#Hooked? Extending the social cognitive model in examining the antecedents of problematic social network sites use among Singaporean adolescents and adults

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**#HOOKED? EXTENDING THE SOCIAL COGNITIVE
MODEL IN EXAMINING THE ANTECEDENTS OF
PROBLEMATIC SOCIAL NETWORK SITES USE
AMONG SINGAPOREAN ADOLESCENTS AND ADULTS**

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WEE KIM WEE SCHOOL OF COMMUNICATION AND INFORMATION

2018

**#Hooked? Extending the Social Cognitive Model in Examining the Antecedents of
Problematic Social Network Sites Use Among Singaporean Adolescents and
Adults**

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A thesis submitted to Nanyang Technological University
in fulfillment of the requirement for the degree of
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ABSTRACT

Cases of social network sites (SNSs) users potentially developing problematic SNSs use have revived scholarly interest in addictive media research in the last few years. As a nascent research area, there is a need for clear communication-centric theoretical paradigms and rigorous methods in guiding empirical inquiry in problematic SNSs use. The purpose of this thesis is to test and extend the social cognitive model of problematic media use in the context of SNSs and examine what are the external and individual-level antecedents of problematic SNSs use among Singaporean adolescents and adults.

Chapter One identifies some of the gaps in existing problematic media use research, highlights the objectives of this thesis, and outlines how subsequent chapters attempt to bridge these existing gaps. Chapter Two defines SNSs, highlights their distinctiveness from other social media applications, and describes their prevalent use among adolescents and adults. Chapter Three contains the first study in this thesis—a critical review—which gives an overview of problematic media use research, identifies the strengths and weaknesses of existing theoretical frameworks used in problematic media use research, and argues why the social cognitive model has the most potential for theoretical development and extension in the field of communication. The chapter also presents the social cognitive model as the overarching framework that will guide rest of the studies. Chapter Four contains the second study in this thesis, which tests the viability of the social cognitive model in explaining problematic SNSs use on a sample of 293 secondary students aged 13 to 17 years in Singapore using covariance structure modeling. In the study, the results showed that adolescents' time spent on SNSs was a function of both deficient self-

observation and deficient self-regulation. Second, self-reactive outcome expectations were positively associated with deficient self-observation and deficient self-reaction. Third, depression and loneliness were positively associated with self-reactive outcome expectations and deficient self-reaction. The overall analysis showed that the social cognitive model was a viable communication model in understanding problematic SNSs use as it had good psychometric properties and all the hypothesized paths were significant.

Chapter Five—which is the third study—builds upon the findings of Chapter Four by postulating that problematic SNSs use is a three-dimensional factor comprising of *excessive SNSs use*, *withdrawal symptoms*, and *negative outcomes*, and extends the social cognitive model to include both external- (relationship with parents) and individual-level antecedents (i.e., depression, loneliness, dependence on SNSs for identity formation, and self-reactive outcome expectations). The model was tested on a large-scale nationally representative sample of adolescents aged between 13 and 17 ($n = 4,920$) recruited using multi-stage cluster and simple random sampling. The results supported the proposed three-dimension problematic SNSs use factor, as well as the extended social cognitive model. Most of the hypothesized paths received empirical support. Most notably, a nuanced difference in how paternal and maternal relationships were associated with adolescents' problematic SNSs was found—adolescents who had poor relationships with their fathers were more likely to depend on SNSs for identity formation—which had the strongest association with deficient self-regulation.

Last but not last, Chapter Six seeks to test another version of social cognitive model on an adult sample. This fourth study proposes that the social cognitive model can integrate key components from Caplan's problematic Internet use model—

preference for online social interaction and mood alteration—to explain why adults develop problematic SNSs use. The study also examines how a different set of external- (social capital) and individual-level antecedents (SNSs use motivations) relate to problematic SNSs use among a large scale nationally representative sample of Singaporean adults aged between 19 and 50 ($n = 1,000$). The results showed that the integrated model had good fit and received partial support for the hypothesized paths. Bonding and bridging capital, as well as various SNSs motivations (social connection, shared identities, and social investigation), were positively associated with mood alteration; only dependence on SNSs to derive shared identities was positively associated with both preference for online social interaction and mood alteration. Preference for online social interaction and mood alteration both had positive associations with deficient self-regulation, which was a key antecedent of problematic SNSs use in the model.

Overall, the findings from this thesis have demonstrated that the social cognitive model is a viable communication model in showing how problematic SNSs use may develop in both adolescents and adults by accounting for the roles of various external- and individual-level antecedents through deficient self-regulation. The theoretical and practical implications of the thesis are discussed in Chapter Seven.

CHAPTER ONE INTRODUCTION

The Internet has brought about major changes and has become an essential part of individuals' daily lives (Amichai-hamburger & Vinitzky, 2010). The availability of the Internet has ushered in a whole range of modern conveniences, such as the ease of making online payments for purchases (H. W. Kim, Gupta, & Koh, 2011; Q. Xu & Sundar, 2014), accessing real-time news, as well as seeking information on diverse subject matters (e.g., S. S. Ho, Detenber, Rosenthal, & Lee, 2014; S. S. Ho & Lee, 2014; E. W. J. Lee & Ho, 2015; E. W. J. Lee, Shin, Kawaja, & Ho, 2016). In particular, one major area that the Internet has the greatest impact in is revolutionizing the way people communicate (C. Huang, 2010). Among the many applications for communication made available by the Internet, social *networking* sites, or social *network* sites¹ (SNSs), have become very popular in the last decade (D. M. boyd & Ellison, 2008). SNSs are web-based platforms where individuals can create personalized profiles, view and generate content (e.g., photos, videos, text messages), as well as interact and collaborate with other users in the network.

Despite offering new opportunities for social interconnectedness, entertainment, and information sharing (D. J. Hughes, Rowe, Batey, & Lee, 2012), the presence of SNSs also brings about new issues such as privacy violation (H. T. Chen & Kim, 2013), cyberbullying (L. Chen, Ho, & Lwin, 2017; Freis & Gurung, 2013; Kwan & Skoric, 2013), and possibly addictive or pathological behaviors among users

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¹ D. M. boyd and Ellison (2008) made a distinction between the terms social *networking* and social *network* when describing SNSs. The former connotes that the usage of SNSs is primarily for *networking* purposes, which focuses on individuals meeting new people through applications such as Facebook, Twitter, Instagram, and other similar platforms. The authors state their preference for the latter term, which they argue to be a more accurate description of SNSs usage—while individuals do use SNSs to meet new people, a large majority also use them to stay in connection with people that they already know. This thesis aligns with D. M. boyd and Ellison's (2008) arguments, and uses the term SNSs with reference to social *network* sites and not social *networking* sites.

(Kittinger, Correia, & Irons, 2012). The prevalence of SNSs has sparked a resurgence in the interest in pathological media use research, albeit in the context of SNSs, known as *problematic SNSs use*. While studies on dependency or pathological Internet use are not new (LaRose, Lin, & Eastin, 2003; Young, 1998, 2004), some argue that problematic SNSs use is a distinct subset of problematic Internet use alongside extensive online gaming, deviant sexual behavior on the Internet, and online gambling addiction and is worthy of further research (Andreassen & Pallesen, 2014; Griffiths, Kuss, & Demetrovics, 2014; Karaiskos, Tzavellas, Balta, & Paparrigopoulos, 2010). After all, there are increasing number of reports—from within and outside of academia—that show that people are spending more and more time on SNSs, resulting in a slew of disruptions to both their personal and professional lives (Karaiskos et al., 2010; Kira et al., 2017; Kuss & Griffiths, 2011a).

Gaps in Existing Research

Despite seeing an incremental growth in the number of studies dedicated to understanding what problematic SNSs use is, there are currently five major gaps² in this nascent research field that will need to be addressed in order for the field to progress. First and foremost, one of the main gaps is in achieving a degree of conceptual clarity in unpacking the term *problematic SNSs use*. Scholars have used multiple expressions such as *addiction*, *dependency*, and *problematic use*, to describe people's uncontrollable use of SNSs almost indiscriminately—this inevitably results in unintended conceptual murkiness (Andreassen & Pallesen, 2014; Andreassen, Torsheim, Brunborg, & Pallesen, 2012; Meena, Mittal, & Solanki, 2012; Wolniczak et al., 2013). While some have cautioned against the use of the term *addiction* loosely in describing non-substance, behavioral impulsivity, others have claimed that the

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² The number of gaps highlighted in this thesis is not definitively exhaustive—they are identified and compiled by the author after an extensive review of the field.

attractive features of SNSs have in part led to the emergence of a new clinical disorder called *SNSs addiction* (Grant, Potenza, Weinstein, & Gorelick, 2010; Karaiskos et al., 2010). As such, it is pertinent to address what are the conceptual differences between these terms.

The second gap in problematic SNSs use research is the lack of focus in building communication models that explain the *process* of problematic SNSs use development. While much of the existing work on problematic SNSs use seeks to identify different potential antecedents of problematic SNSs use—such studies typically draw from social psychology research, and examine how factors such as motivational and personality traits relate to problematic SNSs use (Andreassen & Pallesen, 2014; D. J. Hughes et al., 2012; Özguven & Mucan, 2013; Ross et al., 2009). While the findings of these studies do incrementally add to existing scholarship on problematic SNSs use, the uncoordinated piecemeal approach on the macro-level may pull the development of the field in conflicting directions, and further fragment this research area into isolated, intellectual *frog ponds* (Rosengren, 1993). Scholars need to do more in showing and explaining why and how problematic use occur, rather than short-listing a compilation of antecedents that have statistical correlations with problematic use.

To avoid this widening divide, it is thus pertinent for scholars to undertake problematic media research through empirically based theoretical lenses. As communication scholars, it is especially important to draw from existing communication models to understand the phenomenon. How is a theoretically guided approach different from identifying potential antecedents through a series of regression models consisting of factors that are not banded together by similar conceptual threads? Theories, or theoretical frameworks, arguably offer a more

targeted examination of problematic use and provide insights into the process of the problematic use development systematically.

The third gap of problematic SNSs use research is that much of the current literature primarily examines individual-level psychological constructs that are associated with problematic SNSs use, and the roles of external or environmental factors, or the interplay of both the external and individual-level variables in contributing to problematic SNSs use are neglected (e.g., LaRose et al., 2003). As research suggests that the development of problematic media behaviors may also be due to individuals' interaction with their external environment (Andreassen & Pallesen, 2014), it is both worthwhile and necessary for scholars to consider other types of external factors that may be associated with problematic media behaviors. Such external factors may include family influences, presence of social capital online, and the different features and functions of the Internet (Bozoglan, Demirer, & Sahin, 2014; S. J. Lee & Chae, 2012; Lwin, Stanaland, & Miyazaki, 2008; Valcke, Bonte, De Wever, & Rots, 2010). After all, psychological research has demonstrated that behavioral variance may be a product of both individual and external factors (Bandura, 2001b). For instance, adolescents growing up in a negative family environment may turn to SNSs for emotional compensation (Andreassen & Pallesen, 2014). The psychological distress that one faces from family—together with low self-regulatory functions and the attractive features of SNSs—may predispose individuals to use SNSs as a coping mechanism (e.g., Mcnicol & Thorsteinsson, 2017). Thus, for a more comprehensive assessment of why and how problematic SNSs use occur, this thesis will consider how both external factors and individual factors are associated with problematic SNSs use.

A fourth gap in SNSs research is that most scholars only examined problematic SNSs among adolescents or college students (Alabi, 2013; Kuss & Griffiths, 2011a; LaRose, Kim, & Peng, 2010; Patchin & Hinduja, 2010; Skues, Williams, & Wise, 2012). However, the dark side of SNSs use may not be an adolescent-only problem—with more and more adults using SNSs, they may be susceptible to the development of problematic SNSs use as well (e.g., Khang, Han, & Ki, 2014). There are reasons to expect the antecedents of problematic SNSs use for adolescents may not necessarily be the same for adults as research has shown that there are different developmental goals for people at different stages of their lives (Santrock, 2009). At the stage of adolescence, one of the developmental goals for teenagers is to engage in identity-seeking; at the stage of adulthood, one of the key developmental goals is to forge intimate relationships with significant others. As adolescents and adults may use SNSs for different reasons, it is reasonable to expect that antecedents of problematic SNSs use may differ due to context-specificity.

Last but not least, a fifth gap in problematic SNSs use is the lack of methodological and analytical rigor in existing studies. In terms of sampling, many studies relied on small convenience samples from undergraduate courses in universities to derive conclusions regarding problematic media use (Caplan, 2010; Clayton, Osborne, Miller, & Oberle, 2013; Khang, Kim, & Kim, 2013; Yao & Zhong, 2014). These results drawn from WEIRD³ sample may not be generalizable to the other populations (Henrich, Heine, & Norenzayan, 2010). In addition, many of problematic media use studies used multivariate regression (Alhabash, Park, Kononova, Chiang, & Wise, 2012; Oldmeadow, Quinn, & Kowert, 2012; Pelling & White, 2009) and path analysis (LaRose et al., 2003; D. Lee & LaRose, 2007) in the

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³ WEIRD is an acronym for samples that are drawn from Western, Educated, Industrialized, Rich, and Democratic societies.

examination of problematic SNSs use. Few have adopted a full covariance structure modeling to examine how the theorized conceptual models fit the data. While there are recognizable benefits of regression or path analysis, one of the major shortcomings of these techniques is that the measured variables are assumed to be error free (R. B. Kline, 2011; Maccallum & Austin, 2000). Covariance structure modeling on the other hand, allows researchers to specify relationships among common latent factors while allowing for the estimation of unique variances of indicators—this controls for the presence of errors and hence minimizes the biases (Maccallum & Austin, 2000). There are other statistical issues that are often left unaddressed, such as the failure to correct for common method variance (CMV)⁴, which is a prevalent issue among cross-sectional behavioral sciences that may diminish the validity of the results (Lindell & Whitney, 2001; Podsakoff, MacKenzie, Lee, & Podsakoff, 2003).

Objectives of Thesis

The overall purpose of this thesis is to address some of these gaps. There are altogether five overarching objectives of this thesis. First, this thesis seeks to unpack what is *problematic SNSs use*. Second, this thesis will review the major theoretical frameworks used in understanding problematic media use, highlights their strengths and weaknesses, and suggests why the social cognitive model has the most potential for theoretical development. Third, this thesis will examine the antecedents of problematic SNSs use by using the social cognitive model as the overarching theoretical framework, and to describe the *process* of how individuals may develop addictive tendencies through deficient self-regulation. It will propose several

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⁴ CMV refers to variances induced by the method of data collection itself rather than the hypothesized constructs (Podsakoff et al., 2003). For instance, in a cross-sectional survey, variances among the indicators may be explained by the survey method itself instead of the hypothesized common latent factors. As such, CMV is a form of measurement error and its presence can seriously have confounding effect on the findings of research. To ensure a high validity, researchers should control for CMV using available statistical techniques (T. J. Kline, Sulsky, & Rever-Moriyama, 2000; Richardson et al., 2009).

extensions to the social cognitive model—by incorporating both external- and individual-level antecedents—in understanding the development of problematic SNSs use among two nationally representative samples, one comprising of adolescents, and the other of adults in Singapore. The study also proposes that problematic SNSs use can be modelled as a three-dimension latent factor, instead of a single composite measure. Fourth, a more sophisticated statistical approach—covariance structure modeling—will be used to test the extended social cognitive models. Last but not least, based on the findings of the studies, practical suggestions on how to address problematic SNSs use will be drawn for the public, as well as for how communication scholars can approach future communication theorizing in problematic media use research.

Outline of Thesis

This thesis consists of seven chapters. The next chapter—Chapter Two—gives the background of SNSs and its prevalence globally and locally in Singapore. Chapter Three—the first study in this thesis—is a critical review that gives an overview of media addiction research and defines problematic SNSs use. The review also examines the strengths and weaknesses of different theoretical frameworks that can be used to understand problematic SNSs use, and argues that the social cognitive model (LaRose et al., 2003) can be used for theoretical extension in understanding the potential antecedents of problematic SNSs use.

Chapter Four, which is the second study in this thesis, seeks to test the social cognitive model on a small sample of 293 adolescents in Singapore. It postulates that adolescents' time spent on SNSs is a function of deficient self-observation and deficient self-reaction. The model also identifies self-reactive outcome expectations as one of the key antecedents of deficient self-observation and deficient self-reaction, and

that depressed and lonely adolescents are more likely to indicate a higher level of self-reactive outcome expectations and deficient self-reaction.

Based on the findings of Chapter Four, Chapter Five—the third study—tests an extended social cognitive model of problematic SNSs use comprising of both external and individual-level antecedents among a nationally representative sample of Singaporean adolescents ($n = 4,920$) recruited using multi-stage cluster and simple random sampling. The study examines how relationship with parents (external antecedent), as well as individual-level antecedents such as depression, loneliness, dependence on SNSs for identity formation, and self-reactive outcome expectations relate to deficient self-regulation and problematic SNSs use.

Chapter Six—the fourth study—builds upon the findings of Chapter Five, and aims to test if the social cognitive model—with a different set of external- and individual-level antecedents—has good explanatory power in understanding problematic SNSs use development among a nationally representative sample of Singaporean adults ($n = 1,000$). To do so, it integrates elements from Caplan's problematic Internet use model—preference for online social interaction and mood alteration—and shows how social capital dimensions (external antecedents) as well as different motivations of SNSs use may be factors that influence adults' development of problematic SNSs use.

It is hoped that collectively, all the studies in this thesis will contribute to theorizing about problematic SNSs use from a communication perspective. Before untangling problematic SNSs use, the next chapter gives a background of SNSs, and how they differ from other social media applications. Figure 1.1 on the next page gives a summary and an outline of the studies in this thesis and how they address the research gaps.

Figure 1.1. Thesis flowchart. Study Two, Three, and Four will collectively address the fifth gap—the lack of methodological and statistical rigor.

CHAPTER TWO   BACKGROUND

The twenty-first century marks the unprecedented surge in online communication platforms based on the technological foundations of Web 2.0. The opportunities made possible by Web 2.0 have brought about a dramatic change in the way people interact over the Internet. Instead of being passive receivers of information, individuals are now empowered to be active producers of content, and this has transformed online communication to become more participatory in nature (Chou, Prestin, Lyons, & Wen, 2013).

The focus on developing user-generated content platforms by technology-centric companies and start-ups has partially created an environment which ferments the growth of a new media ecology, resulting in the creation of many “*new media species*” such as blogs, wikis, and wide-ranging applications found on mobile platforms (Scolari, 2012, p. 214). These new communication platforms have enhanced the level of interactivity in communication (Cabral, 2011; Hilsen & Helvik, 2012), and many scholars have termed these new applications as *social media* (Kaplan & Haenlein, 2010; Özguven & Mucan, 2013).

The term *social media* is an all-encompassing concept that refers to a variety of user-generated applications. These applications allow users to generate content, as well as enhance different forms of interpersonal communication (Hussain, 2012; O’Keeffe & Clarke-Pearson, 2011). The generic definition has caused much disarray, especially to academics doing research on the practices, impact, and engagement with these platforms. For instance, *social media* is used synonymously with terms like *SNSs*, *social networks*, *Enterprise 2.0*, and the blurring of terms does not account for qualitative differences among these applications (Hilsen & Helvik, 2012; Himelboim

& Han, 2014; Nef, Ganea, Müri, & Mosimann, 2013; Scheepers, Scheepers, Stockdale, & Nurdin, 2014). For an accurate understanding of the effects of social media use, scholars will need to recognize the distinct conceptual differences among the various types of social media.

Types of Social Media

Since this thesis aims to examine the different facets of problematic SNSs use, this begs the question—what is the difference, if any at all, between SNSs and social media? While there may be many overlapping areas in terms of their functionality, SNSs is a subset of social media and there are aspects of SNSs that are qualitatively different from the other applications nested under the term *social media*.

Kaplan and Haenlein (2010) were among the first few scholars who articulated these differences. They defined *social media* as a broad conceptual term that consists of varying Internet related applications—“*a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user generated content*” (p. 61)⁵. The authors identified six different categories of social media, and they are: (a) collaborative projects, (b) blogs, (c) content communities, (d) virtual game worlds, (e) virtual social worlds, and (f) SNSs.

Definition of SNSs

Kaplan and Haenlein (2010) defined SNSs as applications that “*enable users to connect by creating personal information profiles, inviting friends and colleagues to have access to those profiles, and sending e-mails and instant messages between each other*” (p. 63). This definition, which includes the idea of creation of public profiles,

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⁵ Even though this is one of the earlier definitions of social media, it has arguably withstood the test of time and there are no major qualitative changes to subsequent variations of the definition adopted by scholars (Cross, 2014; Khang et al., 2014; Leonardi, Huysman, & Steinfield, 2013; Smith, Fischer, & Yongjian, 2012).

sharing of content, as well as information and personal exchanges, is shared by many other scholars (Bateman, Pike, & Butler, 2011; Brandtzæg, Lüders, & Skjetne, 2010; Cheung, Chiu, & Lee, 2011; Krishnan & Atkin, 2014; Kuss & Griffiths, 2011b; N. Park, Jin, & Jin, 2011; Pempek, Yermolayeva, & Calvert, 2009). Notably, many have also chosen to rely on D. M. boyd and Ellison's (2008)⁶ definition of SNSs in their research (Alhabash et al., 2012; Amichai-hamburger & Vinitzky, 2010; Baker & White, 2010; K. Y. Lin & Lu, 2011b; Orchard, Fullwood, Galbraith, & Morris, 2014).

D. M. boyd and Ellison (2008) defined SNSs as web-based platforms that fulfill the following three requirements. First, they allow users to create a personalized private profile in an enclosed system consisting of other users. Second, they allow users to communicate with others whom they may share a connection with. Third, SNSs facilitate the viewing of connections among users within the enclosed systems. Similarly, Cross (2014) defined SNSs as sites where people could connect with one another, showcase snapshots of themselves through profile pages, and post textual, photographic, audio, or video content. Others have advocated the adoption of a more nuanced and function-specific approach to SNSs definition—such as identifying interpersonal communication as the primary activity of SNSs—in addition to D. M. boyd and Ellison's (2008) criteria (Rains & Brunner, 2015).

One of the strengths of these definitions is that they have laid the foundational work of distinguishing SNSs from other social media platforms, from which other scholars could base their SNSs research on. In addition, most of the definitions share a certain degree of consistencies and similarities in identifying key features of SNSs (e.g., allowing users to create personalized profiles). Despite the strengths of the existing definitions, there are some weaknesses in how existing scholars define SNSs.

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⁶ For a comprehensive review of the history of SNSs, Lewis, Kaufman, and Christakis (2008) recommended D. M. boyd and Ellison's (2008) work.

First, D. M. boyd and Ellison's (2008) definition may be too general (Rains & Brunner, 2015). Second, most of the definitions—including D. M. boyd and Ellison's (2008)—did not specifically account for new changes in SNSs. For instance, recent changes to SNSs include allowing users to share both enduring (posting videos or photos on Facebook) and ephemeral (e.g., posting videos on Instagram stories, which will automatically be removed after a certain time period) content (Evans, Pearce, Vitak, & Treem, 2017; Pittman & Reich, 2016). Third, these definitions often implicitly assume that users are often active—however research has shown that while users do engage in active content creation, sharing, and communication, some users may only use SNSs passively (Alhabash et al., 2012).

Considering the strengths and weaknesses of these existing definitions, a refined definition for SNSs in this thesis is proposed. In this thesis, SNSs are defined as online network services which allow users to: (a) create personalized profile in an enclosed system consisting of other users; (b) communicate with other users through direct messages, public broadcast, or express affective evaluation of other messages (e.g., liking a comment) publicly; (c) view how others are connected; (d) share enduring or ephemeral content such as videos or photos; and (e) engage in content creation and sharing or passive browsing.

A Brief History of SNSs

The beginnings of SNSs can be traced back to 1997 with the creation of "SixDegrees.com" (D. M. boyd & Ellison, 2008). SixDegrees.com was started based on the concept of *six degree of separation*, which was the idea that everyone was connected to each other by six people or less (Cross, 2014). As one of the earliest prototypes of SNSs, SixDegrees.com already had some key features of SNSs that people know of today, such as allowing users to create their individual profiles, search

for others, and interact with friends. Despite achieving some level of initial success, SixDegrees.com did not sustain as a business model. Considering that it was ahead of its time and that most people did not have a large group of online friends, users felt that there was not much activity after the initial excitement of sending friend requests and accepting invites.

After SixDegrees.com shut down in year 2000, the next SNS that caught the world's attention was *Friendster*, which began in 2002 (D. M. boyd & Ellison, 2008). Friendster became popular quickly as it was one of the alternatives to match-making sites (Cohen, 2003). Friendster differed from traditional matchmaking sites such that while the latter connected strangers with similar interests, Friendster connected friends of friends by displaying the links between one another (Cross, 2014), thus narrowing the search for romantic interests within an individual's circle of friends. However, the working teams at Friendster were not well equipped to handle the heavy demands, causing much frustration. As the popularity of Friendster waned, *MySpace* became the next dominant SNS and sought to capture the market that Friendster failed to do so. One of the main attractions of MySpace was that it provided a point of contact for music bands and their fans, in addition to allowing users to create personalized profiles. By 2004, MySpace had drawn a large following of teenagers, until it faced competition from newer SNSs such as Facebook and Twitter.

Recent SNSs Growth

Among the different epoch of SNSs development, the most significant was marked by the rise of Facebook. As a SNS, Facebook allows users to connect with friends and families as well as virtual communities, upload and share content such as photos and videos, play games, and engage in impression and identity management (Alhabash et al., 2012; Dhir, Kaur, & Rajala, 2018; Mehdizadeh, 2010). Facebook

began in 2004 as an online community system for Harvard students only (D. M. boyd & Ellison, 2008), in which the purpose of its use was for students to create and maintain relationships formed at the university (Ross et al., 2009). By 2006, the founder Mark Zuckerberg, and his colleagues, brought Facebook to the public (Cross, 2014). Since then, it has expanded to become one of the largest SNSs with approximately 1.11 billion users, which is an exponential growth from merely 100 million users just a few years ago in 2008 (Statistic Brain, 2017a). The amount of time people spent on Facebook had increased over the years as well. During the formative years of Facebook between 2007 and 2008, people on average spent 10 to 30 minutes per week on the site (Ellison, Steinfield, & Lampe, 2007; Joinson, 2008). Now, this has increased to an average of 50 minutes per day (Stewart, 2016).

After Facebook, another SNS that has achieved a considerable amount of success is Twitter. Twitter's interface differs significantly from Facebook, and one of its key features is allowing users to broadcast short messages consisting of 280-characters called *tweets* to their *followers* (D. J. Hughes et al., 2012). Because of this unique feature of Twitter, some scholars have classified Twitter as *microblog* and not a SNS (Junco, 2012; Kaplan & Haenlein, 2010; Sundar & Limperos, 2013). This is because the way Twitter is used resembles a one-way communication medium where users transmit their messages and comments to their followers (Davenport, Bergman, Bergman, & Fearington, 2014; Ndasauka et al., 2016). Others have made a similar proposition considering that motivations for Twitter use may differ from Facebook. Syn and Oh (2015) found that *community interest* is one of the main motivations as to why users frequently share information on Facebook but for Twitter users, one of the key motivations is *altruism*—where users broadcast (in a one-way communication format) perceived useful information that *followers* ought to know.

While there is some validity to the arguments, Twitter does qualify as SNSs (Cross, 2014). First and foremost, Twitter does meet the three criteria of SNSs put forth by D. M. boyd and Ellison (2008)—users are able to create personalized profiles, view whom they share connections with, and interact with others in their network. They can actively curate whom they want to follow, and decide who can follow them (Cross, 2014). Second, the Twitter platform is more than a one-way communication medium; it allows users to engage in two-way communication in several ways. Users are able to respond and interact with one another by replying or *retweeting* messages, tag their friends in messages, organize interpersonal messages through the use of hashtags, and share video and photos. In addition, Twitter’s potential for reciprocal communication has been well documented (Syn & Oh, 2015), where communities on Twitter have often come together for the purpose of social support (Himmelboim & Han, 2014). Third, many scholars from both the field of communication and psychology have recognized Twitter as part of SNSs (Baek, Bae, & Jang, 2013; Dhuffar & Griffiths, 2014; Gentile, Twenge, Freeman, & Campbell, 2012; O’Keeffe & Clarke-Pearson, 2011; Odaci & Çelik, 2013; E. T. Panek, Nardis, & Konrath, 2013; Paul, Baker, & Cochran, 2012; Radovic, Gmelin, Stein, & Miller, 2017).

To date, Twitter has a total of 554 million registered users and is listed as one of the top ten most visited sites (Statistic Brain, 2017b). The number of monthly active users grew from 30 million in 2010 to 330 million in 2017 (Statista, 2018b), where 4 million new monthly users were added in 2017. Twitter’s influence on society is far-reaching as many governments and non-governmental organizations (NGOs) are using it as a platform for communication (e.g., H. Park, Reber, & Chon, 2016).

In addition to Facebook and Twitter, Instagram in recent years has also become one of the more popular SNSs. Launched in 2010, Instagram is an image-centric

photo-sharing application designed to allow users to share pictures of their lives with each other (Hendrickse, Arpan, Clayton, & Ridgway, 2017; Ridgway & Clayton, 2016). Its dominant features include allowing users to share photos or short videos taken with their phones, and to view content generated by others (Dumas, Maxwell-Smith, Davis, & Giulietti, 2017). Particularly, users share *selfies*—portraits taken of themselves with their handphone cameras—and *wefies*—portraits of a group, or snapshots of food or travels (Hendrickse et al., 2017; Tiidenberg & Gomez Cruz, 2015). One of the other key functions of Instagram is the application of *filters* to photos to enhance or beautify the effects of images. In 2016, Instagram launched *Instagram Stories*, where users could share photos and short videos depicting life moments in the form of a slideshow that would appear on their friends' feed for 24 hours (Instagram, 2016).

From 2013 to 2017, the number of active monthly Instagram users grew from 90 to 800 million, among which, there are 500 million active daily users (A. Balakrishnan & Boorstin, 2017; Statista, 2018a). Currently in the U.S., 32% of all American Internet users use Instagram and 51% of Instagram users in the U.S. reported visiting Instagram at least once a day (Greenwood, Perrin, & Duggan, 2016; Pew Research Center, 2017). The number of photos uploaded onto Instagram daily grew from 40 million in 2013 to 52 million in 2017 (Etherington, 2013; Statistic Brain, 2018).

Prevalence of SNSs Use

Compared to other types of social media, SNSs' "meteoric" growth is unparalleled (Krishnan & Atkin, 2014, p. 1). In a short span of a decade since the introduction of SixDegrees.com, many have already adopted and integrated SNSs into their daily lives (De Souza & Dick, 2009). Daily routines and SNSs use are almost

inextricable as using SNSs becomes one of the favorite online activities of Internet users (Amichai-Hamburger & Vinitzky, 2010; Cheung et al., 2011). The popularity of SNSs flourishes even beyond the U.S., North America and Europe—it has high adoption rate in Asia-Pacific regions such as Taiwan, Malaysian and Singapore (Alhabash et al., 2012; V. Balakrishnan & Shamim, 2013; K. Y. Lin & Lu, 2011b; T. C. Lin, Chiu, & Lim, 2011).

Being one of the most highly wired nations in the world, it is not surprising that Singaporeans are one of the most frequent users of SNSs in Asia (W. Z. Tan, 2009). In Singapore, approximately 87% of the households have Internet access and its smartphone penetration is one of the highest in Asia (Info-communications Media Development Authority of Singapore, 2017). By 2012, more than three-quarters of Singaporeans already have Facebook accounts (Rock Publicity, 2012). The Google Consumer Barometer conducted a recent survey and found that visiting SNSs was ranked as one of the top three activities for Singaporeans while using their mobile phones (Hio, 2014). A separate study reported that Singapore was ranked second in terms of SNSs penetration rate at 59%—which was doubled the global average of 26%. The report also highlighted that an average Singaporean spent around 2.2 hours per week on SNSs (Mohd, 2014).

Among the different population segments, research has shown that adolescents are one of the groups that are most prone to spend a significant amount of time on SNSs (Andreassen & Pallesen, 2014). A report by Pew Research Center showed that more than 71% of adolescents surveyed were users of multiple SNSs, among which the most widely used platforms were Facebook, Twitter, and Instagram (Lenhart, 2015). SNSs offer the opportunities for the creation and maintenance of friendships as well as a slew of entertainment options, making it highly desirable for adolescents

(Best, Manktelow, & Taylor, 2014). At the adolescence stage, teenagers may want to seek out new experiences such as social connection with others and impression management, which are important for their psychosocial development (D. R. Boyd & Bee, 2012; K. Davis, 2013; Toma, 2013). This is evident among Singaporean adolescents, who reported that the main use of SNSs was to remain connected and to examine what their friends' activities were by visiting their profile pages (Sp Buzz, 2009).

Increasingly, reports have shown that more and more adults are incorporating SNSs use in their daily lives (T. T. C. Lin et al., 2011). Among Internet users, 88% between the ages of 18 and 29 as well as 84% of those between the ages of 30 and 49 years old were SNSs users (Greenwood et al., 2016). The most recent survey findings on Singaporean's SNSs use showed that between 2016 and 2017, SNSs users increased by 22% and that 70% of Singaporeans used SNSs on their mobile phones, which was twice the global average of 34% (A. Tan, 2017). As such, problematic SNSs use may not necessarily be an issue that is confined to adolescents. Adults may be as susceptible as adolescents in terms of developing problematic SNSs use.

Before any research on problematic SNSs use can be meaningful, it is pertinent to understand the historical development of media addiction research. As such, the next chapter gives an overview of addictive media research and describes how scholars have approached the field of problematic media use. The chapter will also review the existing theoretical frameworks that could be applied to examine problematic SNSs use, identifies their strengths and weaknesses, and argues why the social cognitive model has the most potential for theoretical development in problematic SNSs use research.

CHAPTER THREE   STUDY ONE

Unpacking Problematic Social Network Sites Use—A Criterial Review of Concepts and Theoretical Frameworks in Problematic Media Use Research

The idea of problematic media use (e.g., Internet, television, video games, SNSs), or media addiction, can trace its scholarly roots to research as early as the 1940s (Tokunaga, 2014). In the early years of this field, scholars such as Rowland (1944) and Preston (1941), were among the many who engaged in discussions about the media addiction phenomenon, and articulated the possibility of people developing an irresistible urge to use the dominant media of that time—television and radio—which were considered novel inventions. Preston (1941) postulated that children could develop addictive tendencies toward radio and motion pictures, while Rowland's work (1944) examined how media content could elicit a sense of obsession. Since then, with the introduction of newer media platforms, research on media addiction has been extended to these new mediums, such as video games (Spekman, Konijn, Roelofsma, & Griffiths, 2013), the Internet (Winkler, Dörsing, Rief, Shen, & Glombiewski, 2013), and specifically SNSs in the most recent years (Andreassen & Pallesen, 2014; Hormes, Kearns, & Timko, 2014; Koc & Gulyagci, 2013; LaRose et al., 2010).

Before attempting to build communication models to understand problematic SNSs use, it is vital to conduct a critical review of the field to gain a holistic overview of existing research on problematic media use. There are three main objectives of this critical review. First, it seeks to untangle some of the conceptual knots and explore the differences among the terms *addiction*, *dependency*, and *problematic use*, and gives arguments as to why problematic SNSs use is the most preferred term to be adopted by

this thesis. Second, this study will review some of the existing theoretical frameworks used by scholars in understanding problematic SNSs use. Third, it will make a case as to why the social cognitive model of problematic use has the most potential for theoretical development in understanding problematic SNSs use.

Differences among Addiction, Dependency, and Problematic Use

With the burgeoning literature in media addiction research, scholars have used an assortment of terms in describing different types of addictive tendencies (LaRose et al., 2003). The three most common terms are *addiction* (Alabi, 2013; Koc & Gulyagci, 2013; Young, 2004), *dependency* (Kubey, 1996; Lu, 2008; Wei & Liu, 2010) and *problematic use* (Caplan, 2003, 2010; Caplan & High, 2007). While scholars have used these terms interchangeably, this Chapter argues why the term *problematic SNSs use*⁷ is preferred as compared to *addiction* or *dependency*. Table 3.1 shows a summary of how these terms are defined and examples of studies that have used these terms.

The use of the term *addiction* in describing media consumption behavior was borrowed from substance abuse research, which examined how the continuous use of a product (e.g., drugs, alcohol, food) to obtain certain forms of pleasure (Sussman, Lisha, & Griffiths, 2011), could result in uncontrollable and repeatable consumption patterns. As the field developed, scholars noticed that apart from ingesting substance, engaging in certain behaviors (e.g., gambling) also seemed to elicit the same patterns and consequences associated with substance addiction. Since then, the scholarly community has largely recognized that addiction is a compulsive and unhealthy dependence on substances, or impulsive behaviors, that result in negative repercussions (Byun et al., 2009).

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⁷ Even though this thesis makes it explicit that the term *problematic use* is preferred, for the ease of discussion in this section, the terms are used synonymously unless specific distinctions are highlighted for the purpose of comparison.

Table 3.1 Selected terms associated with addictive tendencies

Terms	Definition	Example of studies	Scholarly criticism
Addiction	"The habitual compulsion to engage in a certain activity or utilize a substance, notwithstanding the devastating consequences on the individual's physical, social, spiritual, mental, and financial well-being" (Young, Yue, & Ying, 2007, p. 6).	Floros and Siomos (2013); Mitchell (2000); Park, Kim and Cho (2008); Widyanto and Griffiths (2006); Yen et al. (2008); Young (2004).	There is no official diagnosis of media addiction of any kind in DSM-5 and the term tends to raise a false sense of urgency for a "cure".
Dependency	A psychological state characterized by the continuous need for media and the experience of psychological discomfort in its absence (Peng & Liu, 2010).	Lu (2008); Kubey (1996); Peng and Liu (2010); Wolniczak et al. (2013).	The term <i>dependency</i> was deemed confusing and was removed from the DSM-5.
Problematic use	Cognitions and behaviors that are maladaptive in nature, resulting in individuals reaping negative consequences professionally and socially (Caplan, 2003).	Bowen and Firestone (2011); Caplan (2002, 2003, 2005, 2007, 2010); Cheong, Choo, and Khoo (2011); Li, Liao and Khoo (2011).	N.A.

Young, Yue, and Ying (2007) defined addiction as “*the habitual compulsion to engage in a certain activity or utilize a substance, notwithstanding the devastating consequences on the individual’s physical, social, spiritual, mental, and financial well-being*” (p. 6). This idea of identifying a repetitive action or habit as addictive is consistent with some of the earlier scholarly works in the 1970s and 1980s. For instance, Marlatt, Baer, Donovan, and Kivlahan (1988) defined addiction as “*a repetitive habit pattern that increases the risk of disease and/or associated personal and social problems...often experienced subjectively as “loss of control” [that] continues despite volitional attempts to abstain or moderate use*” (p. 224).

With the prevalence of Internet use, the notion of individuals having the proclivity to engage in uncontrollable Internet use, or to be addicted to the Internet was first mooted by Goldberg (1995), who coined the term *Internet Addiction Disorder* (IAD) (Tonioni et al., 2012). It was then made popular by Young (1996), who presented one of the first studies on Internet addiction at the Annual Meeting of the American Psychological Association in 1996, which resulted in a polarizing debate between scholars and clinicians since (Young, 2004).

Despite having a longstanding academic tradition with a wealth of research (Byun et al., 2009; Douglas et al., 2008), the term *addiction* remains highly contentious, resulting in much division in the scholarly community. The usage of the word fell out of favor with professional academic societies such as the American Psychiatric Association, which replaced it with the term *dependence* in the Diagnostic and Statistical Manual of Mental Disorder (DSM-IV) (LaRose et al., 2003). Internet addiction was not recognized as an official disorder as issues such as etiology, comorbidity, and treatment, were not clearly accounted for (R. C. Ho et al., 2014), and it raised false alarm to seek treatment when there was none (LaRose et al., 2003).

The second term that is used commonly to describe addictive tendencies pertaining to media use is *dependency*. While some scholars advocated the use of *dependency*, the preference for *dependence* as a descriptive label was short-lived and did not gain widespread acceptance. This is because *dependency* may not necessarily be a negative behavior. For instance, scholars have highlighted that it is possible to develop a certain level of dependency to SNSs due to the nature and responsibilities of work (e.g., L. Li & Lin, 2016)—a SNSs manager for a company may be highly dependent on SNSs for his or her day-to-day duties, but that does not mean that his or her SNSs use is uncontrollable in any way. Second, even though some preferred the term *dependency* as compared to *addiction*, the measures of *dependency* were almost identical to items measuring *addiction* (Widyanto & Griffiths, 2006).

Moreover, in the latest DSM-5, scholars recognized that the word *dependence* had caused much confusion instead of achieving conceptual clarity. As such, *dependency* was eventually replaced by *substance use disorder* in the description of addictive tendencies related to substance use, while *addictive disorder* was used to describe behavioral addictions (American Psychiatric Association, 2014).

Problematic Use as the Preferred Term

Last but not least, the third most common term used in describing addictive media consumption is *problematic use*. In recent years, the use of the term *problematic use* has become popular with Internet researchers (Yellowlees & Marks, 2007). Many scholars prefer this concept because compared to terms like *addiction* or *dependency*, it does not assume that all cases of problematic SNSs use are pathological. At the same time, it is broad enough to encapsulate varying degrees of compulsivity and negative outcomes experienced by individuals (Caplan, 2002; Yellowlees & Marks, 2007).

Based on R. A. Davis' (2001) work in pathological Internet use, Caplan (2002) was one of the researchers who popularized *problematic Internet use* as a preferred term over *Internet addiction*. In his treatment of the topic, Davis emphasized using a cognitive-behavioral approach and highlighted the importance of examining maladaptive cognitions and behaviors associated with Internet use as antecedents to negative consequences (Caplan, 2002; Neo & Skoric, 2009).

R. A. Davis (2001) postulated that there are two types of problematic Internet use—*specific* and *generalized* Internet usage. *Specific* problematic Internet use refers to an irresistible urge and dependency on a particular content or function of the Internet. For instance, researchers who are focused on specific problematic Internet use typically assume that users are goal-driven in searching for a particular Internet content or function, such as pornography or gambling. As such, the Internet merely serves as an avenue for individuals to satisfy their existing addictive tendencies. *Generalized* problematic Internet use, on the other hand, focuses on how cognitions and behaviors relate to general Internet usage and negative consequences (Caplan, 2010).

There are two major assumptions of generalized problematic Internet use. First, it assumes that the unique communication context provided by the Internet such as anonymity, opportunities for self-presentation and social interaction, together with pre-existing psychosocial problems, facilitate the growth of problematic use (Caplan, 2002). Thus, the Internet as a medium plays a significant role in fostering problematic use because of its affordances. Second, generalized problematic Internet use framework accounts for understanding online cognitions and behaviors of users who may or may not be goal-directed at all—after all, not all online activities are goal directed and individuals may go online simply to pass time (R. A. Davis, 2001).

As such, problematic use may be a preferred⁸ term to describe addictive tendencies to SNSs because it avoids a premature diagnosis of a pathological problem, and yet it is broad enough to encompass differing levels of compulsivity and negative consequences related to SNSs use. The two assumptions of generalized problematic Internet use integrate well with how people use SNSs. Pertaining to the first assumption, the unique affordances (e.g., self-presentation, anonymity, facilitating online communication) of SNSs (Nadkarni & Hofmann, 2012), together with preexisting psychosocial problems, do exacerbate problematic use (LaRose et al., 2010). With regard to the second assumption, research has also shown that SNSs use may also not always be goal-directed; people sometimes do use SNSs because they are unable to resist the urge to do so or use SNSs simply out of habit (Giannakos, Chorianopoulos, Giotopoulos, & Vlamos, 2012; LaRose, 2010; LaRose et al., 2010).

Theoretical Frameworks for Problematic Media Use

To understand the potential antecedents of problematic SNSs use, scholars have adopted a variety of theoretical perspectives to explain its development trajectory. In general, these theoretical perspectives can be categorized as: (a) disease model of addiction, (b) neurobiological and psychophysiological perspective, (c) addictive personality model, (d) operant conditioning model of addiction, (e) Caplan's problematic Internet use model, and the (f) social cognitive model (Grant et al., 2010; Griffiths, 2013; LaRose et al., 2003).

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⁸ While *problematic use* is the preferred term for this thesis, this thesis does not advocate a puritanical and dogmatic use of the term as it is recognized that all concepts are often subjected to evolutionary progress in accordance to societal and technological changes.

Disease Model of Addiction

Among all the theoretical frameworks, the most prominent is the disease model of addiction. Under this framework, problematic media use is equivalent to having a mental or psychiatric disorder with compulsive qualities (LaRose et al., 2003). Those who were found with problematic use would be labeled as “addicts,” and those without the symptoms would be labeled as “non-addicts.” Young’s (1998) Internet addiction test is a good representation of this theoretical framework. Her eight-item criteria was adapted from what DSM-IV presented for pathological gambling, in which she equated Internet addiction to a clinical disorder similar to pathological gambling (Young, 2004). Apart from focusing on diagnosing and identifying the etiology of addiction, scholars who adopt this framework are also concerned about the treatment process, such as knowing how to reduce the dependency on media through different programs such as therapy, or group and individual counseling sessions (Young et al., 2007).

Neurobiological and Psychophysiological Perspective

The second framework that scholars have adopted in understanding problematic media use is the neurobiological and psychophysiological perspective. Researchers who adopt this perspective may be interested in comparing neural activities between individuals with high and low dependence (Grant, Brewer, & Potenza, 2006). To date, there are no known studies that have examined problematic SNSs use from a neurobiological perspective even though this is worth considering for future research (Andreassen & Pallesen, 2014) as past studies have found similar neural activities among those who scored high on Internet gaming addiction scales and those who were highly dependent on nicotine (e.g., Ko et al., 2013). As such, it is plausible that similar neural activities would be found in frequent users of SNSs. This

is because excessive users of SNSs may be prone to develop depressive symptoms and suffer from social anxiety; they may thus rely more on SNSs for mood modification as the brain's reward-system will release endorphins and dopamine, contributing to a state of physiological emotional high (Andreassen & Pallesen, 2014). Just like the neurobiological perspective, the application of a psychophysiological perspective to SNSs is relatively new. Thus far, only one study has examined problematic SNSs use from a psychophysiological perspective—measuring skin conductance and pupil dilation when people use SNSs (Mauri, Cipresso, & Balgera, 2011).

Addictive Personality Model

The third type of theoretical framework used in problematic media use research is the addictive personality model. This paradigm presumes that individuals of certain personality types are more likely to exhibit addictive tendencies to SNSs (D. J. Hughes et al., 2012; e.g., Skues et al., 2012). After decades of psychological research, scholars have identified five dimensions of personality—neuroticism, extraversion, conscientiousness, openness to experience and agreeableness—which collectively are known as the five-factor model of personality (D. J. Hughes et al., 2012). This perspective received some degree of empirical evidence as studies have shown that traits such as conscientiousness, openness to experience, (Amichai-hamburger & Vinitzky, 2010; Özgüven & Mucan, 2013), and extraversion (Caci, Cardaci, Tabacchi, & Scrima, 2014) were associated with high SNSs use even though the relationships were often disputed due to contrary findings (e.g., Ross et al., 2009).

Operant Conditioning Model

Fourth, the operant conditioning model is an alternative framework adopted by scholars in addiction studies (e.g., R. A. Davis, 2001). The assumption of this paradigm is that addictive consumption behavior goes through four stages—from

initiation, transition to on-going use, to addiction (Marlatt et al., 1988). At the initiation stage, an individual engages in a certain behavior (e.g., either substance related or non-substance related) due to the positive expected outcomes, such as obtaining gratification from the behavior. The obtained gratification propels the individual to persist in the behavior for continual gratification and at this stage, the behavior is not problematic even though there is a level of automaticity involved. However, if the behavior becomes an exclusive mechanism to achieve the desired outcomes (e.g., gratification), there is a transition to *addiction*. In the addiction phase, individuals may require higher consumption level to achieve the same level of gratification; they may also face withdrawal symptoms when the consumption behavior ceases (LaRose et al., 2003).

Caplan's Problematic Internet Use Model

The fifth theoretical framework used in problematic media studies is Caplan's problematic Internet use model (Caplan, 2003, 2005). Caplan (2002) drew from R. A. Davis' (2001) conceptualization of pathological Internet use that came from the cognitive-behavioral model, which postulated that maladaptive symptoms of problematic Internet use consisted of both cognitive and behavioral dimensions. Like Davis, Caplan advocates a shift from the traditional media addiction framework when examining individuals' excessive Internet use, and postulates that psychosocial problems⁹ such as depression predispose individuals to develop maladaptive cognitions associated with Internet use (Caplan, 2002), leading to undesirable negative outcomes such as disruptions to relationships and work. Caplan highlights that there are two key mechanisms that explain why people develop problematic Internet use,

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⁹ The later versions of Caplan's model showed that it may not just be depression that predisposed individuals to develop a high preference for online social interaction. For instance, Caplan (2005) argued that individuals with deficits in social skills tend to prefer the online environment to engage in communication as compared to face-to-face settings. Bozoglan et al. (2014) showed that functions of the Internet may play a role in explaining the development of problematic Internet use.

known as preference for online social interaction and mood alteration (Caplan, 2003, 2010; Caplan & High, 2012). Individuals who display more preference for the online mediated platform for communication and depend on it for regulation of emotions are more at risk of developing problematic Internet use.

Social Cognitive Model

Last but not least, the sixth theoretical framework is the social cognitive model proposed by LaRose et al. (2003). This model is adopted from Bandura's (1986) work in the social cognitive theory, in which the original theory postulates that human behavior and cognitions are complex, and they are a function of a triadic causation of human, behavioral and environmental determinants (Bandura, 2001b). The premise of the theory is a significant departure from the dominant psychological theorizing in the 1970s to 1980s, which predominantly focuses on an input-output model—where human behavior was assumed ultimately to be reactive to forces from external sources—in explaining human behavior. One of the key ideas of the social cognitive theory is the assumption of human *agency*, where humans are active agents and behaviors are a result of intentionality (Bandura, 2001a). As agents, Bandura argued that humans have the capacity to display intentionality, forethought, self-reactiveness, self-reflectiveness and self-regulatory functions.

The theory has been adopted in different addiction contexts (Bandura, 1999; Webb, Sniehotta, & Michie, 2010). LaRose, Mastro, and Eastin (2001) extended it to Internet use in conjunction with the uses and gratification perspective. In LaRose et al.'s (2003) social cognitive model, the key variables of interests are outcome expectations and self-regulation mechanism. *Outcome expectations* are defined as the perception of the consequences of engaging in a behavior (LaRose et al., 2001), and they serve as an incentive or disincentive for engagement in a particular behavior. If

the expected outcome by engaging in a behavior provides gratification, it will encourage individuals to continue in that behavior. In contrast, should there be negative outcome expectations (e.g., pain, boredom), individuals are less likely in wanting to perform the behavior.

Central to the LaRose's social cognitive model is the *self-regulation* mechanism. As humans are agents, they are assumed to have self-regulatory power over their behavior, manifested through three sub-dimensions such as self-monitoring, judgmental process, and self-reactive function (Bandura, 1991). Self-monitoring refers to how an individual observes his or her action to assess the consequences of the action on others and themselves (LaRose et al., 2003). Thus, a certain level of attention is a pre-requisite to action and behavior of the individual. Judgmental process refers to the assessment of the normalcy of the behavior performed in a particular context, and it evaluates the behavior and compares it against social norms or any type of established yardsticks (Bandura, 1991). Self-reactive function refers to the creation of incentives for an individual to engage in self-regulatory control—people will adopt behaviors that incentivizes them and avoid actions that have negative consequences.

LaRose et al. (2003) argues that in many cases where individuals display addictive tendencies in media consumption, it can be due to individual's deficiency in self-regulatory functions. While the concept of self-regulation has a positive connotation where individuals are able to exercise control over their behaviors, LaRose and his colleagues argues that there is an alternative perspective to self-regulation; they propose the concept of *deficient self-regulation*, which describes a situation where individual's self-control can invariably be weakened, leading to excessive consumption of media. While individuals may be goal-driven initially in seeking to maximize positive and minimize negative outcome expectations by

consuming media, paradoxically they may develop deficiencies in self-regulation as they become more dependent on the media, and less aware of their media consumption patterns.

Weaknesses of the Theoretical Frameworks

These six theoretical frameworks have in their own way contributed significantly to research on problematic media use, and they also have provided important conceptual perspectives for researchers embarking on problematic SNSs use research. Yet, there remain gaps and insufficiencies that impede the development of a holistic communication theory. First, one of the main weaknesses in some of the theoretical frameworks is the premature treatment of excessive SNSs use as a clinical disorder or addiction (Griffiths & Kuss, 2015). While existing studies have recognized that heavy SNSs users may experience some form of adverse consequences such as mood disorders, reduced sleep quality, and body image concerns (J. W. Kim & Chock, 2015; Rosen, Whaling, Rab, Carrier, & Cheever, 2013; Shensa et al., 2017; Wolniczak et al., 2013), the American Psychiatric Association (2013) has not considered heavy SNSs use as a disorder, even though it has explicitly listed *Internet Gaming Disorder* (IGD) in the DSM-5 as a condition that warrants more clinical research. While studies examining SNSs use from the addiction perspective have made significant contributions, particularly in scale development (Andreassen et al., 2012; van den Eijnden, Lemmens, & Valkenburg, 2016), important questions are left unaddressed. Just like IGD, details on the etiology, comorbidity, biomarkers, and potential treatment methods—which are necessary information to classify disorders—revolving excessive SNSs are at best inconclusive at this moment (Petry & O’Brien, 2013). This makes any claims on the classification of SNSs users as addicts or non-addicts premature.

This is important as studies have shown that heavy Internet use are highly comorbid with other types of disorders such as anxiety disorder as well as attention-deficit hyperactivity disorder (Bozkurt, Coskun, Ayaydin, Adak, & Zoroglu, 2013; Kuss, Griffiths, & Pontes, 2017). To avoid an over-simplification in pathologizing SNSs use, the addiction framework needs to be robust enough to show concretely that SNSs addiction is a primary disorder, and not just a simultaneous manifestation of other existing disorders (Pontes, Kuss, & Griffiths, 2015). In addition, there are no accepted treatment for addictive SNSs behaviors (Griffiths et al., 2014). Without any clarity on these issues, any preliminary classification of individuals into the *addict* category is not helpful and may be considered alarmist in nature.

Second, while some of the theoretical frameworks are cogent in the articulation of how problematic media use may occur, it is difficult to empirically test them in practice. For instance, the operant conditioning model framework postulates that problematic media behaviors develop through a process of initiation, transition, on-going use, and eventual addiction (Marlatt et al., 1988). Currently there are no yardsticks that can accurately identify at which stage of problematic use users fall into. Even if there are, the validity of such measures will come under scrutiny if they are self-report measures, just like how scholars have criticized using self-report questions for process models such as the transtheoretical model (Brug et al., 2005). Moreover, attempts to test the assumptions of the operant conditioning model will require the design of studies to be longitudinal in nature.

Third, some of the frameworks are highly descriptive in their approach to problematic media use, and do little to provide theoretical justification for the broader *why* questions. For instance, why do the factors in the theoretical frameworks account for possible addictive tendencies? This limitation is more pronounced in the

neurobiological and psychophysiological perspectives as well as for the addictive personality model. For the neurobiological and psychophysiological framework, while there are advantages and novelty associated with data-richness (e.g., neuroimaging may provide a more objective assessment of problematic media use by examining brain activation changes in different regions), it lacks explanatory power. Even though it shows how neural and psychophysiological activities correlate with addictive tendencies, it does not address why and how it happens. In addition, problematic media use may share similar pathophysiology as other types of disorders (Grant et al., 2006). If so, the data-richness edge of these frameworks will be significantly reduced.

Fourth, many of these frameworks (e.g., addictive personality, Caplan's problematic Internet use model, and social cognitive model) are overly focused on personal-level constructs without taking into account how external factors can provide the impetus for individuals to develop problematic media behaviors. These frameworks examine how personal-level factors such as personality types (Andreassen, Pallesen, & Griffiths, 2017; Muller et al., 2013; Wilson, Fornasier, & White, 2010), psychosocial issues (Caplan, 2003; LaRose et al., 2003), self-regulatory problems (Caplan, 2010; LaRose et al., 2010, 2003), preference for online social interaction (Caplan, 2005, 2010), relate to problematic media behaviors. While the findings certainly contribute to the overall understanding of what are the antecedents of problematic media behaviors, compulsivity in media use is a complex phenomenon that is often a consequence of both individual and external factors (Andreassen & Pallesen, 2014). This is well documented in existing literature as studies have shown that external factors such as family structure and relationships are related to development of addictive behaviors (A. E. Barrett & Turner, 2006; Doba, Nandrino, Dodin, & Antoine, 2014; J. Xu et al., 2014; Yen, Yen, Chen, Chen, & Ko, 2007).

Apart from family, as one of the key uses of SNSs is for social connection (Grieve, Indian, Witteveen, Tolan, & Marrington, 2013; Joinson, 2008), this suggests that the presence of the different types of social capital may be an external pull-factor for individuals to engage in SNSs use excessively.

Thus, examining problematic media behaviors purely based only on individual factors provide at best a limited perspective on the potential antecedents of compulsive media use. After all, behavioral variance is a function of both environmental and personal determinants (Bandura, 2001b). Currently among the theoretical frameworks presented, even though LaRose et al. (2003) claimed to adopt Bandura's social cognitive model that sought to explain why individuals develop problematic media use through the interplay of environmental and personal determinants, the actual model tested in subsequent studies did not include any environmental or determinants (Larose & Eastin, 2004; LaRose et al., 2010; D. Lee & LaRose, 2007).

Proposed Overarching Theoretical Framework—Social Cognitive Model

Despite these limitations, it is important to note that the insufficiencies of the theoretical frameworks do not nullify the contributions by the scholars who worked on them. Instead, these theoretical frameworks have provided much of the conceptual foundation for research in problematic SNSs use, and much could be gained by building upon existing knowledge gleaned from these perspectives. Yet, in terms of theoretical and methodological development, this study proposes that LaRose's social cognitive model is the most suitable for problematic SNSs use research.

First, the model shows promising potential for further development of communication theory, as they have communication roots. Though the social cognitive model was initially conceptualized from a psychological point of view, Bandura (2001b) specifically argued that this framework could be applied to a communication

context as it accounted for interaction of communication systems and described the relationship between mass media and individual's behavior. LaRose et al. (2001) also demonstrated that the assumptions of social cognitive model shared many similarities with the uses and gratification paradigm (a communication theory), and showed how initial uses of media for gratification could spiral into problematic behaviors.

Second, the social cognitive model adopts a reasonable caution in their approach to the topic of media addiction. For instance, LaRose's social cognitive model is careful in avoiding categorizing high users as *addicts*; instead by framing addictive tendencies as a function of the degree of deficient self-regulation, it avoids demonizing people who may at one point demonstrate a high reliance on SNSs but may recover when he or she regained mastery over self-regulatory functions.

Third, the model—tested using path analysis—demonstrated good psychometric properties (LaRose et al., 2010; D. Lee & LaRose, 2007). Fourth, the conceptualization of the models allows the possibility of the inclusion of external factors in explaining addictive tendencies. For instance, the social cognitive model highlights that apart from personal determinants, environmental determinants are equally as important in influencing behaviors (Bandura, 2001b). However, the application of social cognitive model in addictive context has yet to take this into consideration (Larose & Eastin, 2004; LaRose et al., 2003; D. Lee & LaRose, 2007).

With the above reasons, this study proposes that the social cognitive model provides the best conceptual foundation and potential for examining problematic SNSs use. In keeping with the key propositions of the social cognitive model (Bandura, 2001b; LaRose et al., 2003), this thesis will systematically examine how external and individual-level antecedents—including the key variable deficient self-regulation—relate to problematic SNSs use. The visual representation of the over overarching

conceptual framework of the social cognitive model that will guide the rest of the studies is shown in Figure 3.1.

The next section of this thesis (Chapter Four) seeks to test if the original social cognitive model is applicable in explaining problematic SNSs use (operationalized as time spent on SNSs) among a small sample of Singaporean adolescents, albeit with minor modifications to the original model. This would be a crucial step as most of the existing models were tested in a primarily western sample (LaRose et al., 2010, 2003; D. Lee & LaRose, 2007). After which, Chapter Five will build upon the findings of Chapter Four and tests an extended social cognitive model. The purpose of Chapter Five is to advance the social cognitive model in a few ways. First, it proposes that using time spent on SNSs as problematic use is problematic in many ways and argues that problematic SNSs use should be conceptualized as *excessive use*, *withdrawal symptoms*, and *negative outcomes*¹⁰. Second, it extends the original social cognitive model by examining how both external and individual-level antecedents relate to problematic SNSs use among a nationally representative sample of Singaporean adolescents.

For the next study in Chapter Six, recognizing that the external and individual-level antecedents that relate to problematic SNSs use may not necessarily be the same for adults, the Chapter will examine a different set of external and individual-level antecedents of problematic SNSs use—by integrating the social cognitive with Caplan’s problematic Internet use model—among a nationally representative sample of Singapore adults. Figure 3.2. shows the visual representation of how each of the chapters build upon the social cognitive model.

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¹⁰ More details on why time spent on SNSs is insufficient to qualify as problematic SNSs use as well as literature supporting the explication of problematic SNSs use into the three dimensions will be discussed in Chapter Five.

Figure 3.1. Overarching conceptual framework of the social cognitive model.

Figure 3.2. Conceptual mapping of the social cognitive model development.

CHAPTER FOUR   STUDY TWO

Examining the Antecedents of SNSs Use Among Singaporean Adolescents—A Social Cognitive Approach

Using the social cognitive model as the theoretical framework, this study aims to examine the antecedents related to problematic SNSs use among adolescents. The social cognitive model of media attendance—first conceptualized by LaRose et al. (2003)—is one of the more prominent theoretical models used in the field of communication to examine media consumption behavior (Bandura, 2001a, 2001b; Larose & Eastin, 2004; LaRose et al., 2010, 2003). It has also been tested in a variety of media consumption contexts such as general Internet usage (Larose & Eastin, 2004), video games (D. Lee & LaRose, 2007), and SNSs in recent years (LaRose et al., 2010). To date, the different variants of the social cognitive model have been demonstrated to have adequate psychometric properties in explaining media consumption behaviors as well as problematic media use (LaRose et al., 2010, 2003; D. Lee & LaRose, 2007).

The underlying premise of this thesis is that there is much potential for extending the social cognitive model theoretically in the context of SNSs use. There are a few key objectives of this study. First, it aims to test the replicability of the social cognitive model in the context of SNSs use, on a small Singapore adolescent sample to ascertain if it has good psychometric fit. Second, it examines how key variables in the model—depression, deficient self-observation and reaction, self-reactive outcome expectations—relate to adolescent's time spent on SNSs, which is the dependent variable in the original social cognitive model (LaRose et al., 2003). Third, this study

proposes that apart from depression, loneliness is an additional psychosocial problem that may be an antecedent of SNSs consumption. Fourth, this study postulates that a more statistical rigorous approach is needed to test the model by using covariance structure modeling—previous models were tested only using path analysis in which issues such as measurement validity were not fully taken into account (LaRose et al., 2003; Lee & LaRose, 2007).

Theoretical Framework—Social Cognitive Model

The social cognitive model of problematic media use offers an alternative perspective for understanding development of addictive behavior in the context of the media (LaRose et al., 2003). The model postulates the following paths which explain why individuals may consume media excessively: (a) psychosocial problems¹¹ (e.g., depression) are antecedents of self-reactive outcome expectations, deficient self-observation, and deficient self-reaction; (b) self-reactive outcome expectations are antecedents of deficient self-observation and deficient self-reaction; and (c) time spent on media is a function of deficient self-observation and deficient self-reaction (see Figure 4.1).

Bandura's social cognitive theory accounts for behavioral variance by examining the interplay between complex internal psychological factors, external factors, and individual behaviors (Bandura, 1986, 1989, 2001b). The theory postulates that human behavior is a function of the reciprocal causative relationship between behavioral, environmental and personal factors (Bandura, 2001b). By focusing on reciprocal relationships between the triadic mechanisms, the social cognitive theory distinguished itself from the dominant paradigm of psychology of that time that

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¹¹ Loneliness was not part of the original social cognitive model (LaRose et al., 2003).

Figure 4.1. Hypothesized social cognitive model.

explained human behavior as an automatic consequence of external stimuli (Bandura, 2001a), which failed to account for individuals' capacity to induce behavioral changes.

According to Bandura, one aspect that scholars often overlook when examining behaviors is that human beings are active agents of behavioral changes and that they are capable of exercising control of their actions (Bandura, 2001a). This is known as the *agentic* perspective, where the term *agency* refers to human actions that are calculated or purposeful in nature (Bandura, 2001a). Thus, the role of self-regulation is an important aspect in the social cognitive theory and helps explain why individuals develop problematic behaviors (Bandura, 1991).

The Two Dimensions of Deficient Self-Regulation

The original social cognitive theory largely postulates an optimistic scenario that assumes that human beings can control their actions. Yet in cases of addictive tendencies, people have demonstrated a lack of efficacy in restraining themselves or resisting urges (Grant et al., 2010). Recognizing a dysfunctional form of self-regulation, LaRose et al. (2001) extended Bandura's concept of self-regulation to encompass a degree of deficiency in regulatory function termed as *deficient self-regulation* in his social cognitive model. Deficient self-regulation is defined as the "*state in which conscious self-control is relatively diminished*" (LaRose et al., 2003, p. 232). Thus, problematic media use consumption occurs when individuals are unable to regulate or monitor their own behavior. Deficient self-regulation can manifest in terms of regularly using media to the extent of getting in the way of more important tasks at hand (LaRose, 2010), such as continuous game-playing when an important assignment is due.

LaRose et al. (2003) argue that viewing the problem of problematic use through the lenses of deficient self-regulation addresses the conceptual shortfalls in the

mainstream addiction paradigm. The dominant addiction paradigm labels a person struggling with repetitive use as an *addict*—some criticize this to be a premature diagnostic as scholars and clinicians have not recognized it as an official psychiatric disorder as questions of etiology, diagnostic criteria and comorbidity remain unresolved. Moreover, the term *addict* may raise a false sense of alarm for official treatment when none has been formulated (LaRose et al., 2003). Conceptualizing problematic media use through deficient self-regulation circumvents these problems and yet at the same time, make salient the issue of unhealthy dependence on media. This is because deficient self-regulation is measured along a continuum and does not presume to be a mutually exclusive categorical construct like the addiction paradigm (e.g., either one is an addict, or one is not). As such, individuals who are highly dependent at one point in time may exhibit all the traits of addiction, but he or she may be able to regain self-control again.

There are two dimensions of deficient self-regulation—deficient self-observation and deficient self-reaction (LaRose, 2010; LaRose et al., 2003). Deficient self-observation can be defined as the state in which conscious awareness and observation of one's media consumption patterns are relatively diminished. At the initial stage of media consumption—when a person wants to create an account with a new SNS—he or she will be more aware of the time they spent on it as compared to another individual who have been using the SNS for a long time. Over time, the repeated use of media forms may result in the formation of a routine; the longer the routine is integrated into individuals' daily lifestyle, the stronger the strength of the habit. The stability of the context of a repeated behavior is a necessary prerequisite for deficient self-observation to occur (LaRose, 2010). As a behavior is performed repeatedly, a direct association is forged between the context in which the behavior is

performed and the memory (Neal, Wood, & Quinn, 2006). Thus, similar contextual cues in future will prime an automatic behavior response.

Deficient self-observation is characterized by the lack of awareness, attention, intentionality and controllability (LaRose, 2010). When a behavior becomes habitual, individuals no longer need to dedicate extensive cognitive processing in order to carry out the activity. Thus, intentionality and controllability diminished as the individual becomes less aware of their action. From a neurological perspective, the formation of habits helps expedite life's processes and ensures that individuals are protected from being overwhelmed from active information processing in every life routine (LaRose, 2010).

The second dimension of deficient self-regulation—deficient self-reaction—describes a state of compulsivity where an individual is unable to regulate his or her media consumption behavior because of the need to derive the same degree of gratification by increasing media usage (LaRose et al., 2010). People may start using SNSs due to the perceived benefits such as enjoyment and social support (Al-debei, Al-lozi, & Papazafeiropoulou, 2013; Oh, Ozkaya, & LaRose, 2014), but these gratifications by themselves may not be inherently problematic. However, problematic use occurs when the same level of SNSs usage do not satisfy anymore, resulting in users being unable to regulate their SNSs use from spiraling out of control.

Deficient Self-Regulation and Time Spent on SNSs

When individuals suffer deficiency in either their observation of their media behavior or reaction, they have a degree of deficient self-regulation. Whenever an individual is unable to regulate his or her media behavior, the natural consequence is an increase in one's media usage. The outcome of interest of the social cognitive model—in the context of this study—is time spent on SNSs. Time spent on SNSs is an

important outcome of interest because 28% of people's activities on the Internet are on SNSs (Bennett, 2015). As SNSs use becomes more prevalent, research has shown that the time spent on SNSs has increased dramatically over the years. In 2007, students who were the most active users of SNSs, spent approximately ten to thirty minutes per day interacting with their friends (Ellison et al., 2007). By 2015, the amount of time spent on SNSs increased to approximately 2 hours per day (globalwebindex, 2015), which was a fourfold increase from 2007. Understanding the factors behind time spent on SNSs will have valuable practical implications. For example, identifying potential risk factors will be useful in mitigating and preventing SNSs consumption behavior from spiraling into problematic use.

Past studies have demonstrated that there is a direct relationship between deficient self-regulation (both dimensions) and actual time spent on media (Larose & Eastin, 2004; LaRose et al., 2003; D. Lee & LaRose, 2007). This relationship can be extrapolated to the context of SNSs use as well (LaRose et al., 2010), where adolescent's increasing time spent on SNSs is documented (V. Balakrishnan & Shamim, 2013). As such, this study postulates:

H1: Deficient self-observation is positively associated with time spent on SNSs.

H2: Deficient self-reaction is positively associated with time spent on SNSs.

Individual-level Antecedent—Self-Reactive Outcome Expectations

While the latter half of the social cognitive model postulates that deficient self-observation and deficient self-reaction are related to media consumption, the first half seeks to explain how personal antecedent factors relate to deficient self-regulation. After all, the vision of conceptualizing the social cognitive model is to create a comprehensive model of media consumption that accounts for variables that may be associated with deficient self-regulation (LaRose et al., 2003).

Self-reactive outcome expectations are identified as one of the antecedents of deficient self-regulation (Larose & Eastin, 2004; LaRose et al., 2003; D. Lee & LaRose, 2007). Self-reactive outcome expectations refer to the motivation, or the psychological incentives that individuals perceive they will receive after engaging in a particular behavior (Bandura, 1977). Particularly for SNSs use, users report that one of the motivations for its use is to derive psychological benefits such as making people feel connected and happy (V. Balakrishnan & Shamim, 2013). As adolescents allow these psychological incentives to motivate SNSs use, this may result in a conditioned response to dysphoric mood states. Over a period of time, the dependence on SNSs to provide these psychological incentives may diminish individuals' observation of their time spent on SNSs and their self-control (LaRose et al., 2003). As such, this study postulates:

H3: Self-reactive outcome expectations are positively associated with (a) deficient self-observation and (b) deficient self-reaction.

Individual-Level Antecedents—Depression and Loneliness

Apart from self-reactive outcome expectation, two factors—depression and loneliness—are psychosocial factors that may also result in high SNSs use. Both are recognized by research as risk factors of compulsive media use (Caplan, 2002, 2005; J. H. Kim, LaRose, & Peng, 2009; LaRose et al., 2003). It is important to consider how loneliness relate to problematic SNSs use in addition to depression, despite concerns if the two are truly distinct due to the strong association ($.40 < r < .66$) (Weeks, Michela, Peplau, & Bragg, 1980). However, research has established that depression and loneliness are distinct concepts even though the correlation is high (Cacioppo, Hawkley, et al., 2006; Cacioppo, Hughes, Waite, Hawkley, & Thisted, 2006; Russell, Peplau, & Cutrona, 1980). While depressed individuals may experience a certain

degree of loneliness—depression scales often contain items measuring loneliness—lonely individuals may not necessarily have depressive moods (Cacioppo, Hawkley, et al., 2006; e.g., LaRose et al., 2003). Moreover, research has shown that empirical test of the depression (measured by Beck Depression Inventory) and loneliness (UCLA Loneliness Scale) concepts using principal axis factor analysis with oblique rotation to allow for correlated factors showed that loneliness items had low loadings on depression construct ($<.11$); similarly, depression items had low loadings ($<.20$) on the loneliness construct (Cacioppo, Hawkley, et al., 2006).

Depression—defined as feelings of sadness which may come together with loss of energy or fatigue (American Psychiatric Association, 2018)—is one of the original key variables in LaRose et al.'s (2003) social cognitive model. The authors postulate that depressed individuals may seek out media, specifically the Internet, to improve their mood. Depression has been identified as a risk factor for many types of behavioral addictions (Özdemir, Kuzucu, & Ak, 2014), and there are some reasons as to why depressed adolescents may turn to SNSs. First, research has shown that people who exhibit depressive symptoms tend to turn to the Internet for escapism (D. Li et al., 2011). There are a variety of activities available on SNSs that individuals could engage in for escapism. Users can choose to play games offered on SNSs platforms as they allow them to collaborate and engage with their SNSs friends (J. Lee, Lee, & Choi, 2012). Alternatively, depressed individuals may turn to SNSs to look for inspirational quotes or content, or gain social acceptance and social support, or even to engage in downward comparison with those who are perceived to be less attractive in order to make themselves feel better (Radovic et al., 2017).

Second, SNSs provide avenues for mood modification and psychological incentives by allowing users to engage in self-presentation to boost their self-esteem

(V. Balakrishnan & Shamim, 2013; Caplan, 2005). The opportunity to beautify oneself through the use of filters on image-centric SNSs (e.g., Instagram) and gain followers, likes, and comments may alleviate dysphoric mood (Ridgway & Clayton, 2016). In addition, SNSs allow users to communicate with one another either synchronously or asynchronously—this may be an attractive feature to depressed individuals who often suffer deficit in social skills, and prefer their communication with others to occur in a safe, mediated space (Caplan, 2003, 2005). The link between depression and self-reactive outcome expectation has been supported in the SNSs context (LaRose et al., 2010).

A recent study that applied social cognitive model in SNSs context also found support for the positive association between depression and deficient self-reaction (LaRose et al., 2010). A conditioned response to use SNSs to alleviate dysphoric mood may weaken self-regulation among depressed individuals as they develop an unhealthy reliance on SNSs as a coping mechanism. As such, the following hypothesis is postulated:

H4: Depression is positively associated with (a) self-reactive outcome expectation and (b) deficient self-reaction.

Apart from depression, this study proposes that loneliness is another psychosocial antecedent that should be included in the model, as there are substantial reasons as to how it can increase the explanatory power of the model. Loneliness is one of the indicators of an individual's social well-being and it is a feeling of how well connected or isolated the individual is (De Jong- Gierveld & Tilburg, 2006). There are many different definitions of loneliness. Loneliness has been defined in existing literature as the isolation experienced by people due to deficiencies in social relationships (De Jong-Gierveld, 1987). On a similar note, it has also been defined as

the discrepancy between the perceived desired level of social connection and one's actual relationships (Frison & Eggermont, 2015b; Peplau & Perlman, 1982). In short, loneliness is the feeling of isolation and disconnectedness that one experiences; it is a subjective evaluation and the individual may not necessarily be *objectively* isolated in order to feel lonely (M. E. Hughes, Waite, Hawkley, & Cacioppo, 2004; Jaya, Hillmann, Reininger, Gollwitzer, & Lincoln, 2017).

There are several reasons as to why loneliness may be positively associated with self-reactive outcome expectations. First, the asynchronous features of SNSs may be attractive to lonely individuals as they allow them to process how they want to communicate and represent themselves to their network, and this reduces the stresses of face-to-face interaction which requires immediate responses, thereby allowing users to express themselves better (McKenna, Green, & Gleason, 2002). For instance, on Facebook, users are able to think through how to craft specific messages they want to be broadcasted to their network. Even after posting messages online, they are able to remove or edit the content should they want to.

Next, as lonely people may be motivated to seek out online social interaction because of their unmet companion needs (Tokunaga, 2014), SNSs are platforms where they could reach out to people in their network for social support. After all, social support seeking, companionship support, and socializing are listed as some of the key reasons as to why people use SNSs (Frison & Eggermont, 2015a). Frison and Eggermont (2015b) in their two-wave panel study showed that loneliness was positively associated with active public Facebook use—defined as both targeted (e.g., one-on-one communication) and non-targeted exchanges (e.g., posting status updates for everyone to see) between Facebook users and their friends in public—which in turn increased perception of social support derived online mediated by positive

feedback. In a separate study, Frison and Eggermont (2016) in their hypothesized structural equation model showed that both active public Facebook use (e.g., responding to friends' comments publicly on their Facebook profile) and private Facebook use (e.g., privately communicating with another Facebook user out of the public's eye) were both positively associated with perceived online social support. This suggests that individuals may use SNSs as a psychological incentive because it alleviates their loneliness.

In addition to facilitating social interactions, SNSs are avenues where friends, family members, other people and organizations are able to post user-generated content (J. Lu, Hao, & Jing, 2016). Lonely people are able to view content such as selfies or *outfit of the day* (OOTDs) of friends and family members, share viral memes or videos, and follow the posts of microcelebrities (Chua & Chang, 2016; Marwick, 2015; Myrick, 2015; Spitzberg, 2014) to curb their boredom. Research shows that users find SNSs entertaining as they could browse updates posted by others (V. Balakrishnan & Shamim, 2013), and this act of browsing SNSs content triggers more positive than negative motions (R. Lin & Utz, 2015).

In addition to self-reactive outcome expectations, loneliness may have a positive relationship with deficient self-reaction. Loneliness has been associated with a sense of emotional connectedness to SNSs (Clayton et al., 2013), which makes it difficult for lonely individuals to control their SNSs use. Past research has shown that loneliness is positively associated with deficient self-regulation in the context of Internet addiction (Özdemir et al., 2014), deficits in social skills, as well as preference for online social interaction (J. H. Kim et al., 2009). Considering that SNSs provide an immediate relief for lonely individuals by allowing them to communicate with others without the stresses of face-to-face interaction, their regulatory functions over SNSs

usage may diminish as they turn to SNSs to alleviate their loneliness (Özdemir et al., 2014). Thus, the following hypothesis is postulated:

H5: Loneliness is positively associated with (a) self-reactive outcome expectations and (b) deficient self-reaction.

Method

Research Design

To test the hypothesized social cognitive model, a cross-sectional pen-and-paper survey was administered to students from secondary 1 to 5 (13 to 17 years old) from two secondary schools in Singapore in the month of October 2014. A total of 293 students completed the self-administered questionnaire. The sample consists of 50.5% females and 49.5% males and age ranged from 13 to 21 years ($Mdn = 14$, $M = 14.73$). In terms of race, the majority of the sample were Chinese (79.69%), followed by Malay (11.63%), Indian (4.25%), and Other Races (4.43%).

Ethics and Informed Consent

Prior to data collection, approval was obtained from the Institutional Review Board (IRB), the Ministry of Education (MOE), parents, and the student participants. Upon receiving approval from the two institutions, an invitation letter with MOE and IRB approval letters were sent out to the two secondary schools. They were informed that the survey would take approximately 30 minutes and there were no foreseeable risks or harm to the students. The school management, parents and students were notified that students were free to exit the study at any point in time with no penalty. Parental and students' consent were obtained prior to the survey.

Measures

Exogenous Variables

Depression. To measure *depression*, participants were asked on a seven-point scale (where 1 = Rarely/None at all, 7 = Most/All) if they felt the following in the past

week: (a) “I felt lonely¹²,” (b) “I felt sad,” and (c) “I could not get ‘going.’” The three items (Cronbach’s $\alpha = .91$) were adapted from LaRose et al.(2003).

Loneliness. The construct *loneliness* was measured by asking participants on a five-point scale (where 1 = Hardly ever, 5 = Most often) how often they perceived that they: (a) “Lack companionship;” (b) “Felt left out;” and (c) “Felt isolated from others.” The three items (Cronbach’s $\alpha = .93$) were adapted from Hughes, Waite, Hawkley, and Cacioppo (2004).

Endogenous Variables

Self-Reactive Outcome Expectations. To measure *self-reactive outcome expectations*, participants were asked on a seven-point scale (where 1 = Very unlikely, 7 = Very likely) how likely were they to use SNSs for the following: (a) “Forget my problems;” (b) “Feel a sense of achievement;” and (c) “Find something that challenges me.” The three items (Cronbach’s $\alpha = .82$) were adapted from LaRose et al. (2003).

Deficient Self-Observation. To measure *deficient self-observation*, participants were asked on a seven-point scale (where 1 = Strongly disagree, 7 = Strongly agree) how agreeable were they with: (a) “Using SNSs is part of my routine;” (b) “Using SNSs is a habit I got into;” and (c) “I use SNSs without really thinking about it.” The three items (Cronbach’s $\alpha = .89$) were adapted from LaRose et al. (2003).

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¹² Additional confirmatory factor analyses (CFAs) were conducted and evaluated based on the criteria set out under the *Analytical Approach* section in this chapter to check if the measure “I felt lonely” (denoted as dep1 in Figures 4.2 to 4.4) is problematic. First, a CFA (see Figure 4.2) was conducted where all the three depression items loaded onto depression, while all the three loneliness items loaded onto loneliness. The measurement model showed good fit (Model fit: $\chi^2 = 24.29$, $df = 8$; CFI = .99; TLI = .98; RMSEA = .08; 90% confidence interval = .05 and .12; SRMR = .03), and most of the factor loadings were between .80 and .90. Next, a second CFA (see Figure 4.3) was conducted by loading dep1 onto both depression and loneliness. While the model fit was acceptable ($\chi^2 = 16.26$, $df = 7$; CFI = .99; TLI = .99; RMSEA = .07; 90% confidence interval = .02 and .11; SRMR = .03), the factor loading for dep1 on loneliness was low (.13), while its loading on depression was high (.81). A third CFA (see Figure 4.4) was conducted by loading dep1 only on loneliness. The model fit ($\chi^2 = 252.34$, $df = 8$; CFI = .84; TLI = .69; RMSEA = .32; 90% confidence interval = .29 and .36; SRMR = .13) was poor and factor loading for dep1 on loneliness was low. Consistent with existing research that showed that loneliness items typically had low loadings on depression (Cacioppo, Hawkley, et al., 2006), the results from the three CFAs showed that dep1 was a reflective indicator of depression and not loneliness.

Figure 4.2. Two-factor depression and loneliness model. Model fit: $\chi^2 = 24.29$, $df = 8$; CFI = .99; TLI = .98; RMSEA = .08; 90% confidence interval = .05 and .12; SRMR = .03. For identification purposes, variances of the common latent factors were fixed to “1”, while all the manifest variables were allowed to be estimated freely.

Figure 4.3. Two-factor depression and loneliness model with cross loadings. Model fit: $\chi^2 = 16.26$, $df = 7$; CFI = .99; TLI = .99; RMSEA = .07; 90% confidence interval = .02 and .11; SRMR = .03. For identification purposes, variances of the common latent factors were fixed to “1”, while all the manifest variables were allowed to be estimated freely.

Figure 4.4. Two-factor depression and loneliness model with dep1 loaded on loneliness. Model fit: $\chi^2 = 252.34$, $df = 8$; CFI = .84; TLI = .69; RMSEA = .32; 90% confidence interval = .29 and .36; SRMR = .13. For identification purposes, variances of the common latent factors were fixed to “1”, while all the manifest variables were allowed to be estimated freely.

Deficient Self-Reaction. To measure *deficient self-reaction* (Cronbach's $\alpha = .87$), participants were asked on a seven-point scale (where 1 = Strongly disagree, 7 = Strongly agree) how agreeable were they with: (a) "I use SNSs so much that it interferes with other activities;" (b) "I get strong urges to be on SNSs;" and (c) "I have to keep using SNSs more and more to get my thrill." The three items (Cronbach's $\alpha = .88$) were adapted from LaRose et al. (2003).

Time Spent on SNSs. To measure time spent on SNSs, participants were asked to indicate the total number of hours and minutes for the following items: (a) "How much time do you spend on SNSs on a typical weekday?" (Note: only one day from Mon to Fri); (b) "How much time do you spend on SNSs on a typical weekend (Saturday OR Sunday);" and (c) "How much time do you spend on SNSs the day before this survey?" The measures (Cronbach's $\alpha = .89$) were taken from LaRose et al. (2003). A $\log_{10}(1+\text{value})$ transformation was applied to each of the three indicators to correct for positive skewness.

Missing Values Imputation

Missingness for the items ranged from 0% to 2.00%. Little's Missing Completely At Random (MCAR) returned a significant estimate ($p < .001$) which indicated that the data was not MCAR. As it was difficult to establish if the data were Missing Not At Random (MNAR) or Missing At Random (MAR), researchers usually assumed missingness to be either MNAR or MAR. This study took the more conservative approach and assumed missingness to be MNAR. To replace missing values, this study used the *amelia* package in R to conduct multiple imputation due to its statistical appropriateness for data assumed to be MNAR or MCAR (J. W. Graham, Hofer, & Mackinnon, 1996).

Analytic Approach

The *lavaan* package in R was used to test the social cognitive model of problematic SNSs using covariance structure modeling, where maximum likelihood was used for estimating unknown parameters. Individual items were allowed to load on their common latent factor. The following fit indices were used to evaluate the model's goodness of fit: Model chi-square (χ^2), Comparative Fit Indices (CFI), Tucker-Lewis Index (TLI), Root Mean Squared Error of Approximation (RMSEA), and Standardized Root Mean Squared Residual (SRMR). χ^2 should not be significant if the model fits the data well (P. Barrett, 2007). However, χ^2 is sensitive to large sample sizes, and as such a significant χ^2 may not necessarily indicate that the model fit is bad. As such, model fit evaluation will need to be accounted for by other indicators. For CFI and TLI, the acceptable threshold is a figure close to .95 (Hu & Bentler, 1999) while for RMSEA, values below .05 indicate good fit; values between .05 and .08 indicate reasonable fit; values between .08 and .10 indicate mediocre fit while values above .10 indicate poor fit (Browne & Chudeck, 1993). Values of SRMR below .08 indicate good fit (Hu & Bentler, 1999).

Results

Table 4.1 shows the correlation among all the items. CFA showed that the measurement model for the hypothesized social cognitive model of problematic SNSs use had good fit ($\chi^2 = 156.22$, $df = 120$; CFI = .99; TLI = .99; RMSEA = .03; 90% confidence interval = .02 and .04; SRMR = .05). Most factor loadings exceeded .70, indicating a high level of measurement validity (see Figure 4.5 and Table 4.2). The hypothesized model with measurement model and full structural paths were tested. For scaling and identification purposes, the variances common latent factors (ϕ and ψ) were fixed to "1". Results indicated that the hypothesized model had good fit ($\chi^2 =$

Table 4.1 Correlation among composite indices (Social cognitive model)

Variables	1	2	3	4	5	6
1. dep	-					
2. lone	.61***	-				
3. expectations	.02	.04	-			
4. deficient-ob	.20***	.22***	.27***	-		
5. deficient-react	.31***	.31***	.34***	.56***	-	
6. time spent on SNSs	.17***	.21***	.05	.39***	.32***	-

Note: * $p < .05$, ** $p < .01$, *** $p < .001$. For a more parsimonious presentation, only the correlation among the composite indices is shown here.

Figure 4.5. Measurement model of the social cognitive model. The paths between the common latent factors were not drawn to reflect a more parsimonious diagram. Model fit: $\chi^2 = 156.22$, $df = 120$; CFI = .99; TLI = .99; RMSEA = .03; 90% confidence interval = .02 and .04; SRMR = .05.

Table 4.2 Summary of measurement items (Social cognitive model)

Variable (range)	Factor loading	<i>M</i>	<i>SD</i>
Depression (1-7)			
dep1	.90	2.90	1.89
dep2	.92	3.01	2.00
dep3	.80	2.88	1.85
Loneliness (1-5)			
lone1	.82	2.64	1.23
lone2	.94	2.75	1.29
lone3	.93	2.68	1.30
Self-Reactive Outcome Expectations (1-7)			
expectations1	.68	4.30	2.07
expectations2	.92	3.28	1.89
expectations3	.74	3.49	1.97
Deficient Self-Observation (1-7)			
deficient-ob1	.88	4.34	1.86
deficient-ob2	.91	4.14	1.90
deficient-ob3	.79	4.15	1.89
Deficient Self-Reaction (1-7)			
deficient-react1	.84	2.69	1.61
deficient-react2	.79	2.53	1.54
deficient-react3	.85	2.69	1.58
Time spent on SNSs (minutes)			
time1	.94	224.78	213.15
time2	.89	305.31	254.05
time3	.74	186.30	202.36

Note: Items appear in the same order as the Method section in this chapter.

257.90, $df = 189$; CFI = .98; TLI = .98; RMSEA = .03; 90% confidence interval = .02 and .05; SRMR = .08). Table 4.3 shows the summary of model fit for both the measurement and the full model.

Results from the analysis showed that deficient self-observation was positively associated with adolescent's time spent on SNSs ($\beta = .33, p < .001$), supporting H1. Deficient self-reaction was positively associated with adolescent's time spent on SNSs, thus supporting H2 ($\beta = .19, p < .001$). Next, self-reactive outcome expectations were positively associated with deficient self-observation ($\beta = .28, p < .001$) and deficient self-reaction ($\beta = .41, p < .001$), supporting H3(a) and H3(b). Depression was positively associated with self-reactive outcome expectations ($\beta = .27, p < .001$) and deficient self-reaction ($\beta = .25, p < .001$), supporting H4(a) and H4(b). Loneliness was positively associated with self-reactive outcome expectations ($\beta = .23, p < .001$) and deficient self-reaction ($\beta = .10, p < .01$)—supporting H5(a) and H5(b). The total variance explained for time spent on SNSs was 21% ($R^2 = .21$). Figure 4.6 shows the social cognitive model with all the standardized coefficients reported.

Table 4.3 Summary of model fit (Social cognitive model)

Model	χ^2	df	CFI	TLI	RMSEA (<i>p</i>-close)	CI of RMSEA	SRMR
Measurement model	156.22	120	.99	.99	.03 (.99)	.02 to .04	.05
Social cognitive model	257.90	189	.98	.98	.04 (.99)	.02 to .05	.08

Note: CFA = confirmatory factor analysis; *df* = degrees of freedom; CFI = comparative fit index; TLI = Tucker-Lewis index;
RMSEA = root mean square error of approximation; 90% CI of RMSEA = 90% confidence interval of root mean square error of approximation;
SRMR = Standardized Root Mean Squared Residual.

Figure 4.6. Final social cognitive model. Standardized coefficients are shown in this diagram. $*p < .05$, $**p < .01$, $***p < .001$.

Model fit: $\chi^2 = 257.90$, $df = 189$; CFI = .98; TLI = .98; RMSEA = .03; 90% confidence interval = .02 and .05; SRMR = .08. The figure in parenthesis indicates the amount of variance explained. The error terms for deficient self-observation and deficient self-reaction were correlated but not reflected here to present a parsimonious diagram.

Discussion

This study has yielded important findings in the area of problematic SNSs use. First, this study aims to test the replicability of the social cognitive model in the context of adolescent's problematic SNSs use in Singapore. The results showed that the model has achieved good psychometric properties. Second, empirical support was found for all the hypothesized paths. Deficient self-observation and deficient self-reaction were positively associated with adolescents' SNSs use. Next, self-reactive outcome expectations were significantly associated with deficient self-observation and deficient self-regulation. Last but not least, both depression and loneliness were associated with self-reactive outcome expectations and deficient self-reaction.

One of the key contributions of this study is the demonstration of the replicability of the social cognitive model in the context of Singaporean adolescents' problematic SNSs use. This has many implications for the construction of communication theory and the way scholars approach problematic SNSs use. Many of the current studies in problematic SNSs use are focused on identifying factors associated with problematic SNSs use such as motivations, personality types or attitude (Al-debei et al., 2013; Alhabash et al., 2012; Caci et al., 2014; Davenport et al., 2014; Ross et al., 2009). Few, however, have explored the *process* behind the development of problematic tendencies. The social cognitive model not only identified factors that may be associated with high SNSs use, but also showed how problematic use may be developed through the mechanism of deficient self-regulation.

The main premise of the social cognitive model is that media consumption, or problematic media use, can be conceptualized as a function of formation of deficient self-regulation (LaRose et al., 2003). This study extrapolated this relationship to the context of SNSs use based on findings from past research (LaRose et al., 2010, 2003;

D. Lee & LaRose, 2007) and found adequate support for the hypothesized relationships between deficient self-regulation and adolescent's time spent on SNSs.

The results showed that the two dimensions of deficient self-regulation—deficient self-observation and deficient self-reaction—were strongly associated with the amount of time adolescents spent on SNSs. Adolescents may initially be goal-directed and purposive in their use of SNSs at the initial stage to fulfill certain gratification and wield control over their usage. However, as SNSs use become ritualized and routine, they may be less conscious of how much time they spend using it. The learned dependency will deplete their ability to stop SNSs use at will.

Apart from examining the process of developing problematic SNSs use through deficient self-regulation, the social cognitive model also identifies certain factors that are antecedents of problematic SNSs. Consistent with past results, self-reactive outcome expectations were positively associated with deficient self-observation and the deficient self-reaction (Larose & Eastin, 2004; LaRose et al., 2003). Adolescents may turn to SNSs as they provide certain psychological incentives such as mood modifying effects, boosting of self-esteem, entertainment and social enhancement value (Cheung et al., 2011; Nadkarni & Hofmann, 2012; Zhang, Tang, & Leung, 2011). Recent psychophysiological research has found that SNSs use is associated with high positive valence and high arousal in users (Mauri et al., 2011). As adolescents continuously return to SNSs to derive the same level of gratification, they become less aware of their behavior regulation, and the repeated behavior becomes automated without the presence of effortful cognition (Ouellette & Wood, 1998).

Apart from psychological antecedents, this study identified that adolescents who are depressed are more susceptible to high SNSs use as they tend to seek out SNSs for psychological motivations and indicate higher deficiency in regulating their

SNSs use. Depression was included in the original social cognitive model in the context of general Internet usage; past research on problematic Internet use have associated depressive symptoms with problematic Internet use (Dalbudak, Evren, Aldemir, & Evren, 2014; LaRose et al., 2003). To alleviate depression, individuals may turn to the media as they provide a form of escapism. Likewise, since SNSs use is associated with positive valence (Mauri et al., 2011), there is an association between depression and self-reactive outcome expectations. As depressed adolescents solely depend on SNSs to reduce dysphoric mood, they become desensitized to their regulatory capabilities.

Loneliness has been cited as one of the factors associated with problematic SNSs (Clayton et al., 2013; Deters & Mehl, 2013; Ryan & Xenos, 2011; Skues et al., 2012), and this study proposed the inclusion of loneliness to the social cognitive model. One of the main reasons why people use SNSs is for social connection (Alhabash et al., 2012; Bonds-Raacke & Raacke, 2010; D. M. boyd & Ellison, 2008), and hence lonely adolescents would perceive that using SNSs would alleviate the feeling of loneliness. As lonely adolescents derive greater social and emotional connection from SNSs use and develop an overdependence on it, they become desensitized and their regulatory function diminished.

Theoretical and Practical Implications

The findings from this study have contributed to both theory and practice. In terms of theoretical development, the good psychometric properties of the social cognitive model of problematic SNSs use attest to its replicability in Singapore; this is significant as currently the bulk of SNSs research remain predominantly western-centric (LaRose et al., 2010, 2003; D. Lee & LaRose, 2007). The viability of the model points scholars to a paradigm shift in conceptualizing problematic SNSs use as

a function of deficient self-regulation—a move away from the traditional *addiction* research that categorize high users as *addicts* and low users as *non-addicts*. By conceptualizing problematic use as a function of deficient self-regulation, not only can scholars avoid unnecessary stigmatization, they could also investigate further what contributes to the deficiency in regulatory functions, and therein suggest practical steps to help adolescents resume efficacious control over their SNSs use.

A second theoretical contribution of this study is the vigorous statistical validation of the hypothesized model using covariance structure modeling. Previous studies examining social cognitive model mainly used path analysis, in which statistical issues such as measurement validity and error terms were not accounted for. Even though confirmatory factor analysis may be performed prior to path analysis, a major statistical issue with path analysis is that observed variables were analyzed as if they were error free; this assumption is not accurate for behavioral research (Maccallum & Austin, 2000). However, in this study, after accounting for both measurement and structural paths, as well as for unique variances, the model achieved a comparable fit to models in previous research (LaRose & Eastin, 2004; LaRose et al., 2011; LaRose et al., 2003; Lee & LaRose, 2007). This lends a strong support to the claims of the social cognitive model.

In terms of practical significance, this study has identified that depressed and lonely adolescents seek out SNSs as a form of psychological incentive and have a higher propensity in developing deficient self-regulation. In adolescent research, studies have found that the family environment largely contribute to the formation of depression and loneliness (White, Shelton, & Elgar, 2014). While a total absence from SNSs is neither visible nor beneficial in the media-centric society, family members could learn to engage young people in positive SNSs use, which will alleviate

depression and loneliness as well as induce positive family functioning (Coyne, Padilla-Walker, Fraser, Fellows, & Day, 2014).

Like all studies, there are various limitations to this research. First, as the sample comes from only two secondary schools, the results cannot not be generalized to the adolescent population in Singapore. Second, due to the cross-sectional nature of the study, causal inference could be not established. For instance, depression is assumed to be one of the antecedents of time spent on SNSs use in this study. However, SNSs use can also be an antecedent of depression (Frison & Eggermont, 2015b; Shensa et al., 2017; Woods & Scott, 2016); research has shown that active public and private use of Facebook are positively related to depressed mood (Frison & Eggermont, 2016). To be more conclusive about the direction of how the factors relate to one another, longitudinal research will be required. Third, studies have pointed to the multi-dimensional nature of problematic SNSs use (Andreassen et al., 2012), but this study only uses time spent on SNSs as the dependent variable. Fourth, the measures for depression required respondents to indicate their feelings within the past week—however the measures for other factors such as loneliness or time spent on SNSs did not require respondents to give their answers based on a specific time frame. This is a limitation as the responses that individuals give may differ depending on the time-frame. For instance, people may generally feel optimistic in the long term, but they may experience frustration and anger in the short term due to certain circumstances.

The findings of this study have provided at best a cursory examination of the antecedents of problematic SNSs use among adolescents in Singapore and the process of addictive tendencies development, and more research is necessary to achieve a deeper and holistic understanding of the phenomenon. Here in this study, only

individual-level antecedents' (i.e., depression and loneliness) associations with the mechanisms of the social cognitive model (i.e., self-reactive outcome expectations, deficient self-observation, deficient self-reaction, and time-spent on SNSs) were examined. While the results indicated support for the social cognitive model, it is important to extend the social cognitive in two ways. First, scholars have argued for the inclusion of psychological dimensions of problematic use as behavioral dimension (e.g., time spent on SNSs) is not sufficient as a proxy for addictive behavioral tendency (Caplan, 2002; J. Kim & Haridakis, 2009). Second, when examining problematic media use in the context of adolescents, studies have highlighted the important role of family and parents in contributing to problematic media behaviors in their children and adolescents (Gunuc & Dogan, 2013; S. J. Lee & Chae, 2007; S. K. Park et al., 2008; Yen et al., 2007). As such, it is worthwhile to extend the social cognitive model in the context of problematic SNSs with the inclusion of these new factors. The next chapter proposes to test an extended social cognitive model on a representative sample of Singapore adolescents, accounting for both external- and individual-level antecedent factors that may account for why adolescents develop problematic SNSs use.

CHAPTER FIVE   STUDY THREE

Examining the External and Individual Antecedents of Singaporean Adolescent's Problematic SNSs Use—A Theoretical Extension of The Social Cognitive Model

The study in the previous chapter attests to the viability of the social cognitive model in understanding antecedents of adolescent's problematic SNSs use with moderate success. It has demonstrated the replicability of the social cognitive model in a Singapore sample where in the past most research testing the model were done on a western sample (LaRose et al., 2010, 2003; D. Lee & LaRose, 2007). Having established the model's replicability, the good psychometric properties and significant hypothesized paths provide empirical support for its underlying premise that problematic SNSs use can be conceptualized as a function of deficient self-regulation, among other antecedents such as self-reactive outcome expectations, depression and loneliness.

While the hypothesized model holds much promises in extending communication theorizing in the area of problematic SNSs use, the model still falls short of providing a comprehensive overview of problematic SNSs use. There are still four main weaknesses with the usage of the social cognitive model in the previous chapter. First, in the social cognitive model, problematic media use is conceptualized solely as spending too much time on media (LaRose et al., 2010, 2003; D. Lee & LaRose, 2007). This assumption may not necessarily hold in SNSs context. In previous research where the model was tested in context such as video gaming, the conceptualization of time spent as problematic use was logical as individuals were required to be stationed at a fixed location for game play (D. Lee & LaRose, 2007)—

the more time was spent on gaming, the less time they could devote to important matters. This is not the same for SNSs. First, as SNSs are easily accessible through personal laptops or mobile phones (Khang et al., 2013), users do not necessarily need to stay logged on continuously at a specific location (e.g., in front of a computer). As such, using time spent on SNSs alone may not be indicative of problematic use in a situation where SNSs use may be intermittent—this suggests that psychological measures of problematic use may be more useful in determining the extent of the problem.

Second, a key concept that has not been accounted for in understanding why adolescents may develop problematic SNSs use is dependence on SNSs for identity formation. Much of the research on SNSs have highlighted that young people depend heavily on them for self-presentation purposes (Mehdizadeh, 2010; Ong et al., 2011; Seidman, 2013). At the stage of adolescence, young people struggle with developmental issues such as identity formation and aligning themselves to various friendship circles (Erikson, 1968; Knifsend & Juvonen, 2013; Meece & Daniels, 2008). SNSs provide the opportunities for young people to *recreate* themselves online and exert a high degree of control on how they want to be perceived, by others and by themselves. Thus, dependence on SNSs for identity formation could potentially be an integral antecedent of problematic SNSs use.

The third weakness is that many of the current studies primarily focused on individual level constructs when examining problematic SNSs use (LaRose et al., 2010; Ryan & Xenos, 2011; Skues et al., 2012). One key area deserving of exploration is the incorporation of external factors that may foster the formation of addictive tendencies. The social cognitive theory postulated a triadic mechanism which modeled complex relationships between behavior, personal and environment determinants, but

thus far research has only examined how personal determinants relate to problematic media use (Bandura, 2001b; LaRose et al., 2010). However, behaviors are not shaped in a vacuum, and external factors¹³ such as individuals' physical and social environment certainly play a role in shaping behaviors (Meece & Daniels, 2008). Specifically, research has shown that one of such external factors—relationship with parents—plays a significant role in explaining the development of addictive tendencies, especially in the media use context (Floros & Siomos, 2013; R. L. Huang et al., 2009; J. Xu et al., 2014; Zhu, Zhang, Yu, & Bao, 2015). As such, this study proposes that relationship with parents is one of the external factors that may increase the explanatory power of the social cognitive model in examining problematic SNSs use.

Last but not least, a fourth weakness is that current research on SNSs mostly relied on convenience sampling, which greatly diminishes the external validity of the claims in the study (e.g., V. Balakrishnan & Shamim, 2013; D. J. Hughes et al., 2012; Ryan & Xenos, 2011). As such, there is a need for scholars to strive for the use of more robust sampling methods (e.g., different forms of random sampling) in which inferences could be generalized to the adolescent population.

There are a few objectives in this proposed study. It seeks to build upon the findings of the previous study by conceptualizing problematic SNSs use as a three-dimension factor consisting of excessive SNSs use, withdrawal symptoms, and

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¹³ There are many other types of external factors (Santrock, 2007) that may be related to the development of problematic media use, such as (a) *microsystem*—environmental factors that have a direct impact on adolescents (e.g., parents, teachers, peers); (b) *exosystem*—indirect environmental factors in adolescents' lives (e.g., workplace of parents); *mesosystem*—the interactions of different microsystems which affects adolescents (e.g., teachers updating parents about adolescents' poor behavioral performances at school, resulting in parents' adoption of strict disciplinary actions over their adolescents, which may lead to poorer parent-adolescent relationships in the short term); and (c) *macrosystem*—the broader and abstract influences on adolescents' lives such as cultural and socio-economical forces (Andreassen et al., 2012). However, the focus of this thesis is only examining how one of the external factors—relationship with parents—may improve the explanatory power of the social cognitive model applied to the context of problematic SNSs use.

negative outcomes—instead of using time spent on SNSs. Second, it will formally test an extended social cognitive model of problematic SNSs use on a large-scale nationally representative sample of adolescents. Third, this study argues for the inclusion of dependence on SNSs for identity formation, and for external factors such as relationship with parents. Figure 5.1 shows the hypothesized extended social cognitive model in this study.

Explicating Problematic SNSs Use

Thus far, many studies treat problematic use as a unidimensional construct. Most often, scholars have used the amount of time individuals spent on media platforms as an indicator of problematic use (e.g., LaRose et al., 2003; D. Lee & LaRose, 2007). This is unsurprising as research has shown that people are spending an increasing amount of their Internet time on SNSs use (Griffiths et al., 2014), which is a prevalent trend in both the Western and Eastern parts of the world. Not only can users log on to various SNSs applications in computers or laptops located in the privacy of their homes, the proliferation of smartphones has made SNSs much more accessible while people are on the move. While equating the amount of time spent on media as an indicator of problematic use seems intuitively sound—albeit on a superficial level—there are several concerns over its construct validity. First, spending a significant amount of time on SNSs may not necessarily be a manifestation of problematic usage. For instance, individuals may spend a lot of time on SNSs out of necessity, such as seeking out important information (S. S. Ho & Lee, 2014), getting social support from online communities facing similar health challenges (X. Wang, Shi, Chen, & Peng, 2016), and use SNSs for work and education purposes (Leftheriotis & Giannakos, 2014).

Figure 5.1. Hypothesized extended social cognitive model.

Moreover, using time spent on SNSs as an indicator of problematic use may not be as objective as it seems. An individual may spend a lot of time on SNSs, but their lives are not significantly disrupted by their SNSs use—research has shown that frequency of media use may not be significantly associated with excessive use (Emelin, Tkhostov, & Rasskazova, 2013). Conversely, another individual who spends lesser time on SNSs may develop an unhealthy excessive preoccupation toward their SNSs usage. This renders time spent on SNSs as a poor measurement for problematic use if used in isolation. Third, from a methodological perspective, it is difficult to capture objectively how much time one really spends on SNSs. If such a question is asked during a survey, individuals may under report their usage to social desirability factors. Even if the respondents want to be honest, it is difficult to keep track of their total SNSs usage when their SNSs use may often be intermittent and sporadic throughout the day.

Last but not least, there are also statistical limitations to using time spent on SNSs in statistical modelling. Using time spent on SNSs as a dependent variable in statistical modelling will mean that the basic assumption of multivariate normality of dependent variables in regression or structural equation modelling is violated—the nature of the variable is such that it is positively skewed. Even if utmost care is taken to manipulate the data—by applying logarithm transformation—it makes data interpretation difficult (e.g., LaRose et al., 2003).

*The Three Dimensions—Excessive Use, Withdrawal Symptoms,
and Negative Outcomes*

While time spent on SNSs alone may not be adequate as an indicator of problematic use, research suggests that there are at least three potential dimensions¹⁴ that are symptomatic of problematic use. The first is known as *excessive SNSs use* (Caplan, 2002; H. T. Chen & Kim, 2013; Watters, Keefer, Kloosterman, Summerfeldt, & Parker, 2013). Excessive use of SNSs can be defined as individuals spending more time than expected on SNSs. Excessive SNSs use is an indication of problematic SNSs use because it is a function of compulsivity, and suggests that an individual has difficulties in regulating his or her SNSs usage (Andreassen & Pallesen, 2014). For instance, if an adolescent constantly uses SNSs more than what he initially sets out to, it may reduce the time he has for important responsibilities such as completion of homework, revision, or sleep.

As such, excessive SNSs use has a symbiotic relationship with the second dimension of problematic SNSs use, known as *negative outcomes* (Caplan, 2002, 2010; LaRose et al., 2010). As highlighted, these negative consequences can take the form of poorer academic grades for students, less-than-satisfactory work performances for workers, or impaired relationships (Andreassen & Pallesen, 2014; Koc & Gulyagci, 2013).

Last but not least, the third dimension of problematic SNSs use is *withdrawal symptoms*. Withdrawal symptoms refer to the psychological discomfort experienced by SNSs users upon ceasing SNSs usage (Pápay et al., 2013; Quinones & Kakabadse, 2015; Rehbein & Baier, 2013; Spada, 2014). Nauert (2010) reported that researchers

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¹⁴ This thesis acknowledges that the three dimensions of problematic SNSs use—excessive use, withdrawal, and negative outcome—are not the only dimensions of problematic SNSs use. Studies have suggested other potential dimensions such as *tolerance*—requiring an increase in the problematic behavior to derive the same level of gratification or *relapse*—reverting to addictive behavioral patterns after initial cessation (Andreassen et al., 2012).

from the University of Maryland found some symptoms of withdrawal in students when they were tasked to abstain from SNSs use for a 24-hour period in a study. After the 24-hour ban on media, students displayed great negative valence and indicated that they missed the social connections provided by SNSs (Wolniczak et al., 2013).

Antecedents of Problematic SNSs Use

Consistent with the premises of the social cognitive model tested in the previous chapter, this study postulates that the relationships hypothesized in the previous chapter hold for the extended social cognitive model. One minor change is that deficient self-regulation in this study will be modelled as a higher-order common latent factor comprising of two first-order latent factors—deficient self-observation and deficient self-reaction. There are both theoretical and methodological reasons to support this modification. First, the results from the previous chapter showed that the directions of deficient self-observation and deficient self-reaction in relation to the dependent variable are the same¹⁵—there are no arguable theoretical reasons to expect otherwise. Second, this way of modelling deficient self-regulation significantly reduces the number of common latent factors in the model and is more parsimonious comparatively. This had empirical support, where Caplan (2010) was one of the first who proposed and modelled deficient self-regulation as a higher order latent construct.

Similar to the previous chapter, this study postulates the following hypotheses:

H1: Deficient self-regulation is positively associated with (a) excessive SNSs use, (b) withdrawal symptoms, and (c) negative outcomes.

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¹⁵ One may point out that in the previous chapter, depression and loneliness were hypothesized only to have a positive association with deficient self-reaction, but not deficient self-observation. As such, these two factors may relate differently to deficient self-observation. While this critique may be theoretically valid to a certain extent, the correlation table in the previous chapter clearly shows that depression and loneliness both had positive significant associations with deficient self-observation and deficient self-reaction. As such, this lends further support to the decision to model deficient self-regulation as a second-order common latent factor as there are no expectations that the relationships between the antecedents (depression and loneliness) and the deficient self-reaction and observation will differ in this study.

H2: Self-reactive outcome expectations are positively associated with deficient self-regulation.

H3: Depression is positively associated with (a) self-reactive outcome expectations and (b) deficient self-regulation.

H4: Loneliness is positively associated with (a) self-reactive outcome expectations and (b) deficient self-regulation.

Individual-Level Antecedent—Dependence on SNSs for Identity Formation

While psychosocial problems may motivate media consumption through deficient self-regulation, scholars should also examine other potential antecedents that may account for problematic use due to the affordances of SNSs. One other important factor that may explain why adolescents develop problematic SNSs use is dependence on SNSs for identity formation due to their attractive features of allowing young people to engage self-presentation and promotion (S. S. Ho, Lee, & Liao, 2016). Young people may be attracted to SNSs during the adolescence phase as one of the developmental issues they grapple with during their teenage years is identity formation (Meece & Daniels, 2008). An individual's identity is a sense of one's self integrated by past, present and future experiences (Clancy & Dollinger, 1993; Erikson, 1963), and it can be defined as amalgamation of core functions that provide a foundational basis for individuals' understanding of who they are in order to achieve a personal coherence (Adams & Marshall, 1996).

During the adolescence phase, teenagers struggle with the development task of "identity formation vs. identity confusion," in which they are challenged to think through who they are and where they are headed in life (Erikson, 1968). SNSs provide a safe avenue for identity exploration as they allow young people to express themselves freely, interact with peers without the risks involved in face-to-face

communication, join online groups to derive group identities, and engage in impression management, where they get to control how they want to be perceived by others (S. G. Graham, 2014). As such, adolescents may find that seeking identity formation online (which may be perceived to be easier) may be more fulfilling than doing so in an offline setting.

These features may facilitate adolescents' dependence on SNSs for identity formation and may lead to the development of deficiencies in self-regulation. The development of deficient self-regulation may occur at the *individual* as well as the *online community level*. On the individual level, adolescents use SNSs primarily to create a desirable self that they are not able to achieve offline (Nadkarni & Hofmann, 2012; Zhao, Grasmuck, & Martin, 2008). As identity formation in the offline world can be a frustrating process, the act of creating an ideal identity can have mood modifying effects. Research has shown that engaging self-presentation is positively associated with subjective well-being (J. Kim & Lee, 2011). For example, while teenagers may not be popular in the offline world, they can gain attention through status updates, as well as selfies to make themselves look more attractive than they are in real-life (Tiidenberg & Gomez Cruz, 2015). On the online community level, adolescents may take their peer networks as referent groups in order to derive their sense of identity. This is consistent with the social identity perspective, in which a core assumption is that people partially derive their identity from the social groups that they belong to (Hogg & Reid, 2006). Research has shown that individuals who feel a strong membership and connection with their online groups show a higher level of gratification (Zhang et al., 2011).

Since at the individual and online community level dependence on SNSs provide a certain level of psychological gratification, over a period of time this may

reduce self-regulatory capabilities as their dependence on SNSs for identity formation and SNSs use become inextricable (LaRose et al., 2003). Moreover, adolescents who are at the stage of identity exploration are more susceptible to deficiencies in their regulatory function at this developmental period as they tend to exhibit low internal locus of control (Lillevoll, Kroger, & Martinussen, 2013).

As adolescents learn to depend on SNSs for identity formation, it may result in an unconscious automaticity in SNSs use in the long run. Another affordances of SNSs is allowing adolescents to engage in constant curation of their identities online, made possible by the accessibility to SNSs platforms via smartphones (Bayer, Cin, Campbell, & Panek, 2016; S. S. Ho et al., 2016). The goal-oriented nature of identity-formation—which in the short run can be construed as immediate outcome expectation (V. Balakrishnan & Shamim, 2013; LaRose, 2010)—may motivate adolescents to learn how to use SNSs for self-presentation. The repetitive nature of going back to SNSs again and again for identity formation may dull their conscious use of SNSs (Aarts & Dijksterhuis, 2000). Over time, the immediate outcome expectation may be developed into long-run average outcome expectation, as adolescents become less observant of their dependence on SNSs (LaRose, 2010). As such, this study postulates:

H5: Dependence on SNSs for identity formation is positively associated with deficient self-regulation.

External Antecedents—Relationship with Father and Mother

Considering that the fundamental assumption of the social cognitive model is that behavior is also influenced by external factors, it is also important for research to account for the types of external antecedents that may influence adolescent's SNSs use. Among the different types of external factors, studies have shown that parents play an important role in influencing the outcomes of addictive tendencies and

problematic media behaviors in their adolescents and children (Doty & Dworkin, 2014; Valcke et al., 2010; Yu, Kim, & Hay, 2013); this is consistent with findings from developmental psychology, which show how parents' roles and functions are associated with the development of addictive tendencies during adolescence (Baumrind, 1991; Doba et al., 2014; Montgomery, Fisk, & Craig, 2008; Putnick et al., 2008).

One significant body of research focuses on how various forms of parental mediation strategies (e.g., restrictive vs. active) mitigate negative effects of media use (Aarsand, 2011; Bleakley, Ellithorpe, & Romer, 2016; Griffiths, Benrazavi, & Teimouri, 2016; Miyazaki, Stanaland, & Lwin, 2009; E. Panek, 2014). Research has also demonstrated the counter-perspective, where harsh or strict parenting practices seem to have boomerang effect; instead of curbing excessive media consumption, adolescents who experience harsh parenting practices indicate high consumption patterns (Kalaitzaki & Birtchnell, 2014; C. Li, Dang, Zhang, Zhang, & Guo, 2014; Valcke et al., 2010; M. Wang & Qi, 2017; Yu et al., 2013).

While there is a growing interest in understanding the role of parents and its link with problematic media use, one area that received significantly less attention is how parent-child relationship may be an antecedent of problematic SNSs use. This study proposes that relationship with parents may be as equally important as existing focus on external factors such as parental mediation. After all, studies have shown that the association between parental mediation and problematic media consumption is inconclusive at best. For instance, while some scholars view active parental mediation as a more favorable strategy as compared to restrictive mediation—thus expecting it to be more effective in reducing problematic use—research has shown that this may not be so (Benrazavi, Teimouri, & Griffiths, 2015; Sasson & Mesch, 2014). This is

because even though parents may disapprove of adolescents' SNSs usage and take time to explain to them, adolescents may still develop problematic SNSs use because they do not receive instructions well from their parents due to the poor relationship (J. Xu et al., 2014).

This points to the reason why this thesis focuses on the role of adolescents' relationship with parents. Based on existing research, relationship with parents can be defined as the extent to which the child feels close toward his or her parents (Cheong et al., 2011). Among the few studies conducted, research shows that relationship with parents is negatively related to problematic Internet use (Liu, Fang, Zhou, Zhang, & Deng, 2013; J. Xu et al., 2014). Also, adolescents with higher problematic Internet use tend to have poorer relationship with their parents (Chng, Li, Liao, & Khoo, 2015; Siomos et al., 2012).

In addition, relationship with parents fits well into the social cognitive model as there are reasons to postulate its link with depression, loneliness, and dependence on SNSs for identity formation. Pertaining to how relationship with parents may be associated with psychosocial problems, studies have shown that a negative relationship with parents, which may be a result of favoritism or divorce, is associated with adolescent's depression and loneliness (Aydin & Öztütüncü, 2001; Demirli & Demir, 2014; Moharib, 2013; Rekart, Mineka, Zinbarg, & Griffith, 2007; White et al., 2014). Moreover, when parents do not take a keen interest in their child or exert appropriate authority (Baumrind, 1971, 1991), adolescents tend to develop depressive symptoms or feelings of loneliness.

Adolescents' relationship with their parents has a large bearing on their identity development (Umaña-Taylor & Guimond, 2010). The family environment provides the context in which adolescents grow, learn, and form their identity (Meece

& Daniels, 2008; Santrock, 2007). When adolescents perceive that their relationship with parents is positive, it may encourage them to engage in healthy identity exploration and formation. Parents serve as a role model in which adolescents look to for identity development (Marcia, 1988). When there are deficiencies in family function or relationship with parents, such as when parents were overbearing or neglectful (Baumrind, 1971, 1991), adolescents may depend on SNSs as an alternative for identity exploration (K. Davis, 2013). As such, the following hypotheses are proposed:

H6: Positive relationship with father is negatively associated with (a) depression, (b) loneliness, and (c) dependence on SNSs for identity formation.

H7: Positive relationship with mother is negatively associated with (a) depression, (b) loneliness, and (c) dependence on SNSs for identity formation.

Method

Research Design

To test the hypothesized model, a cross-sectional, self-administered pen and paper survey was administered to younger adolescents from secondary schools (ages 13 to 17), and older adolescents from junior colleges (ages 17 to 19) between October 2014 and June 2015. To ensure that the sample was nationally representative¹⁶, the secondary school students were recruited using multi-stage cluster sampling while junior college students were recruited using simple random sampling.

Prior to conducting the multi-stage cluster sampling, four education planning zones in Singapore—North, South, West, and East—as designated by MOE—were identified as the *clusters*. Within each of these four clusters, two secondary schools (primary sampling unit) were randomly selected and invited to participate in the survey. Within each school, all the secondary school students (secondary sampling unit) were invited to participate in the study. All in all, a total of 48 secondary schools were randomly selected and invited from all clusters to participate in the study, of which 8 schools consented to participate. Among these 8 schools, a total of 4,793 students were invited for the survey, and 3,753 students participated and completed the study. The survey's response rate was calculated based on Foy's (1989) formulation¹⁷. The total response rate for secondary school's participation (primary sampling unit) was 16.7% while the response rate for student's participation (secondary sampling unit) was 78.3%.

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¹⁶ Multi-stage cluster sampling was used for recruiting secondary schools as this ensured appropriate representation of schools drawn from homogenous subsets (the different clusters from which the schools come from) of the entire secondary school population (Babbie, 2008). However, as the sampling frame for junior colleges consisted of only 21 institutions during our data collection period, simple random sampling was used.

¹⁷ Response rate for schools (primary sampling unit) = $\frac{\text{Total no. of participating schools}}{\text{Total no. of schools invited}} \times 100\%$
Response rate for students (secondary sampling unit) = $\frac{\text{Total no. of participating students}}{\text{Total no. of students invited}} \times 100\%$

The older adolescents (junior college students) were recruited using simple random sampling. Each institution in the list of all public junior colleges in Singapore were assigned an arbitrary number and using a random number generator, the college was invited if their number was generated. In a case of rejection, the next selected junior college was invited. In total, 9 junior colleges were invited and 1 consented to participate. In that college, 1,300 students were invited for the survey of which, 1,167 students participated and completed the survey. The total response rate for junior colleges' participation was 11.1% and the response rate for junior college students' participation was 89.8%.

In total, the final sample consisted of 50.5% females and 49.5% males and age ranged from 13 to 21 years ($Mdn = 14$, $M = 14.73$). In terms of race, the majority of the sample were Chinese (79.69%), followed by Malay (11.63%), Indian (4.25%) and Other Races (4.43%)—the ethnic proportions were similar to the figures reported in the national census conducted in 2010 (Department of Statistics Singapore, 2010). The total sample size comprising of both secondary and junior college students was 4,920 students.

Ethics and Informed Consent

Approval was obtained from the NTU IRB as well as MOE before data collection. Upon receiving approval from the two institutions, an invitation letter with MOE and IRB approval letters were sent out to the randomly selected secondary schools and junior colleges. They were informed that the survey would take approximately 30 minutes and that there were no foreseeable risks or harm to the students. The school management, parents and students were notified that students were free to exit the study at any point in time with no penalty. Parental and students' consent were obtained prior to the survey.

Exogenous Variables

Positive Relationship with Father/Mother. Adolescents' *relationship with their father/mother* was measured by asking respondents to rate on a five-point scale (where 1 = Strongly disagree, 5 = Strongly agree) on how agreeable they were with the following statements: (a) "I feel close to my father;" (b) "I think that my father cares about me;" and (c) "I am happy with my relationship with my father;" (d) "I feel close to my mother;" (e) "I think that my mother cares about me;" (f) "I am happy with my relationship with my mother." Items (a) to (c) were loaded onto a common latent factor called *relationship with father* (Cronbach's $\alpha = .92$) while items (d) to (f) were loaded onto *relationship with mother* (Cronbach's $\alpha = .91$), where the higher the responses, the more positive the relationship respondents have with their parents. The six items were adapted from Cheong et al. (2011).

Endogenous Variables

Depression. To measure *depression*, participants were asked on a seven-point scale (where 1 = Rarely/None at all, 7 = Most/All) if they felt the following in the past week: (a) "I felt lonely;" (b) "I felt sad;" and (c) "I could not get 'going'." The three items (Cronbach's $\alpha = .90$) were adapted from LaRose et al. (2003).

Loneliness. The construct *loneliness* was measured by asking participants on a five-point scale (where 1 = Hardly ever, 5 = Most often) how often do they perceive that they: (a) "Lack companionship;" (b) "Felt left out;" and (c) "Felt isolated from others." The three items (Cronbach's $\alpha = .90$) were adapted from Hughes, Waite, Hawkley, and Cacioppo (2004).

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¹⁸ All questions in this survey are reflective indicators as the questions *reflect* the latent constructs they measure (Iacobucci, 2010).

Dependence on SNSs for Identity Formation. To measure *dependence on SNSs for identity formation*, participants were asked on a seven-point scale (where 1 = Strong disagree, 7 = Strongly agree) how agreeable they are with the following: (a) “I would feel a loss if I were forced to give up SNSs;” (b) “For me, being a SNSs user means more than just using SNSs;” and (c) “SNSs are an important part of who I am.” The three items (Cronbach’s $\alpha = .75$) were adapted from Callero (1985).

Self-Reactive Outcome Expectations. To measure *self-reactive outcome expectations*, participants were asked on a seven-point scale (where 1 = Very unlikely, 7 = Very likely) how likely were they to use SNSs for the following: (a) “Forget my problems;” (b) “Feel a sense of achievement;” and (c) “Find something that challenges me.” The three items (Cronbach’s $\alpha = .82$) were adapted from LaRose et al. (2003).

Deficient Self-Regulation. The measure of *deficient self-regulation* is composed of two sub-dimensions—*deficient self-observation* and *deficient self-reaction*. To measure *deficient self-observation* (Cronbach’s $\alpha = .91$), participants were asked on a seven-point scale (where 1 = Strongly disagree, 7 = Strongly agree) how agreeable were they with: (a) “Using SNSs is part of my routine;” (b) “Using SNSs is a habit I got into;” and (c) “I use SNSs without really thinking about it.” To measure *deficient self-reaction* (Cronbach’s $\alpha = .90$), participants were asked on a seven-point scale (where 1 = Strongly disagree, 7 = Strongly agree) how agreeable were they with: (d) “I use SNSs so much that it interferes with other activities;” (e) “I get strong urges to be on SNSs;” and (f) “I have to keep using SNSs more and more to get my thrill.”

Items (a) to (c) were loaded onto the latent construct called *deficient self-observation*, while items (d) to (f) were loaded onto *deficient self-reaction*. The two latent constructs were then loaded onto the overarching *deficient self-regulation*. All

the six items were adapted from LaRose et al. (2003).

Excessive SNSs Use. To measure *excessive SNSs use*, participants were asked to rate on a five-point scale (where 1 = Strongly disagree, 5 = Strongly agree) how agreeable were they with the following statements: (a) “I lose track of time while using SNSs;” (b) “I use SNSs for a longer time than I expected to;” and (c) “I go on SNSs for longer time than intended.” The three items (Cronbach’s $\alpha = .91$) were adapted from Caplan (2002).

Withdrawal Symptoms. To measure *withdrawal symptoms*, participants were asked to rate on a five-point scale (where 1 = Strongly disagree, 5 = Strongly agree) how agreeable were they with the following statements: (a) “I miss being on SNSs if I can’t go on it;” (b) “I feel lost if I can’t go on SNSs;” and (c) “It is hard to stop thinking about what is waiting for me on SNSs.” The three items (Cronbach’s $\alpha = .88$) were adapted from Caplan (2002).

Negative Outcomes. To measure *negative outcomes*, participants were asked to rate on a five-point scale (where 1 = Strongly disagree, 5 = Strongly agree) how agreeable were they with the following statements: (a) “I have got into trouble with school because of my SNSs activities;” (b) “I have missed class because of my SNSs use;” and (c) “I have missed social events (e.g., outings) because of SNSs.” The three items (Cronbach’s $\alpha = .83$) were adapted from Caplan (2002).

Missing Values Imputation

Missingness for the items ranged from 0% to 0.91%. Little’s Missing Completely At Random (MCAR) returned a significant estimate ($p < .001$), which indicated that the data was not MCAR. As stated in the previous chapter, whenever it was difficult to establish if the data were Missing Not At Random (MNAR) or Missing At Random (MAR), researchers usually assumed missingness to be either MNAR or

MAR. This study also adopted a conservative approach and assumed missingness to be MNAR. Using the *Amelia* package in R, missing values were replaced with multiple imputation techniques due to the statistical appropriateness for data assumed to be MNAR or MCAR (J. W. Graham et al., 1996).

Analytic Approach

The *lavaan* package in R was used to run covariance structure modelling, where maximum likelihood was used for estimating unknown parameters. Each of the individual items were loaded on their hypothesized latent common factors. The only exception was deficient self-regulation, which was modelled as a higher order latent construct.

For each hypothesized path, *gender*, *type of school* (“Secondary School” or “Junior College”), *age*, and *ethnicity* (“Malay”, “Indian” and “Other” were dummy coded and “Chinese” was treated as the baseline group) were treated as control variables. As there was a slight deviation in terms of the representation of students per education level,¹⁹ a post-stratification weight²⁰ was created and the weighted sample for analyses in order to correct for potential representation bias.

The following fit indices were used to evaluate the model’s goodness of fit:

Model chi-square (χ^2), Comparative Fit Indices (CFI), Tucker-Lewis Index (TLI), Root Mean Squared Error of Approximation (RMSEA), and Standardized Root Mean Squared Residual (SRMR). χ^2 should not be significant if the model fits the data well

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¹⁹ The breakdown of the sample by education level: Secondary 1 (22.56%); Secondary 2 (22.87%); Secondary 3 (20.53%); Secondary 4 (9.39%); Secondary 5 (0.80%); first-year junior college (12.89%) and second-year junior college (10.96%). These numbers deviate slightly from the national figures released by MOE (2014): Secondary 1 students (21.00%), Secondary 2 students (19.89%), Secondary 3 (20.40%), Secondary 4 (21.48%), Secondary 5 (3.32%), first-year junior college (7.37%), and second-year junior college (6.54%).

²⁰ The post-stratification weight by education level was computed using the formula to tabulate weighted average ratio (Gelman & Carlin, 2001): $\frac{x_i/n}{w_i/N}$, where x_i = total number of students per education level in our sample, n = total sample size; w_i = total number of students per education level according to national census; N = total student population according to national census.

(P. Barrett, 2007). However, χ^2 is sensitive to large sample sizes, and as such a significant χ^2 may not necessarily indicate that the model fit is bad. As such, model fit evaluation will need to be accounted for by other indicators. For CFI and TLI, the acceptable threshold is a figure close to .95 (Hu & Bentler, 1999) while for RMSEA, values below .05 indicate good fit; values between .05 and .08 indicate reasonable fit; values between .08 and .10 indicate mediocre fit while values above .10 indicate poor fit (Browne & Chudeck, 1993). Values of SRMR below .08 indicate good fit (Hu & Bentler, 1999).

Results

Table 5.1 shows the correlation among items. Prior to testing the measurement and hypothesized social cognitive model, a confirmatory factor analysis (CFA) was conducted to examine if the proposed three dimensions of problematic SNSs use model fitted the data (see Figure 5.2). The CFA results indicated that the hypothesized three-factor orthogonal model had the best fit ($\chi^2 = 491.76$, $df = 24$; CFI = .98; TLI = .97; RMSEA = .06; 90% confidence interval = .06 and .07; SRMR = .03), as compared to a two-factor²¹ ($\chi^2 = 6145.03$, $df = 26$; CFI = .77; TLI = .68; RMSEA = .22; 90% confidence interval = .21 and .22; SRMR = .13) or a one-factor²² orthogonal model ($\chi^2 = 9746.68$, $df = 27$; CFI = .64; TLI = .52; RMSEA = .27; 90% confidence interval = .27 and .28; SRMR = .13).

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²¹ The two-factor model was tested by loading all items associated with excessive SNSs use and withdrawal symptoms onto one latent factor, while the items for negative outcomes onto a second latent factor. This is because problematic media use literature largely agrees that actual negative repercussions of SNSs use (negative outcomes) are distinct from psychological distress (Caplan, 2010; LaRose, 2010).

²² The one-factor model was constructed by loading all the indicators onto one common latent factor.

Table 5.1 Correlation among composite indices (Extended social cognitive model)

Variables	1	2	3	4	5	6	7	8	9	10	11
1. father	-										
2. mother	.49***	-									
3. dep	-.23***	-.21***	-								
4. lone	-.18***	-.16***	.59***	-							
5. identity	-.03	.00	.19***	.16***	-						
6. expectations	-.02	-.03	.21***	.15***	.39***	-					
7. deficient-ob	-.03	.02	.25***	.19***	.51***	.32***	-				
8. deficient-react	-.08***	-.08***	.36***	.25***	.47***	.49***	.59***	-			
9. excess	-.03	.00	.27***	.24***	.28***	.21***	.53***	.46***	-		
10. withdrawal	-.10***	-.08***	.35***	.26***	.47***	.42***	.51***	.63***	.54***	-	
11. negative	-.16***	-.17***	.33***	.19***	.19***	.26***	.20***	.45***	.32***	.49***	-

Note: * $p < .05$, ** $p < .01$, *** $p < .001$. For a more parsimonious presentation, only correlation among the composite indices are shown here.

Figure 5.2. Three-factor problematic SNSs use model. Model fit: $\chi^2 = 491.76$, $df = 24$; CFI = .98; TLI = .97; RMSEA = .06; 90% confidence interval = .06 and .07; SRMR = .03. For identification purposes, variances of common latent factors were fixed to “1”, while all the manifest variables were allowed to be estimated freely.

Next, CFA was used to examine the measurement model for the hypothesized social cognitive model, and the results indicated that the measurement model (see Figure 5.3) had good fit ($\chi^2 = 4450.21$, $df = 448$; CFI = .96; TLI = .96; RMSEA = .04; 90% confidence interval = .04 and .05; SRMR = .04). To address any potential critique that claim that it was the survey method that caused the variances in the latent constructs and not the manifest variables, a second CFA was conducted by controlling for CMV (see Figure 5.4). CMV was controlled by loading all indicators on an additional common latent factor called *CMV*, in addition to their hypothesized common latent factors. This method of controlling for the effects of a single, unmeasured latent method factor is recommended if it meets the following criteria: (a) predictor and criterion variables are obtained from a single source; (b) predictor and criterion variables are measured in the same context; (c) the method bias is arguably identifiable but not measurable (Podsakoff et al., 2003).

The results showed that the model that controlled for CMV²³ also had good fit ($\chi^2 = 4406.75$, $df = 447$; CFI = .96; TLI = .96; RMSEA = .04; 90% confidence interval = .04 and .05; SRMR = .04), thus indicating the presence of CMV²⁴. Even though there may be presence of CMV, most factor loadings on the hypothesized common latent factors exceeded .70 even after controlling for CMV, which attested to a high level of measurement validity. Table 5.2 shows the summary of all the measurement items after controlling for CMV.

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²³ For model identification purpose, the factor loadings on CMV were constrained to be equal by applying equality constraint. After application of the equality constraint, the factor loadings of all the indicators on CMV was .26, which indicated that the variances explained by CMV were not too significant.

²⁴ Even though the presence of CMV was found, it does not pose a significant problem as χ^2 is likely to be significant in the presence of a large sample size.

Figure 5.3. Measurement model of the extended social cognitive model. CMV was not controlled for here. The paths between the common latent factors were not drawn to reflect a more parsimonious diagram. Model fit: $\chi^2 = 4450.21$, $df = 448$; CFI = .96; TLI = .96; RMSEA = .04; 90% confidence interval = .04 and .05; SRMR = .04.

Figure 5.4. Measurement model of the extended social cognitive model controlled for CMV. The paths between the common latent factors were not drawn to reflect a more parsimonious diagram. Model fit: $\chi^2 = 4406.75$, $df = 447$; CFI = .96; TLI = .96; RMSEA = .04; 90% confidence interval = .04 and .05; SRMR = .04.

Table 5.2 Summary of measurement items (Extended social cognitive model)

Variable (range)	Factor loading	<i>M</i>	<i>SD</i>
Relationship with Father (1-5)			
father1	.86	3.72	1.18
father2	.82	4.04	1.10
father3	.88	3.86	1.17
Relationship with Mother (1-5)			
mother1	.80	4.00	1.09
mother2	.81	4.25	.97
mother3	.87	4.11	1.04
Depression (1-7)			
dep1	.88	2.89	1.80
dep2	.89	2.95	1.85
dep3	.80	2.94	1.79
Loneliness (1-5)			
lone1	.77	2.54	1.17
lone2	.87	2.66	1.21
lone3	.87	2.57	1.22
Self-Identity (1-7)			
identity1	.61	4.09	1.95
identity2	.62	3.98	1.70
identity3	.87	3.77	1.79
Self-Reactive Outcome Expectations (1-7)			
expectations1	.63	4.12	1.02
expectations2	.90	3.27	1.85
expectations3	.75	3.39	1.91
Deficient Self-Observation (1-7)			
deficient-ob1	.90	4.24	1.89
deficient-ob2	.94	4.09	1.89
deficient-ob3	.77	4.12	1.88
Deficient Self-Reaction (1-7)			
deficient-react1	.84	2.79	1.64
deficient-react2	.78	2.75	1.70
deficient-react3	.81	2.87	1.65
Excessive SNSs Use (1-5)			
excess1	.79	2.68	1.34
excess2	.91	2.87	1.33
excess3	.85	2.86	1.30
Withdrawal Symptoms (1-5)			
withdraw1	.77	2.45	1.22
withdraw2	.85	2.16	1.13
withdraw3	.80	2.17	1.16

Negative Outcomes (1-5)

negative1	.68	1.72	1.02
negative2	.76	1.60	.95
negative3	.69	1.64	.97

Note: Items appear in the same order as listed in the Method section in this chapter. The factor loadings shown here are from the measurement model that controlled for CMV.

To be conservative and rigorous in the actual model testing, the hypothesized extended social cognitive model with its measurement model and full structural paths were tested with CMV controlled. For scaling and identification purposes, the variances of all the common latent factors (ϕ and ψ) were fixed to “1.” Results indicated that the extended social cognitive model had good fit ($\chi^2 = 6739.71$, $df = 615$; CFI = .95; TLI = .94; RMSEA = .05; 90% confidence interval = .04 and .05; SRMR = .07). Table 5.3 shows the summary of model fit for all the measurement and full models.

Results from the covariance structure modelling showed that deficient self-regulation was positively associated with excessive SNSs use ($\beta = .52$, $p < .001$), withdrawal symptoms ($\beta = .74$, $p < .001$), and negative outcomes ($\beta = .43$, $p < .001$). As such, H1(a) to H1(c) were supported. H2 postulated that self-reactive outcome expectations had a positive association with deficient self-regulation. The results supported H2 ($\beta = .36$, $p < .001$).

Depression was positively associated with self-reactive outcome expectations ($\beta = .20$, $p < .001$) and deficient self-regulation ($\beta = .26$, $p < .001$), supporting H3(a) and H3(b). Contrary to what was hypothesized in H4(a) and H4(b), loneliness was neither significantly associated with self-reactive outcome expectations or deficient self-regulation.

Dependence on SNSs for identity formation was positively associated with deficient self-regulation ($\beta = .51$, $p < .001$), thus H5 was supported. Adolescents' positive relationship with their fathers was negatively associated with depression ($\beta = -.22$, $p < .001$), loneliness ($\beta = -.17$, $p < .001$) and with dependence on SNSs for identity formation ($\beta = -.07$, $p < .05$). Thus, H6(a) to H6(c) were supported. On the other hand, adolescents' positive relationship with mother was negatively associated

Table 5.3 Summary of model fit (Extended social cognitive model)

Model	χ^2	df	CFI	TLI	RMSEA (<i>p</i>-close)	CI of RMSEA	SRMR
Measurement model (No CMV)	4450.21	448	.96	.96	.04 (1.00)	.04 to .05	.04
Measurement model (With CMV)	4406.75	447	.96	.96	.04 (1.00)	.04 to .05	.04
Extended social cognitive model	6739.71	615	.95	.94	.05 (.70)	.04 to .05	.07

Note: CFA = confirmatory factor analysis; *df* = degrees of freedom; CFI = comparative fit index; TLI = Tucker-Lewis index;

RMSEA = root mean square error of approximation; 90% CI of RMSEA = 90% confidence interval of root mean square error of approximation;

SRMR = Standardized Root Mean Squared Residual.

with depression ($\beta = -.20, p < .001$) and loneliness ($\beta = -.17, p < .001$). However, it was not significantly associated with dependence on SNSs for identity formation. Thus, only H7(a) and H7(b) were supported. The total variance explained for excessive SNSs was 31% ($R^2 = .31$), 56% ($R^2 = .56$) for withdrawal symptoms, and for negative outcomes it was 20% ($R^2 = .20$). Figure 5.5 shows the extended social cognitive model with all the standardized coefficients reported.

Figure 5.5. Final extended social cognitive model. Standardized coefficients are shown in this diagram. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$. Dotted lines reflect nonsignificant pathways. Model fit: $\chi^2 = 6739.71$, $df = 615$; CFI = .95; TLI = .94; RMSEA = .05; 90% confidence interval = .04 and .05; SRMR = .07. The figures in parentheses indicate the amount of variance explained. The error terms for depression and loneliness were correlated but not reflected or a parsimonious diagram presentation. CMV was controlled in this model.

Discussion

Overall, this study has generated several additional important findings that help us understand media consumption behavior, and specifically in the context of antecedents of SNSs. The main objective of this study is to build upon the findings of the previous, and extend the social cognitive model—by providing empirical support for the three-dimensional problematic SNSs use and to incorporate both external and individual-level antecedents that may further explain why adolescents develop problematic SNSs use. The results showed that the model had good psychometric properties, and that the factors explained a significant portion of the variances in the three dimensions of problematic SNSs use, and most of the hypothesized paths were supported.

First and foremost, one of the key contributions of this study is providing empirical support for the three-factor problematic SNSs use dependent variable. The three factor-model provides a more holistic and realistic picture of what problematic SNSs use looks like, as compared to a single factor as it accounts for both cognitive and behavioral dimensions of problematic media use (Caplan, 2002).

Another significant aspect of our study is that apart from individual-level factors, it is important to understand the role of external antecedents in explaining SNSs consumption. After all, the social cognitive model explains human behavior via both external and individual-level determinants (Bandura, 2001b). For this study, relationship with both parents were identified as important external antecedents. The results showed that relationship with both parents were negatively associated with depression and loneliness. This suggests that adolescents with poorer relationship with their parents are more likely to exhibit depressive symptoms and thus, the likelihood of developing problematic SNSs use is higher as they may depend on SNSs to

incentivize themselves psychologically and have weakened self-regulation functions. However, only positive relationship with father was negatively associated with adolescents' dependence on SNSs for identity formation. This suggests there are nuanced differential influences of parents on the trajectory of adolescents' time spent on SNSs, of which a negative relationship with father may have a more adverse impact.

This result is consistent with past research, which has identified differential influence of the roles of fathers and mothers on adolescents (Koh, Shao, & Wang, 2009), and made salient the importance of father's role in adolescents' life, especially in identity formation and helping young people achieve identity-closure (Faber, Edwards, & Bauer, 2003; Magagna & Goldsmith, 2009). While literature in western context have often emphasized the importance of mother-child relationships, it is possible that father-child relationship is more influential in an Asian context as the father typically possess greater authority and control over the family than mothers (Choo & Shek, 2013).

A negative relationship with fathers may push adolescents to seek SNSs for identity formation in two ways. First, there are evidence to suggest that adolescents with negative relationship with fathers have lower self-reliance scores— adolescents who perceived their father as more authoritarian have lower self-reliance than those who perceive their fathers as more authoritative (Ang, 2006). As such, adolescents with low reliance may turn to SNSs for identity formation as they gives them an avenue for adolescents to feel a sense of achievement by creating a positive presentation of themselves (Nadkarni & Hofmann, 2012). Second, Asian parents tend to use more authoritarian parenting style (Nguyen, 2008), which may be stifling for teenagers at a stage characterized by the need for autonomy and rebellion. This

situation could be exacerbated in an Asian context, since the concept of “love” and “care” are also synonymous with the Chinese notion of “guan” (to govern) (Ang & Goh, 2006), which extends to control over adolescents’ many lifestyle choices. As such, fathers may tend to be perceived as distant, strict disciplinarians instead of warm caregivers. The perceived restrictiveness serves as a push-factor for adolescents to seek out SNSs to forget their problems and to exert a higher degree of autonomy in self-expression.

Apart from the differential influence of parents, consistent with the social cognitive model in the previous chapter, this study found support for the relationship between depression and deficient self-regulation. Likewise, since SNSs use is associated with positive valence (Mauri et al., 2011), there is an association between depression and self-reactive outcome expectations. As depressed adolescents solely depend on SNSs to reduce dysphoric mood, they become desensitized to their regulatory capabilities.

However, contrary to the previous chapter, there were no empirical support for the hypothesized paths between loneliness, self-reactive outcome expectation, and deficient self-regulation. The nonsignificant association between loneliness and self-reactive outcome expectations suggests that lonely people do not view SNSs as a psychological incentive as compared to less lonely individuals. While this finding may seem counter-intuitive on the surface, lonely people may not perceive that SNSs can provide any self-reactive incentives as past research has shown that engaging and connecting with family and friends online may not be as effective as offline interpersonal communication in reducing loneliness (e.g., Yao & Zhong, 2014). Perhaps it is because there is lesser perceived psychological gratification associated with SNSs use, lonely individuals may not exhibit the same type of uncontrollability in

their SNSs usage. This may be in line with Caplan's (2007) conclusion that the relationship between loneliness and problematic media use is spurious in nature.

Consistent with past results, self-reactive outcome expectations were positively associated with deficient self-regulation (Larose & Eastin, 2004; LaRose et al., 2003). Recent psychophysiological research had found that SNSs use was associated with high positive valence and high arousal in users (Mauri et al., 2011). As adolescents continuously return to SNSs to derive the same level of gratification, they become less aware of their behavior regulation, and the repeated behavior becomes automated without the presence of effortful cognition (Ouellette & Wood, 1998).

Theoretical and Practical Implications

The findings from this study have contributed to both theory and practice. First, one of the key contributions of this study is to present an extended social-cognitive model that explains why adolescents spend time on SNSs. The model in this study differs from the original model in three ways. First, problematic SNSs use was modelled as a three-factor model comprising of excessive SNSs use, withdrawal symptoms, and negative outcomes. Second, this model accounts for both external (i.e., relationship with parents) as well as individual-level antecedents of problematic use, while the original model only accounts for individual-level antecedents. Third, this model also extended individual-level antecedents to include loneliness as well as dependence on SNSs for identity formation—the original model only postulated depression as the main psychosocial driver of deficient self-observation and deficient self-reaction. Last but not least, the model—analyzed with covariance structure modelling—showed good fit after accounting for statistical uniqueness of indicators, as well as controlling for CMV. In contrast, the original model only used path analysis and did not account for CMV.

This study yields many implications for the construction of communication theory and the ways scholars approach research in understanding SNSs use. Many of the current studies in SNSs use are focused on identifying certain factors associated with SNSs use such as motivations, personality types, or attitude (Al-debei et al., 2013; Amichai-hamburger & Vinitzky, 2010; Ross et al., 2009). Few, however, have explored the *process* and mechanism behind the development of adolescents' time spent on SNSs. This study had demonstrated how through a developmental psychology perspective, relationship with parents could be drivers of psychosocial problems and self-identity issues, which in turn be related to deficient self-regulation, and eventual problematic SNSs use.

Second, the good psychometric properties of the extended social cognitive model attests to its applicability in a non-western context. This is significant as the current bulk of SNSs research are predominantly done in western countries. By conceptualizing problematic SNSs use as a function of deficient self-regulation, not only can scholars avoid unnecessary stigmatization, they could also further investigate factors that contribute to the deficiency level, and therein suggest practical steps to help adolescents resume efficacious regulatory function.

In terms of practical significance, understanding how external and individual-level antecedents relate to adolescents' problematic SNSs use can be beneficial on multiple levels. On the most intuitive level, government agencies and educators can craft digital media literacy programs targeting adolescents by emphasizing the importance of being conscious of their SNSs usage. For adolescents, this reminder and awareness are perhaps one of the first steps to take in setting limits on SNSs consumption. After all, the purpose of promoting awareness is to induce self-regulation (Baumeister & Vonasch, 2015). Existing research in self-regulation and

media consumption have recommended future works to explore how mindfulness relate to self-control (Bayer et al., 2016). Next, the study has specifically pointed out the influential role of parents in fostering positive communication climate, which will reduce the onset of psychosocial problems, reliance on SNSs for psychological incentives, as well as dependence on SNSs for self-identity formation. Thus, government agencies, schools, educators should also target parents and educate them on the importance of building positive communication climate at home, and identify risk factors of problematic SNSs use.

Like all studies, there are some limitations to this study. Like the previous study, due to the cross-sectional nature of the study, causal inference²⁵ could not be established—instead of deficient self-regulation inducing problematic SNSs use²⁶, the

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²⁵ As research has shown that problematic SNSs use may be an antecedent of depression (Shensa et al., 2017), this study also tested an alternative model where depression was treated as the outcome variable of the three problematic SNSs dimensions (see Figure 5.6). However, the model's fit falls below the acceptable threshold (Model fit: $\chi^2 = 7421.97$, $df = 619$; CFI = .94; TLI = .93; RMSEA = .05; 90% confidence interval = .04 and .05; SRMR = .08. This suggests that the model with depression as outcome variable does not fit the data in this study. In addition, the total variance explained for depression is relatively low (16%).

²⁶ To alleviate the concerns that deficient self-regulation, excessive SNSs use, and withdrawal symptoms were not conceptually distinct, and that both excessive SNSs use and withdrawal symptoms may be antecedents of deficient self-regulation as well, the following statistical procedures were undertaken to show that the concepts were distinct and that there was a stronger empirical support for not postulating hypothesized paths from excessive SNSs use and withdrawal symptoms to deficient self-regulation.

First, a CFA (see Figure 5.7) was conducted by loading all the respective indicators onto the four hypothesized common latent factors—deficient self-observation, deficient self-reaction, excessive SNSs use, and withdrawal symptoms. The results indicated that the four-factor model had good fit (Model fit: $\chi^2 = 914.67$, $df = 48$; CFI = .98; TLI = .97; RMSEA = .06; 90% confidence interval = .05 and .06; SRMR = .03), thus supporting the premise that deficient self-regulation (decomposed into the two first-order common latent factors of deficient self-observation and deficient self-reaction) was distinct from excessive SNSs use and withdrawal symptoms. Next, a nonrecursive extended social cognitive model (see Figure 5.8) was tested with the following freed parameters: (a) excessive SNSs use and deficient self-regulation, and (b) withdrawal symptoms and deficient self-regulation. While the results showed that excessive SNSs use was positively associated with deficient self-regulation ($\beta = .37$, $p < .001$), withdrawal symptoms had no significant association with deficient self-regulation. The results also indicated that the nonrecursive extended social cognitive model did not have good fit. (Model fit: $\chi^2 = 7769.29$, $df = 617$; CFI = .94; TLI = .93; RMSEA = .05; 90% confidence interval = .04 and .05; SRMR = .08). Thus, the data did not support the freeing of the parameters from excessive SNSs use and withdrawal symptoms to deficient self-regulation in the model.

Figure 5.6. Alternative extended social cognitive model. $*p < .05$, $**p < .01$, $***p < .001$. Dotted lines reflect nonsignificant pathways. Model fit: $\chi^2 = 7421.97$, $df = 619$; CFI = .94; TLI = .93; RMSEA = .05; 90% confidence interval = .04 and .05; SRMR = .08. The figure in parenthesis indicates the amount of variance explained. CMV was controlled in this model.

Figure 5.7. Measurement model of deficient self-regulation, excessive SNSs use, and withdrawal symptoms. * $p < .05$, ** $p < .01$, *** $p < .001$. Model fit: $\chi^2 = 914.67$, $df = 48$; CFI = .98; TLI = .97; RMSEA = .06; 90% confidence interval = .05 and .06; SRMR = .03.

Figure 5.8. Nonrecursive extended social cognitive model. $*p < .05$, $**p < .01$, $***p < .001$. Dotted lines reflect nonsignificant pathways. Model fit: $\chi^2 = 7769.29$, $df = 617$; CFI = .94; TLI = .93; RMSEA = .05; 90% confidence interval = .04 and .05; SRMR = .08. The figures in parentheses indicate the amount of variance explained. CMV was controlled in this model.

relationship may be reversed.

Second, in terms of operationalization, the measures for depression required respondents to indicate their feelings within the past week—however the measures for other factors such as loneliness did not require respondents to give their answers based on a specific time frame. This is a limitation as the responses that individuals give may differ depending on the time-frame.

Third, this study only considered the role of relationship with parents as external antecedents. It is acknowledged that there may be different relationship dynamics that influence problematic SNSs use, especially for adolescents who grow up in single-parent family. In addition, there are other types of external factors that may influence adolescents' problematic SNSs use, such as the influence of adolescents' peer groups and social networks. Last but not least, the nature of the antecedents chosen in the social cognitive model are adolescent-specific, and may not be able to explain why and how problematic SNSs use occur among adults.

The findings of this study have provided at best a limited understanding of how external and individual-level antecedents in the extended social cognitive model relate to problematic SNSs use. Specifically, this study showed how poor relationship with parents may be antecedent to depression and dependence on SNSs for identity formation, which are strongly associated with deficiencies in SNSs use regulation. However, the external factors listed in this chapter—relationship with parents—may not be as influential in explaining how problematic SNSs develop among the adult population. One relevant external antecedent that may be applicable to the social cognitive model in the context of adults may be the presence of social capital—research has shown that the easy access to different forms of social capital is a key reason as to why adults use SNSs (K. Y. Lin & Lu, 2011a; Nef et al., 2013). In

addition, psychosocial problems may not only be the only individual-level antecedents of problematic use. Studies have also suggested that the various affordances of SNSs (e.g., social connection, shared identities, photographs, and social investigation) may give rise to motivations to leverage on these affordances (Khang et al., 2014; Sundar & Limperos, 2013)—these expected outcomes of use may be associated with problematic use as well. Thus, in addition to the main assumption of how problematic use occur in the social cognitive model (i.e., deficient self-regulation as a key factor of problematic use), it may be worthwhile to draw from Caplan's problematic Internet use model, which illustrates how factors such as preference for online social interaction and mood alteration—dominant features of SNSs use—may be associated with deficient self-regulation and problematic SNSs use. The next chapter seeks to build upon the findings of this chapter and integrate the social cognitive with Caplan's problematic Internet use model to explain problematic SNSs use among adults.

CHAPTER SIX   STUDY FOUR

Integrating the Social Cognitive Model with the Problematic SNSs Use Model— Examining the External and Individual Antecedents of Problematic SNSs Use among Singaporean Adults

The previous chapter has found support for the notion that both external and individual level antecedents play an equally important role in influencing adolescents' problematic SNSs use development, through the mechanisms identified in the extended social cognitive model. While adequate empirical support was shown for the hypothesized model, one of the limitations is that its explanatory power may be confined to explaining problematic SNSs use development in the adolescents' context only. This is because the role of relationship with parents and its association with deficient self-regulation may be more pronounced during the stage of adolescence, and not among adults (Ardila, Rosselli, Matute, & Guajardo, 2005; Baumrind, 1991; Schroeder & Kelley, 2009; Susic-Vasic et al., 2017). Adolescence is a transitional phase characterized by teenagers learning how to juggle between new found autonomy with required behavioral regulation in order to achieve goals and avoid negative consequences (Prencipe et al., 2011; Steinberg, 2005), and parents play a visible role in modelling regulatory behaviors and engaging in boundaries setting for teenagers.

From a developmental perspective, the role of parental influence on the development of self-regulation may not be as important in the context of adults (MacKenzie, Mezo, & Francis, 2012). During adulthood, individuals have achieved more autonomy and independence in most areas of their lives as compared to when they were teenagers. Parents' influence on individuals' self-regulation development

may have reached a plateau during adulthood. Considering that the role of parents is not as important at the stage of adulthood, it is thus necessary for the social cognitive model to adopt an alternative perspective as to why and how adults may develop problematic SNSs use through deficient self-regulation. The purpose of this study is to build upon the findings of Chapter 5 and develop an integrated social cognitive model that can identify a different set of external and individual level antecedent factors associated with problematic SNSs use among Singaporean adults. There are three main objectives. First, this study proposes that an integrated model can be developed by synergizing the social cognitive model with Caplan's problematic Internet use model—by incorporating key factors such as preference for online social interaction and mood alteration into the social cognitive model (LaRose et al., 2010). Second, this study builds upon the integrated model by postulating that the presence of social capital and various SNSs use motivations are relevant external- and individual-level antecedents that may explain why adults develop problematic SNSs use, through the mechanisms of the integrated model. Last but not least, this study aims to test the integrated model on a nationally representative sample of Singaporean adult using covariance structure modelling. Figure 6.1 shows the hypothesized integrated social cognitive model.

Figure 6.1. Hypothesized integrated social cognitive model.

Theoretical Integration—Social Cognitive Model and Problematic Internet Use Model

To derive a more universal set of factors that may explain why adults develop problematic SNSs use, this study proposes that a theoretical integration between the social cognitive and Caplan's problematic Internet use model may shed light on problematic SNSs use development among adults. There are three important reasons as to why and how a theoretical integration may be useful.

First, the problematic Internet use model brings a complementary perspective to the social cognitive model in explaining why individuals may develop problematic SNSs use, partially by focusing on the types of gratification a person can derive from SNSs (LaRose et al., 2010). While the social cognitive model postulates that deficient self-regulation is a key antecedent of problematic media use, Caplan's model on the other hand, takes a more communication platform-centric perspective and postulates that *preference for online social interaction* is one of the key reasons why people may not be able to regulate their media usage (Caplan, 2003; Caplan & High, 2012). A later version of the social cognitive model²⁷ theorized that the immediate outcome expectations, or gratifications derived from the media may have a relationship with the self-regulatory function of individuals (LaRose, 2010), in which preference for SNSs to facilitate communication processes is arguably one of the gratifications.

Preference for online social interaction can be defined as individuals' perception that the Internet is their communication channel of choice when interacting with others, and people may develop preference for online social interaction because of existing psychosocial problems (Caplan, 2003), the lack of confidence and social skills in interacting with people in a face-to-face-setting (Caplan, 2005), or because they are drawn to various functions of the Internet (Bozoglan et al., 2014; H. Kim &

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²⁷ This version of the social cognitive model was conceptualized in a theoretical piece (LaRose, 2010) and at the point of writing this thesis, it has not been empirically tested.

Davis, 2009). It is plausible that individuals with preference for online social interaction are more likely to develop deficient self-regulation as compared to those with less preference for online social interaction as SNSs takes a prominent role in their socialization process and day-to-day interactions. This relationship has largely been supported in past research (Caplan, 2010; LaRose et al., 2010).

The second key reason why a theoretical integration may be useful in examining problematic SNSs use among adults is because of the theoretical synergy derived due to conceptual similarities found in the two models. For instance, the second key factor in Caplan's model is mood alteration—defined as the dependence on Internet platforms for emotional and mood regulation—which is conceptually equivalent to self-reactive outcome expectations in the social cognitive model (LaRose et al., 2010). Caplan argued that apart from preference for online social interaction, when individuals depend heavily on the Internet for mood regulation, they are less likely to be able to control their media consumption. Moreover, the more they depend on SNSs for mood modification, the more likely they are to develop a preference for online social interaction. More importantly, one other similarity is that the end goal of both models is similar—to ultimately understand the factors that are associated with problematic media use (Caplan, 2003; LaRose et al., 2003).

Last but not least, there is empirical evidence that the two models have good psychometric fit, where data fits the proposed relationships in earlier attempts to merge the two models (Caplan, 2010; LaRose et al., 2010). The basic assumption of the integrated model is as such—individuals with preference for online social interaction and use the Internet for mood alteration are more likely to develop deficient self-regulation. In addition, users who use the Internet for mood alteration, are also likely to develop preference for online social interaction. Last but not least,

consistent with the social cognitive model's fundamental assumption, deficient self-regulation is positively associated with the three dimensions of problematic SNSs use. In line with the findings from past research, this study postulates the following hypotheses:

H1: Deficient self-regulation is positively associated with (a) excessive SNSs use; (b) withdrawal symptoms, and (c) negative outcomes.

H2: Preference for online social interaction is positively associated with deficient self-regulation.

H3: Mood alteration is positively associated with (a) preference for online social interaction and (b) deficient self-regulation.

External Antecedents—Bonding and Bridging Social Capital

While preference for online social interaction, mood alteration, and deficient self-regulation make up the key mechanisms of this integrated model, there is a need to examine the potential external- and individual-level antecedents of problematic SNSs use among adults. One of the external factors that scholars should consider is if the ease of access to different types of *social capital*²⁸ facilitate the growth of problematic SNSs use. After all, communication scholars have often examined how access and connections to different types of social capital promote or inspire behaviors in public health (C. J. Lee, 2014; C. J. Lee & Kam, 2015), civic engagement (Putnam,

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²⁸ It is acknowledged that existing studies have conceptualized and treated social capital as an outcome variable (Ellison et al., 2007; Ellison, Steinfield, & Lampe, 2011; Ellison et al., 2014). However, for the purpose of this study, the two social capital dimensions—bonding and bridging capital—are treated as antecedents in the integrated social cognitive model. The reasons for the placement of the two types of social capital as antecedents rather than the outcome variable are as such: (a) The dependent variables in both the social cognitive as well as problematic Internet use models are different variants of problematic media use and not social capital (Caplan, 2010; LaRose et al., 2003); (b) The focus of this study is understanding what factors are related to problematic SNSs use and not how problematic SNSs use relates to different dimensions of social capital; (c) There are no known studies that have accounted for theoretically why and how problematic SNSs use is related to social capital; (d) Social capital is not always exclusively treated as outcome variables—studies have examined social capital as an antecedent of psychological distress (L. Song, 2011), health-related attitude and communication behaviors (C. J. Lee & Kam, 2015), and intention to use SNSs (R. Chen, Sharma, & Rao, 2016).

2000), as well as media consumption behaviors (K. Y. Lin & Lu, 2011a; Shen, Monge, & Williams, 2014).

The current understanding of social capital can be traced back to early sociological research. Since then, there are multiple theoretical paradigms and approaches to social capital research, resulting in a degree of ambiguity and elasticity surrounding its definition (Ellison et al., 2007; Rojas, Shah, & Friedland, 2011; Shen et al., 2014; Vergeer, 2009). For instance, Coleman (1988) defined social capital by its *functions*—how actors interact with different people across social structures which produces advantages for the actors. Another popular definition of social capital was examined from the perspective of structural holes. Popularized by Burt (2005), he defined social capital as the advantage that someone can gain by his or her structural position or location in the network. Bourdieu (1985) defined social capital as the amount of resources available from existence of relationships.

While definitions given by scholars may vary, one commonality across these definitions is that they focus on people's relations with one another, and how these relationships help to achieve certain outcomes (Rojas et al., 2011; Vergeer, 2009). Existing studies on social capital largely agree that there are at least two types of social capital, known as *bonding* and *bridging* capital²⁹ (Ellison et al., 2007; Ellison,

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²⁹ Scholars have conceptualized bonding and bridging social capital as the *benefits* derived from social network. For instance, Ellison et al. (2011) defined bonding capital as “benefits from close personal relationships, which might include emotional support, physical succor, or other ‘large’ benefits (such as willingness to loan a substantial sum of money)”, and bridging capital as “the benefits derived from casual acquaintances and connections, can also lead to tangible outcomes such as novel information from distant connections and broader world-views” (p. 875). While “benefits” are derived from social ties, scholars have also adopted broader definitions (e.g., access to resources, relationships) as social capital is multidimensional in nature and encompasses more than *benefits* derived (L. V. Huang & Liu, 2017; Phua, Jin, & Kim, 2017). In addition, Ellison et al.'s (2011) work referenced Putnam (2000), who defined bridging social capital as connections formed between individuals from very different backgrounds which facilitate the greatest informational exchange, and bonding capital as strong relationships which provide social and emotional support. Moreover, based on how the items are phrased for bonding (e.g., there are several people on SNSs whom I trust to solve my problems) and bridging (e.g., interacting with people on SNSs makes me feel like part of a larger community) capital, they emphasize the connections that people share; benefits are the peripheral resulting consequences of these connections.

Vitak, Gray, & Lampe, 2014; Gittell & Vidal, 1998), each providing different types of benefits to individuals in a network. Bonding capital refers to the strong connections that individuals have with people that are close to them, such as family members or friends (Brandtzæg, 2012). Bridging capital refers to individuals' ties with other people they may know, albeit to a weak extent (L. V. Huang & Liu, 2017). Bridging capital is commonly referred to as weak ties, and may refer to individuals who are acquaintances, or someone that an individual only got to know recently.

The presence and access to both bonding and bridging capital on SNSs may be related to the development of problematic SNSs use among adults. While there are no existing studies that have empirically tested this relationship, there is evidence that suggests that bonding capital may be positively associated with preference for online social interaction and mood alteration. At the fundamental level, people have an intrinsic need for interaction with others and a need to maintain these social connections (Baumeister & Leary, 1995). Peers and family members, which constitute a significant group of bonding capital—meet people's need for *companionship*, *stimulation* (e.g., information), *physical support*, *ego support* (e.g., encouragement), *social comparison*, as well as *intimacy* (Santrock, 2007). The instant accessibility to bonding capital through SNSs platforms may induce preference for online social interaction as these needs could be met almost instantly. At the same time, instant access to bonding capital will also allow SNSs users to modify their moods, as they can derive the sense of belonging or encouragement from their bonding social capital.

The unobstructed access to peers via SNSs may increase the chances of developing dependency on such platforms for interpersonal relationships. This is not surprising as scholars have found that the use of SNSs can create a sense of online social connectedness (Grieve et al., 2013), which serve as a psychological incentive

derived from increased SNSs usage. Existing research has shown that SNSs are widely used for maintenance of social connection with friends (V. Balakrishnan & Shamim, 2013) and that peer norms are associated with intention to use SNSs (Pelling & White, 2009).

Likewise, this study postulates that bridging social capital is positively associated with both preference for online social interaction as well as mood alteration. How is access to bridging social capital associated with preference for online social interaction? The asynchronous communication nature of SNSs (J. Lee et al., 2012) may reduce the pressures that come along with face-to-face interactions, and gives individuals greater control of how they present themselves to others (Caplan, 2005; J. Kim & Lee, 2011). This is attractive for those who suffer deficits in social skills. Thus, this feature induces a preference for online communication via SNSs, which provides a safe haven for interaction as it gives people the power of manipulating how they are presented to their online communities (Nadkarni & Hofmann, 2012). This, known as the *social compensation hypothesis* (the poor gets richer), has received substantial empirical support where individuals who suffer from psychosocial problems are more likely to use SNSs for social skills compensation (Barker, 2009; Kuss & Griffiths, 2011b; Teppers, Luyckx, Klimstra, & Goossens, 2014). In addition, bridging social capital may be associated with mood alteration as well. This is because interacting with bridging social capital facilitates new flow of information and opportunities, which SNSs users may not easily have access to in their networks that are more homogenous in nature (Ellison et al., 2007). As such, this study postulates the following:

H4: Bonding capital is positively associated with (a) preference for online social interaction and (b) mood alteration.

H5: Bridging capital is positively associated with (a) preference for online social interaction and (b) mood alteration.

Individual-level Antecedents—Motivations for SNSs Use

Apart from external antecedents, this study proposes that motivations for various SNSs functions use are important individual-level antecedents that may induce problematic SNSs use among adults. Sundar and Limperos' (2013) postulate that affordances of new media technologies may shape users' needs, and give rise to new forms of gratifications that previously did not exist. In one of the earlier studies on SNSs, Joinson (2008) conducted an exploratory factor analysis examining dimensions of Facebook use motivations showed that there are four distinct factors—*social connection, shared identities, photographs, and social investigation*. Subsequently, scholars have shown that social connection (V. Balakrishnan & Shamim, 2013), shared identities online (Scheepers et al., 2014), use of photo-centric (Marwick, 2015; Moon, Lee, Lee, Choi, & Sung, 2016), and social investigation (Aladwani, 2014) are reasons behind why individuals may use SNSs extensively. For instance, Alhabash et al. (2012) who adapted the scale developed by Joinson (2008), found that these motivations were positively associated with intensity of Facebook use. Even though intensity of Facebook use may not be synonymous with problematic SNSs use as defined in this thesis, there are reasons to postulate that motivations may be associated with problematic use. This is because some of the intensity of Facebook use items overlap with some of the measures of problematic SNSs use (e.g., feeling out of touch when not logging onto Facebook; considering Facebook a part of my everyday

activity). As such, this study will explore how the four specific motivations³⁰ relate to problematic SNSs use.

Individuals may be motivated to use SNSs as they allow users to derive *social connection* by allowing them to stay constantly connected with others in their networks perpetually anytime, anywhere, without any geographical or time constraints (S. S. Ho et al., 2016). Users can communicate with their friends via SNSs through multiple platforms, such as texting messages (e.g., Facebook chat) and tagging others in their status updates, shared photos, videos, or posts. SNSs also allow users to reach out to others—they can form friendships with strangers, or even form connections with their favorite celebrities, music artists, or even politicians. The constant connectivity may induce preference for online social interaction as users derive a sense of social connectedness (Grieve et al., 2013). Social connection via SNSs may also appeal to users who want to escape loneliness or social isolation (Ahn & Shin, 2013). Moreover, the asynchronous nature of communication through SNSs may appeal to people who suffer deficits in face-to-face interactions or social anxiety in their interpersonal communication, and allow them to depend on this platform as a surrogate for connecting with others (Barker, 2009; Caplan, 2005; Teppers et al., 2014), thereby allowing them to alleviate dysphoric moods.

Second, individuals may be motivated to use SNSs as they allow users to create *shared identities* with various online communities (Mehdizadeh, 2010; Schwämmlein & Wodzicki, 2012). Such communities could be groups consisting of people with shared interests (e.g., music, movies, games), organizations, or groups dedicated to different social causes. Studies have shown that people are motivated to

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³⁰ This study acknowledges that the list of motivations for SNSs use presented here is not exhaustive. For instance, motivations such as self-expression (Kuss & Griffiths, 2011b) and self-presentation (V. Balakrishnan & Shamim, 2013) are not examined here in this study as they are not part of the original classification of motivations postulated by Joinson (2008).

use SNSs for affiliation purposes (C. C. Lee & Chiou, 2013), and SNSs users get to determine how they would like to be perceived online through the use of edited profile pictures of themselves, and maintain a grandiose and inflated image of themselves alongside the online communities they want to be associated with (Bergman, Fearington, Davenport, & Bergman, 2011). As such, the motivation to derive shared identities and feel part of an online community may induce preference for online social interaction as they may not be able to derive it in an offline setting (Cheung et al., 2011). Deriving shared identities may also help individuals regulate emotions and feelings of loneliness, and depressive symptoms as they share similar experiences of challenges and difficulties.

The third motivation of SNSs use is the use of *photographs*. One of the main functions of SNSs is to allow users to share photos such as *selfies* or *wefies* (Marwick, 2015; Murray, 2015). In recent years, this function of allowing people to share photos has led to an explosive growth of image-centric sites such as Instagram (Hochman, 2014; Tiidenberg & Gomez Cruz, 2015). Sharing of photos may be associated with preference for online social interaction as such posts may open up doors for initiating online conversations. In addition, as uploading of photos is one form of self-disclosure as users share private details of their lives such as the food they ate, the places they went, and the activities that they engaged in, research suggests that it may have mood modification effects (N. Park et al., 2011; Special & Li-Barber, 2012).

Last but not least, the fourth motivation for using SNSs is *social investigation*. One of the affordances of SNSs is empowering users to engage in interpersonal surveillance. Surveillance can be defined as an unobtrusive, habitual, and purposeful collection of information from people (Lyon, 2001). The idea of surveillance is not new—surveillance research predates the SNSs era as contemporary societies are by

themselves surveillance-driven (Murakami & Webster, 2009). Traditionally, surveillance research was concerned with the interplay of relationships among hierarchical classes, typically between the watcher (those endowed with hierarchical power) and the watched (Monahan, 2011). This was known as *vertical* surveillance. However, when SNSs became popular, it greatly altered the surveillance landscape by democratizing surveillance. Now, surveillance is not a function exclusive to the elites, and this phenomenon is now integrated into everyday social interaction. As media products become domesticated (e.g., mobile phones and computers), there is a shift from vertical to *lateral* surveillance (Andrejevic, 2006; Trottier, 2012), where individuals can easily find out more information about people in their networks via SNSs.

SNSs users who are motivated to use SNSs for social investigation may be more likely to use SNSs for online communication with others and mood alteration. For instance, SNSs users can use SNSs to search out to their favorite celebrities, microcelebrities, bloggers, or any social influencers they admire online. Research has shown that following these individuals online is akin to forming a parasocial relationship with them. The perception they can live life vicariously through these Internet personalities and have a relationship with them can have mood modification effects (Baek et al., 2013; S. S. Ho et al., 2016). As such, this study postulates the following hypotheses pertaining to SNSs motivations and Caplan's two key factors:

H6: Social connection is positively associated with (a) preference for online social interaction and (b) mood alteration.

H7: Shared identities are positively associated with (a) preference for online social interaction and (b) mood alteration.

H8: Photographs are positively associated with (a) preference for online social interaction and (b) mood alteration.

H9: Social investigation is positively associated with (a) preference for online social interaction and (b) mood alteration.

Method

Research Design

To test the hypotheses, a separate nationally representative survey of adults was conducted (ages 19 to 50) in Singapore between January and February 2016. The adult participants were recruited through a door-to-door household survey using stratified random sampling. To recruit Singaporean adults, Singapore was stratified into five regions (Central, East, North-East, North, and West) as designated by the Urban Redevelopment Authority of Singapore. Next, using purchased residential address listing from the Singapore Department of Statistics for each of the regions as a sampling frame, a residential address was selected. Interviewers approached the selected household for the survey and if the members of the household declined to participate or if no suitable participant was found, the interviewer proceeded to the next randomly selected address in that region.

To ensure randomization within household, the “Next Birthday Method” was adopted as it ensured an equal probability of selection of all household members. For this method, the interviewer asked to speak to the adult member of the household who will have the next birthday. In total, 2,639 adults were approached and eventually 1,000 of them completed the survey. The overall response rate was 43% calculated based on the American Association for Public Opinion Research (AAPOR) formula 3³¹. The adult sample comprised 52% females and 48% males. The ethnic proportions of our sample were: Chinese (71%), Malays (13%), Indians (12%), and Others (4%). The figures were similar to the national census conducted in 2010.

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³¹ AAPOR formula 3 is taken from the American Association for Public Opinion Research (2015).

Ethics and Informed Consent

Approval was obtained from the NTU IRB before data collection. For adults, the survey was administered after obtaining informed consent from the participants themselves. Participants were told that the survey would take approximately 30 minutes and that there were no foreseeable risks or harm. Participants were told that they could exit the study at any point in time with no penalty.

Measures

Exogenous Variables

*Bonding Capital*³². To measure *bonding capital*, participants were asked on a five-point scale (where 1 = Strongly disagree, 5 = Strongly agree) how agreeable they were with the following statements about their SNSs usage: (a) “There are several people on SNSs whom I trust to help solve my problems;” (b) “There is someone on SNSs I can turn to for advice about making very important decisions;” and (c) “If I needed an emergency loan of \$500, I know someone on SNSs I can turn to.” The three items (Cronbach’s $\alpha = .85$) were adapted from Ellison et al. (2007).

Bridging Capital. To measure *bridging capital*, participants were asked on a five-point scale (where 1 = Strongly disagree, 5 = Strongly agree) how agreeable they were with the following statements about their SNSs usage: (a) “Interacting with people on SNSs makes me interested in things that happen outside of my country;” (b) “Interacting with people on SNSs makes me want to try new things;” and (c) “Interacting with people on SNSs makes me feel like part of a larger community.” The three items (Cronbach’s $\alpha = .88$) were adapted from Ellison et al. (2007).

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³² To address the concern that bonding and bridging capital could be conceptualized as outcome variables, an alternative model was tested with bonding and bridging capital as the dependent variables. However, the data did not fit the hypothesized model (Model fit: $\chi^2 = 2373.51$, $df = 817$; CFI = .94; TLI = .94; RMSEA = .04; 90% confidence interval = .04 and .05; SRMR = .10). Moreover, the model explained less than 7% of the variance in the social capital dimensions (see Figure 6.2).

Figure 6.2. Alternative integrated social cognitive model. Standardized coefficients are shown in this diagram. * $p < .05$, ** $p < .01$, *** $p < .001$. Dotted lines reflect nonsignificant pathways. Model fit: $\chi^2 = 2373.51$, $df = 817$; CFI = .94; TLI = .94; RMSEA = .04; 90% confidence interval = .04 and .05; SRMR = .10. The figures in parentheses indicate the amount of variance explained.

Endogenous Variables

Social Connection. To measure *social connection*, participants were asked on a seven-point scale (where 1 = Strongly disagree, 7 = Strongly agree) how agreeable they were with the following statements about their SNSs usage: (a) “Reconnecting with people;” (b) “Finding people you haven’t seen in a while;” and (c) “Finding out what old friends are doing now.” The three items (Cronbach’s $\alpha = .92$) were adapted from Alhabash et al. (2012).

Shared Identities. To measure *shared identities*, participants were asked on a seven-point scale (where 1 = Strongly disagree, 7 = Strongly agree) how agreeable they were with the following statements about their SNSs usage: (a) “Joining groups;” (b) “organizing or joining events;” and (c) “communication with like-minded people.” The three items (Cronbach’s $\alpha = .87$) were adapted from Alhabash et al. (2012)

Photographs. To measure *photographs*, participants were asked on a seven-point scale (where 1 = Strongly disagree, 7 = Strongly agree) how agreeable they were with the following statements about their SNSs usage: (a) “Being tagged in photos;” (b) “Tagging photos;” and (c) “Sharing/posting photos.” The three items (Cronbach’s $\alpha = .90$) were adapted from Alhabash et al. (2012).

Social Investigation. To measure *social investigation*, participants were asked on a seven-point scale (where 1 = Strongly disagree, 7 = Strongly agree) how agreeable they were with the following statements about their SNSs usage: (a) “Using advances search to look for people;” (b) “Meeting new people;” and (c) “Scrolling through people’s profile.” The three items (Cronbach’s $\alpha = .78$) were adapted from Alhabash et al. (2002).

Endogenous Variables

Preference for Online Social Interaction. To measure *preference for online*

social interaction, participants were asked on a five-point scale (where 1 = Strongly disagree, 5 = Strongly agree) how agreeable they were with the following statements about their SNSs usage: (a) “I prefer communicating with other people online rather than face-to-face;” (b) “I have more control over conversations on SNSs than I do in face-to-face conversations;” and (c) “Meeting and talking with people is better when done online rather than face-to-face.” The three items (Cronbach’s $\alpha = .85$) were adapted from Caplan (2002).

Mood Alteration. To measure *mood alteration*, participants were asked on a five-point scale (where 1 = Strongly disagree, 5 = Strongly agree) how agreeable they were with the following statements about their SNSs usage: (a) “I use SNSs to talk to others when I feel isolated;” (b) “I seek others on SNSs when I feel isolated;” and (c) “I use SNSs to make myself feel better when I am down.” The three items (Cronbach’s $\alpha = .90$) were adapted from Caplan (2002).

Deficient Self-Regulation. The measure of *deficient self-regulation* was composed of two sub-dimensions—*deficient self-observation* and *deficient self-reaction*. To measure *deficient self-observation* (Cronbach’s $\alpha = .92$), participants were asked on a seven-point scale (where 1 = Strongly disagree, 7 = Strongly agree) how agreeable were they with: (a) “Using SNSs is part of my routine;” (b) “Using SNSs is a habit I got into;” and (c) “I use SNSs without really thinking about it.” To measure *deficient self-reaction* (Cronbach’s $\alpha = .90$), participants were asked on a seven-point scale (where 1 = Strongly disagree, 7 = Strongly agree) how agreeable were they with: (d) “I use SNSs so much that it interferes with other activities;” (e) “I get strong urges to be on SNSs;” and (f) “I have to keep using SNSs more and more to get my thrill.”

Items (a) to (c) were loaded onto the latent construct called *deficient self-*

observation, while items (d) to (f) were loaded onto *deficient self-reaction*. The two latent constructs were then loaded onto the overarching common latent factor called *deficient self-regulation*. All the six items were adapted from LaRose et al. (2003).

Excessive SNSs Use. To measure *excessive SNSs use*, participants were asked to rate on a five-point scale (where 1 = Strongly disagree, 5 = Strongly agree) how agreeable they were with the following statements: (a) “I lose track of time while using SNSs;” (b) “I use SNSs for a longer time than I expected to;” and (c) “I go on SNSs for longer time than intended.” The three items (Cronbach’s $\alpha = .92$) were adapted from Caplan (2002).

Withdrawal Symptoms. To measure *withdrawal symptoms*, participants were asked to rate on a five-point scale (where 1 = Strongly disagree, 5 = Strongly agree) how agreeable they were with the following statements: (a) “I miss being on SNSs if I can’t go on it;” (b) “I feel lost if I can’t go on SNSs;” and (c) “It is hard to stop thinking about what is waiting for me on SNSs.” The three items (Cronbach’s $\alpha = .89$) were adapted from Caplan (2002).

Negative Outcomes. To measure *negative outcomes*, participants were asked to rate on a five-point scale (where 1 = Strongly disagree, 5 = Strongly agree) how agreeable they were with the following statements: (a) “I have got into trouble in my workplace because of my SNSs activities;” (b) “I have missed work because of my SNSs use;” and (c) “I have missed social events (e.g., outings) because of SNSs.” The three items (Cronbach’s $\alpha = .86$) were adapted from Caplan (2002).

Analytic Approach

The *lavaan* package in R was used to run covariance structure modelling, where maximum likelihood was used for estimating unknown parameters. Each of the individual items were loaded on their hypothesized latent common factors. The only

exception was deficient self-regulation, which was modelled as a higher order construct. For each hypothesized path, *gender*, *age*, *income*, *ethnicity* (“Malay”, “Indian”, “Eurasian”, and “Other” were dummy coded and “Chinese” was treated as the reference group) were treated as control variables.

The following fit indices were used to evaluate the model’s goodness of fit: Model chi-square (χ^2), Comparative Fit Indices (CFI), Tucker-Lewis Index (TLI), Root Mean Squared Error of Approximation (RMSEA), and Standardized Root Mean Squared Residual (SRMR). For CFI and TLI, the acceptable threshold is a figure close to .95 (Hu & Bentler, 1999) while for RMSEA, values below .05 indicate good fit; values between .05 and .08 indicate reasonable fit; values between .08 and .10 indicate mediocre fit while values above .10 indicate poor fit (Browne & Chudeck, 1993) Values of SRMR below .08 indicate good fit (Hu & Bentler, 1999).

Results

Table 6.1 shows the correlation among the composite indices. Similar to Chapter 5 (Study 3), prior to testing the measurement and hypothesized social cognitive model, a CFA was conducted to examine if the proposed three dimensions of problematic SNSs use model fitted the data (see Figure 6.3). The CFA results indicated that the hypothesized three-factor orthogonal model had the best fit ($\chi^2 = 158.83$, $df = 24$; CFI = .98; TLI = .97; RMSEA = .08; 90% confidence interval = .06 and .09; SRMR = .04), as compared to a two-factor³³ ($\chi^2 = 1351.86.03$, $df = 26$; CFI = .79; TLI = .71; RMSEA = .23; 90% confidence interval = .22 and .24; SRMR = .13),

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³³ The two-factor model was tested by loading all items associated with excessive SNSs use and withdrawal symptoms onto one latent factor, while the items for negative outcomes onto a second latent factor. This is because problematic media use literature largely agrees that actual negative repercussions of SNSs use (negative outcomes) are distinct from psychological distress (Caplan, 2010; LaRose et al., 2010).

Table 6.1 Correlation among composite indices (Integrated social cognitive model)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
1. bonding	-												
2. bridging	.30***	-											
3. connection	.24***	.37***	-										
4. identities	.21***	.38***	.56***	-									
5. photographs	.21***	.26***	.53***	.58***	-								
6. investigation	.20***	.27***	.46***	.54***	.50***	-							
7. preference	.16***	.15***	.11***	.26***	.15***	.25***	-						
8. mood	.23***	.24***	.11***	.26***	.18***	.29***	.57***	-					
9. deficient-ob	.19***	.36***	.36***	.29***	.30***	.31***	.17***	.24***	-				
10. deficient-react	.30***	.14***	.10**	.25***	.21***	.32***	.44***	.54***	.31***	-			
11. excess	.19***	.13***	.14***	.25***	.23***	.31***	.35***	.39***	.35***	.56***	-		
12. withdrawal	.17***	.14***	.13***	.26***	.21***	.30***	.45***	.51***	.30***	.72***	.60***	-	
13. negative	.10**	-.04	-.05	.10**	.08*	.19***	.42***	.51***	.08*	.53***	.35***	.53***	-

Note: * $p < .05$, ** $p < .01$, *** $p < .001$. For a more parsimonious presentation, only the correlation among the composite indices is shown here.

Figure 6.3. Three-factor problematic SNSs use model. Model fit: $\chi^2 = 158.83$, $df = 24$; CFI = .98; TLI = .97; RMSEA = .08; 90% confidence interval = .06 and .09; SRMR = .04. For identification purposes, variances of common latent factors were fixed to “1”, while all the manifest variables were allowed to be estimated freely.

or a one-factor³⁴ orthogonal model ($\chi^2 = 2421.25$, $df = 27$; CFI = .63; TLI = .50; RMSEA = .30; 90% confidence interval = .29 and .31; SRMR = .16).

Next, CFA was used to examine the measurement model for the hypothesized social cognitive model, and the results indicated that the measurement model (see Figure 6.4 and Table 6.2) had good fit ($\chi^2 = 1794.23$, $df = 634$; CFI = .96; TLI = .95; RMSEA = .04; 90% confidence interval = .04 and .05; SRMR = .07). A second CFA was conducted to control for CMV—however the results showed that the results could not converge³⁵. As such, the hypothesized social cognitive model was tested without controlling for CMV. For scaling and identification purposes, the variances of all the common latent factors (ϕ and ψ) were fixed to “1.” Results indicated that the hypothesized model had good fit ($\chi^2 = 2204.02$, $df = 849$; CFI = .95; TLI = .95; RMSEA = .04; 90% confidence interval = .04 and .05; SRMR = .08). Table 6.3 shows the summary of all the model fit.

Results from the covariance structure modelling showed that deficient self-regulation was positively associated with excessive SNSs use ($\beta = .64$, $p < .001$), withdrawal symptoms ($\beta = .66$, $p < .001$), and negative outcomes ($\beta = .70$, $p < .001$). As such, H1(a) to H1(c) were supported.

Preference for online social interaction was positively associated with deficient self-regulation ($\beta = .31$, $p < .001$), thus H2 was supported. Mood alteration was positively associated with both preference for online social interaction ($\beta = .55$, $p < .001$) and deficient self-regulation ($\beta = .41$, $p < .001$), thus both H3(a) and H3(b) were supported.

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³⁴ The one-factor model was constructed by loading all the indicators onto a common latent factor.

³⁵ One potential reason why the model failed to converge could be due to the many free parameters to be estimated (Hoyle, 2011).

Figure 6.4. Measurement model of the integrated social cognitive model. The paths between the common latent factors were not drawn to reflect a more parsimonious diagram. Model fit: ($\chi^2 = 1794.23$, $df = 634$; CFI = .96; TLI = .95; RMSEA = .04; 90% confidence interval = .04 and .05; SRMR = .07).

Table 6.2 Summary of measurement items (Integrated social cognitive model)

Variable (range)	Factor loading	<i>M</i>	<i>SD</i>
Bonding Capital (1-5)			
bonding1	.88	2.50	1.32
bonding2	.92	2.40	1.31
bonding3	.63	1.85	1.21
Bridging Capital (1-5)			
bridging1	.85	3.28	1.33
bridging2	.91	3.26	1.34
bridging3	.77	3.06	1.31
Social Connection (1-7)			
connection1	.85	5.30	1.53
connection2	.93	5.27	1.57
connection3	.88	5.35	1.53
Shared Identities (1-7)			
identities1	.84	4.21	1.98
identities2	.83	3.90	2.04
identities3	.82	4.21	1.92
Photographs (1-7)			
photographs1	.84	4.59	1.87
photographs2	.92	4.14	2.01
photographs3	.83	4.57	1.90
Social Investigation (1-7)			
investigation1	.76	3.80	2.02
investigation2	.73	3.37	1.99
investigation3	.72	4.26	1.85
Preference for Online Social Interaction (1-5)			
preference1	.82	2.05	1.09
preference2	.79	2.22	1.20
preference3	.80	2.06	1.11
Mood Alteration (1-5)			
mood1	.93	2.08	1.15
mood2	.97	2.05	1.13
mood3	.72	2.19	1.21
Deficient Self-Observation (1-7)			
deficient-ob1	.93	4.48	1.83
deficient-ob2	.95	4.33	1.88
deficient-ob3	.80	4.40	1.82
Deficient Self-Reaction (1-7)			
deficient-react1	.87	1.81	1.32
deficient-react2	.84	1.74	1.17
deficient-react3	.81	1.85	1.31

Excessive SNSs Use (1-5)

excess1	.84	2.19	1.25
excess2	.95	2.32	1.27
excess3	.90	2.33	1.28

Withdrawal Symptoms (1-5)

withdraw1	.80	1.93	1.09
withdraw2	.88	1.67	.92
withdraw3	.89	1.66	.94

Negative Outcomes (1-5)

negative1	.81	1.47	.78
negative2	.84	1.37	.68
negative3	.80	1.41	.71

Note: Items appear in the same order as listed in the Method section in this chapter.

Table 6.3 Summary of model fit (Integrated social cognitive model)

Model	χ^2	df	CFI	TLI	RMSEA (p-close)	CI of RMSEA	SRMR
Measurement model	1794.23	634	.96	.95	.04 (1.00)	.04 to .05	.07
Integrated social cognitive model	2204.02	849	.95	.95	.04 (1.00)	.04 to .05	.08

Note: CFA = confirmatory factor analysis; *df* = degrees of freedom; CFI = comparative fit index; TLI = Tucker-Lewis index;
RMSEA = root mean square error of approximation; 90% CI of RMSEA = 90% confidence interval of root mean square error of approximation;
SRMR = Standardized Root Mean Squared Residual.

Bonding capital was not significantly associated with preference for online social interaction, but it was positively associated with mood alteration ($\beta = .15, p < .001$), thus only H4(b) was supported. Bridging capital was not significantly associated with preference for online social interaction, but it was positively associated with mood alteration ($\beta = .10, p < .05$), thus only H5(b) was supported.

Next, social connection was not significantly associated with preference for online social interaction, but it was positively associated with mood alteration ($\beta = .21, p < .001$), thus only H6(b) was supported. Shared identities were positively associated with preference for online social interaction ($\beta = .19, p < .001$) and mood alteration ($\beta = .18, p < .001$), thus supporting H7(a) and H7(b). Photographs were neither positively associated with preference for online social interaction nor mood alteration, thus H8(a) and H8(b) were not supported. Social investigation was not significantly associated with preference for online social interaction, but it was positively associated with mood alteration ($\beta = .28, p < .001$), thus only H9(b) was supported. The total variance explained for excessive SNSs was 48% ($R^2 = .48$), 72% ($R^2 = .72$) for withdrawal symptoms, and for negative outcomes it was 49% ($R^2 = .49$). Figure 6.5 shows the integrated social cognitive model with all the standardized coefficients reported.

Figure 6.5. Final integrated social cognitive model. Standardized coefficients are shown in this diagram. * $p < .05$, ** $p < .01$, *** $p < .001$. Dotted lines reflect nonsignificant pathways. Model fit: $\chi^2 = 2204.02$, $df = 849$; CFI = .95; TLI = .95; RMSEA = .04; 90% confidence interval = .04 and .05; SRMR = .08. The figures in parentheses indicate the amount of variance explained.

Discussion

The main purpose of this fourth study is to develop an integrated social cognitive model of problematic SNSs use that could be applied to understand problematic SNSs use among the Singaporean adult population. The underlying premise of this research is that an integrated social cognitive model can be developed by synergizing key elements from both the social cognitive and Caplan's problematic Internet use model. The results from the study were promising—the model fit was psychometrically sound and most of the hypothesized paths were supported—more than 40% of the variances in the three problematic SNSs use dimensions were explained by the factors in the model. Similar to the conclusion in Chapter Five, this study has shown that it is important to consider both external- and individual-level determinants when examining the development of problematic SNSs use. In the context of adults, social capital—the external determinant in this study—and SNSs motivations—the individual-level determinants in this study—play distinct roles in how they relate to deficient self-regulation and problematic SNSs use, through preference for online social interaction and mood alteration.

At the fundamental level, this study supported previous research that a synergistic approach could be adopted when integrating factors from the social cognitive and problematic Internet use model (LaRose et al., 2010). The first synergized model proposed by LaRose et al. (2010), postulated that individuals with depression are more likely to develop deficits in social skills. Such individuals are predisposed to have preference for online social interaction—they are also more likely to use SNSs as psychological incentives, and thus develop deficient self-regulation resulting in negative consequences in their lives.

The integrated model in this study share many conceptual similarities and hypothesized paths with that original integrated model. For instance, there are two dimensions of deficient self-regulation comprising of deficient self-observation and deficient self-reaction. Also, both studies showed that individuals' preference for online interaction and their use of SNSs for mood modification were related to deficient self-regulation. Preference for online social interaction may predispose individuals to develop deficient self-regulation in a few ways. According to the hyperpersonal model, computer-mediated communication may facilitate communication that far surpasses that of traditional face-to-face interactions (Walther, 1996). The reduction in non-verbal cues and increased in editing capabilities (e.g., users of SNSs could take the time to edit their text messages) may reduce the stresses that come along with face-to-face interactions. Over time, individuals with the preference of online social interaction may develop an unhealthy dependency on SNSs for their communication processes—leading to an increase in deficient self-regulation. Mood modification plays an equally important role as preference for online social interaction in predisposing individuals to develop deficiencies in self-regulation. Individuals who rely on SNSs to relieve dysphoric emotions may eventually develop an unhealthy dependence on SNSs (LaRose et al., 2003).

However, the model in this study differs from the previous model in several ways. The previous model postulated that problematic use as a one-dimensional factor (i.e., negative consequences), while this study showed that a three-factor model fits the data better. In terms of statistical modelling, this study adopted covariance structure modelling and postulated that deficient self-regulation as a second-order latent construct (Caplan, 2010). Perhaps the most important distinction is in addressing what may influence individuals to develop problematic SNSs use. Like the adolescents'

study, this study argues that it is important to account for both external and individual level determinants that may contribute to problematic SNSs use—albeit the factors here are distinct from that of the previous study. In particular, motivations to use SNSs as well as social capital were assumed to be key drivers of problematic SNS use.

Pertaining to motivations, this study has shown that not all motivations of SNSs use are equal—some are considerably more important than others in their contribution to the growth of problematic SNSs use through preference for online social interaction and mood alteration. The findings showed that among the four motivations, the use of SNSs to derive shared identities was perhaps one of the more important ones—it had a strong, positive association with both preference for online social interaction ($\beta = .19, p < .001$) and mood alteration ($\beta = .18, p < .001$). This corroborates the result from Chapter Five, where dependence on SNSs for identity formation was found to be the strongest antecedent of deficient self-regulation. Similar to adolescents, adults who depend on SNSs to derive their sense of identity from online groups are more likely to develop preference for online social interaction and use SNSs for mood alteration.

Using SNSs for social connection and social investigation were related to mood alteration, but not preference for online social interaction. The null relationship between social connection and preference for online social interaction is unexpected, considering the intuitive connection between the two. However, this points to a more important finding—the use of SNSs for social connection may not necessarily result in a preference for online social interaction—unless emotions are evoked. Using SNSs for social investigation has mood modification properties. The prevalence of SNSs use has normalized surveillance, where anyone with SNSs accounts can search and do background checks on others (Dubrofsky, 2011; Greti-Iulia, 2013; Monahan, 2011).

SNSs users can use SNSs to engage in search to monitor those close to them such as romantic partners (Darvell, Walsh, & White, 2011; Marshall, Bejanyan, Di Castro, & Lee, 2013), or to find out more about new friends or acquaintances. The act of social investigation has mood modification effect because of its functional properties of uncertainty reduction.

Among the four motivations, only the use of photographs was neither significantly associated with preference for online social interaction nor mood alteration. This is unexpected, considering that one of the main uses of SNSs is the use of photographs, as shown by the popular use of selfies, food photography, and photo sharing (S. S. Ho et al., 2016; Katz & Crocker, 2015; Marwick, 2015; Qiu, Lu, Yang, Qu, & Zhu, 2015). Yet, this unexpected null finding points to a larger implication; the use of photographs—an attractive feature of SNSs—is at best peripheral when compared to other functions such as allowing individuals to derive a sense of identity, social connection, and surveillance. Alternatively, there may be a generational difference in SNSs usage, such that the use of photos may be more popular among adolescents only (S. S. Ho et al., 2016; Valkenburg, Koutamanis, & Vossen, 2017), as they use it for impression management and social comparison purposes. However, for other populations—such as those in this study—the motivation for identity seeking, social connection, and surveillance are the more important *pull* factors in influencing the growth of problematic use.

Last but not least, this study argues that bonding and bridging social capital are external determinants that may influence the problematic SNSs use trajectory. The assumptions were partially supported, as both bonding and bridging capital were positively associated with mood alteration, but not preference for online social interaction. Humans have an intrinsic need to belong and connect (Leary, Kelly,

Cottrell, & Schreindorfer, 2013), whether it is with someone new or someone close. When facing emotional turbulence, individuals may seek out bonding capital via SNSs to derive a sense of comfort. After all, SNSs allow users to reach out to close friends and family members without any geographical constraints. Access to bridging capital also has a mood modification quality. Bridging capital, which is typically characterized by weak ties—serves as content brokers which facilitates the greatest amount of novel information exchange (Shen et al., 2014). The exposure to fresh information and ideas, as well as new experiences from acquaintances may help individuals break out of dysphoric mood.

Theoretical and Practical Implications

There are several theoretical and practical implications that can be drawn from this study for communication and media educators when examining problematic SNSs use. Most notably, this study has demonstrated that an integrated social cognitive and problematic Internet use model is efficacious at showing how problematic SNSs use may occur among adults. By bringing together key concepts from both the social cognitive and problematic Internet use model, the synergized model is distinct from the older versions in a few ways. One notable difference is that the self-reactive outcome expectations were substituted by mood alteration from Caplan's model. Even though self-reactive outcome expectations were found to be a strong antecedent factor of deficient self-regulation in Chapter Five, one of its weakness is that it may be too general conceptually. As such, mood alteration may be a better substitute. A second difference is that preference for online social interaction is a key antecedent factor of problematic SNSs use instead of depression. Thus, in addition to psychosocial problems, affordances of SNSs may be equally important in eliciting problematic behaviors.

The second important theoretical development is identifying both potential external and individual level antecedent factors of problematic SNSs among adults, through the pathway of preference for online social interaction, mood alteration, and deficient self-regulation. This study showed that the two social capital dimensions and SNSs motivations were mostly associated with mood alteration and not preference for online social interaction. This highlights that the ability of SNSs to alleviate dysphoric mood is one of the major risk factors of deficient self-regulation.

One of the practical implications that can be derived from this study is that adults are not immune to the development of problematic SNSs use. Given the right factors and environment, even adults may develop some level of deficiency in regulating problematic SNSs use. Thus, media educators, academic scholars, as well as government agencies may consider designing media literacy campaigns targeting the adult population. The education campaigns can highlight that problematic SNSs use is not only an adolescent-only phenomenon, and use the indicators for problematic use as a checklist for adults as well.

Even though much thought went into designing this study, like all research, there are some limitations. First, this study is cross-sectional in nature and as such causality cannot be ascertained. Second, this study only examined four specific motivations for SNSs use and how they relate to problematic SNSs use. While it is not the intention of this study to be exhaustive in examining all the possible types of motivational factors, future research could examine if factors such as self-expression (Kuss & Griffiths, 2011b) or self-presentation (V. Balakrishnan & Shamim, 2013) could fit into the integrated social cognitive model. Third, as it was necessary to identify different set of antecedents for the adult population, it was not feasible to test the same extended social cognitive model applied to the adolescents in Chapter Five.

Thus, it is difficult to be conclusive about the differences in terms of how the antecedents relate to problematic SNSs use between the adolescents and adults.

Fourth, it is acknowledged that some of the SNSs use motivations (e.g., social investigation) may be Facebook-specific—individuals may be less likely to use certain platforms for social investigation (e.g., Twitter) as compared to Facebook. Last but not least, while this study is nationally representative, there is a limit to the ability to make inference to the general population as the sample only consists of individuals from 19 to 50 years old. Fourth, creating and sharing videos has become one of the more popular features of SNSs, made popular by newly added features such as Facebook Stories and Instagram Stories—however this is not accounted for in this study. Despite the limitations, this study has shown that social capital and some motivations of SNSs use could be conceptualized as external and individual-level antecedents of the mechanisms in Caplan’s model (i.e., preference for online social interaction and mood alteration), which integrates well with the social cognitive model’s portion illustrating how deficient self-regulation relates to problematic SNSs use.

CHAPTER SEVEN   OVERALL DISCUSSION AND CONCLUSION

The main purpose of this thesis is to address some of the existing conceptual and methodological gaps and extend communication theorizing in the context of problematic SNSs use research. To do so, four separate studies were conducted. The first study—a critical review—sought to address the problem of conceptual murkiness in problematic media use research. The review gave a historical overview of media addiction research and identified and delineated conceptual differences between terms such as *addiction*, *dependency*, and *problematic use*, and argued that problematic use would be one of the more suitable terms to describe addictive tendencies pertaining to individuals' SNSs use. The review also surveyed existing theoretical models that could be used to examine problematic SNSs use and gave justifications why the social cognitive model provided a theoretically guided approach to unpack problematic media use research.

The second study—which aimed to examine why people develop problematic SNSs use through the theoretical lens of the social cognitive model—tested the model on a small sample of Singaporean adolescents to examine if it had sound measurement validity and structural psychometric properties. The results lend support to the process of problematic SNSs use development put forth by the social cognitive model (LaRose et al., 2003), where psychosocial problems may motivate teenagers to seek out SNSs to psychologically incentivize themselves, resulting in the development of deficient self-regulation and increased SNSs consumption.

After demonstrating that the model was psychometrically sound with all the hypotheses supported, the third study extended the social cognitive model by

accounting for both external and individual level antecedents of problematic SNSs use on a nationally representative adolescent sample in Singapore. The study showed that apart from looking at psychosocial problems alone, relationship with both parents play an equally crucial role in explaining why adolescents may develop problematic SNSs use. Specifically, the study highlighted that adolescents with poor relationship with their fathers are more likely to depend on SNSs for identity formation—which had a strong association with deficient self-regulation.

Last but not least, the fourth study aimed to explore a different set of external- and individual-level antecedent factors associated with problematic SNSs use among a nationally representative sample of Singaporean adults. To do so, key factors from the social cognitive model as well as Caplan’s problematic Internet use model were synergized to form an integrated social cognitive model; and social capital and SNSs use motivations were incorporated as external and individual level-antecedent factors respectively. The results showed that social capital and most of the SNSs motivations were associated with usage of SNSs for mood alteration—which was strongly associated with the development of deficient self-regulation. The study also showed that like adolescents, the issue of identity—using SNSs to derive shared identities online—was one of the most important antecedent of problematic SNSs use.

Overall, this thesis has contributed to research in the field of problematic media consumption—specifically problematic SNSs use—in terms of developing communication models as well as generating important findings for practical, real-world media literacy advocacy. In summary, there are three important contributions that could be extracted from the four studies collectively. First, the work in this thesis has partially addressed the fragmented and conceptually murky field of problematic media use research, by showing that problematic SNSs use has three distinct

dimensions. The three-factor problematic SNSs use—comprising of excessive SNSs use, withdrawal symptoms, and negative outcomes—had good psychometric properties across the two large-scale nationally representative adolescent and adult samples. This validates the view from existing scholarship that problematic SNSs use is multidimensional in nature (Caplan, 2010; LaRose et al., 2010; Ndasauka et al., 2016), in which its complexities may not be adequately captured by any single construct. As such, modelling problematic SNSs use as a three-factor construct is a small step in the right direction as many of the existing problematic media use research only depend on a single dimension as the outcome variable where most often than not, either time spent (LaRose et al., 2003; D. Lee & LaRose, 2007), or negative consequences (Caplan, 2010) are used as the sole proxies of problematic use.

Not only does the three-factor model offers more theoretical depth than a one-dimensional construct, it circumvents some of the weaknesses associated with some of the current one-dimensional conceptualization of problematic use. For instance, using time spent on SNSs as the dependent variable has serious theoretical and methodological flaws that have not been adequately addressed. At the fundamental level, the amount of time spent on SNSs may not necessarily be indicative of problematic use. Adolescents may use SNSs extensively for work related purposes, and not because they are unable to regulate their consumption behavior (Caplan, 2010). Moreover, adolescents who spend more time on SNSs may not necessarily exhibit problematic use traits as compared to another individual who spends lesser time on SNSs. At the methodological level, asking respondents to report how much time they spent using SNSs may be challenging—individuals may underreport due to social desirability or inflate their responses as they really cannot remember accurately their SNSs consumption. Moreover, recording hours and minutes results in positively

skewed data, and requires logarithmic transformation to normalize the data (LaRose et al., 2003). While logarithmic transformation resolves the issue of non-normality required of a dependent variable in covariance structure modelling, the interpretation of results may be difficult. As for conceptualizing negative outcomes—which captures the significant impact on individuals’ professional or public life—as the sole indicator of problematic use, it does not account for the negative psychological impact of SNSs that may not be readily visible.

The three-factor problematic SNSs use model—though no perfect—does in part circumvent some of these theoretical and methodological issues and present a holistic assessment of problematic use. In terms of capturing SNSs usage, excessive SNSs use may be a better substitute for time spent on SNSs. The view that excessive use is a key component of problematic media use is largely not disputed by scholars (Caplan, 2002; Ceyhan, Ceyhan, & Gurcan, 2007; Kuss & Griffiths, 2011b). While excessive SNS use captures the problem of over-consumption, it does not have the methodological and analytical baggage as time spent on SNSs.

The three-factor model also accounts for symptoms of problematic SNSs use that are both visible and less-visible. While most studies generally agree that one key manifestation of problematic media use is if it result in significant negative real-world consequences (Caplan, 2010; Griffiths, 2013; LaRose et al., 2010; Oberst, Wegmann, Stodt, Brand, & Chamarro, 2017), few have accounted for the less-visible, psychological distress that users experience. This thesis draws upon early Internet and behavioral addiction research and postulates that withdrawal symptoms are an integral component of problematic use (Griffiths, 2013; Hormes et al., 2014; Kittinger et al., 2012; Leung & Lee, 2012; Spada, 2014). Just like how an individual with gambling or smoking addiction may experience severe psychological distress after stopping the

behavior, likewise, research has suggest that SNSs users may experience similar problems upon ceasing SNSs use (Kira et al., 2017).

Apart from the three-factor problematic SNSs use, a second contribution of this thesis is developing two versions of the social cognitive model that account for why and how adolescents and adults develop problematic SNSs use. While both models are similar in terms of staying true to the fundamental assumption of the social cognitive model—deficient self-regulation is a key antecedent of problematic SNSs use (LaRose et al., 2010, 2003; D. Lee & LaRose, 2007)—they account for different external and individual-level antecedent factors as what influence adolescents may not necessarily influence adults.

The extended social cognitive model in the adolescent context illustrates that parents' quality of relationship with their teenagers play a crucial role in the development of problematic SNSs in the adolescents' lives. Currently, there are very few studies in communication research that have examined the impact of family on adolescents' regulatory functions in media consumption behaviors, but some psychological studies have documented the link between parents and self-regulatory functions of adolescents (Farley & Kim-Spoon, 2014; J. Xu et al., 2014). Adolescents with poor, dysfunctional relationship with their parents are more likely to exhibit depressive symptoms, which may motivate them to seek out SNSs as a psychological incentive, and develop deficient self-regulation. When adolescents have difficulty in regulating their SNSs consumption behavior, they are more likely to display higher levels of excessive SNSs use, withdrawal symptoms, and suffer tangible negative consequences in their lives. The study also highlighted the importance of relationship with fathers—a poor relationship with fathers may motivate adolescents to turn to SNSs for identity formation.

In the case of the adult sample, the integrated model shows how social capital (external antecedents) and various SNSs motivations (individual level antecedents) relate to problematic SNS use through preference for online social interaction, mood alteration, and deficient self-regulation. Notably, mood alteration surfaced as one of the important antecedent factors in the model as it had a strong relationship with deficient self-regulation as compared to preference for online social interaction. Both bonding and bridging capital, as well as most of the SNSs motivations (all but photographs) were positively associated with mood alteration. One interesting and surprising finding is that like adolescents, identity formation is another important individual-level antecedent factor for adults. Adults who use SNSs to derive a sense of identity are more likely to indicate preference for communicating over SNSs and use it to alleviate dysphoric mood. Over time, they may suffer deficits in SNSs regulation.

Last but not least, the third key contribution is the adoption of a more rigorous methodological and analytical approach in theory testing for both the social cognitive models. As highlighted in Chapter One, one major weakness in problematic SNSs use research is the use of small convenient sample (LaRose et al., 2010). To ensure that the results are generalizable to the larger population, multi-stage cluster with simple random sampling and stratified random sampling were used to recruit two nationally representative samples of adolescent ($n = 4,920$) and adult ($n = 1,000$) respectively.

In terms of analytical approach, covariance structure modelling was used instead of path analysis to estimate the social cognitive models. Apart from one study³⁶ (e.g., Caplan, 2010), most studies testing the social cognitive model predominantly used path analysis (LaRose et al., 2010, 2003; D. Lee & LaRose, 2007). By using covariance structure modelling and demonstrating that models have

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³⁶ Strictly speaking, the study by Caplan (2010) tested a problematic Internet use model with factors from the social cognitive model.

had good psychometric properties, the work in this thesis has advanced previous versions of the social cognitive models.

There are distinct advantages of modelling the various latent constructs with reflective indicators, instead of averaging all indicators into one overall manifest variable, as in the case of path analysis. The latter assumes that one singular variable encapsulates an error-free representation of the overall construct of interest (Maccallum & Austin, 2000). This is largely unrealistic. Covariance structure modelling on the other hand, allows for the estimation of unique variances of indicators. Moreover, the adolescent study applied a stricter approach to modelling by controlling for CMV. This ensures that the variances in latent constructs are not significantly explained by the survey method itself, but by the indicators in the model, thus guarding against the artificial inflation of the results (Lindell & Whitney, 2001; Richardson, Simmering, & Sturman, 2009).

Overall Practical Implications

Like all impactful research, theoretical contributions must result in significant and meaningful impact. There are several practical implications that could be derived from the overall findings of this thesis. It is important for academics, government officials, policy-makers, and educators in various learning institutions to design holistic media literacy programs that create awareness of problematic SNSs use and educate both adolescents and adults on the seriousness of the issue.

The digital media literacy program can focus on three “Ps,” which stand for *Problem*, *Potential Risk*, and *Power*. Regarding the first “P,” the public must know what the problem is. To do so, the program can distribute the 9 questions used to measure SNSs excessive use, withdrawal symptoms, and negative outcomes as a checklist. The program can emphasize that apart from using SNSs excessively, it is

important to take note if they have experienced psychological discomfort after ceasing to use SNSs, or if their SNSs use result in any impairment in their school, work or interpersonal relationships.

After helping the public define the problem, the program can teach the public to identify the second “P”—the Potential Risk Factors. Based on the findings in Chapter Five, the program can highlight that depressive symptoms, the tendency to use SNSs to psychologically incentivize themselves, dependence on SNSs for identity formation, and inability to regulate their SNSs use as potential risk factors for adolescents. For adolescents, special attention may be given to helping them check if they are highly dependent on SNSs to derive their sense of identity as it is strongly related to deficient self-regulation. For adults, the program can highlight that the tendency to use SNSs to connect with both bonding and bridging capital, four SNSs use motivations (i.e., social connection, shared identities, social investigation), preference for online social interaction, mood alteration, and deficient self-regulation as potential risk factors.

Last but not least, the program should empower both adolescents and adults with the last “P”—Power—to take the necessary steps in preventing problematic SNSs use. For parents of adolescents, they may want to pay attention to the family communication climate, as this may adversely affect the development of their teenagers’ self-regulatory capabilities. For both adolescents and adults, the program may want to emphasize how to take charge and develop a healthy self-image and not be dependent on SNSs for identity formation.

So how can policy makers go about with the education? It can be accomplished through multiple ways: (a) emphasizing digital health and literacy pertaining to SNSs through major events such as the Safer Internet Day in the month of February; (b)

organizing formal talks and seminars; and (c) distributing information via educational content utilizing traditional and new media channels. By leveraging on events during occasions like the Safer Internet Day to raise awareness on digital media issues related to SNSs, it will galvanize the actions of various government agencies, non-government agencies, as well as the public when examining issues relating to digital media. This may increase the success and receptiveness of the programs when official talks and seminars on digital media are organized, targeted, and coordinated.

To target adolescents, such seminars and talks could be organized during the assemblies, school and leadership camps, as well as during the schools' cyber wellness curriculum. In addition, educational material could be developed and targeted at the public segment using the appropriate media strategies (e.g., disseminating education materials to younger populations through online platforms).

To reach adults, seminars could focus on providing tips to parents on how to communicate with their child on media regulation behaviors, especially on SNSs. Policy makers may want to tap into the resources of organizations such as the People's Association, community centers, or non-governmental agencies (e.g., Focus on the Family; TOUCH Cyber Wellness) in reaching out to more Singaporeans by integrating awareness of problematic SNSs use into existing cyber wellness programs.

While steps have been taken to ensure that the design of the study is conceptually and methodologically sound, like all studies, there are several limitations. First, as highlighted in the individual chapters, the studies in Chapter Four, Five, and Six were cross-sectional in nature and as such, causality cannot be inferred. Second, it is unfortunate that for the synergized social cognitive model in Chapter Six, due to model identification problem, CMV was not able to be controlled for. Last but not least, while the three-factor problematic SNSs use model received empirical support,

there are studies that suggest that there are more than three dimensions, such as *deception*—hiding how much time one really spent on SNSs—or *persistence*—failed attempts to regulate SNSs use despite continuous efforts (van den Eijnden et al., 2016).

Directions for Future Research

There are a few key areas in which scholars can undertake to build upon the findings of this thesis. In terms of future theoretical extension, more could be done to further explicate problematic SNSs use. Scholars should test if a four-factor or five-factor problematic SNSs use model (with additional dimensions such as *deception* or *persistence*) fit the data better than the proposed three-factor model.

In terms of theoretical modelling, there is certainly more room for growth in extending the social cognitive model. The main construct in the social cognitive model is deficient self-regulation. However, researchers may want to consider going beyond self-report measures to measure deficient self-regulation. There is a wealth of research on measuring executive functions, which has three dimensions—inhibitory control, working memory, and cognitive flexibility (Diamond, 2013; Friedman et al., 2009; Hofmann, Schmeichel, & Baddeley, 2012). In addition, one of the weaknesses in LaRose's versions of the social cognitive model was that he and his co-authors did not take into account how people may learn behaviors through modelling, which was a key idea of the original social cognitive theory (Bandura, 1991). To stay true to the assumptions of the original social cognitive theory where social learning is accounted for, researchers may adopt an experimental (or quasi-experimental) approach and examine how parental modelling of their SNSs use may influence adolescents' self-regulation or problematic SNSs use—and vice versa.

To overcome the weakness of a cross-sectional design, researchers may want to adopt a longitudinal approach to test the social cognitive model of problematic SNSs use. For instance, scholars could adopt latent growth modelling (Maccallum & Austin, 2000) to examine the developmental trajectory of problematic SNSs use from adolescence to adulthood. This will allow researchers to uncover if: (a) intra-individual development of problematic SNSs use is linear or nonlinear in nature; (b) whether there is a significant association between individuals' initial problematic SNSs use level and the rate of change (E. S. Kim & Willson, 2014); (c) examine if problematic SNS use is time-invariant; and (d) explore if the rate of change in a variable of interest results in a change in problematic SNSs use.

Scholars may also investigate findings of this thesis further. For instance, based on the nonsignificant relationship between loneliness and self-reactive outcome expectations, Chapter Five concluded that perhaps lonely individuals do not necessarily view SNSs as psychological incentives. Perhaps future research could examine if there are different dimensions of self-reactive outcome expectations, and how loneliness may be related to these dimensions.

In addition, it is acknowledged that one of the weaknesses of this thesis is that different sets of external and individual-level antecedents of problematic SNSs use were examined for the adolescents and adults' sample. It is hoped that scholars could build upon the findings of this thesis and develop a *universal* social cognitive model in future that could explain problematic SNSs use regardless of contextual differences.

Conclusion

As a relatively new phenomenon, problematic SNSs use may not be very well understood by the general public. Moreover, the field of problematic media use research has been plagued by a slew of theoretical and methodological challenges. It is

hoped that the four studies have in part addressed some of the theoretical and methodological shortfalls in problematic SNSs use research—through reviewing problematic media research, explicating problematic SNSs use, and developing two social cognitive models that may explain the process of problematic SNSs use development among adolescents and adults.

This thesis is at best a cursory examination of problematic SNSs use. The collective work of the four studies is akin to lighting a candle in a dark city—while it illuminates and brings a certain degree of clarity, much more candles are required to light up the entire city. As the field of problematic SNSs use is at its infancy stage, the field is fertile and has tremendous potential for extensive development of communication models. It is hoped that future scholars will find the work in this thesis useful in advancing the field of problematic media use, and build more comprehensive communication models in explaining problematic media consumption.

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