001 INR = 4), academic performance (assessed using Below 40% = 1; Between 41-60% = 2; Between 61-80% = 3; Above 80% = 4), parental attitudes towards Internet use (evaluated using Always supportive = 1; Support if limited = 2; Offended if I use too much = 3; Always get offended = 4), and change in school academic performance (CSP) after starting using the Internet (answered using Improved = 1; Unchanged = 2; Became worse = 3).

#### *Technology Accessibility*

A total of four items assessed the technology accessibility attributes of the adolescent Internet users. These are ownership of a personal computer (Yes = 1, No = 2), ownership of home Internet connectivity (Yes = 1, No = 2), daily

time spent on Internet use (an open-ended question to which participants can respond in hours and/or minutes) and Internet use experience (assessed using an open-ended question and answered in years and/or months). The mean daily time spent on the Internet was 1.78 (SD = 1.24) hours, and mean Internet use experience was 2.79 (SD = 1.73) years.

### ***Unwillingness to Communicate (UCS)***

The 20-item UCS was utilized to examine the unwillingness to communicate attribute among adolescent Internet users in a two-way communication process. The scale was composed of the 10-item UCS Approach Avoidance scale (UCS-AA) ( $\alpha = 0.75$ ), and 10 items of the UCS Reward-seeking scale (UCS-R) ( $\alpha = 0.70$ ). The 20-item scale was rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

### ***The Internet Addiction Test (IAT)***

The 20-item IAT was utilized to assess IA among adolescents and was rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The EFA using ML (with Varimax rotation) returned a single factor solution, which is consistent with the findings of recent IAT validations (Hawi, 2013; Panayides & Walker, 2002; Pontes, Patrão, & Griffiths, 2014). The single factor structure was also confirmed using parallel analysis (PA) (O'Connor, 2000), a scree-plot (Catell, 1966), and Velicer's Minimum Average Partial test (MAP) (Velicer, 1976). Later, CFA also returned a good model fit for the single factor solution ( $X^2/df = 1.44$ , CFI = 1.00, GFI = 0.99, RMSEA = 0.02). The cumulative IAT score was calculated by adding the score for all 20 items, and the mean IAT score for the participants was 36.28 (SD = 21.39). The scale possesses very good internal consistency ( $\alpha = 0.88$ ). The participants with an IAT score of 70 or above out of 100 were termed "Internet addicts", consistent with the recommendations of prior literature (Meerkerk et al., 2009; Young, 1998).

## **3.2.4 ANALYSES**

Pearson correlation was performed to examine the relationship between IAT scores, demographic variables (age, family monthly income, academic performance, parental attitudes towards Internet use and CSP), technology accessibility (daily Internet use and Internet use experience), UCS (UCS-AA, UCS-R) and the six Internet U&Gs. The relationship between IAT scores, gender, ownership of a personal computer and home Internet were examined through independent samples t-tests, Cohen's  $d$  and effect size  $r$ . Similarly, differences between Internet addicts and non-addicts with regard to demographics, technology accessibility, UCS, and sought Internet U&Gs were also examined through independent samples t-tests. Following this, logistic regression and hierarchical multiple regression were undertaken to determine the effect of the demographic variables, technology accessibility

status, UCS and Internet U&Gs on the likelihood that the given adolescent is an Internet addict, and predicting IAT scores among adolescents.

### **3.2.5 RESULTS**

The Pearson correlation analysis revealed that IAT shared very weak correlations with age, CSP, and Internet use experience, a medium negative correlation with academic performance, a weak positive correlation with parental control, and no relationship with family monthly income. Similarly, IAT shared medium positive correlations with UCS-AA, UCS-R, daily Internet use, coordination, social influence and connecting gratifications, a weak positive correlation with entertainment, and weak negative correlations with the information-seeking and exposure gratifications.

Independent samples t-test results revealed that Internet addicts are likely to be male adolescents, experience higher parental control, possess lower academic performance, possess a home Internet connection, spend more daily time on Internet use, experience more UCS-AA and UCS-R, and seek more coordination, social influence, entertainment and connecting gratifications than non-addicts. In contrast, Internet addicts and non-addicts did not differ in terms of their age, monthly family income, CSP, Internet use experience, computer ownership, or information seeking or exposure gratifications.

Logistic regression revealed that male adolescents with high UCS-AA, social influence, and connecting Internet U&Gs are likely to become Internet addicts. In comparison, none of the other study variables played any role in predicting the likelihood of adolescent Internet users being an Internet addict. The results of the hierarchical multiple regression analysis revealed that gender (male), daily Internet use, and connecting Internet U&Gs were the strongest predictor variables of IA scores. Other positive predictors were parents' attitudes towards Internet use, UCS-AA, UCS-R, social influence and coordination gratifications. In contrast, academic performance, information seeking, and exposure gratifications were significant negative predictors of IA scores. The demographic variables, technology accessibility attributes, UCS and Internet U&Gs explained 13.4%, 6.7%, 7.1% and 11% variance in the IA scores, respectively.

### **3.2.6 DISCUSSION**

The main objective of Study II was to examine the missing linkages shared between IA, adolescents' demographic profiles, technology accessibility attributes, UCS, and Internet U&Gs. In addition, the study aimed to identify the differences in the background characteristics and Internet U&Gs of Internet addicts and non-addicts. These investigations are important since the prior IA literature has stressed that the conceptual and theoretical links shared between IA and adolescents' background characteristics and Internet U&Gs are currently missing.

The gender differences in IA suggest that male adolescents experience greater freedom and access to Internet use than female adolescents (observed during field studies), which is consistent with the prior literature (Choi et al., 2009; Ferraro, Caci, D'Amico, & Blasi, 2007; Khazaal et al., 2008; Ko et al., 2005; Zhou, 2010). IA did not share any relationship with age, Internet use experience, or family monthly income. This could be due to the integration of Internet use in the school educational curricula, the high penetration of Internet use in Indian households (e.g., 81.8% of the study participants had personal home Internet), and the availability of anytime and anywhere Internet access and cheap computing devices. These findings are consistent with Leung (2004), who also suggested that after high Internet penetration, addicts and non-addicts do not differ in terms of their education or socio-economic norms. Similar to the prior IA research, our study also found that adolescents likely to experience higher IA are those who possess lower academic performance (Chou & Hsiao, 2000; Yang & Tung, 2007; Leung, 2014), have personal home Internet, have high daily Internet use (Billieux et al., 2011; Meerkerk et al., 2009; Yang & Tung, 2007; Chou & Hsiao, 2000; Leung, 2004) and experience strict ICT parenting at home (Yang & Tung, 2007).

The study results revealed that adolescents with higher UCS-AA and UCS-R scores tend to experience IA, and similarly, Internet addicts possess higher UCS-AA and UCS-R scores than non-addicts. These findings are consistent with earlier IA literature, according to which Internet addicts utilize the Internet to attain high self-esteem (Peele, 1985), to communicate and connect (Kubey, Lavin, & Barrows, 2001), and experience shyness, depression and low self-esteem (Yang & Tung, 2007). The study results also suggest that adolescents seeking coordination, connecting, social influence and entertainment gratifications tend to experience IA. Similarly, Internet addicts seek higher social and process gratifications, which is consistent with Chou and Hsiao's (2000), Yang and Tung's (2007), Leung's (2014) and Song et al.'s (2004) findings.

The logistic regression results suggest that gender (male), daily time spent, UCS-AA, connecting and social influence gratifications successfully dichotomized Internet addicts and non-addicts. Similarly, hierarchical regression analysis confirmed that gender (male), strict ICT parenting at home, lower academic performance, high daily Internet time spent, high UCS-AA and UCS-R scores and higher Internet U&Gs (except entertainment) significantly predicted IA among adolescent users.

The main limitation of this research is that the arbitrary cut-off score of 70 or above was utilized to dichotomize Internet addicts and non-addicts. However, it is possible that this arbitrary score might not be able to successfully discriminate the addict from the non-addict sample. Therefore, in the future, statistical measures such as ROC curves and cluster hierarchical analysis must be adopted to find a suitable cut-off score for the sample.

### **3.3 STUDY III**

#### **3.3.1 AIMS**

The purpose of Study III was to examine the conceptual links between Internet U&Gs, Internet users' background characteristics, and heavy Internet use among adolescent Internet users (aged 12 to 18 years). The specific objectives of this study were to examine the role of Internet users' characteristics and Internet U&Gs in discriminating light and heavy Internet users. In addition, the relative influences of adolescents' demographic profile, technology accessibility status, and unwillingness to communicate attributes in predicting Internet U&Gs were examined.

#### **3.3.2 PARTICIPANTS AND PROCEDURE**

The study participants and procedure were the same as in Studies I & II.

#### **3.3.3 MEASURES**

The measured constructs were the same as those utilized in Studies I & II.

##### ***Internet Gratifications***

The 27-item Internet gratification instrument developed in Study I was utilized here.

##### ***Demographics***

The demographic measures were the same as those in Study II.

##### ***Technology Accessibility***

The technology accessibility measures were the same as those in Study II.

##### ***Unwillingness to Communicate (UCS)***

The unwillingness to communicate measure was the same as that in Study II.

#### **3.3.4 ANALYSES**

Pearson correlation analysis was performed to examine the relationship shared between six different Internet U&Gs and demographics (age, monthly family income, academic performance, parental attitudes towards Internet use, and CSP), technology accessibility (daily time spent on Internet use and Internet use experience), and unwillingness to communicate (UCS-AA, UCS-R). The strength of the correlations was examined by calculating Cohen's *d* and effect size (*r*). Independent t-tests were performed to examine gender differences and differences in the adolescents with and without a personal computer and home Internet connectivity in the sought Internet U&Gs. Following this, logistic regression analysis was performed to discriminate



heavy and light Internet users. This was carried out in order to examine the relative influence of demographic variables, technology accessibility attributes, UCS-AA and UCS-R scores, and Internet U&Gs on the likelihood of a given adolescent being a heavy user. Afterwards, hierarchical multiple regressions were performed in order to examine the relative influence of demographics, technology accessibility, UCS-AA and UCS-R among adolescent Internet users in predicting different Internet U&Gs.

### **3.3.5 RESULTS**

The Pearson correlation results showed that age, CSP, parental attitudes toward Internet use, monthly income, and Internet use experience shared either no relationship or very weak correlations with all six Internet U&Gs. Male adolescents tend to seek high social influence and social gratifications (connecting and coordination), while female adolescents seek more content gratifications (information seeking and exposure). Academic performance shared weak correlations with information seeking, exposure, and social influence, and no relationship with the rest of the Internet U&Gs. Daily Internet use shared weak correlations with connecting and social influence and no significant relationships with the other Internet U&Gs.

The independent t-test results suggest that Internet users with a personal computer tend to seek higher social and entertainment gratifications than those without one. Similarly, Internet users with a personal home Internet connection tend to seek higher content, process, and social gratifications than those without home Internet. The UCS-AA and UCS-R measures shared medium positive correlations with connecting, coordination, and social influence and a weak correlation with entertainment gratifications.

The Internet users who spent more than 1 hour per day were classified as heavy users while the others were referred to as light users. The logistic regression analysis results revealed that age, gender (Male), Internet at home, Internet use experience, connecting gratification and UCS-AA were all positive predictors of heavy Internet use. In comparison, academic performance, UCS-R, information seeking, and CSP were negative predictors. Similarly, the results of the hierarchical multiple regressions revealed that older, female adolescents, those with higher academic performance, and adolescents with higher UCS-R scores tend to seek content gratifications. In comparison, older, male adolescents, higher academic performers, and those with higher UCS-AA and UCS-R scores tend to seek higher social gratifications. Similarly, males, and adolescents with high UCS-AA and UCS-R scores tend to seek process gratifications.

### **3.3.6 DISCUSSION**

The study results show that age, family monthly income, and Internet use experience shared no relationship with U&G, which is consistent with the

findings of Kaye and Johnson (2004) and Leung (2003). The possible reasons could be integration of Internet use in the school curriculum, due to which all adolescents are equally exposed to Internet use both inside and outside school, the development of the Internet infrastructure, the availability of cheap computing resources, and affordable Internet access. Likewise, possible reasons behind the gender differences could be that male adolescents experience greater autonomy and freedom to use the Internet, and the societal and family level pressure experienced by female adolescents in India. Internet U&Gs shared no relationship with parental attitudes towards Internet use or CSP. The possible reasons could be that both variables were evaluated using a single item that might not be able to measure the underlying concept, and the popular stereotype prevalent in Indian schools that Internet use always has a positive impact on academic performance and learning, due to which adolescents might feel that their academic performance has improved, even if it has not in reality.

As for academic performance, it was found that it did not share significant relationships with social or process gratifications, and adolescents with strong academic performance tend to seek high content gratifications. The possible reasons could be that high scoring adolescents utilize the Internet to seek more and more content gratifications so that they score even higher in their studies. It was also observed that there is a popular belief among Indian adolescents propagated by teachers that Internet use should focus only on academic use. Adolescents with home Internet tend to utilize the Internet more (Grace-Farfaglia et al., 2006). However, home Internet connectivity is not a prerequisite for seeking higher content gratification since most schools provide Internet access inside the school for academic reasons, and adolescents without Internet at home can visit Internet cafes for the satisfaction of their content gratifications. Similarly, adolescents with a home computer tend to seek higher social and entertainment gratifications, but no relationship was found with either content or social influence gratifications. The possible reasons could be that personal computers provide an additional communication and entertainment channel for adolescents, and Internet connectivity is a prerequisite for accessing social gratifications. The results for daily Internet time spent show that connecting with new friends and maintaining existing social bonding requires more Internet use time (LaRose & Eastin, 2004), while seeking content gratifications does not result in an increase in daily Internet time spent.

The possible reason behind adolescents with higher UCS-AA and UCS-R scores seeking high social and process gratifications could be that they are more comfortable meeting people online than in real life (Sheldon, 2008), and experience higher social activity and interpersonal gratifications (Papacharissi & Mendelson, 2000) via this medium. The results for the discrimination of heavy and light Internet users and prediction of content, process and social gratifications are consistent with the findings of prior IA literature (Ko, 2000; Leung, 2003; Roy, 2009; Wallace, 1999).

## 3.4 STUDY IV

### 3.4.1 AIMS

The aim of Study IV was to examine the psychometric properties of the 14-item CIUS with adolescents. This is a relatively short instrument for the assessment of CIU. The study also examined the relationships among the CIUS, demographics, ICT accessibility, and problematic ICT use among adolescents.

### 3.4.2 PARTICIPANTS AND PROCEDURE

A total of 2,369 adolescents (aged 12-19 years) from 10 private junior and senior high schools participated in the study (November – January, 2014). A paper-and-pencil self-reporting survey was administered in English. Study participation was kept voluntary and anonymous. The first author, along with one or more schoolteachers, administered and managed the survey answering sessions in the classrooms settings. Before the actual survey, a short pilot study was carried out with 25 adolescent Internet users, and the survey was updated based on the pilot study feedback. Participants were clearly informed of the study objectives, research questions and anticipated outcomes. A total of 59.6% (N = 1,412) participants were male and 40.1% (N = 950) were female adolescents, the mean age of the respondents was 14.5 (SD = 1.26) years, and the mean CIUS score was 32.5 (SD = 10.2).

### 3.4.3 MEASURES

#### ***The Internet Addiction Test (IAT)***

The 20-item IAT was evaluated using a five-point Likert-type scale (strongly disagree = 1; to strongly agree = 5). The IAT was utilized in order to examine the concurrent validity of the CIUS.

#### ***The Compulsive Internet Use Scale***

The 14-item CIUS was evaluated on a five point Likert scale anchored at never = 0 to very frequently = 4. Three modifications were made to the original CIUS so as to address the target user group, i.e. adolescent Internet users. These modifications were: Item 3: “How often do others (e.g., partner, children, parents)” was changed to “How often do others (e.g., friends and family)”, Item 4: “spending time with others (e.g., partner, children, parents)” was changed to “others (e.g., friends and family)” and Item 10: “do you rush through your (home) work” to “rush through your homework/schoolwork”. These three modifications are in accordance with the recommendations of the earlier IA literature (Khazaal et al., 2011; Van der Aa et al., 2009).

### ***Demographics***

The study respondents answered a total of five demographic variables including: age, gender, economic status (evaluated as difficult = 1 to rich = 4), academic performance (refers to the grade or percentage received in the last annual exams and assessed as below 40% = 1 to above 80% = 4), and satisfaction with life (refers to the current level of satisfaction with life and was assessed using a five point Likert-type scale, anchored as completely dissatisfied = 1 to completely satisfied = 5).

### ***ICT Accessibility***

A total of seven items assessed the adolescents' ICT accessibility. These were Internet at home (Yes = 1; No = 0), mobile phone ownership (Yes = 1; No = 0), mobile phone Internet (Yes = 1; No = 0), daily Internet use (assessed using: <1 hour = 1; 1–3 hours = 2; 3–5 hours = 3; 5–7 hours = 4; >7 hours = 5), total years of Internet use experience (evaluated as: <1 year = 1; 1–2 years = 2; 2–4 years = 3; 4–6 years = 4; more than 7 years = 5), overall Internet activity (assessed using: Don't use much = 1; Less active = 2; Neutral = 3; Active = 4; Very active = 5), and frequency of excessive Internet use (examined using: Never = 1; Rarely = 2; Sometimes = 3; Very often = 4; Always = 5).

### ***Problematic ICT use***

A total of three survey items assessed problematic ICT use among adolescent Internet users. These included problematic use of the Internet mobile phone and online gaming. All three variables were assessed using a four-point Likert-type scale (Unproblematic = 1; Low problem = 2; Medium problem = 3; High-level problem = 4).

## **3.4.4 ANALYSES**

This study examined the various psychometric properties of the CIUS including its normal distribution (calculating skewness and kurtosis) and Z-score calculation to determine outliers (if any). It also examined the reliability and homogeneity, and carried out exploratory and CFA to reveal the internal factorial structure, and later confirmed this structure using goodness of model fit indices, and various types of CIUS validities and reliabilities. Pearson correlation and independent samples t-tests were also performed to examine the relationships among the CIUS, demographics, ICT accessibility and problematic ICT use. Multiple hierarchical regression was performed to predict the relative influences of demographics, ICT accessibility, and problematic ICT use in predicting the CIUS scores of the adolescents.

### 3.4.5 RESULTS

The study results revealed that the 14-item CIUS possesses high internal consistency ( $\alpha = 0.87$ ) (Cronbach & Meehl, 1955; DeVellis, 2003; Khazaal et al., 2011; Streiner, 2003). The  $\alpha$  value was utilized to calculate the index of measurement error ( $1 - [\text{Square of } (\alpha)]$ ) (Tavakol & Dennick, 2011), and the CIUS returned a very small (0.23) measurement error value. The EFA of the 14-item CIUS was carried out since there do not exist any a priori factorial structures for the English version of the CIUS (previous CIUS validations were carried out in Dutch, German, Arabic, French, Japanese and Persian). Before performing EFA, the entire sample ( $N = 2,369$ ) was divided into two nearly equal sets, that is, Sample A ( $n = 1,161$ ) was utilized for the EFA and Sample B ( $n = 1,208$ ) was used for the CFA. Sample A returned a very good value of 0.91 for the KMO (Kaiser, 1970) test and a statistically significant ( $X^2 = 5193.12$ ,  $df = 91$ ,  $p < 0.01$ ) result for Bartlett's test for sphericity (Bartlett, 1954). The EFA of the CIUS was performed using the ML algorithm with Varimax rotation, and the threshold for item loadings was kept at 0.40 (except for Item 8). Based on the Kaiser criterion (i.e., eigenvalue  $> 1.0$ ), a two-factor solution was extracted. However, Velicer's MAP (O'Connor, 2000), PA with optimal implementation (Velicer, 1976) and Catell's scree test (Catell, 1966), all confirmed a single factor solution. Later, CFA was performed to confirm the single factor solution using two different models, namely Model A (correlation between residual error terms was not permitted) and Model B (correlation between residual error terms was permitted) similar to the prior CIUS literature (Khazaal et al., 2011; Khazaal et al., 2012; Meerkerk et al., 2009; Wartberg et al., 2014). Model A returned a mediocre model fit ( $X^2/df = 10.61$ , CFI = 0.86, GFI = 0.90, TLI = 0.84, RMSEA = 0.09), while Model B returned a good model fit ( $X^2/df = 4.37$ , CFI = 0.95, GFI = 0.96, TLI = 0.94, RMSEA = 0.05) (Browne & Cudeck, 1993; Hu & Bentler, 1999; Kline, 2011). Examination of instrument validity and reliability showed that the CIUS possesses sufficient content validity, construct reliability ( $\alpha = 0.87$ ), and face and concurrent validity ( $r$  (IAT, CIUS) = 0.75,  $p < 0.01$ ).

The Pearson correlation analysis results showed that the CIUS shared a weak correlation with age ( $r = 0.17$ ,  $p < 0.01$ ), satisfaction with life ( $r = -0.15$ ,  $p < 0.01$ ), academic performance ( $r = -0.17$ ,  $p < 0.01$ ), mobile phone ownership ( $r = 0.25$ ,  $p < 0.01$ ), mobile Internet connectivity ( $r = 0.24$ ,  $p < 0.01$ ), Internet use experience ( $r = 0.19$ ,  $p < 0.01$ ), problematic Internet use ( $r = 0.27$ ,  $p < 0.01$ ) and problematic mobile phone use ( $r = 0.14$ ,  $p < 0.01$ ). Similarly, the CIUS shared a medium positive correlation with daily time spent on Internet use ( $r = 0.35$ ,  $p < 0.01$ ), excessive Internet use ( $r = 0.35$ ,  $p < 0.01$ ) and overall Internet activity ( $r = 0.31$ ,  $p < 0.01$ ). However, in comparison, the CIUS shared a very weak relationship with economic status ( $r = 0.05$ ,  $p < 0.01$ ), Internet connectivity at home ( $r = 0.08$ ,  $p < 0.01$ ) and problematic online gaming ( $r = 0.07$ ,  $p < .01$ ). Finally, the t-test results revealed that male adolescents ( $t = 11.09$ ,  $p < 0.01$ , Cohen's  $d = 0.47$ , effect

size ( $r$ ) = 0.23,  $M$  ( $SD$ ) = 34.37 (10.01) tend to experience higher CIU than female adolescents ( $M$  ( $SD$ ) = 29.72 (9.97)).

The results of the multiple hierarchical regression showed that older, male adolescents, lower academic performance, lower life satisfaction, higher daily Internet use, high Internet activity, experiencing excessive Internet use, and problematic Internet use tend to condition CIU among adolescents. The study variables explained 31.1% of the variance in CIU, whereas ICT accessibility explained the greatest share with 17.7% of the variance explained.

### **3.4.6 DISCUSSION**

The present study has shown that the CIUS possesses good psychometric properties and is a valid and reliable self-reporting instrument for the assessment of CIU. The present study resulted in a single factor solution for the CIUS; thus, it also confirmed the results of previous CIUS validations carried out in different languages and cultures. Almost all prior CIUS validations were carried out with a broad age group of Internet users (e.g., Guertler et al., (2014) considered a mean age of 35.24 years in the German CIUS, while 15 to 25 years, 16 to 45 years and 11 to 80 years were considered in the Arabic, French and Dutch CIUS versions respectively. Only Wartberg et al. (2014) focused on the subset of adolescent Internet users, i.e. those aged 14 and 17 years.). In contrast to the earlier CIUS literature, the present study performed its psychometric validation by involving the complete age range of adolescent Internet users (12 to 19 years old). In this way, the study results are transferable to the entire age group of adolescents. The study results also confirm the findings of earlier IA literature, e.g. compulsive Internet users tend to experience low life satisfaction (Wartberg et al., 2014), adolescents with lower academic performance tend to experience CIU (Chou & Hsiao, 2000; Leung, 2009; Leung, 2014; Yang & Tung, 2007) and male adolescents are more vulnerable to IA than female adolescents (Billieux et al., 2011; Choi et al., 2009; Ferraro et al., 2004; Ha et al., 2007; Ko et al., 2005). According to the study findings, older adolescents are more susceptible to IA than their younger counterparts. Possible reasons could be that older adolescents experience greater autonomy and freedoms in terms of Internet use, and due to the integration of Internet use in the school curriculum, older students have greater opportunities to use the Internet in their school routine. Other findings include: CIU does not share any relationship with the economic status of the participants (e.g., very weak correlation); the possible reasons could be the availability of low-cost computing devices, cheaper and affordable Internet access, and, since the majority of the study participants were from low to middle income families, differences in their economic status were not visible. As for the relationship between ICT accessibility and the CIUS, it was found that adolescents with a personal mobile phone, mobile Internet, high daily Internet time, and more Internet experience tended to experience CIU. A possible reason could be that the anytime and

anywhere Internet access makes adolescents vulnerable to IA. Similarly, it was also found that adolescents experiencing problematic Internet and mobile phone use are in fact more vulnerable to CIU. Furthermore, the results of the multiple hierarchical regressions also confirm the moderating role of the aforementioned variables.

The main limitation of this study was that only private English school attending adolescents were recruited. Additionally, most of the study participants have a similar socio-economic status. Therefore, in future studies, a representative sample of adolescents should be studied including adolescents attending public and private schools from very low as well as very high economic status families.

## **3.5 STUDY V**

### **3.5.1 AIMS**

The aim of Study V was to develop WA addiction scales for examining compulsive WA use among adolescents (aged 12 to 19 years). Recent literature on IA suggests that individuals actually become addicted to specific Internet activities rather than to the Internet itself. To address this need for activity specific assessment, three popular IA assessment instruments, namely the Internet addiction test (IAT), the CIUS and the BFAS, were adapted and validated to assess WA addiction. A unified WA addiction scale (comprising all three adapted instruments) and shorter versions of each adapted instrument were also prepared.

### **3.5.2 PARTICIPANTS AND PROCEDURE**

The study participants were 405 adolescent WA users enrolled in eighth to twelfth grades with a mean age of 14.8 years ( $SD = 1.12$ ). A total of 77.5% ( $N = 306$ ) of the participants were male and 22.5% ( $N = 89$ ) were female. The participants were recruited from seven junior and senior high schools from six cities in North-western India. The participating schools were private, and cater to students from lower to upper middle economic status families. A paper-and-pencil questionnaire was administered in English since the participating schools use English as the language of instruction and communication. A short pilot study with 15 target users followed by an informal interview were performed in order to ensure the content validity of the study measures. The pilot study and expert review of the instrument (by researchers, university professors and high school teachers) ensured the face validity of the adapted instruments. Participants answered the updated self-report questionnaire in the classroom environment.

### **3.5.3 MEASURES**

#### ***WA Addiction Test (WAT)***

The 20-item IAT was adapted to assess WA addiction, and was rated on a five-point Likert-scale ranging from 1 (strongly disagree) to 5 (strongly agree). In the adapted instrument, only one modification was made, i.e. “email” was changed to “WA” in the “IAT 7: Do you use email before something else that you need to do”. Furthermore, in all the rest of the IAT stems, “Internet” was changed to “WA,” which is consistent with the recommendation of prior literature (Khazaal et al., 2011). Earlier IAT literature revealed discrepancies in the different dimensions represented by the IAT; however, most recent studies have revealed that it possesses a single



dimension representing “IA” (Hawi, 2013; Khazaal et al., 2008; Korkeila, Kaarlas, Jääskeläinen, Vahlberg, & Taiminen, 2010). Due to this reason, it is theorized that the WAT should also have a single factor solution. The mean WAT score for the study participants was 46.3 (SD = 15.95).

### ***Compulsive WA Use Scale (CWUS)***

The 14-item CIUS was adapted to assess compulsive WA use, and was rated on a five-point Likert-scale ranging from 1 (strongly disagree) to 5 (strongly agree). In the adapted instrument, no major modification was made besides changing “Internet” to “WA”. The theorized dimensions of CIUS are loss of control (Items 1, 2, 5 & 9), conflict (Items 3, 8, 10 & 11), withdrawal symptoms (Item 14), preoccupation (Items 4, 6 & 7) and coping or mood modification (Items 12 & 13) (Meerkerk et al., 2009). The mean CWUS score was 33.6 (SD = 9.84).

### ***The Bergen WA Addiction Scale (BWAS)***

The 18-item BFAS was adapted to assess WA addiction among adolescent WA users. In the adapted instrument, “partner, family members, friends” was changed to “friends/family” in the “BFAS 18: You have ignored partner, family members, friends”. In addition, “Facebook” was changed to “WA”. These changes were consistent with the prior literature (Khazaal et al., 2011; Van der Aa et al., 2009). The dimensions of the original BFAS are salience (Items 1, 2, 6, 3), conflict (Items 16, 17 & 18), mood modification (Items 7, 8 & 9), tolerance (Items 4, 5 & 6), withdrawal (Items 13, 14 & 15) and relapse (Items 10, 11, 6, 12) (Andreassen et al., 2012). The adapted scale was rated on a five-point Likert-scale ranging from 1 (strongly disagree) to 5 (strongly agree). The mean BWAS score was 40 (SD = 13.61).

### ***Daily WA use***

The study participants were asked to report their daily time spent on WA use in hours and/or minutes in response to an open-ended question. The mean daily time spent on WA use was 2 hours (SD = 2.0).

## **3.5.4 ANALYSES**

The psychometric properties of each of the adapted instruments were examined by outlining a common process for statistical treatment. The statistical tests involved examining skewness and kurtosis to confirm the normal distribution of the data, the percentage of missing data points, Z-scores for outliers, Cronbach's alpha ( $\alpha$ ) for internal reliability, index of measurement error, alpha if Item deleted and corrected item-total correlation values for confirming homogeneity. Afterwards, the EFA was performed after confirming with the KMO test (Kaiser, 1970), and Bartlett's sphericity tests (Bartlett, 1954). Following this, the returned factorial solution was confirmed using CFA with ML estimation. The adapted

instruments fulfilled various types of instrument validity and reliability including face, concurrent and nomological validity, and construct reliability. In addition, a shorter version of each of the adapted instruments and a unified scale based on three short WA addiction scales were also prepared.

### 3.5.5 RESULTS

The study results confirmed that the three adapted instruments possess good psychometric properties, e.g. skewness and kurtosis were in the acceptable range of  $\pm 1$  (Byrne, 2001; George & Mallery, 2003; Hair et al., 1998), there was very little missing data, no outliers, very good to excellent internal reliability, low measurement error, stable  $\alpha$  and sufficient homogeneity in the instrument stems. The results of EFA, PA, MAP, and a scree test confirmed the one-factor solution for all three adapted instruments. Afterwards, the one-factor solution was reconfirmed using CFA. Two different models, namely Model A (without correlation of error variances), and Model B (with correlation of error variances), were estimated as per the recommendation of the prior literature (Meerkerk et al., 2009; Wartberg et al., 2014). Model A returned a mediocre fit while Model B returned a good model fit for each of the adapted instruments. The adapted instruments possess sufficient concurrent validity since medium positive correlation between instruments and daily time spent on WA use exists (WAT ( $r$ ) = 0.37, CWUS ( $r$ ) = 0.32, BWAS ( $r$ ) = 0.33,  $p < 0.01$ ), consistent with the prior literature (Khazaal et al., 2011; Meerkerk et al., 2009). In addition, nomological validity was also present, since all three instruments were highly correlated with each other as they present theoretically related concepts, e.g. WAT & CWUS ( $r = 0.65$ ,  $p < 0.01$ ), BWAS & CWUS ( $r = 0.81$ ,  $p < 0.01$ ) and WAT & BWAS ( $r = 0.78$ ,  $p < 0.01$ ). The adapted instruments also possess “very good” to “excellent” internal consistency, e.g. WAT ( $\alpha = 0.93$ ), CWUS ( $\alpha = 0.85$ ) and BWAS ( $\alpha = 0.92$ ).

Those instrument items with a low factor loading ( $< 0.45$ ), high standardized residuals (representing overlapping content) and low squared multiple correlations (representing low contribution to the underlying concept) were deleted in order to develop a shorter version of each of the three adapted instruments. This resulted in the development of the 14-item short WAT (s-WAT) ( $X^2/df = 1.59$ , CFI = 0.98, TLI = 0.98, RMSEA = 0.04,  $\alpha = 0.89$ ), the 8-item short CWUS (s-CWUS) ( $X^2/df = 2.48$ , CFI = 0.96, TLI = 0.95, RMSEA = 0.06,  $\alpha = 0.81$ ) and the 10-item short BWAS (s-BWAS) ( $X^2/df = 2.30$ , CFI = 0.97, TLI = 0.96, RMSEA = 0.06,  $\alpha = 0.87$ ). All three short instruments possess excellent model fit. Subsequently, the short version of each instrument was utilized to develop a 16-item unified WA addiction instrument with good model fit ( $X^2/df = 1.69$ , CFI = 0.97, TLI = 0.97, RMSEA = 0.04) and excellent internal consistency ( $\alpha = 0.92$ ).

### 3.5.6 DISCUSSION

Relatively recent IA research has emphasized that individuals become addicted to specific Internet activities rather than to the Internet itself. There is thus a need to shift the focus of IA research from “general Internet use” to “specific Internet activities” that result in IA conditioning. This can be supported by adapting existing IA assessment instruments to assess addiction due to specific Internet activities. To address this need and bridge the existing gap in the literature, the present study has developed three instruments to assess WA addiction among adolescents by adapting three popular IA instruments (i.e., IAT, CIUS and BFAS). All three adapted instruments resulted in a single factor solution, which is consistent with the recent psychometric validations of the original instruments, i.e. the IAT and the CIUS. The present study provides statistical evidence suggesting that the adapted instruments, namely the WAT, the CWUS and the BWAS, are valid and reliable self-reporting instruments for screening WA addiction among adolescents. Therefore, the present study results provide better understanding of addiction due to Internet-specific activities.

The shorter version of each adapted instrument was prepared because it is not always practical for researchers to utilize long scales because they might have to utilize other instruments; participants’ fatigue is also a concern. In addition, the result of the CFA showed that certain item pairs from each instrument possess very high-standardized residuals. This suggests that these item pairs have overlapping content. Furthermore, a shorter scale is likely to produce a clearer factor structure when combined with other constructs. Similarly, all three shorter scales were utilized for developing a 16-item unified WA addiction assessment scale. It is likely that other researchers will rarely use all three adapted scales in isolation; hence, it is important for the research community to understand how these three short scales perform when used in combination. In addition, the unified scale eliminated those items with poor discriminant validity, thus further improving the validity of the comprehensive scale.

The main limitation of the present study is that adolescent WA users were only recruited from private English schools and from low to upper middle-income families. For this reason, future studies must also include adolescent users from public schools and also those who are economically disadvantaged.

## 4 DISCUSSION

The overall aim of this thesis was to understand the conceptualization of “IA” or “CIU,” terms used interchangeably. The nature and conceptualization of IA have been studied by exploring and quantifying what IA is, and how it can be measured. IA or CIU refers to the psychopathological state when an Internet user spends more time than they originally intended online, despite knowing the obvious consequences of their excessive use (e.g., missing an important work related deadline, loss of sleep, lower academic performance, etc.) (Young, 1996). To gain further understanding of the nature of IA, the theoretical framework of U&G theory was utilized. The relationship between IA, Internet U&Gs, and adolescent users’ background characteristics (demographics, technology accessibility and unwillingness to communicate attributes) were examined, and the differences in heavy and light Internet users and Internet addicts and non-addicts were explored. Measurement instruments were developed and validated with adolescent Internet users, including a new 27-item instrument for examining Internet U&Gs, the 14-item CIUS for the assessment of CIU, and three modified IA instruments for the assessment of addiction due to specific Internet applications (e.g., WA, an IM application in the present study). In the following, the main results of each of the five studies with reference to the five research questions are presented.

## **4.1 THEORETICAL IMPLICATIONS**

The main theoretical implications of this thesis can be summarized in three main points. First, the studies attempt to bring a greater understanding of the conditioning of IA among adolescent Internet users by examining its relationship with Internet U&Gs and user background characteristics. Specifically, the thesis work addresses the relative influence of Internet U&Gs and Internet users' background characteristics (demographics, technology accessibility and unwillingness to communicate), which were otherwise ignored in the prior research that attempted to predict CIU among adolescents. There are only a few examples of empirical studies that have actually examined the relationship between IA, Internet U&Gs, and IA and users' background characteristics separately. For a long time, IA researchers have advocated the need for more holistic and rigorous studies that can combine more background characteristics of Internet users (i.e., not just age, gender and socio-economic status), especially aspects related to technology accessibility and personality-related attributes. This need is served to some extent by the present thesis work. It can be concluded from the study results that some adolescents are more vulnerable than others to CIU, e.g. adolescents seeking more social gratifications, social influence, higher reward seeking and approach avoidance, lower academic performance, strict ICT parenting at home, and those who spend a great deal of time each day on Internet use.

Second, the present thesis has added clarity to utilizing the U&G theory to examine gratifications of media use by making use of quantitative research methodologies. Earlier U&G-based research literature has criticized the U&G theory and related framework because of its various inherent limitations, e.g. it provides only a high-level framework, does not provide a list of items or constructs that can be readily utilized by researchers. Furthermore, the U&G-based items or constructs could be problematic for users, e.g. they might face problems understanding and also explaining the different underlying reasons for their own media use. Due to these underlying limitations, most earlier IA and Internet U&G studies have mirrored the gratifications constructs proposed by prior U&G research. This has resulted in a superficial treatment of the relationship shared between IA and Internet U&Gs, and potentially even created a research bias. The present study has not only brought the underlying methodological limitations in the existing literature to light, but has addressed them through well-planned and well-designed cross-sectional studies. The present study on Internet U&Gs not only addresses those limitations, but has also developed a complete research process of how to examine the U&Gs of media use, which can be a source of inspiration and guidance for other researchers and practitioners.

Third, the study enhances our understanding of the measurement of compulsive Internet and specific Internet activities. Although the psychometric validation of popular IA assessment instruments in other

languages and cultures alone might not be a novel addition to the body of knowledge, there are two main contributions of this work in the context of the measurement of IA, namely: (1) the relationship of CIU with an exhaustive set of demographic variables, ICT accessibility, and problematic ICT, which has been less studied; (2) The research examining compulsive use of specific Internet-based activities is still young and the area of research is emerging. Therefore, the WA addiction assessment instruments have contributed to this newly emerging field of research by providing more knowledge on addiction due to specific Internet activities.

The limitations of the present study include its methodological and conceptual restrictions, making it impossible to present a complete picture of the conceptualization and nature of CIU. This also leaves wide room for future research examining CIU and related conceptualization. However, given the constrained timeframe for this work, this thesis has successfully attained its objectives aligned with the study aims and research questions.

## **4.2 PRACTICAL IMPLICATIONS**

The present study resulted in several practical implications for a wide range of stakeholders in the area of adolescent well-being. These stakeholders include schools (e.g., school-related policy makers, teachers, counsellors and educational psychologists), researchers and practitioners interested in IA and/or adolescent well-being, parents, Internet-based service operating companies, and service and interface designers and product developers. Similarly, the research process followed in the study, which includes instrument development and validation, could act as a source of inspiration and guidance for other IA researchers and practitioners who are interested in developing similar assessment instruments.

Schools are considered important stakeholders of adolescent well-being since adolescents spend a considerable part of their time each day (e.g., 6-7 hours per day in India) inside the school premises. During our field studies in Indian schools (May 2012, December 2012, December 2013 & December 2014), school staff were worried that young adolescents are becoming more vulnerable to CIU (e.g., based on the teachers' observations inside the classrooms). However, ironically, schools, including the teachers, have no means to measure if a certain population of adolescents is in fact experiencing CIU. Mere observations, anecdotal evidence, and word-of-mouth negative publicity about Internet use do not produce any concrete results. To serve this desperate need of Indian schools, this research study was started in January 2012. Based on our extensive field studies, which also included one-to-one and one-to-many interaction with schoolteachers and students, it was found that schools really need a valid and reliable mechanism of screening or at least determining those who are more vulnerable to CIU. This need is fulfilled to some extent by the tested,

validated, and reliable self-reporting assessment instruments for CIU (including general Internet use and compulsive use of specific Internet activities, e.g. WA) developed as part of this thesis. These assessment instruments can be utilized for the quick and timely screening of compulsive Internet users, in addition to providing immediate feedback on the severity of one's own CIU. Because the developed instruments do not require any working knowledge of the clinical testing, they will be useful for counsellors, social workers, educators, parents, child psychologists and other clinical practitioners, if the users are provided with sufficient knowledge of how to calculate the cut-off score and associated interpretations. Proper interventions must be devised so that affected adolescents can be given proper counselling and psychiatric help to recover from this psychopathological state. Parents must provide the needed support, exercise vigilance over excessive Internet use among their children, and suggest alternatives to control excessive usage, e.g. encouraging more outdoor activities, replacing excessive Internet use with other forms of technology use or leisure activities. Policy makers, educational diagnosticians, and practicing psychiatrists could utilize our study results to develop new policies to control rising CIU among adolescents.

Similarly, the study findings on media U&Gs and particularly the 27-item Internet U&G instrument enable school teachers and educational psychologists to better understand the gratifications of technology and/or media use among adolescents. For example, this study explains some of the hidden motivations and reasons behind Internet use by adolescents. The study findings can also be extrapolated to understand the gratifications of social media (e.g., Facebook) and mobile IM applications, which at present are quite popular among adolescents. Based on the study findings on media U&Gs, teachers and educational psychologists must try to examine, re-assess, and even re-define their existing information technology (IT) based educational aids and existing IT support systems. There is a need to transform the existing educational IT support systems so that they become more interesting and enjoyable for adolescents. One practical example could be that of "collaborative blogging systems" which have only recently appeared in schools. These IT support systems are meant to enable students to present and discuss their learning experiences and subjects with peers. However, teachers commonly complain that such systems are not used voluntarily; rather, students are forced to make use of them. Furthermore, student retention is a challenge for teachers. If these blogging systems are transformed to support the various media gratifications sought by adolescents, e.g. information seeking, exposure, connecting and coordination, social influence and entertainment, then students might utilize these "blogging systems" voluntarily. At a conceptual level, these results also inform technology designers and developers. The development of Internet-based services should support the multiple underlying gratifications to ensure successful use and acceptance.

The study results on the linkages between IA, adolescents' background characteristics, and Internet U&Gs are of special relevance for schoolteachers, counsellors and psychologists. The study provides in-depth knowledge of the various conditioning reasons behind CIU and heavy Internet use. For example, the study presents a broader picture of how Internet addicts and non-addicts differ in their background characteristics and sought Internet U&Gs, which adolescents are more vulnerable to IA than others, and when Internet U&Gs turn into the conditioning for IA. The study results show that content Internet U&Gs do not, contribute to the conditioning of IA among adolescents, while social gratifications do. Therefore, educational stakeholders should promote and motivate adolescents to utilize the Internet for the satisfaction of content gratifications. In addition, adolescents who are vulnerable to IA must be supported with the required help. Educational policy makers should understand the underlying factors that predispose adolescents to CIU and develop policies that are conducive to adolescents' well-being.

The study results are of particular relevance to Internet-based service-oriented companies since they assist these companies in the development or advancement of their businesses by providing new opportunities. For example, those companies interested in the adolescent user market can utilize the study results to transform their existing and forthcoming service offerings per the needs and motivations of adolescents. In this way, they can easily reach their target users and increase their own profits. Possible examples could be: (1) companies can develop educational games, services enabling adolescents to get news about the latest happenings in their surroundings and world, and content that enhances the existing knowledge base of the adolescents in order to serve their content gratifications; (2) Internet service-based companies are interested in heavy Internet users since they are treated as "loyal" clients of Internet-based offerings. Recently, the importance of heavy Internet users has grown exponentially due to the fact that most organizations are now moving towards realizing their online presence in the form of brand communities (e.g., Facebook fan pages for different companies, products, services and even individuals), and even offering their services via these newly established brand communities. Heavy Internet users are considered active participants in these virtual communities, e.g. they participate in idea generation, verification, and feedback. Similarly, the findings of this study can provide important design considerations to service designers and user-interface developers. For example, if an educational Internet-based utility is to be developed for adolescents, then it must enable adolescents to experience "social influence," content, and social gratifications from its use. Furthermore, its use should be entertaining, fun and enjoyable for the target users.



### **4.3 STUDY LIMITATIONS AND RECOMMENDATIONS FOR FUTURE WORK**

The present study is not without its limitations, which also open new avenues for future research on this topic. The study limitations affect the generalizability and applicability of the study findings to a wider context. The different study limitations are discussed and presented to enable researchers and practitioners to cautiously interpret and utilize the study results and findings.

The most important issue concerning the applicability and generalizability of the study results lies in its contextual settings. All five studies were carried out with adolescent Internet users who attend seven to ten private English junior and senior high schools (affiliated with central education boards) in North-western India. Furthermore, the study participants were from families of a specific economic status (i.e., low to middle income families). The study samples were not representative of the general adolescent Indian Internet user population since participants from public schools (affiliated with state education boards), non-English speaking schools, and very low and very high income groups were not recruited. In addition, another matter of concern is that the study samples represent only a single country (i.e., India) and one culture (under the assumption that four to six cities from North-western India that participated in this study actually represent similar cultural settings). The applicability of the study results to a wider or generalized context is unknown. However, the present study included one of the most extensive examinations (e.g., large scale data collection, large study samples, repeated examination of the underlying research questions using different studies). This is a departure from prior studies in the IA literature, which is known for reporting research findings based on small sample sizes and single cross-sectional studies (Laconi et al., 2014). The main reason to restrict the data collection exercises to only private schools was differential rates of Internet use and adoption among public and private school attending adolescents. During my field studies in North-western India, I observed that private school attending adolescents tended to have much better Internet, mobile and other forms of technology accessibility than public school attending adolescents. This was mainly due to economic reasons. Further empirical studies are required to validate the findings of the present study in a wider geographical context by involving adolescent Internet users from public and private schools, high and low economic backgrounds, and also from other countries and cultures.

Another equally important concern is the utilization of self-reported measures in the form of Likert scales for the measurement of IA, Internet U&Gs, and adolescent Internet users' background characteristics. This raises obvious concerns about whether closed-ended choices can really capture different perspectives on IA. It is a well-known fact that various methodological shortcomings are associated with the use of self-reports for

data collection (Podsakoff et al., 2000). Qualitative protocols in the form of one-to-one personal interviews, focus discussions, and open-ended questionnaires could have been used for understanding the conceptualization of IA and its measurement. The present work did not break from the existing dominance of quantitative methodology (e.g., cross-sectional surveys) in the IA research space, and thus this work followed the existing trends of determining different perspectives on IA. Therefore, I suggest that in future research, IA researchers should try to find other methods of IA assessment that do not involve self-reports, e.g. in-depth interviews, Internet logs, assessing change in behavior and impact on well-being due to Internet use, etc. This kind of additional empirical data will complement our existing understanding of IA and even act as a source of external validity for findings related to IA conceptualization.

The discrimination of Internet addicts and non-addicts, and heavy and light Internet user cohorts, is also a matter of concern. This thesis work has utilized arbitrary cut-off scores for dichotomizing Internet addicts from non-addicts (e.g., a score of 70 or above out of 100 on the IAT), and heavy from light Internet users (e.g., heavy Internet users spend more than 1 hour per day online). The chosen arbitrary cut-off score and criteria were based on previous IA literature (e.g., Young (1998) suggested the IAT cut-off score; Roy (2009) and Kargaonkar and Wolin (1999) proposed the criterion for heavy Internet users), rather than any statistically determined scores. Therefore, it is possible that these arbitrary measures are not able to successfully dichotomize Internet users into two groups. However, the findings of Studies II & III show clear differences between Internet addicts and non-addicts and heavy and light Internet users in terms of their background characteristics and Internet U&Gs. In the future, different statistical techniques including ROC curves and cluster hierarchical analysis should be utilized for the appropriate discrimination of addicts and non-addicts, and heavy and light Internet users.

In four out of the five studies (Study I, II, III, IV), the study participants were instructed to take into account the overall Internet usage inside (i.e., academic) and outside school (including academic and non-academic Internet use). This is contrary to the recommendation of a relatively recent study by Montag, Jurkiewicz, and Reuter (2010), which suggests that only private Internet use is linked to IA. However, there were two main reasons behind instructing participants to consider both school and private Internet use while evaluating the study measures. First, during field studies in the participating schools, it was observed that students expressed that Internet use for academic purposes tends to turn into leisure use, due to which they are unable to differentiate between academic and leisure based Internet use. Second, teachers have also reported that when students attend Internet based instruction at school then, many times, their Internet use turns into leisure use. Future work should investigate if the findings presented in our study would change if participants were asked to only take

into account their Internet usage for leisure (private) purposes as suggested by Montag et al. (2010).

The Internet gratification instrument (27-item) (study II) should be revised since the development and validation of this instrument is based on a cross-sectional study performed in May 2012. Internet use has witnessed a rapid evolution in the past three years, e.g. due to the emergence of synchronous communication based messaging applications (e.g., WA, Viber, Line). Internet users today tend to prefer these new methods to asynchronous modes such as emails. In May 2012, adolescents were mainly utilizing email, Facebook based private messaging, and the desktop application Google talk for communication. Today, adolescents prefer IM applications and mobile applications for coordination, connecting and information seeking. Due to this transition, it is likely that Internet use has become a deeper and more integral part of their day-to-day routines. Future work should involve re-validation of this instrument with present day adolescent Internet users. It is also possible that the structure of the instrument will need to be expanded to accommodate newer Internet U&Gs. In addition, researchers should adapt this developed instrument to understand the U&Gs of other forms of media use, including mobile IM applications and social media platforms.

One major measurement-related limitation is the use of unitary items for assessing users' background characteristics, e.g. family income, academic performance, change in school performance after starting Internet use, parental attitudes towards ICT use, economic status, overall Internet activity, excessive Internet use and problematic ICT use (mobile, games, and Internet). Since it is known that unitary variables have higher measurement errors, they might also add bias to the study results. Therefore, future work should utilize multi-item constructs representing adolescents' demographic profile, technology accessibility, and problematic ICT use.

Some of the other future research directions include: (1) examining the generalizability of the present study findings in light of organizing panel, longitudinal, or repeated cross-sectional and cross-cultural studies with large samples collected from other cultures and countries. This will not only ascertain the validity of the present study findings in a wider research space, but also enable researchers to gain deeper understanding of the perspectives of IA. (2) In the present study, only a limited number of adolescent Internet users background characteristics were considered. Future work should expand the demographic and personality related variables, e.g. socio-economic status, self-efficacy, shyness, loneliness, alienation, narcissism, depression, dependency, burnout and academic degradation due to Internet use. (3) Other researchers can adopt the research process presented in Study V, and modify existing IA assessment instruments in order to develop assessment instruments for specific Internet activities, e.g. IM, social networking, blogging, and online gaming. This will bring further understanding to the ongoing debate in the IA research, i.e. IA versus CIU due to specific Internet based activities.

Despite these aforementioned limitations, the study has a number of strengths, including: the multidisciplinary nature of this thesis that benefits the psychology, educational science, child well-being, substance abuse, and misuse related areas of research. It also improves understanding the nature of IA by examining its conceptualization and associated measurement, linking IA with Internet U&Gs and adolescents' background characteristics. It furthers the development and validation of newer Internet U&Gs and CIU instruments, applying cross-sectional and psychometric analytical methods, extensive data collection and large study samples. Finally, it accomplished these objectives through five original studies that are compatible and coherent. To conclude, the present thesis work has brought new understanding to the topic of IA, which is otherwise still juggling from various theoretical and methodological challenges. Additional studies are still needed that focus on bringing new knowledge of the very nature of IA, its conceptualization, and measurement.

#### **4.4 CONCLUSION**

Finally, returning to the idea of “lenses”, it is utilized throughout this thesis to present the complex conceptualization of IA or CIU with ease to readers. In the conclusion of the thesis, I now present the case for what type of adolescent Internet users are more likely to wear these lenses and thus are more vulnerable to experiencing IA. The findings suggest that users who are male, are adolescents with high daily Internet use, have higher Internet activity, seek higher connecting, have social influence and coordination gratifications, experience lower life satisfaction, have higher approach avoidance and reward seeking, and are adolescents experiencing excessive Internet use and problematic Internet use are likely to experience IA. All of these variables contribute towards the conditioning of IA among adolescents. Similarly, male adolescents who experience strict ICT parenting at home, who have lower academic performance, who have home Internet connectivity, who experience higher approach avoidance and reward seeking, and who seek higher social and process U&Gs are likely to be Internet addicts. In contrast, adolescents with higher academic performance and those who tend to seek content U&Gs (information seeking and exposure) are less likely to experience IA. These results suggest that adolescents with the aforementioned behavior characteristics, background and U&G needs are likely to wear those “lenses.” Furthermore, the study results suggest that Internet addicts and non-addicts do not differ in terms of age, monthly income, computer ownership, Internet use experience, or content U&Gs. This clearly shows that not all adolescents are equally likely to experience IA, but rather that some are more vulnerable than others. Other than this, it was found that those who were older, female, adolescents with home Internet, had more Internet use experience, sought higher connecting Internet U&Gs

and experienced approach-avoidance were likely to be heavy Internet users. In comparison, adolescents with higher academic performance, higher reward seeking, and information seeking U&Gs were less likely to become heavy Internet users.

The present thesis has shed light on the importance of the linkages shared among IA, users' background characteristics and Internet U&Gs, the measurement of IA, and also CIU due to the excessive use of specific Internet activities. The large-scale study samples and rigorous quantitative research methodology have successfully presented the conceptualization of IA with a due focus on "What it is" and "How it should be measured." The work presented in this thesis should be extended to better address the "nature of IA" and to extend the available knowledge and understanding to the next level, or even to a completely new level. Overall, I believe that IA as a concept is still a complex phenomenon about which teachers, researchers, practitioners, parents and adolescents themselves possess limited knowledge. The use of various forms of Internet-based technologies has become quite common both inside and outside schools. Therefore, educational practitioners and researchers must understand the difference between excessive and non-excessive, compulsive and non-CIU. The future rests in the development of school-friendly strategies for finding adolescents who are vulnerable to IA, supporting them with different interventions, and also promoting the types of Internet use that are good for the well being of adolescent Internet users.

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