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A MIXED METHODS EXPLORATION OF PROBLEMATIC MOBILE PHONE USE IN NEW ZEALAND ADOLESCENTS

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degree of Doctor of Philosophy in Health Science, the University of
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ABSTRACT

Background

Problematic mobile phone use (PMPU) has been defined as any pattern of mobile phone use resulting in subjective distress or impairment in important areas of functioning. Extant research on PMPU has predominantly adopted an addiction perspective in relation to PMPU, focussing on an adult interpretation of this behaviour. Further, limited research on PMPU is available, from a New Zealand (NZ) context. Therefore, this thesis aimed to explore PMPU within the New Zealand adolescent population, by including young people in the development of a PMPU measure.

Methods

A sequential, exploratory, mixed methods research design was employed. A qualitative study involved focus group with adolescents aged 13-19 (N=45), with the aim of exploring the relationship between mobile phone use and New Zealand young people. A Nominal Group Technique (NGT) study involved 10 NGT sessions with adolescents (N=108), as well as expert input, with the aim of constructing a youth-informed PMPU questionnaire. A quantitative study then used an online questionnaire with adolescents (N=664), with the aim of exploring the prevalence of PMPU behaviours and relevant negative consequences within a subset of the NZ adolescent community.

Results

The focus group participants reported awareness of PMPU within their community, and some participants had experienced negative consequences as a result of their mobile phone use. Participants believed adolescents engaged in PMPU as a result of needing to connect, or loneliness. The NGT process resulted in a 60 item PMPU questionnaire. The online survey identified PMPU-related constructs such as problematic cognitions, problematic behaviours and problematic emotions. The prevalence of PMPU-related constructs ranged between 4.2-50%. Negative consequences as a result of mobile phone use were experienced by over 50%

of the survey sample. Scores on the PMPU questionnaire were predicted by female gender, lack of landline availability, and high intensity of mobile phone use. Negative consequences were predicted by each of the PMPU constructs, as well as high intensity of mobile phone use.

Conclusions

The research findings suggest that PMPU does affect a subset of New Zealand's adolescent population, and some experience negative effects as a result of this. However, given the predominantly positive role mobile phone use plays in society, a harm reduction approach may be most appropriate avenue to addressing potential mobile phone use related risks.

DEDICATION

This thesis is dedicated to my grandparents, Ion Sitarus and Gheorghe Vacaru. For as long as I can remember, my grandparents encouraged me to study, develop myself, and aim for the highest peaks. They were incredibly enthusiastic about my completion of this work, and I so wish they could have been here to see me finish it.

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Chapter 5: Qualitative exploration of young New Zealanders' relationships with mobile phone use

Vacaru, M.A., Shepherd, R.M. & Sheridan, (2014). New Zealand youth and their relationship with mobile phone technology. *Int J Ment Health Addiction*, 12: 572. doi:10.1007/s11469-014-9488-z

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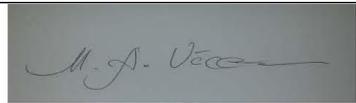
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- ❖ the above statement correctly reflects the nature and extent of the PhD candidate's contribution to this work, and the nature of the contribution of each of the co-authors; and
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CHAPTER 1. INTRODUCTION AND OVERVIEW OF THE THESIS

1.1 Background

The Motorola DynaTAC 8000X was released in 1984 as the first commercially available mobile phone. Its capabilities were limited, offering 30 minutes of talk time while requiring 10 hours for a full battery charge (Antras, 2013). Over the last three decades, however, mobile phone technology has evolved significantly, particularly with the release of ‘smartphones’ during the 1990s. The first smartphones could send and receive person to person text messaging, also called Short Message Service (SMS), as well as faxes, emails and cellular pages (Sarwar & Soomro, 2013). By the late 2000s, many mobile phones included cameras capable of capturing photos and videos, Internet access and Bluetooth (Patrick, Criswold, Raab & Intille, 2008). Further improvements to mobile phone technology include Global Positioning System navigation, media or music players, as well as the growth of mobile applications, or ‘apps’, which may serve almost any purpose (Dickinson, Ghali, Cherrett, Speed, Davies & Norgate, 2014).

The uptake of mobile phone technology by the modern population has been exceptionally high: the International Telecommunications Union estimated the number of worldwide of active mobile phone subscriptions had reached 7 billion in 2015, representing a 97% worldwide penetration rate (ITU, 2016). More interestingly, however, is that of the 249 countries included in the ITU’s 2015 dataset, 146 countries had more than 100 mobile phone subscriptions for every 100 people (ITU, 2016). This suggests a widespread pattern of people owning more than one mobile phone device.

New Zealand has 121.8 mobile phone subscriptions for every 100 people, indicating the practice of owning more than one mobile device is also present locally (ITU, 2016). However, not all mobile phones in use are smartphones: the most recent available data on New Zealand mobile phone technology uptake indicates that in 2015, 70% of New Zealand adults owned a smartphone. Some age-related discrepancies in smartphone ownership were

found, however, with 91% of 18-34 year olds owning one, while only 45% of individuals aged 55 or more owning a smartphone (Research New Zealand, 2015).

Adoption of mobile phone technology has also been high among the adolescent community. Results from a Pew Research Centre study indicate that 75% of American adolescents own or have access to a smartphone, and 30% have a “basic phone” (Lenhart, 2015). A survey conducted by the GSM Association in 2013 explored mobile phone use rates among 8-18 year olds in Japan, India, Indonesia, Egypt and Chile, and found that 65% of participants owned a mobile phone, of whom 27% owned a smartphone (GSMA, 2013). Within the New Zealand context, a 2008 survey by the Broadcasting Standards Authority found that mobile phone ownership among 6 to 13 year olds ranged between 27-62% (Broadcasting Standards Authority, 2008), while the most recent data suggests mobile phone ownership rates among 10-14 year olds has reached 90% (Redmayne, 2013).

In the last decade, however, media reports have emerged of problems relating to mobile phone overuse, predominantly featuring children and adolescents; the most frequently used terminology in these reports was “addicted” or “dependent” (Jackson, 2005; The Sydney Morning Herald, 2006; The Times of India, 2003). A recent poll conducted for Common Sense Media, which involved 1240 interviews with parents and their adolescent children, found that 59% of parents and 50% of adolescents believed that they were addicted to their mobile phones (Common Sense Media, 2016). Some reports provided accounts of mobile phone users receiving treatment for this problem; for example, two children in Spain were entered into an addiction treatment facility for mobile phone “addiction”; they had been doing badly at school as a result of the excessive amount of time spent on their mobile phones, and had attempted to persuade relatives to lend them money so they could continue using their mobile phones (www.bbc.co.uk). James and Drennan (2005) reported an Australian Broadcast Association announcement, which included experts are issuing health warnings about young people so “addicted” to their mobile phones they sleep with them, so that they can never miss a text message or call, and can respond immediately. In New Zealand, a 17 year old male was reported to have sent 8000 text messages a month – the most he had ever sent had been 15 000 in a month; his peers had expressed concern regarding his “dependence” on his mobile phone (Crewdson, 2005).

Reports have also emerged regarding a new disorder, coined “rinxxiety” or “phantom ringing”, which is defined as mobile phone users imagining their phone is ringing, or vibrating, when in fact it isn’t (Laramie, 2007). An American study surveyed 340 individuals and found 66% of participants had experienced phantom ringing, with 37% experiencing them “sometimes” or “always”. Studies have confirmed correlations between experiences of phantom ringing and heavy mobile phone usage (Laramie, 2007; Avvannavar et al., 2008).

A number of academic studies have explored excessive mobile phone use, varyingly conceptualising it as ‘smartphone addiction’ (Casey, 2012; Lee et al., 2013), ‘mobile phone dependence’ (Choliz, 2012), ‘mobile phone addiction’ (Park, 2005; Szpakow et al., 2011), ‘compulsive mobile phone use’ (Matthews et al., 2009), ‘mobile phone overuse’ (Perry & Lee, 2007), or ‘problematic mobile phone use’ (Billieux et al., 2008; Takao et al., 2009). Most studies which have explored this subject conceptualised problematic mobile phone use as a behavioural addiction, and employed the DSM-IV criteria for alcohol or substance dependence, or pathological gambling as the basis for the development of new problematic mobile phone use measurement tools (Billieux, 2012).

These studies have found that young people are more likely to score high on problematic mobile phone use measures than their older counterparts; women are also more likely than men to achieve high scores (Bianchi and Phillips, 2005, Cagan et al., 2014, Lu et al., 2011, Martinotti et al., 2011 and Perry and Lee, 2007). Problematic mobile phone use has been linked to a number of physical, social and psychological consequences, including damage to fingers and joints (Ming et al., 2006), decreased sperm quality (Agarwal et al., 2008), disrupted sleep patterns (Badre, 2006), increased risk of cancer development (Hoskote, Kapdi & Joshi, 2008), regression or stagnation of social and psychological structures, depression and anxiety (Yen et al., 2009). In the New Zealand context, the only published study which has previously sought to explore problematic mobile phone use within the New Zealand population was the candidate’s honours project – “Mobile phone addiction among Auckland high school students” (Vacaru & Shepherd, 2009). That project employed a Problematic Mobile Phone Use (PMPU) questionnaire developed in Australia (Walsh et al, 2007) to explore PMPU behaviour within the New Zealand youth population. The study also explored the links between PMPU, demographic variables, and gratifications of use. The findings suggested that PMPU behaviour may exist in the New Zealand young people population – at

least as defined by the PMPU questionnaire that the candidate had utilised. However, the study was small, and required further development.

1.2 Rationale

This PhD initially emerged from the author's previous work on problematic mobile phone use and New Zealand adolescents. However, during the planning of this work, a series of issues emerged from the literature which needed to be addressed in order to advance academic enquiries into the field of PMPU.

Firstly, excepting the author's own brief endeavours as part of his Honours dissertation, no research on mobile phone use and adolescents could be found within the New Zealand context. This is despite a number of media reports outlining young people engaging in mobile phone use behaviour that produced negative physical, social and psychological effects (for a more detailed discussion of these reports, please see chapter 4). While the primary purpose of any media outlet is to draw attention and to sell papers, this did not discount the possibility that a problem behaviour may be emerging within the New Zealand adolescent populus – thus, further investigation was necessary.

Secondly, the literature on mobile phone use behaviour provided very few instances of qualitative research into the subject matter, with the majority of those in existence focussing on the socio-cultural role that mobile phone communication played within modern society. Therefore little was known regarding the target group's own beliefs regarding mobile phone use behaviour, and whether it could become problematic within their own community, and based on their social norms. Again, this required further assessment, in order to gain a more comprehensive understanding of the behaviour, from the group where it seemed most prolific.

Thirdly, the quantitative assessments of problematic mobile phone use presented a number of concerns to the author. Chief of these was that the predominant majority of such assessments adopted addiction as the theoretical underpinning of their work, without any concrete justification of this assumption; there have been no clinical evaluations that determined mobile phone use behaviour can be addictive, and yet the DSM-IV criteria for dependence have been used in the majority of published works on PMPU that the author has come across.

This approach leads to a second concern: given that some research has raised questions regarding the applicability of the DSM-IV alcohol/substance abuse and dependence criteria for adolescents, PMPU scaled developed based on these criteria may not be suitable for young people (Martin, Chung, Kirisci & Langenbucher, 2006; Winters, Latimer & Stinchfield, 1999). Thus, there was a need to develop a youth-pertinent way of evaluating PMPU behaviour.

Seven research aims were developed, which aimed to address the issues described above, at least in some capacity:

1. To qualitatively investigate the relationships Auckland high school students have with their mobile phone
2. To explore how Auckland high school students define and identify problematic mobile phone use (PMPU)
3. To identify why Auckland high school students engage in PMPU
4. To develop a youth-informed, cognitive-behavioural theory guided PMPU questionnaire
5. To quantitatively explore levels of mobile phone use, problematic mobile phone use, and negative consequences resulting from problematic mobile phone use
6. To explore any associations between demographic variables, levels of mobile phone use, and problematic mobile phone use
7. To explore any associations between demographic variables, levels of mobile phone use, problematic mobile phone use, and negative consequences

1.3 Thesis structure

This thesis comprises eight chapters. An overview of each chapter follows.

Chapter 2 provides a discussion on the concept of behavioural addiction. It describes the similarities between behavioural and ‘classic’ addictions.

Chapter 3 is a literature review on problematic mobile phone use. The primary aim of the chapter is to describe and critically analyse academic endeavours to develop and implement scales or questionnaires which aim to evaluate or diagnose problematic mobile phone use

behaviour. Discussions of nomenclature and definitions of PMPU are also included. Demographic and psychosocial factors associated with PMPU are discussed, as well as theories regarding the underlying mechanisms of the problematic behaviour.

Chapter 4 is an account of the various epistemological, ontological and theoretical underpinnings of this thesis. It begins with a description of the most prevalent epistemological and ontological schools of thought, and an account of the candidate's own theoretical positioning in relation to this thesis. The chapter continues with a description of youth participation theory, cognitive behavioural theory, and provides an explanation of their relevance to and application in this thesis.

Chapter 5 describes the first study in this doctorate, which aimed to explore young New Zealanders' views of and experiences with mobile phone technology, with a particular focus on problematic use. The chapter includes the methodological underpinnings of qualitative research, and progresses through a description of the methods and results of the study, concluding with a discussion of the findings.

Chapter 6 discusses the second study in the thesis, which aimed to develop a youth-inspired PMPU questionnaire. A discussion of existing consensus-building methodologies is followed by descriptions of the methods and results of the study, concluding with a discussion of the results.

Chapter 7 provides an account of the final study of the doctorate, which aimed to implement the PMPU questionnaire developed in study 2, in a sample of New Zealand young people. Firstly, the various statistical methods available for testing a questionnaire are described, including a discussion of various ways to ascertain a questionnaire's validity and reliability. This is followed by descriptions of methods and results, and a discussion of the findings.

Chapter 8 is an overarching discussion of the three studies as a whole. It includes contextualisation of the various findings within the existing literature on PMPU behaviour, a description of the contributions this research may bring to the field of public health, a discussion of strengths and limitations of the research, suggestions for future research, particularly involving the further development of the PMPU questionnaire developed by these studies, and concluding comments.

CHAPTER 2. AN OVERVIEW OF BEHAVIOURAL ADDICTIONS

2.1 Introduction

This chapter aims to provide a general overview of behavioural addiction research. First, definitions of addiction and behavioural addictions are provided, followed by descriptions of some of the more prominent behavioural addictions. The central constructs of addiction are then discussed, and an overview of addiction diagnosis criteria is provided. Finally, the limitations of behavioural addiction research are discussed.

2.2 Addiction

The concept of addiction, its definition, aetiology and underlying factors have been a subject of significant debate (Foddy & Savulescu, 2010a, Foddy & Savulescu, 2010b, Goodman, 1990; Horne, 2010; Larkin & Griffiths, 1998; Matthews, 2010; Nordenfelt, 2010; Shaffer, 1997). Terminology relating to the concept of addiction is varied, and often used interchangeably – use, abuse, misuse, dependence, addiction (Babor & Hall, 2007).

A number of definitions of addiction have been proposed. Albery and colleagues (2006; in Munafo & Albery, 2006), for example, define addiction as “a person’s physical and psychological dependency on a behaviour”. They argue addiction can involve the ingestion of an intoxicant, such as alcohol, illicit drugs, or nicotine, but this is not necessary – potentially referring to “behavioural addictions”, such as gambling. They propose the characterisation of addiction through a number of features, including a strong desire to participate in a behaviour, experiencing distress or discomfort when the behaviour is prevented from occurring, difficulty in controlling the behaviour, and continuing to engage in said behaviour despite evidence of negative consequences to the individual (Albery, Sharma, Niazi and Moss, 2006).

Other authors choose to describe addiction as the “extreme or psychopathological state where control over drug use is lost” (Glautier et al., 1996), or “a primary, chronic, neurobiologic

disease with genetic, psychosocial, and environmental factors influencing its development and manifestations. It is characterized by behaviours that include one or more of the following: impaired control over drug use, compulsive use, continued use despite harm, and craving”, a definition utilised by the American Academy of Pain Medicine, the American Pain Society, and the American Society of Addiction Medicine in 2001 (Heit, 2003). Conversely, Goodman (1990) defines addiction as “a process whereby a behaviour, that can function both to produce pleasure and to provide relief from discomfort, is employed in a pattern characterised by (1) recurrent failure to control the behaviour (powerlessness) and (2) continuation of the behaviour despite significant negative consequences (unmanageability). It has also been argued that addiction is primarily composed of three elements: craving or compulsion, loss of control, and continuing the behaviour despite associated adverse effects – often referred to as the “three Cs” (Shaffer and Albanese, 2005).

However, the term addiction is not used in official diagnostic manuals such as the DSM, with “dependence” being used instead. The DSM-IV defines dependence as “as a maladaptive pattern of substance use leading to clinically significant impairment or distress” (APA, 1994). The latest version of the DSM discarded the term “dependence” in favour of substance/alcohol use disorder (APA, 2013).

2.3 Behavioural addictions

The concept of behavioural addiction has been suggested by researchers since the 20th century; one example is Stanton Peele, who purported that individuals suffering from an addiction were addicted to a set of experiences, and reactions to a particular substance, such as alcohol or drugs, represent only one example of experiences to which one could become addicted (Peele, 1979). However, Isaac Marks’ 1990 editorial on behavioural addictions is often cited in the behavioural addiction literature (1990); Marks defined behavioural addiction as a repetitive routine which leads to handicap due to its frequency or intensity, but has no external substance as a goal (Marks, 1990). He suggested that behavioural and biological addiction syndromes share common features, and are characterized by disorders of impulse control and self-regulation. A number of behaviours were proposed as potential addictions, including obsessive-compulsive disorder, compulsive spending (inclusive of gambling), hypersexuality, overeating (inclusive of bulimic binges), kleptomania,

trichotillomania, tics and Tourette's syndrome (Marks, 1990). Since 1990, the rapid advancements in technology and increase in its use has resulted in the rise of other potentially addictive behaviours, such as Internet use, mobile phone use, and video-game playing (both online and offline). However, of all these behaviours, only gambling has been officially recognised as an addiction, as evidenced by the shift in its classification as an impulse-control disorder in the DSM-IV, to a non-substance-related disorder in the "Substance Related and Addictive Disorders" category in the DSM-5 (APA, 2013). Internet gaming disorder was included in the appendices of the DSM-5, as a condition requiring further study (APA, 2013; Potenza, 2014).

Since 1990, there has been a significant rise in the exploration of behavioural addictions within the research field; for example, an analysis conducted by Billieux et al (2015) on the number of behavioural addiction papers published between 1990 and 2014 found that after 2004, over 1000 papers on the subject were published every year. The highest number of published papers was in 2013 (n=2563), the year when the DSM-5 was released, and gambling was officially categorised as an addiction. The rise in the conceptualisation of behaviours as potentially addictive is at least partly a result of the broadening definition of addiction (James, 2012; Starcevic, 2016). For example, the revised version of the DSM-III (DSM-III-R) no longer required the presence of physiological tolerance and withdrawal for a dependence diagnosis to be met (APA, 1994). Potenza (2006) described addiction as being composed of three core elements, including a state of craving prior to engaging in the behaviour, impaired control over behavioural engagement, and continued use despite negative consequences. The definition of addiction adopted by the American Society of Addiction Medicine in 2011 showed a similar trend towards a broader approach to addiction: 'inability to consistently abstain, impairment in behavioural control, craving, diminished recognition of significant problems with one's behaviours and interpersonal relationships, and a dysfunctional emotional response' (ASAM, 2011, Starcevic, 2016). This change in the conceptualisation of addiction has therefore allowed the application of the addiction label to behaviours where tolerance and withdrawal may not be present, such as television watching, carrot eating, and water intoxication (Shaffer, Hall & Vander Bilt, 2000).

However, there appears to be a lack of agreement amongst researchers regarding the construct of behavioural addictions, as evidenced by the variety in nomenclature, definitions, and conceptualisations present in the literature. For example, activities included under the behavioural addiction umbrella have been variously termed as compulsive (Black, 2007),

dependent (Allegre, Souville, Therme & Griffiths, 2006), excessive (Mudry et al., 2011), problematic (Forrest, King & Delfabbro, 2016), dysfunctional (Billieux et al., 2015). In terms of definitions, Grant, Potenza, Weinstein & Gorelick (2010) define behavioural addictions as ‘syndromes analogous to substance addiction, but with a behavioural focus other than ingestion of a psychoactive substance’. The authors suggest the central concept of behavioural addiction is the loss of control, as evidenced by the engagement in a persistent behaviour, despite knowledge of negative consequences resulting from that particular behaviour; similar definitions have been proposed by other authors (Grant, Schreiber & O’Laug, 2010; Pinna et al., 2015; Villella et al., 2010). Conversely, Martin & Petry (2005) suggest that the common factor underpinning both behavioural and biological addictions is a transformation of basic drives required for survival into problematic actions, characterized by either misdirection or excessive frequency.

A similar pattern may be observed in the literature in relation to the conceptualization of addictive behaviours. For example, Mudry et al (2011) conducted a systematic review of the literature on “Excessive Behaviours” (EBs), seeking to explore their existing definitions of classifications. A total of 361 articles were included in the review, of which the majority (47%) employed an addiction/dependence perspective in their conceptualisation of their respective EB; 9% adopted an impulse control disorder conceptualisation, 2% adopted an obsessive compulsive spectrum conceptualisation, 27% adopted an alternative, or blended conceptualisation, while 16% did not specify a particular conceptualisation (Mudry et al., 2011). Further divergence may be observed within individual studies, where behaviours are labelled as addictive, or compulsive, but are subsequently conceptualised as impulse control disorders (Black, 2001; Krueger, 1988; Young, 1998).

A number of explanatory models have been developed specifically for various addictive behaviours, including gambling (Sharpe, 2002), Internet use (Davis, 2001), mobile phone use (Billieux et al., 2015), and sex (Laier & Brand, 2014). However, despite the high number of studies on behavioural addictions, little evidence could be found regarding the development of explanatory theories or models of behavioural addiction as a construct; that is, theories and models were behaviour-specific, as opposed to broad conceptualisations of behavioural addiction. One of the few examples of an all-encompassing theory is Brown’s theory of addiction (1993), which was specifically developed to address behavioural addiction. Interestingly, the theory was based on the DSM-III-R criteria for dependence (Brown, 1993), and would be better described as a classification model, as opposed to an explanatory theory.

The theory has been applied to a number of behaviours, including mobile phone use (Walsh, White, Coz & Young, 2011), Internet and computer use (Griffiths, 2000), and physical exercise (Griffiths, 1997; Terry, Szabo & Griffiths, 2004). It includes six criteria, all of which must be fulfilled in order for a person to be classified as addicted:

“Salience: This describes a state when the particular activity becomes the most important activity in the person’s life and dominates their thinking (preoccupations and cognitive distortions), feelings (cravings) and behaviour (deterioration of socialized behaviour).

Euphoria: The subjective experience that people report as a consequence of engaging in the particular activity (i.e. they experience a “buzz” or a “high”).

Tolerance: A process whereby increasing amounts of the particular activity are required to achieve the former effects.

Withdrawal symptoms: Describes unpleasant feeling states and/or physical effects which occur when the particular activity is discontinued or suddenly reduced, e.g. the shakes, moodiness, irritability, etc.

Conflict: This refers to conflicts between the addict and those around them (interpersonal conflict) or from within the individual themselves (intrapsychic conflict) which are concerned with the particular activity. Continual choosing of short-term pleasure and relief leads to disregard of adverse consequences and long-term damage which in turn increases the apparent need for the addictive activity as a coping strategy.

Relapse and reinstatement: This is the tendency for repeated reversions to earlier patterns of the particular activity to recur and for even the most extreme patterns, typical of the height of the addiction, to be quickly restored after many years of abstinence or control” (Brown, 1993).

The self-medication theory (Khantzian, 1997) proposes that individuals engage in potentially addictive behaviours in order to medicate suffering, regulate their lives, or to address negative emotions. Further, the individual self-medicating would experience a relief or improvement in functioning, as a result of the substance use. Finally, the theory postulates that the substance of choice is not random, but based on the pharmacological properties of the substance; for example an individual suffering from anxiety would prefer alcohol over a stimulant, due to its anxiolytic properties (Lembke, 2012). The self-medication theory

therefore also explains why some individuals are able to maintain recreational-levels of substance use, while others progress to addiction (Clark, 2011). While research findings are discordant in relation to the potential benefits of self-medication with psychoactive substances (Garland, Pettus-Davis & Howard, 2013; Lembke, 2012; Tomlinson & Brown, 2012; Tomlinson, Tate, Anderson, McCarthy & Brown, 2006), the relationship between psychopathology, such as depression or anxiety, and addiction is well established in the literature (Clark, 2011). Associations have been found between depression, anxiety and alcohol use (Gilman & Abraham, 2011), substance use (Swendsen & Merikangas, 2000), gambling (Barrault & Varescon, 2013), Internet use (Kuss, Griffiths, Karila & Billieux, 2014), mobile phone use (Billieux, 2012) and compulsive buying (Black, 2007). The self-medication theory stipulates that such negative affective states are the cause of addiction, and therefore would have to precede any engagement in substance use or other behaviours. The direction of the relationship between addiction and negative affect remains unclear, however (Clark, 2011).

Schaffer et al (2004) also proposed a broad model of addiction, which they termed a 'syndrome model'. They argue that addictions, both biological (alcohol, drug use, smoking) and behavioural (gambling), have shared commonalities, which reflect a shared aetiology. The authors classified these commonalities into several aspects: shared neurobiological and psychosocial antecedents, and shared manifestations and sequelae. Shared neurobiological antecedents refer to aspects such as neurobiological system nonspecificity and genetic overlap – that is, evidence suggests that both psychoactive drugs and behaviours such as gambling have the capacity to stimulate the brain's dopamine reward system (dopamine being one neurotransmitter that has been identified as playing a primary role in the development and maintenance of addictive behaviours). Similar findings have been reported for Problematic Internet Use, for example, where individuals who scored high on PIU scales had reduced dopamine transporter expression within the corpus striatum (Hou et al., 2012).

Shared psychosocial antecedents refer to psychological and social risk factors which appear to be common across multiple addictions, such as depression, anxiety, or PTSD, as well as impulsivity, poor parental supervision, and delinquency (Schaffer et al., 2004). Correlations between psychopathology and problematic behaviours, such as PIU or PMPU, have also been reported (Kuss et al., 2014; Yen et al., 2009).

Shared manifestations and sequelae included multiple aspects of the addictive process, including object nonspecificity (i.e. the idea that addiction is not necessarily inextricably linked to a particular substance or behaviour, as evidenced by people recovering from one addiction, and then moving on to another), parallel histories (addiction usually involves risk factors, and exposure to potential objects of addiction), neurobiological adaptations (i.e. tolerance and withdrawal), as well as treatment nonspecificity (i.e. pharmacological treatment spillover effects – for example, naltrexone, which is used to treat opioid addiction, can also be used to treat pathological gambling) (Schaffer et al., 2004). Several aspects of this model appear to also be applicable to problematic behaviours, suggesting it could be utilised to underpin future research on PMPU, PIU and other behaviours.

The following sections will provide brief overviews of some of the behaviours which have been described in the literature as behavioural addictions.

2.3.1 Gambling

As previously mentioned, gambling is the only behaviour which has been included in an official diagnostic manual, under the addiction umbrella (APA, 2013). It was first included in the third edition of the DSM in 1980, under the classification of “impulse control disorder”, and the diagnostic criteria were based on the clinical experience of Dr Robert Custer, a gambling treatment expert (Reilly and Smith, 2013). The fourth edition of the DSM included revised Pathological Gambling (PG) criteria, which reflected its similarity to substance dependence, as demonstrated by the addition of “repeated unsuccessful attempts to control, cut back or stop gambling” (APA, 1994). In the most recent version of the DSM, PG has been renamed as “Gambling disorder”, and was classified under a newly developed category, “Addictive disorders” (APA, 2013). The American Psychiatric Association stated this new classification was a result of “research findings that gambling disorder is similar to substance-related disorders in clinical expression, brain origin, comorbidity, physiology, and treatment” (APA, 2013). Gambling disorder is defined as ‘persistent and recurrent problematic gambling behaviour leading to clinically significant impairment or distress’ (APA, 2013).

The reported prevalence of gambling disorder varies based on the country, and the year when the research was conducted; an analysis of 202 problem gambling prevalence studies

conducted between 1975 and 2012 found the past year problem gambling rate to be 0.5-7.6%, with an average of 2.3% (Williams, Volberg & Stevens, 2012). Adolescents appear to be at particular risk, with 60-80% having ever gambled for money, and 10-15% of those being at risk for developing gambling problems (Derevensky & Gupta, 2007). Other research suggests young people experience gambling disorders at 2.5-3 times the rate of adults (Shaffer & Korn, 2002).

Gambling disorder has been linked to a number of negative consequences, including financial problems, relationship disruption or breakdown, emotional or psychological distress, criminal activity, and reduced performance at work or school (Ladouceur et al., 1994; Langham et al., 2016).

2.3.2 Shopping/buying

Compulsive buying, shopping addiction, excessive shopping, or spending addiction, are characterised by a preoccupation with shopping, prepurchase tension followed by a sense of relief upon making the purchase, and associated mood and anxiety disorders (Clark & Calleja, 2008; Van Wormer and Davis, 2013). Other researchers define compulsive buying as ‘an irresistible-uncontrollable urge, resulting in excessive, expensive and time-consuming retail activity’ (Kellett & Bolton, 2009). Compulsive shopping was included in the DSM-III-TR, as an “impulse control disorder not otherwise specified”, but was subsequently removed from later editions; in current research, it is variously categorised as an addiction, an impulse control disorder, or an obsessive compulsive disorder (Van Wormer and Davis, 2013, Black, 2007).

Studies aiming to evaluate the prevalence of shopping addiction within the general population have reported figures ranging from 2-16% (Faber & O’Guinn, 1992; Hassay & Smith, 1996; Koran, Faber & Aboujaoude, 2006; Magee, 1994).

Compulsive buying has been associated with financial problems, legal problems, psychological distress, interpersonal conflict, and marital conflict (Christenson et al., 1994; Lejoyeux & Weinstein, 2010; McElroy, Keck & Phillips, 1995).

2.3.3 Internet use

Internet addiction was a term arguably coined by Kimberley Young, who developed the first instrument which aimed to diagnose such a condition. Internet addiction was defined as an impulse control disorder which does not involve an intoxicant (Young, 1996). Other terms employed include problematic Internet use, excessive Internet use, (Weinstein & Lejoyeux, 2010), Internet overuse (Whang, Lee & Chang, 2003), and pathological Internet use (Davis, 2001). Problematic Internet use has also been defined as an inability to control Internet use (Lee et al., 2012), or as compulsive use which results in personal distress, or social, occupational, financial or legal consequences (Black, Belsare & Schlosser, 1999; Shaw & Black, 2008).

One matter of debate amongst researchers is whether users become addicted to the Internet itself, or to activities which one may engage in on the Internet. Young, for example, suggests that the Internet itself is not addictive, and that Internet addiction may be classified into five different disorders, based on the behaviours users engage in while online. These disorders include cybersexual addiction, cyber-relationship addiction, net compulsions, information overload, and computer addiction (Young, 1996, 1999). Davis (2001), on the other hand, proposed that Problematic Internet Use may either be the result of “specific” Internet use, such as online gambling, shopping, gaming, pornography viewing, or socialising, or as a result of “generalised” Internet use, which described a purposeless but compulsive browsing of the Internet.

Similarly to other behavioural addictions, the prevalence of Internet addiction varies, based on the country, age group, and instrument used to diagnose it. A systematic review by Kuss, et al (2014) found that Internet addiction rates varied between 0.8% (Poli & Agrimi, 2012) and 26.7% (Shek & Lu, 2012) in young people aged 8-24, and between 1% (Bakken et al., 2009) and 22.8% in adults (Kheirkhah, Juibary & Gouran, 2010).

Problematic Internet use has been associated with a range of negative consequences, including obesity and poor vision (Gámez-Guadix, Villa-George, & Calvete, 2012), lack of energy and weakened immunity (Çuhadar, 2012), as well as excessive daytime sleepiness (Beutel et al., 2011). Psychological issues such as anxiety and depression have also been linked to problematic Internet use, although it is not as yet clear whether such problems result from, or act as a precursor to, problematic Internet use (Liu et al., 2011; Ni, Yan, Chen &

Liu, 2009). In addition, one must consider all the potential negative consequences resulting from specific activities conducted on the Internet, such as financial, interpersonal and relationship problems resulting from online shopping, gambling, or pornography use.

2.3.4 Video-game playing

Computer game addiction (Brus, 2013), problematic video-game playing (Forrest, King & Delfabbro, 2016), online gaming addiction (Young, 2009), problematic video/computer game use (Festl, Scharnow & Quandt, 2012), and excessive computer game playing (Grusser, Thalemann & Griffiths, 2007) are all terms which have been used to describe the engagement in computer/video game playing which resulted in negative consequences for the player. Interestingly, no definitions for this behavioural addiction could be found in the literature.

While the prevalence of computer game addiction varies across studies, up to 3% of players can be affected (Muller et al., 2014). Excessive gaming can result in an array of negative consequences, particularly in terms of neglecting diet, sleep, exercise, socialising, academic achievement and hobbies (Chiu, Lee & Hunag, 2004; Young, 2009).

In the most recent version of the DSM, Internet gaming disorder was identified as a condition warranting further study. A list of nine potential criteria was also included, which was derived from previous research on the subject. It is interesting to note, however, that this inclusion specifically applies to Internet gaming, and not generalised Internet use – this is a result of research identifying that Internet gaming disorder may differ markedly from other Internet-based problematic behaviour in terms of symptoms, aetiology, comorbidities, course and treatment (APA, 2013; Petry & O'Brien, 2013).

2.3.5 Sex

Similarly to other problematic behaviours, the nomenclature surrounding excessive sexual behaviour is varied: examples include sex addiction (Barrilleaux, 2016; Hall, 2014), out-of-control sexual behaviour (Faisandier, Taylor & Salisbury, 2012), and hypersexual disorder (Kafka, 2010; Samenow, 2010). Hypersexual disorder has been characterised by “an

increased frequency and intensity of sexually motivated fantasies, arousal, urges, and enacted behavioural responses with adverse consequences” (Kafka, 2010).

Sex addiction has been variously conceptualised as an obsessive compulsive disorder, an impulse-control disorder, or an addictive disorder (Garcia & Thibaut, 2010; Kingston & Firestone, 2008). A related concept has also emerged, termed Internet sex addiction, or cybersexual addiction, which Young (1999) defined as the excessive use of the Internet for cybersex and cyberporn.

The prevalence of sex addiction ranges from 3-6% (Barrilleaux, 2016), and can result in a range of negative consequences, such as loss of family, impact on employment, affective disorders such as depression and anxiety, substance abuse, as well as the contraction of sexually transmitted infections (Carnes & Schneider, 2000; Deneke et al., 2015).

2.3.6 Mobile phone use

The terminology employed to describe problematic mobile phone use in the literature is varied. Terms include mobile phone/cellphone/smartphone addiction (Al-Barashdi & Bouazza, 2014; Aggarwal, Grover & Basu, 2012; Choliz, 2012; Hong, Chiu, Huang, 2012; Kwon et al., 2013; Lin et al., 2014; Roberts, Yaya & Manolis, 2014; Tossell et al, 2015; Park, 2005), mobile phone/cellphone dependence (King et al, 2014; Sanchez-Martinez & Otero, 2009; Wei, 2009), problematic mobile phone/cellphone use (Bianchi & Phillips, 2005; Billieux et al., 2008; Guzeller & Cosguner, 2012; Jenaro et al., 2007; Merlo, Stone & Bibbey, 2013; Pamuk & Atli, 2016; Yen et al, 2009), mobile phone txt messaging overuse (Perry & Lee, 2007), problem use of SMS (Rutland, Sheets & Young, 2007), excessive cellular phone use (Ha et al., 2008), mobile Internet addiction (Shin, 2014) and mobile phone involvement (Walsh, White & Young, 2010).

Definitions of mobile phone addiction are rare in the literature; some examples include ‘an impulse control disorder that does not involve an intoxicant and is similar to pathological gambling’ (Leung, 2007); ‘an over-attachment to mobile phone use that is psychological in nature’ (Walsh, White & Young, 2010); or ‘a strong need for mobile Internet usage and unstable emotional status when without a mobile phone’ (Shin, 2014). However, unlike other

problematic behaviours, such as buying, Internet or sex, mobile phone use has almost exclusively been explored from an addiction perspective (Billieux et al., 2015).

Similarly to Internet addiction, depending on the country, age group and instrument being employed, reports of mobile phone addiction prevalence range from 3-68% (King et al., 2014; Perry & Lee, 2007). Relationships between gender, age and mobile phone addiction have been found consistently across the literature, with females and younger users being more likely to exhibit higher levels of problematic use (Augner & Hacker, 2012; Bianchi & Phillips, 2005; Geser, 2006).

Mobile phone addiction has been linked to a range of negative consequences, including damage to the fingers and spine (Ming et al., 2006) and poor sleep quality (Badre, 2006).

2.4 Underlying factors of addiction

Despite variations in how addiction is defined, there is a common consensus in the literature that three primary factors explain the overarching process of addiction: biology, psychology, and socio-cultural aspects. The following section will describe the role of each of these factors in addiction, as well as explore similarities between substance and behavioural addictions.

2.4.1 Biology

The biological factors related to addiction can be classified into two main categories: the effects of substances and behaviours on the human brain, and genetic predisposition for substance use and abuse. It is beyond the scope of this thesis to provide an in-depth review of the relationship between addiction and biology, and therefore this section will provide a general overview.

The brain structures most often discussed in the addiction literature are the limbic system, basal ganglia, and the prefrontal cortex (Beveridge & Roberts, 2015). The limbic system is composed of several structures, including the amygdala, hippocampus, the limbic lobe, and parts of the basal ganglia and hypothalamus. This system is associated with memory, learning, as well as emotional contextualisation of learned associations (Belujon & Grace,

2011; Beveridge & Roberts, 2015; Robbins & Everitt, 2002). The basal ganglia are associated with coordinating motivated behaviour, while the prefrontal cortex is involved in reward processing and decision making (Beveridge & Roberts, 2015; Sesack & Grace, 2010; Ikemoto, Yang & Tan, 2015). Thus, these areas are associated with the three functional systems which are impaired as a result of the addictive process: motivation-reward, affect regulation, and behavioural inhibition (Goodman, 2008).

The effects of substance use (and some behaviours) are produced as a result of alterations in the functional activity of neurons and neurotransmitters; which neurotransmitters, and which areas of the brain are affected is dependent upon the substance in question (Beveridge & Roberts, 2015). Substance use may result in changes in functional activity through four mechanisms: increasing the release of a particular neurotransmitter, preventing the reuptake of neurotransmitters (thus allowing for increased interaction between the neurotransmitter and the receptor), blocking or activating the neurotransmitter receptors, and inhibiting enzymes which break down neurotransmitters (Brick & Erickson, 2013). Stimulants such as cocaine and amphetamine affect dopamine, noradrenaline and serotonin (5-HT), opioids affect μ , δ and κ receptors, while cannabinoids affect G-protein receptors (CB1 & CB2).

Addictive behaviours also appear to be at least partly influenced by genetic predisposition (Grant, Potenza, Weinstein & Gorelick, 2010; Shaffer & Albanese, 2005). For example, Kreek and colleagues (2005) argue that between 30-60% of the variability in the risk of developing an addictive disorder is due to genetic factors. This was first demonstrated with family and twin epidemiological studies, which found that sons of alcoholics respond less intensely to ingesting moderate levels of ethanol, which suggests a greater initial tolerance for alcohol than sons of non-alcoholics, and therefore at a higher risk of becoming alcoholics themselves (Marlatt, 1988; Kreek et al., 2005). Alcoholic children of alcoholics were found to show symptoms of alcoholism earlier, suffer from more severe symptomology, and less control over drinking (Marlatt, 1988).

Genetic influences can be classified based on their tendency to predispose individuals to experimentation with substances, influence both initiation and later stages of addiction, and specifically influence potential for dependence (Agrawal & Lynskey, 2008). Under this classification, genetic predispositions to substance use initiation would be based on associations with novelty and sensation seeking, impulsivity and risk taking. Impulsivity, or a deficit in impulse control, has been found to be associated with a number of genes which

are responsible for the serotonergic, noradrenergic and dopaminergic pathways (the systems which regulate the neurotransmitters serotonin, noradrenaline, and dopamine). Risk taking, and more specifically novelty seeking, has also been linked to the dopaminergic pathway – the DRD2 and DRD4 genes in particular (Boomsma, Koopmans & van Doornen, 1994; Kreek et al., 2005; Gillespie et al., 2007; McGue, Elkins & Iacono, 2000;).

Other genetic influences may play a part in the progression from substance use to dependence (Agrawal & Lynskey, 2008). In the case of alcohol, discrepancies in the aldehyde dehydrogenase 2 genotype (the gene responsible for metabolising alcohol) were found to be linked to alcoholism potential (Crabb, Matsumoto, Chang & You, 2004; Heath et al., 2001; McCarthy, Wall, Brown & Carr, 2000). Variances in the opioid receptor gene (OPRM1) were associated with opiate dependence; conversely, alleles of the DRD2 gene (one of the genes responsible for the mediation of dopamine receptors) have been linked to polysubstance abuse and addiction (Kreek et al., 2005).

Biological similarities between substance and behavioural addictions have been found in a number of studies. While increased intrasynaptic levels of dopamine are associated with substance use (Sulzer, 2011; Willuhn, Wanat, Clark & Phillips, 2010), they have also been associated with gambling (Bergh et al., 1997), sex (Balfour, Yu & Coolen, 2004), and eating (Avena, Rada, Moise & Hoebel, 2006; Hajnal & Norgren, 2001). Higher levels of noradrenaline, or its metabolites, have been found in blood, urine or cerebrospinal fluid in men diagnosed with pathological gambling, than in men without PG (Roy et al., 1989). Low levels of 5-hydroxyindole acetic acid within cerebrospinal fluid, which indicates high levels of impulsivity and sensation seeking traits, have been found in both pathological gamblers as well as those with substance use disorders (Hollander et al., 1998).

Some substance and behavioural addictions seem to respond to the same pharmaceutical treatment: naltrexone, an opioid antagonist, was shown to be effective treatments for both alcohol use disorder and pathological gambling (Kim, Grant, Adson & Shin, 2001; Grant, Kim & Hartman, 2008; Grant, Desai & Potenza, 2009), and has shown promise in treating compulsive buying (Grant, 2003), compulsive sexual behaviour (Raymond, Grant, Kim & Coleman, 2002), and Internet addiction (Botswick & Bucci, 2008).

Turel (2014) examined the relationship between Facebook “addiction” levels, and the way in which the brain systems of 20 participants responded to Facebook and less potent stimuli. The study found that the activation of the amygdala-striatal (impulsive) brain system was

positively associated with the participants' "addiction" scores, indicating some similarities with biological addictions. Neuroimaging studies on Internet addiction reported that the neural pathways linked to reward and addiction were activated during computer game playing (Han et al., 2010; Hoefft et al., 2008); neurostructural changes were found in Internet addicts, when compared to controls, such as increased and calibrated parts of the mesocorticolimbic system (Liu et al., 2010), as well as reduced orbitofrontal cortical thickness (Hong et al., 2013). Further, duration of Internet addiction was associated with increased severity of brain atrophy over time (Yuan et al., 2011).

Few studies have explored the genetic influences for behavioural addictions (Grant, Potenza, Weinstein & Gorelick, 2010). A review of 18 studies exploring the genetics of pathological gambling found that the heritability of PG is 50-60% (Lobo & Kennedy, 2009), and a higher frequency of the DRD2 dopamine receptor was found in individuals with pathological gambling, as compared to individuals with non-problematic gambling (Comings, 1998).

2.4.2 Psychology

Several psychological factors play a part in the development and maintenance of addictive disorders, including learning, psychopathology, motivations and personality traits.

The psychological facet of addiction which is associated with learned behaviour focuses on two basic learning mechanisms: operant and classical conditioning. Classical, or Pavlovian conditioning involves the pairing of a neutral stimulus with a conditioned stimulus, until they both elicit the same responses (Rescorla, 1988; Siegel, 1999).

Classical conditioning can be used to explain both craving and tolerance in substance users. Internal (anxiety or depression) and external (social situations or advertisements) become associated with the idea of drinking, and therefore elicit a craving for alcohol. Conversely, drinking situations become linked to "anticipatory" responses to alcohol consumption; as the anticipatory responses become stronger, more alcohol is necessary to achieve the initial intoxicating effects (Ogborne, 2005; Siegel, 1999).

The second learning mechanism is operant, or Skinnerian conditioning, in particular positive reinforcement. This occurs when a particular behaviour is followed by a positive outcome, or a reward – this, in turn, leads to an increase of that behaviour (Dalla & Shors, 2009). This is

evident when a rat learns that pressing a particular lever leads to the release of sugar water – more extreme examples involve the insertion of probes directly into the animal’s brain, and lever or button pressing leads to the delivery of dopamine, effectively inducing orgasm (Thombs, 2006).

A similar process is argued to occur in the substance abuse process – the individual ingests an intoxicant, which, depending on the particular type of substance, leads to an elevated/euphoric, or depressed/relaxed mood, an effect which if pleasant the user will seek out through continued use of the substance. Interestingly, one aspect of addictive behaviour is continued use despite problematic outcomes – under the Skinnerian model, this would be seen as negative reinforcement, and therefore should lead to a discontinuation in use. However, Ogborne (2005) notes that the negative outcomes do not occur immediately after consumption, but rather a number of hours or days later – for example, hangovers. Therefore, due to the fact that positive outcomes occur immediately upon consumption, while negative outcomes are usually delayed, the positive reinforcement is much stronger than the negative.

The motivations underpinning the initiation and maintenance of alcohol/substance use is also a relevant factor for the development of addictive disorders. The most common explanation relating to the motivations for substance use relate to a two-factor process: psychoactive substances are either taken to achieve pleasure (i.e. a pleasant ‘high’), or to cope with negative affect (Baker et al., 2004; Kopetz et al., 2013). More specific reasons, particularly in terms of adolescent initiation of substance use, relate to relaxation, enhancing an activity, and remaining awake while socialising (Boys, Marsden & Strang, 2001). However, these motivations do not seem to also apply to certain behavioural addictions. Walsh, White & Young (2007), for example, found that PMPU was related to fulfilling social, entertainment and security needs and motivations. Similarly for Internet gaming, the motivations which predict problematic use seem to relate to escapism, fulfilling self-esteem needs, and gaining social acceptance (King & Delfabbro, 2014; Kuss et al., 2012; Xu, Turel & Yuan, 2012).

Certain personality traits have also been associated with substance use problems. Two common traits among substance abusers are impulsivity, sensation seeking, as well as the Five-Factor model of personality (Kreek et al., 2005; Myrseth et al., 2009; Walther, Morgenstern & Hanewinkel, 2012; Whiteside & Lynam, 2009). Impulsivity, characterised by a lack of behavioural inhibition, is defined as “acting suddenly in an unplanned manner to

satisfy a desire” (Kreek et al., 2005). This can include acting before thinking through all the potential consequences, such as violence, aggression, and suicide (Conrod, Pihl, Stewart & Dongier, 2000). Risk taking, on the other hand, involves undertaking behaviours without comprehensive contingency planning in uncertain circumstances, with or without inherent negative consequences or risk of harm to the self or others. Both of these personality traits occur on a continuum, and links have been found between substance use and abuse problems and higher levels of impulsivity and sensation seeking (Dawe & Loxton, 2004; Ogborne, 2005; Verdejo-Garcia, Lawrence & Clark, 2008).

Impulsivity and sensation seeking have also been found to be correlated with problematic Internet use (Ko et al., 2006), pathological gambling (Kim & Grant, 2001), compulsive sexual behaviour (Raymond, Coleman & Miner, 2003), compulsive buying (Lejoyeux, Tassain & Adas, 1997) and problematic mobile phone use (Billieux et al., 2008).

The five-factor model of personality, composed of extraversion, agreeableness, conscientiousness, neuroticism and openness to experience, has been found to explain a large proportion of the variance in personality (Malouff et al., 2007); it is also related to the development of addictive disorders. For example, a meta-analysis of the relationship between the five-factor model and alcohol involvement, which included 20 studies and 7886 participants, found that alcohol involvement was related to low conscientiousness, low agreeableness, and high neuroticism (Malouff et al., 2007). Similar findings have been reported for smoking, while marijuana use is related to high neuroticism, high extraversion, and high openness, and cocaine use is related to high neuroticism and low conscientiousness (Gorman & Derzon, 2002; Terracciano & Costa, 2004; Terracciano et al., 2008). The five-factor model was also explored in terms of its association with a variety of behavioural addictions (Facebook, video-games, Internet, exercise, mobile phone use, buying, and studying) (Andreassen et al., 2013). The study found that Internet addiction, exercise addiction, compulsive buying, and study addiction were related to high levels of neuroticism; Facebook addiction, exercise addiction, mobile phone addiction, and compulsive buying were related to high levels of extraversion. Conversely, openness to experience was negatively associated with Facebook addiction and mobile phone addiction, agreeableness was negatively associated with Internet addiction, exercise addiction, mobile phone addiction, and compulsive buying, and conscientiousness was negatively associated with Facebook addiction, video game addiction, Internet addiction, and compulsive buying and positively associated with exercise addiction and study addiction (Andreassen et al., 2013).

Addictive behaviours have also been explored from a cognitive behavioural perspective (Sharpe, 2002; Tiffany, 1990). The central premise of CBT is that cognitions, emotions and behaviours are intricately linked, with each of these components continually impacting and influencing the others. More specifically, CBT posits that cognitions about the self, relationships, the world and the future shape emotions and behaviours, which subsequently shape thought processes in a continuous and reciprocal feedback loop (Dobson & Dozois, 2001; Beck, 2002). Problematic cognitions, behaviours and emotions have been found to play a part in the addiction process (Oei & Morawska, 2004; Tiffany, 1990; Tiffany & Conklin, 2000; Verdejo-Garcia, Bechara, Recknor & Perez-Garcia, 2006). Explorations of maladaptive cognitions, behaviours, or both have also been undertaken for video-gaming (Delfabbro & King, 2015), problematic Internet use (Caplan, 2002; Davis, 2001; King, Delfabbro, Griffiths & Gradiscar, 2012), gambling (Baboushkin, Hardoon, Deveresny & Gupta, 2001; Blaszczynski & Nower, 2002; Rylu & Oei, 2004; Sharpe, 2002; Sharpe & Tarrier, 1993) and compulsive buying (Kellett & Bolton, 2009).

2.4.3 Social factors

Sociological and cultural perspectives on addiction serve both to explore the role of substance use in society, and to evaluate factors related to substance use problems.

Four primary social functions of substance use, alcohol in particular, can be identified in the literature (Thombs, 2005). Firstly, it helps enhance social bonds, by lowering interpersonal barriers, enhancing trust, and aiding communication which involves self-disclosure; social intoxication also allows users to bond over a shared experience (Catalano et al., 1996; Hunag et al., 2014; Norman & Ford, 2015). Secondly, it allows escape from the usual social obligations of adulthood, a respite from individuals' roles as parents, spouses, employees (Thombs, 2005). Thirdly, substance use can serve as a mechanism for the promotion of cohesion among members of an ethnic or social group – that is, the use, or non-use of substances can represent a social divide, establishing group boundaries (Simons, Correia & Carey, 2000; Valentine, Holloway & Jayne, 2010). Finally, substance use can function as a rejection of normative social values; in essence, substance users can disregard conventional ideologies, particularly morality and economic productivity, in favour of freedom and

hedonistic pursuits (Thombs, 2005). Each of these social functions can at least partially account for the development and maintenance of addictive behaviour.

Availability and cost of alcohol and other substances can also play a part in addictive behaviour; while this does not necessarily deter those who are already experiencing dependence, or addiction, to a particular substance, it can serve as a preventative measure – this has been one of the central tenets of public health approaches to alcohol, tobacco and gambling in particular (Anderson, Chisholm & Fuhr, 2009; Chaloupka, Grossman & Saffer, 2002; Parke & Griffiths, 2005; Rasch & Greiner, 2008).

The substance use culture of the dominant society can also support the maintenance of addictive behaviour, and contribute to relapse. This can be seen most clearly in the case of alcohol – social norms around alcohol use have been identified as one of the major challenges in addressing problematic alcohol use behaviour in the Western world (Measham & Brain, 2005; Osborne, 2005). Alcohol is often an integral part of daily life, utilised as stress-relief, a social lubricant, or the means of bonding within groups. Adolescents and young adults are particularly vulnerable to being influenced by drinking cultures, from a desire to fit in, or alleviate peer pressure (Piacentini & Banister, 2009).

Finally, certain aspects of family life can also promote substance use behaviour. One example is that of modelling – if a child is brought up in an environment where alcohol, smoking, gambling, or drug use is habitual, the child is more likely to engage in those behaviours themselves. Family members can also act as enablers of the addictive behaviour, through the way in which they cope with and possibly reinforce the behaviour (Nash, McQueen & Bray, 2005). Furthermore, a number of childhood experiences unrelated to substance use can still precipitate addictive behaviour in later life: poverty, parental abuse and neglect, parental separation and low mutual support among them (Goplerud, 1990).

Similar processes can be identified in relation to behavioural addictions. For example, mobile phone use plays a central part in adolescents' lives, and represents a key tool for the development and maintenance of social networks (Walsh, White & Young, 2010), in some ways similarly to alcohol use.

Similarly to alcohol and substance use, a number of family-related variables have been identified in relation to problematic Internet use, including family conflict and dissatisfaction (Lam, Peng, Mai & Jing, 2009; Yen et al., 2009; Wang et al., 2011), perceived parental

monitoring (Lin, Lin & Wu, 2009; Yen et al., 2009), and perceived positive parental attitudes to adolescent substance use (Yen et al., 2009).

2.5 Diagnosing addiction

The official diagnostic criteria for addictions are provided in the DSM-IV and DSM-5, as alcohol/substance abuse/dependence, and alcohol/substance use disorders. While the DSM-5 is the updated version, a description and critique of the DSM-IV criteria will be included in this section, as they pertain to behavioural addiction research. The DSM-IV and V criteria are presented in Table 1, below.

Table 1: DSM-IV and DSM-5 criteria for alcohol abuse, alcohol dependence, and alcohol use disorder

		DSM-IV	DSM-5
		In the <i>past year</i> , have you	In the <i>past year</i> , have you
Alcohol abuse	1	Found that drinking—or being sick from drinking—often interfered with taking care of your home or family? Or caused job troubles? Or school problems?	Had times when you ended up drinking more, or longer, than you intended?
	2	More than once gotten into situations while or after drinking that increased your chances of getting hurt (such as driving, swimming, using machinery, walking in a dangerous area, or having unsafe sex)?	More than once wanted to cut down or stop drinking, or tried to, but couldn't?
	3	More than once gotten arrested, been held at a police station, or had other legal problems because of your drinking?	Spent a lot of time drinking? Or being sick or getting over other aftereffects?
	4	Continued to drink even though it was causing trouble with your family or friends?	Not included
Alcohol dependence	5	Had to drink much more than you once did to get the effect you want? Or found that your usual number of drinks had much less effect than	Wanted a drink so badly you couldn't think of anything else?

	before?	
6	Found that when the effects of alcohol were wearing off, you had withdrawal symptoms, such as trouble sleeping, shakiness, restlessness, nausea, sweating, a racing heart, or a seizure? Or sensed things that were not there?	Continued to drink even though it was causing trouble with your family or friends?
7	Had times when you ended up drinking more, or longer, than you intended?	Given up or cut back on activities that were important or interesting to you, or gave you pleasure, in order to drink?
8	More than once wanted to cut down or stop drinking, or tried to, but couldn't?	More than once gotten into situations while or after drinking that increased your chances of getting hurt (such as driving, swimming, using machinery, walking in a dangerous area, or having unsafe sex)?
9	Spent a lot of time drinking? Or being sick or getting over other aftereffects?	Continued to drink even though it was making you feel depressed or anxious or adding to another health problem? Or after having had a memory blackout?
10	Given up or cut back on activities that were important or interesting to you, or gave you pleasure, in order to drink?	Had to drink much more than you once did to get the effect you want? Or found that your usual number of drinks had much less effect than before?
11	Continued to drink even though it was making you feel depressed or anxious or adding to another health problem? Or after having had a memory blackout?	Found that when the effects of alcohol were wearing off, you had withdrawal symptoms, such as trouble sleeping, shakiness, restlessness, nausea, sweating, a racing heart, or a seizure? Or sensed things that were not there?
12		Wanted a drink so badly you couldn't think of anything else?

The DSM-IV criteria included two potential diagnoses, abuse and dependence. In order to meet the threshold for abuse, at least one criteria had to have been met in the previous 12 months, while 3 criteria were required for dependence. The DSM-5, however, shifted from a binary approach, to a continuum approach, where alcohol use disorder could be mild (2-3 symptoms), moderate (4-5 symptoms), or severe (6 or more symptoms).

2.6 Addiction in adolescence

Given that the aim of this thesis is to explore problematic mobile phone use in young people, a brief overview of addiction in adolescents will be provided. Adolescence is a period of development, marked by physical, neurological and social maturation. This period is also characterized by an increase in risky behaviours, including unprotected sex, criminal activity, and experimentation with drugs and alcohol (Casey & Jones, 2010). Rates of substance use and dependence are higher in adolescents, than in their adult counterparts: for example, Harford, Grant, Yi and Chen (2005) compared the prevalence of alcohol abuse and dependence (as identified by the DSM-IV criteria) in a sample of 55,561 subjects. The study found that adolescents (12-17 year olds) had the second highest rate of alcohol abuse and dependence, with young adults (18-23 year olds) having the highest rates. Similar patterns have been found in a number of behavioural addictions: the prevalence of Internet addiction, mobile phone addiction, and pathological gambling is higher in the adolescent population, than in the adult population. Young people are more likely than their adult counterparts to experience Internet (Kuss et al., 2014), mobile phone (Augner & Hacker, 2012) and gaming (Festl, Scharnow & Quandt, 2003) addiction, as well as problem gambling (Parker et al., 2008). One of the explanations regarding this discrepancy between adolescents and adults focuses on brain development processes which occur during adolescence. While this period is marked by accelerated cognitive and brain development, neurobiological models of adolescence have identified discrepancies in maturation levels between the subcortical and prefrontal areas of the brain (Casey & Jones, 2010; Noël, 2014). This results in an imbalance between different cognitive systems, particularly areas that process emotional and social information, versus areas which are responsible for ‘cognitive control’ and decision making (Casey et al., 2011; Steinberg, 2010). Thus, reward sensitivity and sensation seeking peak during mid-adolescence, while cognitive control only matures in late adolescence, resulting

in higher levels of risk taking (Romer, 2010). Research also suggests that adolescents are less able than adults to suppress dominant responses (Casey et al., 2011).

Other considerations include the influence of peers, which can mediate the relationship between brain systems and risk taking; peer-related stimuli can sensitise the reward system to respond to the reward value of risky behavior (Albert, Chein & Steinberg, 2004). For example, adolescents who played a video game which involved driving took more risks in the presence of peers, than when playing the game alone; conversely, the presence of peers had no influence on adult risk taking (Noel, 2014).

However, substance abuse or dependence during adolescence does not necessarily lead to dependence in adulthood. For many, substance use and abuse is simply a result of the imbalance between the neural systems described above; with maturation, the balance is redressed, and the substance use behavior stops, or is reduced. For example, Von Sydow et al (2002) explored the use, abuse and dependence of ecstasy, stimulants and hallucinogens among young people, by conducting a 42 month longitudinal study with 2446 subjects aged 14-24. The study found that 80% of participants who had used such drugs, but did not meet any disorder criteria, stopped their use spontaneously during their 20s. Of those participants who did meet the DSM-IV dependence criteria, only 50% continued to use the substances in later years.

These developmental considerations, however, may bring into question the use application of adult-based addiction diagnostic scales with adolescents. Some researchers have argued that the DSM-IV criteria for alcohol/substance abuse/dependence may not be entirely appropriate for use with adolescents. For example, Deas et al (2000) note that the field trials conducted for the DSM-III and DSM-IV criteria included very few adolescent respondents: the DSM-III trials included no respondents under the age of 18, while in the DSM-IV trials, only one of seven research sites collected data from adolescent respondents. Thus, any differences between adolescents and adults, in terms of how substance use disorders are developed and expressed were not explored (Deas et al., 2000). Another consideration is how comprehensible the DSM criteria are for adolescents: Chung & Martin (2005) found that the way in which the criteria for tolerance and consuming larger quantities or for a longer period of time than intended may results in false positives for adolescents. Regarding the tolerance criterion (needing to drink more to obtain the same effect), adolescents considered different time frames when answering that question; for example, some answered the question based on comparisons with when they first started drinking. Further, regarding the 'larger/longer' criterion, answers were affected by whether the adolescents had planned their consumption,

or had set a limit. The authors identified a need for an improved assessment method for tolerance, and questioned the usability of the 'larger/longer' criterion in adolescents (Chung & Martin, 2005).

Furthermore, a number of studies have found little applicability of the abuse/dependence dichotomy, with a single dimension capturing adolescent substance use disorders more effectively (Gelhorn et al., 2008; Hartman et al., 2008; Martin et al., 2006; Piontek et al., 2011). While this problem has been resolved in the DSM-5, it does potentially raise question for studies which have employed DSM-IV criteria in the development of a behavioural addiction scale, and subsequently employed that scale in an adolescent sample.

Others have suggested a number of limitations in the applicability of the DSM criteria for adolescents (Winters, 2011). For example, the criterion evaluating 'hazardous use' is more applicable to adults, as adolescents have less access to automobiles than adults (driving while drunk being the most common way of meeting that particular criteria). The withdrawal criterion can also be a confounder, leading to false positives, as the DSM-IV definition for withdrawal only requires two symptoms out of eight to be met, making it possible for withdrawal to be confused with the symptoms of a hangover (Winters, 2010).

These concerns have also been echoed in the behavioural addiction literature. Kraplin (2017), for example, notes that excessive behaviours, such as those relating to the Internet, may be a normal, transient phenomena in adolescents; thus, it would be necessary to ensure that diagnostic instruments are able to differentiate young individuals with normative, or even excessive behavioural patterns, from those suffering from a behavioural addiction. The author further argues for the need to explore how the core features of addiction can be operationalized in the case of adolescents in a way that does not result in false positives, as is the case with current diagnostic instruments (Chung & Martin, 2005; Kraplin, 2017). Billieux et al (2017) further develop these points, and argue that given children can vary considerably in their development, individual assessments of problematic behaviours in children need to determine whether the specific behavior is genuinely uncontrolled, or whether the excessive use is a conscious choice on the part of the child.

2.7 Critiques of behavioural addiction research

Despite the proliferation of research on behavioural addictions in the past three decades, and a number of studies finding similarities between behavioural and substance addictions, a number of critiques concerning the behavioural addiction literature have been raised.

Some authors have questioned whether conceptualising problematic behaviours as ‘addictive’ is the most appropriate approach. From a clinical perspective, Billieux et al (2015b) compared the usefulness of applying a symptoms-based approach (i.e. the addiction model) versus a process-based approach (i.e. exploring cognitive, affective and motivational processes which are responsible for the development, maintenance and recurrence of psychopathological states) in the case of problematic mobile phone use. These two approaches were applied to a single case study, and the findings suggested that the addiction model had limited usefulness in the clinical setting, as it did not identify etiopathological processes. Further, application of the addiction model resulted in use of interventions which targeted symptoms, as opposed to their causes, which would have been more helpful (Billieux et al., 2015b). Levine (2010) conducted a retrospective chart review for 30 patients who had sought psychiatric help for what they had termed ‘sexual addiction’. The author found that the wide variability in sexual behaviour patterns indicated sexual addiction was not a useful conceptualisation. Further, Blundell & Finlayson (2011) argue that food addiction would be better conceptualised as an example of apparent tendencies in industrialised societies to acquire material objects beyond their personal need.

Other researchers have suggested the use of an addiction lens in the exploration of problematic behaviours may lead to the overpathologising of normal behaviours. Klein (2002) argued that the conceptualization of sex as an addictive behavior is incorrect, given the lack of empirical data, and would lead to policies which would seek to control “wholesome sexual behavior”. In an attempt to illustrate the potential for overpathologising, Mihordin (2012) applied the DSM-IV criteria for pathological gambling to model railroading behavior, and developed the ‘pathological model railroading disorder’. The author defined this disorder as “a persistent and recurrent preoccupation with prototype and model railroads, including locomotives, rolling stock, structures, history, and associated industries”; the diagnostic criteria were developed by replacing the word “gambling” with “model railroading” in the DSM-IV criteria for pathological gambling. The author suggested this exercise illustrates the ease with which it is possible to create seemingly legitimate

psychiatric disorders; he further advised that risk-benefit calculations should be employed by DSM committees, in the process of identifying and developing new disorders (Mihordin, 2012). Billieux et al (2015b) employed a similar exercise, by applying the DSM-IV diagnostic criteria for dependence to a fictitious case study of a 26 year old doctoral candidate; the authors demonstrated that the protagonist would meet a ‘Research Addiction’ diagnosis.

Other critiques focus on the methodological limitations of research in the behavioural addiction field. Billieux et al (2015a), for example, discuss the approach taken in the conceptualisation and measurement of behavioural addiction, and summarise it in three distinct steps. Firstly, the behaviour is conceptualised a priori as an addiction, based on anecdotal observations; secondly, screening tools are developed based on the DSM-IV/5 criteria for alcohol/substance dependence, alcohol/substance use disorders, and pathological gambling/gambling disorder; finally, associations between the behaviour and risk factors common to substance addictions (such as impulsivity and sensation seeking) are explored. These steps were found to be insufficient for the validation of the discovery of new disorders (Billieux et al., 2015; Blaszczynsky, 2015; Van der Linden, 2015). One potential issue identified by the authors was the development of items assessing constructs such as tolerance; cited examples of poor conceptualisations of tolerance in the behavioural addiction field include the need to upgrade one’s mobile phone, despite already owning a functioning model (Choliz, 2010), and the need for better computer equipment, more software, and more hours of use (Block, 2008). In a similar argument, Blaszczynsky (2015) noted the lack of empirically evaluated defining features of tolerance, withdrawal and preoccupation in Internet addiction research. Further, King & Delfabbro (2016) argued that the definition of tolerance for Internet Gaming Disorder, as presented in the DSM-5 (‘the need to spend an increasing amount of time engaged in Internet games’), may not accurately capture the factors which motivate and maintain excessive Internet gaming (APA, 2013; King & Delfabbro, 2016).

Some authors have critiqued the wide variability in the conceptualisation of behavioural addictions, despite most studies operating from a common addiction lens (Karim & Chaudhri, 2012; Mudry et al., 2011). Kardefelt-Winther (2014), for example, notes the high levels of disagreement in the Internet addiction literature, in terms of definitions, diagnostic criteria, explanations of what processes result in Internet addiction, risk factors, or a general theory about aetiology. Similar critiques have been made regarding research on problematic Internet

use (van Rooij & Prause, 2014), problematic mobile phone use (Billieux, 2012), online gaming (Kuss & Griffiths, 2012), and compulsive sexual behaviour (Reid, 2016). These variations are likely a result of a lack of theoretical models which clearly identify the specific factors and processes involved in the development and maintenance of behavioural addictions.

Some authors have suggested the need for qualitative explorations of specific problematic behaviours as a way to further understanding of their phenomenology (Billieux et al., 2015a; Griffiths, 2012; Mudry et al., 2011).

Other critiques focus on the use of the DSM-IV dependence or pathological gambling criteria as foundations for the developments of instruments for other behaviours, such as Internet use, mobile phone use, sex and eating. Blaszczynski (2008), for example, argues that adapting and applying diagnostic criteria used for one disorder in order to define a new disorder “is not scientifically acceptable or logical”. The author suggests that in order for such an adaptation to be valid, empirical evidence must demonstrate consistently similar aetiological processes across each of the disorders in question. Wood (2007) employed the example of video game “addiction” in his argument that the conceptualization of video games as an addictive behavior, and the criteria used to ascribe this label, have been inappropriate and misleading. The author noted the adaptation of PG criteria for the purposes of evaluating video game “addiction” posed significant validity problems.

The potential for overpathologising has also been discussed in terms of instrument accuracy. Maraz, Kiraly & Demetrovics (2015) evaluated the sensitivity, specificity and predictive value of two behavioural addiction screening instruments, the Compulsive Buying Scale (Faber & O’Guinn, 1992) and the Scale for the Assessment of Internet Addiction (Muller et al., 2014). The authors found both instruments to have poor positive predictive values (24% for compulsive buying, and 8.9% for Internet addiction), indicating that for every 100 individuals who score positive on these tests, 76-91% would have been misclassified. Further questions on the subject of overpathologising have been raised regarding the need to differentiate between addiction and ‘high engagement’. Research on a number of addictive behaviours has been centred on frequency or intensity of engagement as an identifier of pathology (Garcia & Thibaut, 2010; Kuss, Griffiths, Karila & Billieux, 2014; Mathy & Cooper, 2003). However, while addictive use will likely result in high levels of engagement, high levels of engagement are not necessarily evidence of addiction (Griffiths, 2016).

Charlton & Danforth (2010), for example, differentiate between addictive and high engagement behaviour based on the experiencing of negative consequences, where two individuals might engage in a behaviour to the same extent, however only the one who experiences negative consequences would be classified as addictive.

2.8 Chapter summary

This chapter has explored the concept of behavioural addictions and their similarities to substance addictions. Despite the proliferation of peer-reviewed studies on various behavioural addictions, there is still significant debate in the literature regarding whether the addiction lens is most appropriate. Researchers have taken divergent approaches to exploring problematic behaviours, despite the relatively homogeneous conceptualization of behaviours as addictions. The behavioural addiction literature has been critiqued by a number of authors, and limitations in conceptualization and research methodology have been identified. These critiques hold relevance for the conceptualization of mobile phone use as an addictive behavior. Given the lack of agreement regarding the nosology of problematic behaviours, further explorations of mobile phone use as a problematic behaviour, as opposed to an addiction, may help further elucidate the underpinning mechanisms of problematic mobile phone use. The following chapter will review the extant literature on problematic mobile phone use, focusing on the development, implementation and evaluation of problematic mobile phone use scales, questionnaires and surveys.

CHAPTER 3. LITERATURE REVIEW

3.1 Introduction

This chapter provides a synthesis and review of the current peer-reviewed literature regarding problematic mobile phone use. It starts with a focus on the development, implementation and evaluation of PMPU scales, questionnaires, or surveys. The chapter explores the different demographic, personality and psychopathological factors which have been found to be related to PMPU. Theories which seek to explain the processes underlying the development of PMPU are also presented, followed by a discussion of the overall review findings.

3.2 Aims

This review had three aims: firstly, to produce a comprehensive analysis of the measures/surveys/scales which attempt to explore, evaluate or “diagnose” problematic mobile phone use. Secondly, the review sought to collate information on the demographic, personality, and psychopathological variables which have been linked to problematic mobile phone use. Finally, the review aimed to explore the varying theories which sought to describe or explain problematic mobile phone use.

3.3 Methods

A literature search was conducted through databases provided by the University of Auckland: Pubmed, Psychinfo, Medline, SAGE, Google Scholar and SCOPUS were used as part of the primary search. The search utilised specific key words: “mobile phone”, “cell phone”, “problematic”, “addiction”, “dependence”. Varying combinations of these key words were interchangeably used in the search: i.e. mobile phone (+) problematic; mobile phone (+) addiction and so forth. A Google Scholar alert was also set up using the words “mobile phone” and “cell phone”, which would provide the candidate with any new articles whose titles included those key words; this alert was active throughout the duration of the doctorate,

and any relevant new information was added to the review, until January 2017. Inclusion criteria included relevancy to the topic, full-text availability, and English language. No time constraints were placed on the search.

The literature review followed a four step process, based on the guidelines developed by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Liberati et al., 2009):

1. Search results (the combination of records identified through database searches, and other sources) were initially screened for duplicates, which were subsequently removed.
2. They were then screened for relevancy to the topic and accessibility; articles which contained the key words and linked to the subject of PMPU were extracted and analysed. Irrelevant articles were excluded.
3. The reference lists of these articles were subsequently hand searched for any relevant literature on the subject; such literature was located if possible, and added to the review (classified as ‘Other’ in Figure 3.1).
4. The final records were then categorised into three types of articles:
 - a. Articles which developed a PMPU measure – this category included articles which described the development and utilisation of a previously unused PMPU measure;
 - b. Articles which employed a previously developed PMPU measure – this category was inclusive of research endeavours which utilised a PMPU measure that had been developed previously, and reports which detailed the modification and subsequent utilisation of previously existing PMPU measures;
 - c. Theoretical articles – this included articles on the subject of PMPU which did not include data collection, instead being conceptual or theoretical in nature.

Figure 1 summarises the search strategy, and subsequent results.

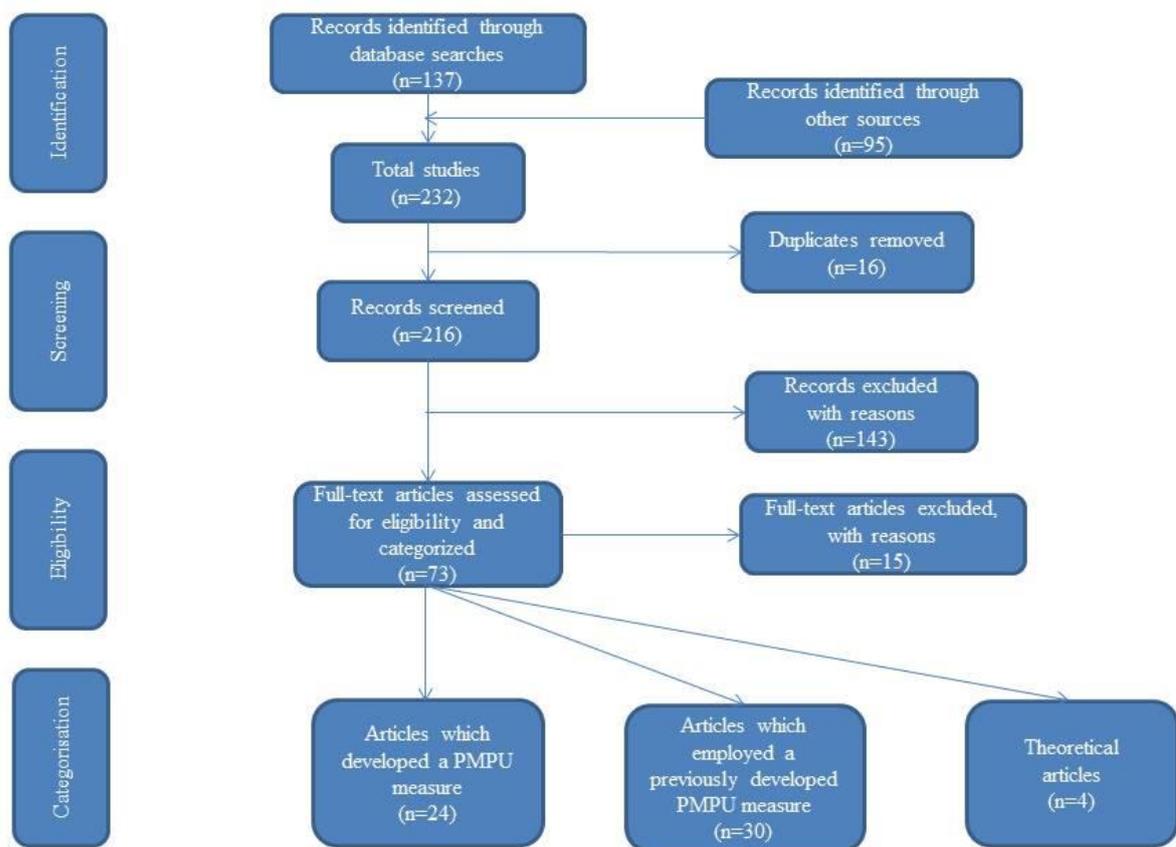


Figure 1: Flow chart following PRISMA guidelines for article selection

3.4 Results

3.4.1 Overview

A total of 24 studies which developed original PMPU scales, and 30 which utilised or modified existing PMPU scales were included in this review; study characteristics are presented in Tables 2 and 3. The studies comprised a total of 65,105 participants from 19 countries. Seven of the studies were conducted in the United States and Japan each, six in Taiwan, five in Turkey, four in Iran and South Korea each, three in Spain and China, two in Australia, Switzerland and Hong Kong, and one each in Mauritius, Oman, Brazil, Germany, Italy, Austria, UK and India; the articles were published between 2005 and 2016. All studies were quantitative, and adopted a cross-sectional design. The following sections will focus on nomenclature and definitions of PMPU, explanatory theories of PMPU, instrument development and testing, prevalence of PMPU, and factors associated with PMPU.

Table 2: Characteristics of studies which developed a PMPU measure

Number	Year	Authors	Study design	PMPU Scale	Sample			PMPU Prevalence
					Age	Size	Country	
1	2005	Bianchi & Phillips	Cross-sectional	Mobile Phone Problem Use Scale (MPPUS)	18-85	195	Australia	-
2	2005	Park	Cross-sectional	Revised Television Addiction Scale ¹	NA	157	Korea	-
3	2007	Jenaro, Flores et al	Cross-sectional	Cell Phone Overuse Scale (CPOS)	18-32	337	Spain	14.26%
4	2007	Perry & Lee	Cross-sectional	Revised Television Addiction Scale ²	19+	214	Mauritius	3-20%
5	2007	Rutland, Sheets & Young	Cross-sectional	SMS Problem Use Diagnostic Questionnaire	18-34	78	U.S.	-
6	2007	Wei	Cross-sectional	Revised Individual Media Dependency Scale	15-20	525	Taiwan	-
7	2008	Billieux et al	Cross-sectional	Problematic Mobile Phone Use Questionnaire	20-35	339	Switzerland	-
8	2008	Ha et al	Cross-sectional	Excessive Cellular Phone Use Survey	15.9	595	Korea	33%
9	2009	Sanchez-Martinez & Otero	Cross-sectional	Unnamed	13-20	1328	Spain	13-26.1%
10	2009	Yen et al	Cross-sectional	Problematic Cellular Phone Use Questionnaire	12-19	10191	Taiwan	16.7%
11	2010	Walsh et al	Cross-sectional	Mobile Phone Involvement Questionnaire	16-24	292	Australia	-
12	2011	Aggarwal, Grover & Basu	Cross-sectional	Unnamed	23-36	192	India	30.8%
13	2012	Choliz	Cross-sectional	Test of Mobile-Phone Dependence (TDM)	12-18	2833	Spain	-
14	2012	Hong et al	Cross-sectional	Mobile Phone Addiction Scale (Revised Internet Addiction Scale)	NA	269	Taiwan	-
15	2012	Guzeller & Cosguner	Cross-sectional	Problematic Mobile Phone Use Scale	16.1	950	Turkey	-
16	2013	Merlo, Stone & Bibbey	Cross-sectional	Problematic Use of Mobile Phones Scale	18-75	244	U.S.	-
17	2013	Kwon et al	Cross-sectional	Smartphone Addiction Scale (SAS)	18-53	197	South Korea	9.6-19.3%
18	2014	Al-Barashdi, Bouazza & Al Zubaidi	Cross-sectional	Smartphone Addiction Questionnaire (SPAQ)	18-27	140	Oman	26.8-42.3%
19	2014	Lin et al	Cross-sectional	Smartphone Addiction Inventory (SAI)	NA	283	Taiwan	-
20	2014	King et al	Cross-sectional	Mobile Phone Use Questionnaire	18-70	120	Brazil	68%
21	2014	Roberts, Yaya & Manolis	Cross-sectional	Manolis/Roberts Cell phone Addiction Scale	19-22	188	U.S.	-
22	2014	Shin	Cross-sectional	Mobile Internet Usage Index	18+	597	U.S.; South Korea	8.88%
23	2015	Tossell et al	Cross-sectional	Smartphone Addiction Measurement Instrument (SAMI)	NA	32	U.S.	-
24	2016	Pamuk & Atli	Cross-sectional	PMPUS	20.7	725	Turkey	-

Table 3: Characteristics of studies which employed or modified a previously developed PMPU measure

Number	Year	Authors	PMPU Scale	Sample			Prevalence
				Age	Size	Country	
Instruments based on the MPPUS (Bianchi and Phillips, 2005)							
1	2007	Leung	Mobile Phone Addiction Index (MPAI)	14-28	624	Hong Kong	28.7%
2	2007	Leung	Mobile Phone Addiction Index (MPAI)	14-20	402	Hong Kong	27.4%
3	2009	Takao et al	Mobile Phone Problem Use Scale	18-39	444	Japan	-
4	2013	Lopez-Fernandez et al	Mobile Phone Problem Use Scale	11-18	1026	UK	10%
5	2014	Cagan et al	Problematic Cellular Phone Use Scale	17-26	700	Turkey	-
6	2015	Foerster et al	German version of the MPPUS	12-17	412	Germany	-
7	2015	Kalhari et al	Cellular Phone Dependency Questionnaire	20-30	300	Iran	23.4%
8	2016	Burnell & Kuther	MPPUS	18-40	256	U.S.	-
Instruments based on the MPDQ (Toda et al., 2004)							
9	2006	Toda et al	MPDQ (no change)	21.3-21.5	275	Japan	-
10	2009	Ezoe & Toda	MPDQ (no change)	24.5	132	Japan	-
11	2013	Ezoe & Toda	MPDQ (no change)	18.7-19.3	105	Japan	-
12	2013	Toda & Ezoe	MPDQ (no change)	18.7-19.3	130	Japan	-
13	2014	Alavi et al	MPDQ (translated into Iranian)	21.5	780	Iran	-
Instruments based on the STDS (Igarashi et al., 2005)							
14	2008	Igarashi et al	STDS (shortened)	15-18	1395	Japan	-
15	2011	Lu et al	STDS (shortened)	22-59	146	Japan	4.1%
Instruments based on the SAS (Kwon et al., 2013)							
16	2014	Demirci et al	Turkish version of the SAS (TSAS)	20.59	301	Turkey	-
17	2015	Demirci et al	Turkish version of the SAS (TSAS)	20.5	319	Turkey	-
18	2015	Haug et al	Shortened version of the SAS (SAS-SV)	18.2	1519	Switzerland	16.9%
Instruments based on the MPAI (Leung, 2007)							
19	2014	Mazaheri & Najarkolaei	MPAI (Translated into Persian)	20.96	1180	Iran	56.2-64.5%
20	2014	Tavakolizadeh et al	MPAI	-	700	Iran	36.7%
Instruments based on the PCPU-Q (Yen et al., 2009)							
21	2010	Yang et al	PCPU-Q (no change)	-	11111	Taiwan	16.4%
22	2016	Long et al	PCPU-Q (no change)	17-26	1062	China	21.3%
Instruments based on the SQAPMPU (Tao et al., 2013)							
23	2016	Tao et al	SQAPMPU (no change)	15.12	14221	China	26.2-27.9%
24	2016	Tao et al	SQAPMPU (no change)	19.76	2376	China	27.9%
Instruments based on other scales							
25	2011	Martinotti et al	Mobile Phone Addiction Test (no change)	13-20	2794	Italy	6.3%
26	2012	Augner & Hacker	Problematic Mobile Phone Use	17-35	196	Austria	-
27	2013	Chiu et al	MPAS (no change)	-	448	Taiwan	-
28	2013	O'Connor et al	CPOS (Jenaro & Flores, 2007)	18.9	383	US	-
29	2015	Lee et al	Inventory for Mobile Phone Dependency (shortened)	10	2378	South Korea	-
30	2015	Roberts, Pullig & Manolis	CPAS (Roberts et al., 2014)	21	346	US	-

3.4.2 Nomenclature and definitions

The terminology employed to describe problematic mobile phone use in the literature is varied. Terms include *mobile phone/cellphone/smartphone addiction* (Al-Barashdi & Bouazza, 2014; Aggarwal, Grover & Basu, 2012; Choliz, 2012; Hong, Chiu, Huang, 2012; Kwon et al., 2013; Lin et al., 2014; Roberts, Yaya & Manolis, 2014; Tossell et al, 2015; Park, 2005), *mobile phone/cellphone dependence* (King et al, 2014; Sanchez-Martinez & Otero, 2009; Wei, 2009), *problematic mobile phone/cellphone use* (Bianchi & Phillips, 2005; Billieux et al., 2008; Guzeller & Cosguner, 2012; Jenaro et al., 2007; Merlo, Stone & Bibbey, 2013; Pamuk & Atli, 2016; Yen et al, 2009), *mobile phone txt messaging overuse* (Perry & Lee, 2007), *problem use of SMS* (Rutland, Sheets & Young, 2007), *excessive cellular phone use* (Ha et al., 2008), *mobile Internet addiction* (Shin, 2014) and *mobile phone involvement* (Walsh, White & Young, 2010). Interestingly, variations in terminology are not necessarily associated with the authors' theoretical conceptualisation of PMPU. For example, despite eschewing the term 'addiction' or 'dependence' in their chosen terminology, several authors still employ an addiction perspective in their conceptualisation of PMPU, and/or employ the DSM criteria for alcohol/substance dependence in their instrument development (Jenaro et al., 2007; Pamuk & Atli, 2016; Walsh, White & Young, 2010; Yen et al., 2009).

Despite the wide variation in nomenclature, definitions of these terms are scarce in the literature. Some authors focus on the psychological aspects. For example, Leung (2007) defined mobile phone addiction as 'an impulse control disorder that does not involve an intoxicant and is similar to pathological gambling', while Walsh, White & Young (2010) define mobile phone involvement as 'an over-attachment to mobile phone use that is psychological in nature'. Shin (2014) describes mobile phone dependency as 'a strong need for mobile Internet usage and unstable emotional status when without a mobile phone'.

Others focus on the negative consequences associated with PMPU. For example, Merlo, Stone & Bibbey (2013) define problematic cellphone use as 'any pattern of mobile phone use resulting in subjective distress or impairment in important areas of functioning', while Al-Barashdi, Bouazza & Al Zubaidi (2014) define smartphone addiction as "a type of behaviour which is associated to a group of negative symptoms of: disregard of harmful consequences, preoccupation, inability to control cravings, productivity loss, feeling of anxiety and loss. This addiction can be measured by calculating three indications (the amount of money

allocated for the use of smartphones, the amount of money spent on smartphone use, the frequency of appearance of smartphone addiction symptoms)”.

On the other hand, Tossell et al (2015) employ the term mobile phone addiction, while describing ‘addiction’ as ‘the colloquial use as a common description of behaviours that are at once reinforcing and potentially problematic. Tao et al (2016) define problematic mobile phone use as ‘an inability to regulate one’s use of the mobile phone, including excessive use, gradual increase in use to get the gratification, interference with school and other personal activities, and the need to avoid emotional alterations when mobile phone use is impeded’.

Bianchi & Phillips (2005) simply define problematic mobile phone use as ‘problem behaviour due to pre-existing factors that make it likely the user will engage in PMPU’.

3.4.3 Theoretical perspective

The 24 studies which developed original PMPU scales vary in their use of theory to describe or explain PMPU. Twelve of the articles did not describe any theory relating to PMPU; ten described the concept of technology addiction, a subset of behavioural addiction, and employed Griffith’s (1996) definition (a behavioural addiction that involves human-machine interaction and is non-chemical in nature); and two employed the concept of media dependence/addiction, described as the use of media information to understand society and self, to interact with others, to relax and to entertain oneself (Wei, 2007).

The predominantly addiction-based approach to PMPU is mirrored in the instrument design methods of the studies, which predominantly rely on the DSM criteria for dependence, either directly or indirectly (for example, modifying a behavioural addiction scale which was based on the DSM, such as Young’s Internet Addiction Test). Instrument design methods will be further elaborated upon in the following section. Table 4 outlines details of each of the 24 PMPU measures.

Table 4: Characteristics of original PMPU measures

Number	Authors	Scale	Developmental criteria	Theoretical construct	Scale type	No of items	Subscales	Reliability (α)	Validity
1	Bianchi & Phillips	Mobile Phone Problem Use Scale (MPPUS)	Addiction literature	Problematic use	Likert (0-10)	27	NA	IC (0.93)	Construct
2	Park	Revised Television Addiction Scale ¹	Television Addiction Scale	Psychological addiction	Likert (1-5)	20	Problem use Guilty use	IC (0.85)	Content Criterion Construct
3	Jenaro, Flores et al	Cell Phone Overuse Scale	DSM-IV pathological gambling criteria	Addiction Excessive use	Likert (1-6)	23	NA	IC (0.87)	Construct
4	Perry & Lee	Revised Television Addiction Scale ²	Horvath's Television Addiction Scale DSM-IV dependence dimensions	Technology addiction Overuse	Likert (1-5)	25	Tolerance Withdrawal Cutting down Displacement Continued use	IC (0.66-0.75)	NA
5	Rutland, Sheets & Young	SMS Problem Use Diagnostic Questionnaire	Internet Addiction Test (Young, 2004)	Problematic SMS use	NA	8	Pathological use Problem use	IC (0.84-0.87)	Construct
6	Wei	Revised Individual Media Dependency Scale	Individual Media Dependency Scale	Mobile phone dependency Media dependency	Likert (1-5)	18	Understanding Orientation Play	IC (0.82-0.83)	NA
7	Billieux et al	Problematic Mobile Phone Use Questionnaire	NA	Problematic use Dependence	Likert (1-4)	30	Prohibited use Dangerous use Dependence Financial problems	IC (0.65-0.85)	NA
8	Ha et al	Excessive Cellular Phone Use Survey	Authors' clinical experience	Excessive use	NA	20	NA	NA	NA
9	Sanchez-Martinez & Otero	Unnamed	NA	Dependence	Dichotomous	2	NA	NA	NA
10	Yen et al	Problematic Cellular Phone Use Questionnaire (PCPU-Q)	DSM-IV-TR substance dependence criteria	Problematic use Addiction	Dichotomous	12	NA	IC (0.85) Test-retest	NA
11	Walsh et al	Mobile Phone Involvement Questionnaire (MPIQ)	Brown's criteria (1992) Substance abuse criteria Results from qualitative study on MPI	Addiction	Likert (1-7)	8	NA	IC (0.78)	NA
12	Aggarwal, Grover & Basu	Unnamed	ICD-10 criteria for substance dependence CAGE questionnaire	Behavioural addiction	Dichotomous	20	NA	NA	NA
13	Choliz	Test of Mobile-Phone Dependence (TDM)	DSM-IV-TR substance abuse criteria	Addiction Dependence	Likert	38	Abstinence Lack of control/problems Tolerance/interference	IC (0.85-0.91)	Concurrent
14	Hong et al	Mobile Phone Addiction Scale (Revised Internet Addiction Scale)	Internet Addiction Scale (Young, 2008)	Addiction	Likert (1-6)	11	Time management Academic problems Reality substitutes	IC (0.86)	NA
15	Guzeller & Cosguner	Problematic Mobile Phone Use Scale	Addiction literature Expert feedback	Problematic use	Likert (1-5)	18	Negative effects Withdrawal/tolerance Compulsion/persistence	IC(+0.7)	Discriminant Concurrent
16	Merlo, Stone & Bibbey	Problematic Use of Mobile Phones Scale (PUMP)	Interviews with self-identified 'cell-phone addicts' DSM-IV-TR substance abuse criteria Review of excessive Internet use measures	Problematic use Addiction	Likert (1-5)	20	None	IC (0.94)	Convergent
17	Kwon et al	Smartphone Addiction Scale (SAT)	DSM-IV-TR substance abuse	Smartphone	Likert (1-6)	48	Daily-life disturbance	IC (0.97)	Concurrent

			criteria Expert review	addiction			Positive anticipation Withdrawal Cyberspace-oriented relationships Overuse Tolerance		
18	Roberts, Yaya & Manolis	Manolis/Roberts Cell-Phone Addiction Scale	NA	Cell-phone addiction	Likert (1-7)	4	NA	IC (+0.7)	Convergent
19	Al-Barashdi, Bouazza & Al Zubaidi	Smartphone Addiction Questionnaire (SPAQ)	Casey's Smartphone Addiction Profile	Smartphone Addiction	Likert (1-5)	17	Productivity loss Feeling anxious and lost Disregard and harmful consequences Preoccupation Inability to control craving	IC (0.76) Test-retest	Concurrent Construct
20	Lin et al	Smartphone Addiction Inventory (SAI)	Chen Internet Addiction Scale	Smartphone addiction	Likert (1-4)	26	Compulsive behaviour Functional impairment Withdrawal Tolerance	IC (0.94) Test-retest	Construct
21	King et al	Mobile Phone Use Questionnaire	Clinician-developed	Nomophobia	Likert (1-5)	29	NA	NA	NA
22	Shin	Mobile Internet Usage Index	Internet Addiction Test	Mobile Internet Dependence	Dichotomous	19	Excessive use Neglect of work and social life Lack of self control Use of mobile Internet for other reasons than calling	NA	NA
23	Tossell et al	Smartphone Addiction Measurement Instrument (SAMI)	Internet Addiction Scale; Cellular Phone Addiction Scale	Addiction	Likert (1-5)	15	Inability to control craving; Feeling anxious & lost; Withdrawal/escape	NA	NA
24	Pamuk & Atli	PMPUS	Relevant literature Qualitative data DSM V criteria for SUD and IGD Expert feedback	Addiction	Likert (1-5)	26	Deprivation Adverse outcomes Control problem Interaction avoidance	IC (0.92) Test-retest	Criterion

3.4.4 Instrument development and testing

The following section will describe the different measure development and testing strategies employed in the studies being reviewed. This will include how items were initially developed, the number and content of subscales, as well as psychometric testing. This information is summarised in Table 4.

3.4.4.1 Item development

The information provided in the 24 articles regarding item development methods is quite limited, as none of the studies provide in-depth information regarding how the initial pools of items for the various measures were created. Three of the articles provided no information on item development (Billieux et al, 2008; Roberts, Yaya & Manolis, 2014; Sanchez-Martinez & Otero, 2008). Two employed ‘addiction’ literature (Bianchi & Phillips, 2005; Guzeller & Cosguner, 2012), and two were based on the authors’ clinical experience (Ha et al., 2008; King et al., 2014).

Others modified existing behavioural addiction scales, such as the Revised Television Addiction Scale (Park, 2005; Perry & Lee, 2007), the Internet Addiction Test (Hong et al., 2012; Rutland, Sheets & Young, 2007; Shin, 2014; Tossell et al., 2015), the Individual Media Dependency Scale (Wei, 2007), or the Chen Internet Addiction Scale (Lin et al., 2014). Perry & Lee (2007), for example, adapted Horvath’s Television Addiction Scale (which was based on the DSM-IV) by removing 12 items from the original scale which did not ‘translate well’; no information is provided on how the remaining 23 items were ‘translated’ from television-related to mobile phone-related. The authors further added four original questions, in order to ‘inquire about aspects of one of the seven DSM-IV addiction components’; however, the authors do not mention which component they are attempting to measure, or how the items were designed.

Several of the questionnaires were based, in total or in part, on the DSM-IV criteria for pathological gambling (Jenaro et al, 2007), substance abuse (Choliz, 2012; Kwon et al., 2013; Merlo, Stone & Bibbey, 2013; Walsh, White & Young, 2010), substance dependence (Yen et al., 2009), or the DSM-5 criteria for substance use disorder and Internet Gaming Disorder

(Pamuk & Atli, 2016). How the DSM criteria were adapted for mobile phone use is again unclear; for example, Cholz (2012) describes that the initial pool of items for the Test of Mobile-phone Dependence included 101 items, which were reduced to 46 after a pilot study; the items were reduced to 22 in the 2012 study. There is no information provided, however, on how 101 or 46 items reflected the seven criteria of dependence in the DSM-IV.

Some authors employed a number of methods for the item development process, such as qualitative data with ‘self-identified cell phone addicts’ (Merlo, Stone & Bibbey, 2013; Pamuk & Atli, 2016; Walsh, White & Young, 2010). Others included expert review and feedback of the items (Guzeller & Cosguner, 2012; Kwon et al., 2013; Pamuk & Atli, 2016). However, no information is provided regarding how these different sources of information influenced the content of the item pool, or how this is reflected in the final questionnaire.

3.4.4.2 Questionnaire testing

Of the 24 studies, 13 described employing exploratory factor analysis, confirmatory factor analysis, or both, in order to determine the latent constructs underlying the newly developed items (Al-Barashdi, Bouazza & Al Zubaidi, 2014; Billieux et al., 2008; Cholz, 2012; Hong et al., 2012; Guzeller & Cosguner, 2012; Kwon et al., 2013; Lin et al., 2014; Pamuk & Atli, 2016; Park, 2005; Perry & Lee, 2007; Roberts, Yaya & Manolis, 2014; Rutland, Sheets & Young, 2007; Walsh, White & Young, 2010), and one study employed scale analysis in order to determine whether any items should be removed from the overall pool (Merlo, Stone & Bibbey, 2013).

The other ten studies did not describe any exploration or confirmation of the questionnaire’s underlying structure. Interestingly, of those ten studies, three have organised the questionnaire items into subscales, despite lacking any statistical confirmation of the factor structure. Details regarding these ten studies can be found in Table 4.

The number of subscales within the 24 measures ranges from two to six. While some similarities can be seen in the dimensions being evaluated across the different measures (e.g. tolerance, withdrawal, loss of control, negative consequences), most questionnaires appear to be quite heterogeneous. For example, Wei’s (2007) questionnaire is the only one which measures ‘understanding’, ‘orientation’ and ‘play’; Park’s (2005) is the only example of a

‘guilty use’ subscale; the measure produced by Kwon et al is the only one which has a ‘cyberspace-oriented relationships’ subscale.

3.4.4.3 Reliability

Most studies evaluated their measure’s internal consistency, through Cronbach’s Alpha Coefficient. All of these measures were found to have acceptable internal consistency, as denoted by a Cronbach’s Alpha score of .7 or higher. Six studies either did not conduct, or did not report the results of this analysis (Aggarwal, Grover & Basu, 2011; Ha et al., 2008; King et al., 2014; Sanchez-Martinez & Otero, 2009; Shin, 2014; Tossell et al., 2015).

Four of the studies also explored the measure’s test-retest reliability, at two or three week intervals (Al-Barashdi, Bouazza & Al Zubaidi, 2014; Lin et al., 2014; Pamuk & Atli, 2016; Yen et al., 2009). The measures were found to have good test-retest reliability, as determined by score correlations of .667-.91.

None of the studies evaluated the measures’ interrater reliability.

3.4.4.4 Validity

Twelve studies explored at least one type of validity for their measure; six evaluated construct validity, four evaluated concurrent validity, three evaluated convergent validity and discriminant validity, two evaluated criterion validity, and one evaluated content validity.

Construct validity was established through a number of methods. Some studies found high correlations between PMPU scores and levels of mobile phone use (Bianchi & Phillips, 2005; Rutland, Sheets & Young, 2007), measures of depression, anxiety and general health (Jenaro et al., 2007), measures of addiction potential (Bianchi & Phillips, 2005), other measures of PMPU (Rutland, Sheets & Young, 2007). Park (2005) purports construct validity for their scale was established based on the factor analysis identifying two constructs of addiction, problem use and guilty use; the author did not explain how these constructs related to the DSM criteria, or to the media dependency theory employed in the study. Al-Barashdi, Bouazza & Al Zubaidi (2014), on the other hand, suggest that construct validity in their study

was established due to gender differences in scores on their smartphone addiction measure. The authors' argument is that given previous research has found a gender difference in PMPU scores, this is sufficient to establish construct validity for their measure. Lin et al (2014) argued construct validity was established for their measure, based on the factor analysis results; it is not clear how factor analysis could support the construct validity of a measure.

Park (2005) established criterion validity based on the high correlation between the PMPU scores and scores achieved on the CAGE, an instrument which evaluates alcohol use; it is not clear what the connection is between mobile phone use and alcohol use. Pamuk and Atli (2016), on the other hand, established criterion validity through correlations between their instrument, and the Mobile Phone Problem Use Scale (MPPUS).

Concurrent validity was established by Choliz (2012) based on correlations between scores on the TMP and levels of mobile phone use. Guzeller & Cosnuger (2012) determined concurrent validity based on correlations between scores on their Problem Mobile Phone Use Scale (PMPUS), and depression and loneliness levels. Kwon et al (2013) determined concurrent validity based on significant correlations between scores on the SAS and scores achieved on measures of Internet addiction. Al-Barashdi, Bouazza & Al Zubaidi (2014), on the other hand, explored correlations between scores achieved on their measure and scores achieved on the Smartphone Addiction Scale (SAS).

Discriminant validity was established by Guzeller & Cosnuger (2012) based on significant differences found between scores on the PMPUS, and daily mobile phone use duration. One-way Anovas and Dunnett C analyses determined high duration of mobile phone use was correlated with higher scores on the PMPUS.

Convergent validity was established by Merlo, Stone & Bibbey (2013) based on significant correlations between scores on the PUMP, and scores achieved on other measures of PMPU. Roberts, Yaya and Manolis (2014) purport convergent validity for the Manolis/Roberts Cell-Phone Addiction Scale was determined based on confirmatory factor analysis loadings being statistically significant, and the average variance extracted was within the minimum threshold of 0.5; it is unclear why these measures of factorial validity are being used as evidence for convergent validity.

Content validity was established by Park (2005), on the premise that the questionnaire items represented the dimensions of addiction, as a result of the scale being based on the DSM-IV criteria.

3.4.5 PMPU prevalence

Of the 54 studies included in this review, 24 reported the prevalence of PMPU within their samples; prevalence ranged from 3-68%. The following section will describe the different methods employed to establish cut-off scores for the measures.

Some researchers employed the cut-off score established for the scales their measures were based on; for example, the scale produced by Jenaro & Flores (2007) was based on the DSM-IV criteria for pathological gambling, and subsequently a cut-off score of 5 symptoms or more out of 10 was employed (symptoms were considered to be met, if a score of 3 or higher out of 5 was achieved). Aggarwal, Grover & Basu (2011) established a cut-off score of 3 criteria out of 10 needing to be met, based on the ICD-10 criteria, while Kwon et al (2013) based their cut-offs on the DSM-IV criteria for abuse and dependence.

Leung (2007a, 2007b) employed the cut-off score developed for Young's Internet Addiction Test (IAT); however the author does not indicate what this cut-off is, or how it was employed in his research. Furthermore, given that Leung's scale was based on Bianchi & Phillips' MPPUS, not the IAT, it is unclear why the IAT criteria were used. Mazaheri & Najarholaei (2014) employed the same approach, given that they were utilizing Leung's scale. Shin (2014) employed a cut-off score of 80% (i.e. 80% of items needed to have a positive endorsement), based on Young's criteria.

Yen et al (2009) sought to establish a cut-off point on their seven item Problematic Cellular Phone Use Questionnaire (PCPU-Q) by examining the agreement between scores obtained on that scale, and levels of functional impairment caused by cell phone use (CPU), as evaluated by five separate items; Cohen's Kappa values indicated a cut-off point of four symptoms of the possible seven would have the highest potential to differentiate between participants who experienced functional impairment caused by cell phone use from those who did not. Yang et al (2010) and Long et al (2016), in utilising the PCPU-Q, adopted the same cut-off score.

Martinotti et al (2011) determined the cut-off score for PMPU on the Mobile Addiction Test (MAT) based on the best model obtained through a logistic regression analysis between MAT results and other behavioural addictions (gambling, compulsive buying, Internet, work, and exercise). Some studies determined cut-off scores based on diagnostic interviewing between participants and clinicians (Kalhori et al., 2015; Haug et al., 2015).

Finally, a number of studies reported PMPU prevalence, but did not report a cut-off score, or a rationale for establishing one (Al-barashdi & Bouazza, 2014; Ha et al., 2008; King et al., 2014; Lopez-Fernandez, 2013; Tao et al., 2016; Perry & Lee, 2007; Sanchez-Martinez & Otero, 2009).

3.4.6 Factors associated with PMPU

The following section aims to discuss the different factors which have been found to be associated with PMPU. These factors have been divided into two categories: demographic and mobile phone use factors, and psychosocial factors. The information presented in this section was obtained solely from the 54 studies included in this review; while other studies have explored the relationship between different demographic factors and general mobile phone use, they were not included, given the focus of this chapter.

3.4.6.1 Demographic factors

Gender: Several studies explored the associations between levels of PMPU and gender; however, findings varied across studies. Bianchi & Phillips (2005) and Perry & Lee (2007) found no association; Billieux et al (2008) found that women were more likely to be 'dependent', and men were more likely to use their phone in dangerous situations. Mazaheri & Najarkolaeci, (2014) found a positive association between PMPU and male gender, while others found a positive association between PMPU and female gender (Al-Barashdi & Bouazzam 2014; Augner & Hacker, 2012; Chiu, Hong, & Chiu, 2013; Choliz, 2012; Jenaro et al., 2007; Shin, 2014). Geser (2006) investigated the gender differences in usage of mobile phone technology, in a sample of 1415 students from Switzerland: although there were no gender differences in the average amount of money spent on mobile phone usage, women

sent significantly more SMS messages (320 versus 200 SMS sent a month), while males made more phone calls (120 versus 75 calls made per month). In addition, females used mobile phones to share their thoughts, feelings and experiences to a much greater degree than men, while males used mobile phones to co-ordinate activities such as set up meetings. Geser concluded that “significantly more women than men have assimilated the mobile phone as a central component of their personal existence, by integrating it into their lifestyle or by becoming so dependent on it that life without it has become unimaginable”. It was also concluded that such integrations of mobile phones into one’s lifestyle were of more consequence in the case of women, as the integration determined the intensity of mobile phone use to a greater degree than in the case of men (Geser, 2006).

Age: An association was also found between PMPU and age, with younger people tending to score higher on PMPU measures (Augner & Hacker, 2012; Bianchi & Phillips, Choliz, 2012; Lu et al., 2011; Shin, 2014). However, other studies found no relationship between age and PMPU (Cagan et al., 2014; Martinotti et al., 2011; Tavakolizadeh et al., 2014).

Education: Kwon et al (2013) explored the relationship between PMPU and education level – they reported that those with only a high school education on average achieved higher scores on the SAS, when compared with participants who had achieved a doctoral degree. The authors suggest that this may be a result of individuals with low education levels potentially lacking self-control. However, it is possible that other factors may have influenced that relationship – for example, participants were recruited from both universities and commercial companies, and therefore the sample had a wide age distribution (18-53). Given that other studies have found that age affects the likelihood of an individual engaging in PMPU, it is possible that the relationship reported by Kwon et al was affected by this.

Length of mobile phone ownership: Billieux et al (2008) found that participants who had owned a mobile phone for a longer period of time were more likely to engage in problematic use; the study did not find any associations between age and general mobile phone use (associations with PMPU were not sought), and therefore the authors conclude the degree of PMPU increased with exposure to the device itself. Given that PMPU was explored from a behavioural addiction perspective, this relationship was considered unsurprising by the

authors, as it mimics other addictions where dependence symptoms increase with time (Billieux et al., 2008).

Mobile phone use levels: A number of studies found associations between PMPU and mobile phone use levels, including, time spent on the phone, time spent talking, number of calls, and number of SMS sent (Aggarwal, Grover & Basu, 2012; Cagan et al., 2014; Demirci et al., 2014; Haug et al., 2015; Hong et al., 2012; Leung, 2007; Merlo, Stone & Bibbey, 2013; Perry & Lee, 2007; Rutland, Sheets & Young, 2007; Sanchez-Martinez & Otero, 2009; Shin, 2014; Tossell et al., 2015; Walsh et al., 2010). Hong et al (2014) suggested that the higher levels of mobile phone use found in individuals with high levels of mobile phone ‘addiction’ may result in deeper friendships and stronger interactions with their social circle.

3.4.6.2 Psychosocial factors

Loneliness: Park (2005) found a weak, but statistically significant positive correlation between mobile phone addiction, and loneliness as measured by the UCLA Loneliness Scale. Guzeller and Cosnuger (2012) also found a weak, but statistically significant positive correlation between mobile phone addiction and loneliness. Park (2005) theorised that heavy mobile phone users might render themselves inaccessible to individuals outside their own social network, thereby resulting in feelings of loneliness.

Extraversion: Augner and Hacker, (2012), Bianchi and Phillips, (2005), Ezoë et al (2009) and Hong et al (2012) found that extroverts were more likely to obtain high scores on the PMPU scales; Bianchi and Phillips suggest extraversion and high levels of mobile phone use are inextricably linked, given the social nature of extroverts, and the primary function of mobile phones as a communication tool.

Self-esteem: Bianchi and Phillips (2005), Leung (2007) and Ha et al (2008), Hong et al (2012), Leung, (2007) and Yang et al, (2010) all found that those with low self-esteem were more likely to obtain high scores on the PMPU scales; Bianchi and Phillips, however, note that it is unclear whether those with low self-esteem are more likely to engage in problematic

use, due to their need to seek assurance, or whether problematic use leads to low self-esteem, due to problems associated with inappropriate use.

Impulsivity: Billieux et al (2008) investigated the associations between four different aspects of problematic mobile phone use (dangerous use, prohibited use, dependence, and financial problems) and four types of impulsivity: Urgency, Premeditation, Perseverance, and Sensation Seeking. Urgency was defined as ‘the tendency to experience strong impulses, frequently under conditions of negative affect’; Premeditation was defined as ‘the tendency to think and reflect on the consequences of an act before engaging in the act’; Perseverance was defined as ‘the ability to remain focussed on a task that may be boring and difficult’; finally, Sensation Seeking was defined as ‘a tendency to enjoy and pursue activities that are exciting, and openness for new experiences’. The study found that all aspects of PMPU were predicted by at least one type of impulsivity; Urgency was most strongly related to PMPU, as indicated by it being the only type of impulsivity that predicted three aspects of PMPU. The authors postulated that urgency may increase PMPU due to users employing mobile phones in order to satisfy certain strong impulses to relieve negative affect in the short term. O’Connor et al (2013) also found associations between PMPU and impulsivity. Chen et al (2016) employed behavioural measures and electrophysiology to explore general and specific inhibitory control in a group of normal smartphone users, and a group of excessive smartphone users. The authors reported that excessive smartphone users experience more conflicts and show a general deficit relating to inhibition processing, indicating a psychological difference between excessive and normative smartphone users relating to inhibition and impulse control.

Emotional stability: Augner and Hacker (2012) found that individuals in their sample who had low emotional stability were more likely to score highly on their measure of PMPU. The article did not include an explanation for this relationship.

Sensation seeking: Leung (2007) found a significant positive relationship between participants’ scores on a sensation seeking measure, and their scores on a PMPU measure. Billieux et al (2008) found that sensation seeking predicted mobile phone use in dangerous situations.

Self-monitoring: Takao et al (2009) found a relationship between PMPU and self-monitoring (comprising extraversion, acting, and other-directedness), with high self-monitors scoring higher on the PMPU measure. The authors postulated that given the fundamentally social nature and susceptibility to peer pressure of high self-monitors, as well as their increased disposition to risk behaviours and sensation seeking, it is unsurprising that a correlation was found with inappropriate (problematic) mobile phone use.

Approval motivation: Takao et al (2009) found a relationship between PMPU and approval motivation, or the need for favourable evaluations from others, with high approval motivators scoring higher on the PMPU measure. The authors suggested that individuals with low self-esteem also display high approval motivation, and therefore, given that correlations between PMPU and low self-esteem have been found, the relationship between high approval motivators and PMPU is unsurprising.

Anxiety: Links between PMPU and anxiety have been found by a number of studies (Jenaro et al., 2007; Demirci et al., 2015; Hong et al., 2012; O'Connor et al., 2013; Tavakolizadeh et al., 2014). Hong et al (2012) theorised that individuals with high anxiety are more likely to be afraid of interpersonal relationships, and therefore use their mobile phone to facilitate social contact, as opposed to face-to-face interaction. The mobile phone interface allows users a degree of control that is impossible to achieve in real life (the ability to compose and edit messages before sending them, for example) and would therefore potentially relieve some individuals' anxiety regarding social interaction. However, the authors do not explain why this might lead to problematic use of mobile phone technology.

Depression: Based on the findings from a number of studies, PMPU appears to also be linked to depression (Augner & Hacker, 2012; Demirci et al., 2015; Jenaro et al., 2007; Guzeller & Cosguner, 2012; Lu et al., 2011 Yen et al., 2009; Tavakolizadeh et al., 2014; Toda & Ezoë, 2013). Yen et al (2009) suggested that mobile phones provide depressed adolescents with a virtual world in which “they can adjust their emotional problems and perceive the feeling of control”. Alternatively, excessive mobile phone use may lead to difficulties in the lives of adolescents and affect relationships with their families, and thus may intensify depressive symptoms. A third option suggested by the authors postulated that both PMPU and depression may be co-existing outcomes of an overall unhealthy lifestyle

(Yen et al., 2009). Further, Yang et al (2010) found correlations between high PMPU scores and suicidal tendencies.

Addictive disorders: PMPU appears to be linked to a number of addictive disorders, including alcohol use (O'Connor et al., 2013; Tao et al., 2016). Martinotti et al (2011) found positive associations between PMPU and alcohol use, as well as pathological gambling, while Jenaro et al did not (2007). Several studies also link PMPU to PIU (Chiu, Hong, & Chiu, 2013; Ezoë & Toda, 2013; Ha et al., 2008; Martinotti et al., 2011; Mazaheri & Najarkolaeci, 2014), compulsive buying (Martinotti et al., 2011), exercise addiction (Martinotti et al., 2011), and work addiction (Martinotti et al., 2011). Further, associations between PMPU and smoking behaviour have been noted (Toda et al., 2006; Yang et al., 2010).

3.4.7 Explanatory theories

While studies have been conducted investigating mobile phone addiction, few endeavours have been made to explore the causal factors and mechanisms that may lead to problematic mobile phone use. The following section is based both on purely theoretical articles on PMPU, as well as theories posited by authors in the context of empirical articles.

Walsh, White and Young (2007) suggested that the Uses and Gratification Theory can be applied to mobile phone use. This theory was first developed in the 1940s, to explain the gratifications that attracted and held audiences to the types of media and content that satisfied their social and psychological needs (Ruggiero 2000). It has been used to explain the use of newspapers, radio, television, and more recently the Internet (Walsh et al 2007). However, the Uses and Gratification Theory has also been applied to mobile phone use. Wei & Lo (2006) stated that mobile phone use facilitates social contact between individuals, thus fulfilling social gratifications. Second, mobile phones provide entertainment through the various games and activities that are available on the device, and also improve one's self-esteem, by making individuals feel more popular as a result of increased social contact (Ozcan & Kocak, 2003). Mobile phones also provided organising features which assist in planning of users' schedules, and also allowed users to remain contactable at all times (Ozcan & Kocak, 2003). Walsh et al (2007) also applied uses and gratification theory to mobile phone use. Three major factors emerged: self-gratification, which related to entertainment or

enjoyment; social gratification, which related to the use of mobile phones for the maintenance and development of social relationships; and security gratification, which was linked to practical use of mobile phone technology, such as arranging transport, and emergency contact capabilities. The authors reported that self and social gratifications were strongly linked to addiction indices. However, security gratification was most reported by participants, suggesting that mobile phone users gained a psychological sense of safety from having access to a mobile phone (Walsh et al., 2007).

Another theory posited by Walsh et al (2009) suggested that “mobile phone addiction” is linked to self-identity. The authors proposed that when external behaviours become an internalised part of an individual’s concept of self, it is possible for mobile phone usage to become a valuable part of people’s self-identity. This theory is augmented by the notion of the extended self, which states that it is possible to incorporate objects into one’s self identity, if the objects reflect the person’s concept of self (Belk, 1988; Walsh et al., 2009). Furthermore, adolescents have been shown to be more likely to have a materialistic orientation, which in turn results in them seeking behaviours and objects which represent their values and attitudes, and lead to the development of behavioural addictions to objects and behaviours (Dittmar, 2005). Mobile phones have been described as a form of self-expression, as many users choose to personalise their phone through the use of distinctive wall-papers, ring-tones, and even costume jewellery (Billieux et al., 2008; Walsh et al., 2009). Walsh et al (2007) have also found self-identity to be a predictor of mobile phone use, with individuals who identified with their mobile phone being more likely to have higher mobile phone use rates (Walsh et al., 2007). Thus, it may be possible that as mobile phone use becomes more prolific during pre-adolescence and adolescence, which are periods crucial to the development of self-identity (Steinberg, 2006; Westen et al, 2007), mobile phones can become a crucial component of a person’s self-identity. The suggestions made by Walsh et al (2007) are further supported by the theory that behaviours which are positively reinforced are more likely to become part of an individual’s sense of self (Belk, 1988). Mobile phone use is positively reinforced, for example, by the boost of self-esteem that users experience when being contacted by other individuals, as they feel popular (Wei & Lo, 2006).

Roberts, Yaya and Manolis (2014) proposed Learning Theory as a basis through which the development of “cell-phone addiction” could be explained. They suggested that certain mobile phone activities provided users with rewards, through eliciting feelings of happiness

and/or enjoyment (such as receiving funny videos from friends). This concept was linked to operant conditioning, and in particular positive reinforcement – if a person enjoys a particular activity (i.e. receives a reward), they are more likely to engage in that activity again. Roberts et al also note that mobile phone use can also operate under the principle of negative reinforcement, through the use of mobile phones to escape awkward situations by pretending to send a text message or call someone. They argue that any behaviour which is rewarding can become addictive.

Conversely, Foerster et al (2015) argue that problematic mobile phone use may result from two different patterns of use: specific or generalised. Given that mobile phones have multiple capabilities, the authors theorise that one pattern of use focusses on media, with the mobile phone providing portable, high level accessibility to entertainment; thus, they suggest PMPU may involve a combination of various reinforcement mechanisms present in other technology addiction, such as Online Gaming Disorder and Internet-Addiction.

Foerster et al also note the role that a need for social contact may play in the development of PMPU – mobile phones help adolescents satisfy their needs for peer influence, social relationships and belongingness, all of which are important factors in adolescent life. Fear of loneliness and exclusion may be driving the urge to remain perpetually connected in these cases (Campbell, 2005).

The proposition put forward by Foerster et al is similar to a distinction made in the Problematic Internet Use literature by Davis (2001), who proposed that pathological Internet use could be separated into two distinct categories: specific (relating to a specific activity on the Internet, such as gambling, shopping, socialising, or viewing pornography), and generalised (which denoted a general, multidimensional overuse of the Internet, or use without a specific purpose).

Billieux (2012) developed a model based on the existing PMPU literature which sought to explain the different pathways which may lead to PMPU. The author described four different pathways: the Impulsive pathway, which relates to individuals whose mobile phone use is predominantly driven by poor self-control and/or maladaptive emotion regulation; the Maintenance pathway relates to mobile phone use for the purpose of obtaining reassurance in affective relationships, and focuses on individuals with low self-esteem and a high level of neuroticism; the Extraversion pathway suggests some users may be at a higher risk of

developing PMPU due to their sociable and outgoing nature, and a heightened need to communicate with peers and finally, the Cyber Addiction pathway relates to the use of the mobile phone as a tool to engage in a range of online activities, such as multiplayer role-playing games.

3.5 Discussion

This review sought to synthesise the current literature on PMPU, with a particular focus on original scale development and testing. The approach taken to the exploration of PMPU appears to be predominantly atheoretical; of the 24 studies using original scales included in this review, half (n=12) did not describe any theory which guided the research or development of the scales; most of the others mentioned or described the concept of behavioural addiction, or technology addiction. However, no explanation was provided as to the link between such theories and the DSM-IV criteria for abuse, dependence or pathological gambling which were widely used. This is evident in the variability of terminology relating to PMPU, and to the lack of definitions identifying exactly what the researchers are exploring. Despite most adopting an addiction lens, and using the DSM-IV criteria, either directly or indirectly, there is also variability in the concepts being explored, as illustrated by the differing subscales across the questionnaires. This variation would indicate the lack of agreement regarding a unitary or central construct underpinning PMPU; a similar issue regarding variation in definitions and diagnostic criteria has been identified in the problematic Internet use literature (Kardefelt-Winther, 2014).

Considerable variation can also be found in the existing definitions relating to PMPU: some provide a very generic definition (Bianchi and Phillips, 2005), others liken it to other disorders, (Leung, 2007), others describe it in terms of over-attachment (Walsh, White & Young, 2010). Some definitions, on the other hand, focus on characterising PMPU based on its symptomatology: from withdrawal symptoms (Shin, 2014), to tolerance (Tao et al., 2016), to negative consequences (Al Barashdi et al., 2014). Al Barashdi et al (2014), for example, postulate that PMPU can be measured through three indicators, including money allocated for spending on smartphone use, actual money spent on smartphone use, and appearance of addiction symptoms. It is unclear why expenditure features so strongly in this definition. Overall, however, the definitions reflect a wider concern present in behavioural addiction

literature, which has resulted in some researchers noting the need for a central, theory-supported definition of behavioural addiction (Billieux et al., 2017; Kardefelt-Winters et al., 2017; Kraplin, 2017).

The reported prevalence of PMPU across the literature is varied, with estimates ranging from 3-68%. This wide variation is likely due to a number of factors, with discrepancies in instrument development being a major aspect. Given the reasonably heterogeneous sub-concepts the different scales are aiming to evaluate, it is not surprising that it has resulted in significant discrepancies. This, however, may be less of an issue for instruments for which concurrent and construct validity have been correctly established. Another aspect which may play a significant role is the range of countries and cultures where PMPU has been explored; the current review includes studies from 19 countries, predominantly European, Asian, and the U.S. Only one study was conducted with significantly different samples (U.S. and South Korea), and variations in prevalence were found, despite use of the same questionnaire. However, the variations may also be a result of the convenience sampling strategy, and may not be indicative of broader generalizability. Finally, divergences in prevalence rates may have resulted from different approaches to establishing cut-off scores. Of the prevalence-reporting articles included in this review, only half provided a cut-off score or a rationale for one. Of those studies that do indicate a cut-off score, some do not provide explanations for their choice of cut-off; for example, the top 30% demarcation employed by Ha et al (2012), or the top quartile threshold used by Tao et al (2013).

The studies indicate PMPU is correlated to a number of demographic and psychosocial factors. Of the demographic factors, relationships with age and gender appear most often in the literature, with female users and younger users being more likely to obtain high scores on various PMPU measures. However, the relationship between gender and PMPU has been identified more consistently than that with age. The variance in age-related findings across the studies may be explained by the use of different PMPU instruments, as well as researching different age groups: for example, Bianchi and Phillips (2005) reported the broadest age range in their participants (18-85), and the mean age of 36.07 years; Lu et al (2011) reported an age range of 22-59, with a mean of 42.4 years. Other studies focussed on adolescents and young people (14-35). Billieux et al (2008) noted that the younger age groups had likely grown up with easy access to mobile phone technology, while their older counterparts would have only began using mobile phones at a later stage in life, which may

have had an effect on the development of PMPU. The authors further explained this disparity as possibly resulting from older people being less likely than their younger counterparts to embrace new technology; loss of vision and deterioration of flexibility and dexterity of joints in fingers may play a part in older people's reduced use of mobile phone technology, particularly the SMS function. A gender-based pattern has also been found in relation to problematic Internet use (PIU); conversely to PMPU, however, most studies have found that males are more likely to obtain high scores on measures of PIU. Similarly to PMPU, younger people appear more likely than their older counterparts to score highly on measures of PIU (Kuss, Griffiths, Karila & Billieux, 2014).

Of the personality factors, impulsivity and sensation seeking appear to be most consistently correlated to PMPU. Interestingly, similar findings have been reported for problematic Internet use (Cao, Su, Liu & Gao, 2007; Mehwash & Griffiths, 2010), gambling (Fortune & Goodie, 2010; Leeman et al., 2014) and sex addiction (Levine, 2010). Impulsivity and sensation seeking also play a part in the development of alcohol and substance use problems (Ersche et al., 2010). These correlations may indicate either a common psychological mechanism between behavioural and biological addictions, or similar psychopathological root causes; unfortunately, it is not possible to draw any conclusions regarding causality, without longitudinal studies.

Correlations have been found between PMPU and mental health issues, particularly anxiety and depression. Authors have proposed a number of potential reasons for these relationships, such as individuals using their phones to engage in social contact, when face-to-face contact may prove too difficult (Hong et al., 2012), or as a coping mechanism for depressive or anxious affect (Demirci et al., 2015; Yen et al., 2009). Conversely, PMPU may be resulting in both anxious and depressed mood, due to social isolation, and general issues associated with the behaviour (Yen et al., 2009). Again, depression and anxiety have been linked to both substance use and other problematic behaviours (Walther, Morgenstern & Hanewinkel, 2012).

Interestingly, PMPU has also been directly linked to other potentially problematic behaviours, including Internet use, sex, working, gambling, and alcohol use (Chiu, Hong, & Chiu, 2013; Martinotti et al., 2011; O'Connor et al., 2013). Co-occurrence of multiple

problematic behaviours/substance use disorders has been previously documented in the literature (Barnes et al., 2011; van Rooij et al., 2014); a systematic review of studies exploring co-morbidities in pathological gamblers, for example, found that 57.5% of pathological gamblers also suffered from a substance use disorder (Lorains, Cowlishaw, & Thomas, 2011). Further research is necessary, in order to explore the significance of these correlations, particularly in light of apparent similarities with other problematic behaviours. For example, it is unclear whether the similarities between PMPU and other problematic behaviours are evidence of a shared aetiology, or they simply indicate that a mobile phone can be used as a coping mechanism for other problems.

The adoption of an addiction lens, and the subsequent use of DSM-IV criteria in these studies are subject to a number of limitations, which are relevant for most behavioural addictions. These limitations were discussed in greater detail in chapter 2 of this thesis, and therefore this section will offer a brief overview of the limitations within the PMPU context.

The use of the DSM-IV criteria for abuse, dependence, AUD/SUD, or pathological gambling as a foundation for the development of PMPU measures presents certain challenges. For example, the criteria for dependence were largely developed based on experience with clinical adult samples; several revisions, based on current knowledge and understanding of alcohol and substance use behaviours, have been implemented since the inception of the DSM (Martin & Chung, 2008). The criteria are specifically designed for alcohol and substance use and gambling, based on clinical presentations, and several components of the broader concept of addiction (Martin & Chung, 2008). This is evident in the differences between the DSM criteria for alcohol/substances, and gambling: despite gambling disorder now being included under the overarching addiction umbrella in the DSM-5, there are still several gambling-specific aspects. One difference is the number of criteria required to meet a diagnosis: in the DSM-IV, dependence on alcohol or substances required a minimum of 3 criteria to be met, while pathological gambling required 5. In the DSM-5, 2 criteria are needed for mild AUD/SUD, while 4 are needed for mild GD (APA, 2013). Further, the gambling criteria include three gambling-specific items, including ‘after losing money gambling, often returns another day to get even’; ‘relies on others to provide money to relieve desperate financial situations’; ‘lies to conceal the extent of involvement with gambling’ (APA, 2013). Thus, employing the DSM-IV/5 criteria for a behaviour that was not

specifically considered in the DSM development appears problematic. A further concern is the significant qualitative differences between PMPU and alcohol/substance use, or gambling disorder. It is possible that in utilising the DSM criteria, significant constructs, mechanisms or symptoms of PMPU are being disregarded, because they may not fit the DSM construct (Blaszczynski, 2008; Wood, 2008).

A further concern with the adoption of an addiction perspective is the potential burdening of a vulnerable population with an 'addiction' label, which carries negative connotations in both adult (Barry et al., 2014) and adolescent populations (Adlaf, Hamilton, Wu & Noh, 2009). Thus, ascribing the addiction label to problematic behaviours may result in more harm for the population. For example, DePierre et al (2013) found that attributing a 'food addict' label to obese people resulted in increased stigma, as examined by participants' attitudes towards a range of 'individuals', including smokers, obese people, obese food addicts, and disabled people. Stigma against young people playing online games is also increasing, in part due to the 'moral panic' surrounding Internet addiction (Szablewicz, 2010).

Employing other theoretical perspectives would prove useful in furthering the knowledge surrounding PMPU. Similar approaches have been taken with other problematic behaviours; for example, Internet use has been explored from cognitive (Davis, Flett & Besser, 2004) and cognitive behavioural perspectives (Caplan, 2002), interpersonal theory (Liu & Kuo, 2007), and compensatory theory (Kardefelt-Winther, 2014). Sex addiction research has included the exploration of obsessive-compulsive mechanisms (Bancroft & Vukadinovic, 2004), dissociative states (Bancroft, 2008), cognitive behavioural theory (Laiher & Brand, 2014) and impulse-control problems (Garcia & Thibaut, 2010). Finally, gambling disorder has been explored through the theory of planned behaviour (Wu & Tang, 2012), learning theory (Fischer & Smith, 2009), and cognitive theory (Emond & Marmurek, 2010; Michalczuk et al., 2011; Sharpe, 2002), to name a few. Adopting differing theoretical approaches to the exploration of PMPU would likely result in the identification of components and mechanisms that an addiction perspective might miss.

While a significant number of studies have identified demographic and personality factors associated with PMPU, few researchers have proposed explanatory theories or models for problematic mobile phone use. Some examples include the application of Uses and Gratifications theory, and the Theory of the Extended Self to problematic mobile phone use;

Walsh et al (2007, 2009) found that PMPU is correlated with self-identity, as well as certain types of gratifications obtained from mobile phone use. Other authors have suggested PMPU may be a result of learning and conditioning, where positive reinforcement could be related to rewarding mobile phone-based activities, such as socialising, gaming, or accessing the Internet (Foerster et al., 2015; Roberts, Yaya & Manolis, 2014). To the best of the researcher's knowledge, however, the only explanatory model that has been proposed in the literature is Billieux's Pathways Model, which suggests four different avenues through which PMPU might be developed (Billieux, 2012). The model is based on findings from existing PMPU research, and further studies are necessary in order to confirm the different pathways which were proposed. However, given that the model is based on the extant literature, its application in exploratory research could restrict the scope of potential findings; the adoption of a broader theoretical lens in exploratory research would potentially be more useful in developing PMPU-related knowledge.

3.6 Limitations

This review focused primarily on quantitative explorations of PMPU, assessment tools, and associations with demographic and psychosocial variables. Thus, information relating to other aspects of mobile phone use, which could be relevant to PMPU, were not included; this would include qualitative articles, as well as information regarding potential negative consequences resulting from mobile phone use.

The initial review was conducted in 2011; while efforts were made to update the literature until January 2017, a second systematic search was not conducted. Also, qualitative studies, book chapters, unpublished reports, theses or dissertations, as well as review articles were not included in this review; therefore, it is possible that some information was missed. Furthermore, several articles relating to PMPU could not be included, as no English-language version could be found.

The cross-sectional nature of the studies limited any inference regarding cause and effect. Most sample sizes were small, making generalizability difficult; furthermore, the studies were conducted in 19 countries, and the findings may not represent PMPU behaviour in other cultures.

3.7 Conclusions

This review has illustrated that PMPU exists in a subset of the population, to varying degrees. Factors associated with PMPU, such as depression, anxiety, and SUD, raise concerns regarding the potential impact on the population, particularly young people. Therefore, further explorations of PMPU are necessary, in order to develop a better understanding of the factors and mechanisms underpinning this behaviour, and establish to what degree PMPU can affect a mobile phone user's wellbeing.

To date, researchers tend to have adopted an addiction-based perspective, and employed the DSM-IV/5 dependence criteria for the exploration of PMPU, similarly to explorations of other potentially problematic behaviours, such as Internet use, gaming, and sex. However, solely focussing on addiction-based criteria may limit the scope of PMPU-related knowledge. Furthermore, very few studies explored mobile phone users' experiences with or opinions regarding PMPU, as part of their instrument development process. This has created certain limitations, and left a number of gaps in the literature, such as understanding of the perceptions and experiences of the mobile phone users. Future studies could adopt varied perspectives on PMPU, and include stakeholder experiences and opinions in their conceptualization of PMPU, thus leading to further development of understanding in the PMPU-related field.

CHAPTER 4. THEORETICAL FRAMEWORK

4.1 Introduction:

This chapter provides an overview of the author's methodological framework, and how this positioning has influenced the methods adopted in this thesis. Firstly, an overview of different epistemologies is provided, followed by a description of varying theoretical perspectives. Mixed-methods approaches to research are discussed, followed by a description of participation research, with a focus on youth participation. Finally, a description of the three studies that make up this thesis will be provided.

4.2 Theoretical underpinnings

Theory plays an important part in the guiding and development of a research study: the choice of a researcher's theoretical basis may influence research questions, types of data collection methods, as well as the analysis and subsequent interpretation of the results. There are several ways in which the theoretical underpinnings of research can be classified: Adams and Buetow (2014), for example, propose a six-layer theory framework, which includes background theory, grand theory, translational theory, foundational theory, methodology, and theoretical concepts. Conversely, Crotty (1998) proposes four elements for the theoretical basis of research: epistemology, theoretical perspective, methodology, and methods, represented in Figure 4.1.

For the purposes of this thesis, Crotty's theoretical framework for research will be employed to describe the theoretical foundations of the research. Each of the four segments described by Crotty will be discussed in the following sections.

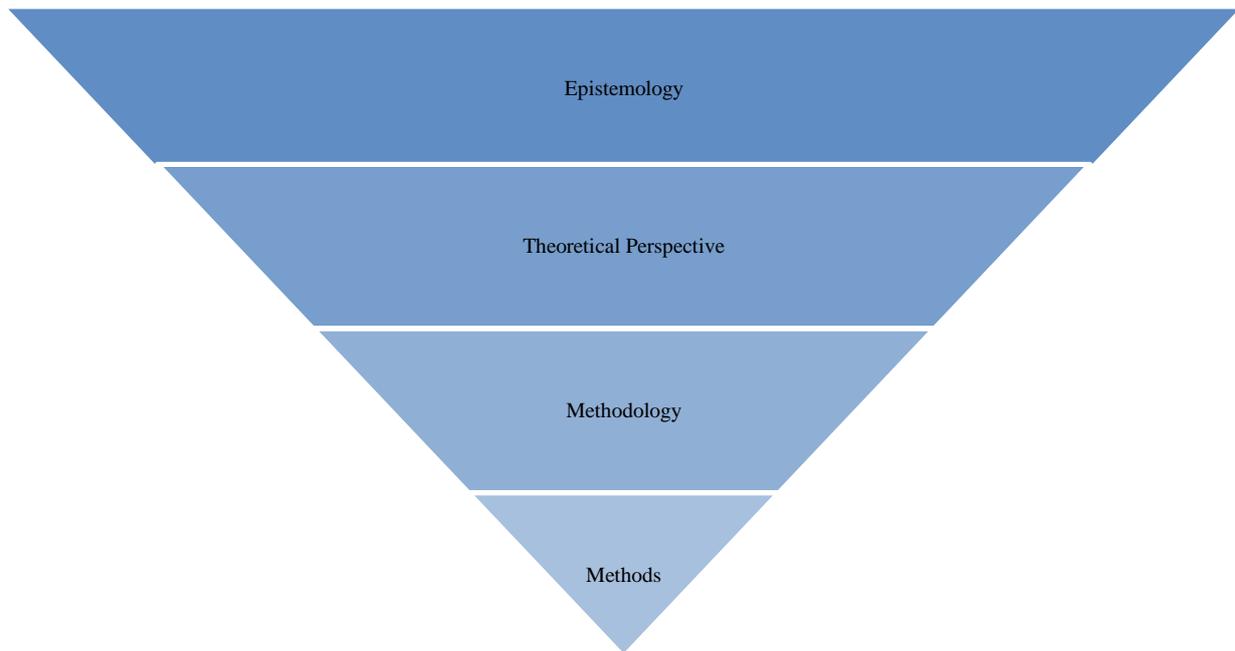


Figure 2: The four elements of the research process (Crotty, 1998)

4.3 Epistemology

Epistemology refers to the study of knowledge, its possibilities, scope, and general basis, therefore helping to determine how it is generated (Crotty, 1998). While Crotty (1998) identifies three primary epistemologies: Objectivism, Constructionism, and Subjectivism, there are a number of epistemological stances which can guide the research process. For the purposes of this thesis, pragmatism was found to be the most appropriate choice. As has been described in the introductory chapter, the aim of this thesis is to explore problematic mobile phone use in New Zealand adolescents, and to develop a youth-informed PMPU questionnaire. These objectives could not be fully achieved by the exclusive use of either qualitative or quantitative methods, and therefore a mixed methods approach was required. Thus, it would have been suitable to adopt an epistemology that requires the use of a single approach. The link between pragmatism and mixed methods research has been recognised by several methodologists, providing further support for the choice of pragmatism within the context of this thesis (Biesta, 2010; Howe, 1988; Johnson & Onwuegbuzie, 2004; Teddlie & Tashkkaori, 2012). Further, pragmatism fits well with participatory and action research, which is of relevance to this thesis, given the youth participation approach being adopted (Hope & Waterman, 2003; Johansson & Lindhult, 2008). The following sections will provide

brief overviews of objectivism, constructionism, and subjectivism, followed by a description of the pragmatism epistemology.

4.3.1 Objectivism

Objectivism views reality as external to the knower, independent of human experience; it is possible for this reality to become known, through the increasing accumulation of complete information regarding the world (Denzin & Lincoln, 1994; Crotty, 1998; Ratner, 2012). Objectivism is predominantly associated with quantitative research, given that it does not acknowledge the potential subjectivity of participants and researchers. However, some researchers argue that objectivity is possible within qualitative research; psychologists such as Wilhelm Dilthey stressed that concepts such as meaning should be objectively determined through rigorous, scientific procedures (Ratner, 2012). Unlike constructivism, which purports that reality and meaning are shaped by the humans defining them, objectivism defines the world as real, structured, and it can be shaped.

4.3.2 Constructivism

As opposed to objectivists, the Constructivist paradigm does not allow for an external, objective reality; instead, knowledge and meaning is constructed by each individual, based on their interactions with the world (Jonassen, 1991). From a constructivist viewpoint, given that reality and meaning are constructed by humans, they cannot be simply defined as 'objective'. Constructivism represents a shift from the aim to explain reality, typically found in the natural sciences, to an emphasis on understanding reality (Constantino, 2012). Within this context, researchers aim to explore multiple interpretations of social actions and phenomena, with a particular focus on participants' subjective views of the world (Creswell, 2003; Schutt, 2006).

4.3.3 Subjectivism

As opposed to constructivism, subjectivism does not claim that meaning is created through an interaction between subject and object; rather, meaning is imposed on the object, by the subject (Crotty, 1998). Subjectivism conceptualises subjectivity as the processes involved in what individuals feel, think, understand, imagine and remember, and those processes are entirely produced by the individual (Ratner, 2012). Subjectivist research views man as “pure spirit, consciousness, being” and reality is a result of human imagination (Morgan & Smircich, 1980).

4.3.4 Pragmatism

The pragmatism philosophical movement emerged in the United States, in the second half of the 19th century; Charles S. Pierce is usually considered to have been the founder of pragmatism, while other philosophers, such as W. James, J. Dewey, C.I. Lewis, W. van O Quine, H. Putnam and R. Rorty significantly contributed to the development of pragmatist ideas (Dillon, O’Brien & Heilman, 2000; Lewis-Beck, Bryman & Liao, 2004). James defined pragmatism as ‘a principle of method for estimating the practical value and results of philosophical conceptions’ (Bawden, 1904). The central concept of pragmatism is what Pierce termed the ‘pragmatist maxim’: “Consider what effects, which might conceivably have practical bearings, we conceive the object of our conception to have. Then, our conception of those effects is the whole of our conception of the object” (Hookway, 1997). Pragmatism rejects the concept of an absolute truth; rather, it views the ‘provisional truth value’ of a particular thought, action or phenomenon as a product of the observable outcomes (Putnam, 1995). Pragmatism emerged as a result of the debate between qualitative and quantitative researchers regarding the combination of these approaches, and the resulting conflict between subjective and objective epistemologies; the aim of Pragmatism was to develop a “middle ground” between methodological purists, and rejects the traditional dualisms (e.g. subjectivism vs objectivism) (Johnson and Onwuegbuzie, 2007).

Pragmatism accentuates both multiple and singular realities, in which the researcher can exercise a freedom of choice by not committing to any one philosophical approach and collect data via ‘what works’ in order to address the research question (Creswell & Plano-

Clark, 2007). Pragmatism focuses on what is useful and values the usefulness of knowledge more than its theoretical legitimacy (Lewis, 2006). Pragmatic researchers use all approaches available to understand and develop knowledge from the issue at hand. Pragmatism does not necessarily reject philosophical arguments in favour of conducting research; rather, pragmatists have concluded that epistemological debates cannot be resolved, due to the idea that meaning cannot be separated from human experience, and is therefore dependent upon context (Dillon, O'Brien & Heilman, 2000).

In terms of methodology, pragmatism supports the use of any approach that aids the process of addressing the research question, and the production of meaningful outcomes. In particular, pragmatism has been linked to mixed methods research, with some researchers considering it the 'philosophical partner' for mixed methods approaches to research (Denscombe, 2008). Four ways in which pragmatism fits with mixed methods, and underpins knowledge production have been identified (Denscombe, 2008). Firstly, pragmatism provides the means for the synthesis of different approaches, when the dualism between classic philosophies of research is deemed to be unproductive (Maxcy, 2003; Tashakkori & Teddlie, 1998). Secondly, it provides a basis for the use of mixed methods, when researchers find that neither qualitative nor quantitative methods alone would provide adequate results for their intended study (Johnson et al., 2007). Thirdly, pragmatism may be treated as a new philosophy, where it is not only acceptable, but also encouraged to use both qualitative and quantitative methods, given the underpinning belief that such mixing would result in better research (Greene et al., 2001; Rocco et al., 2003). Finally, pragmatism may be adopted based on its colloquial meaning, suggesting convenience or expedience. This results in the risk of pragmatism, and mixed methods approaches by extension, being regarded as an 'anything goes' approach, where one may seek to circumvent philosophical or ethical bases of research, in favour of an expedient research process. However, this is not the philosophical meaning of the pragmatism perspective, which recognises the importance of theory as a means of explaining and predicting phenomena (Denscombe, 2008; Goleis & Hirschheim, 1999).

However, pragmatism was critiqued as early as 1917, when Dewey employed a pragmatist viewpoint in his justification for the United States becoming involved in World War I. The use of pragmatism to support such a view resulted in the rejection of pragmatism by cultural critics, Marxists and Conservatives; this led to its eventual 'downfall' (Dillon, O'Brien & Heilman, 2000). While pragmatism has been revived in recent times, several weaknesses

have been noted, which were summarised by Johnson and Onwuegbuzie (2004). Due to pragmatism's focus on immediate and practical results, it may result in applied research being favoured, while basic research might receive less attention. As a result of its primary focus being on incremental change, pragmatism may result in delays in major societal changes, and scientific revolutions. The meaning of usefulness or workability may be considered vague, unless it is explicitly addressed by the researcher; further on the subject of usefulness, researchers have questioned who would benefit from a pragmatic solution, in the research process. Finally, pragmatism does not offer a solution for the existing philosophical and ethical disputes

4.4 Theoretical perspective

Crotty (1988) describes the theoretical perspective as the philosophical stance which underlies a researcher's choice of methodology, based on their view of the human world, and social life within that world. He identifies several theoretical perspectives, including positivism, post-positivism, interpretivism, critical enquiry, feminism, and postmodernism. Given that this thesis has adopted a post-positivist perspective, the following sections will focus on post-positivism, and its pre-cursor, positivism.

4.4.1 Positivism

Positivism is associated with the belief that reality exists independent of our observation or measurement, driven by immutable laws and mechanics of nature; it is usually associated with the natural sciences, such as physics, biology, chemistry (Denzin & Lincoln, 1994). Positivists suggest the investigator and the focus of the investigation are separate entities; therefore, the investigator is able to conduct the research without affecting or being affected by the "object" under scrutiny. Given that Positivism subscribes to an Objectivist epistemology, inquiry is considered to be completely objective, with biases and values being prevented from affecting the outcome of the research, as long as the methodological rigors are followed (Creswell, 2009). Positivist research aims to develop generalizable laws, which can subsequently be used to predict the likelihood of a phenomena occurring. However, Positivism has been criticised for its reductionist approach of minimising or removing factors

which may introduce bias, as such an approach may result in difficulties applying results or laws to a complex real-life context (Andrew & Halcomb, 2009).

4.4.2 Post-positivism

Post-positivism resulted from the numerous criticisms received by the positivist perspective. While Positivism assumes knowledge is absolute, quantifiable and verifiable, and does not allow for subjectivity, Post-positivism views research findings as the interpretations of the researcher. Therefore, it acknowledges that research findings are not purely certain and objective (Creswell, 2009). This theory was first implemented by Frege, in the early 19th century, and is another name for philosophical realism – the idea that an independent reality exists, which can be measured. While post-positivism does not strictly adhere to this theory, in the same way that it does not maintain the dualist claim that researcher and object can be independent, it does emphasize external guardianship of objectivity, such as critical traditions – always questioning whether the findings fit in with already existing knowledge, and the role of the critical community, such as professional peers, or reviewers (Creswell, 2009). Post-positivism allows for the inclusion of qualitative, as well as quantitative data within the process of inquiry. This aims to redress some of the critiques of positivism, by allowing for the conducting of research in more natural settings and collecting more situational information. However, while the researcher subscribes to the overall positioning of post-positivism as a paradigm, within the actual research a continual, reciprocal relationship is maintained between the theoretical specifications and principles of post-positivism, and the pragmatic requirements of undertaking scientific inquiry within the field (Guba & Lincoln, 1989).

4.5 Methodology

Crotty (1998) defined research methodology as a “plan of action...research design that shapes our choice and use of particular methods and links them to the desired outcomes”. Gray (2014) describes several methodologies, including experimental and quasi-experimental research, phenomenological research, analytical surveys, action research, and heuristic

inquiry. Experimental research involves the random allocation of subjects into experimental and control groups, in order to identify whether and how dependent variables affect independent variables. Phenomenological research employs somewhat unstructured data collection methods, with the aim of producing in-depth descriptions of people's perspectives and experiences, within their natural settings. Analytical surveys, conversely, are highly structured, and aim to test a particular theory in a "real-life setting" through the exploration of potential associations between variables. Action research is based on the close collaboration between researchers and practitioners, and aims to explore the perspectives and attitudes of those practitioners, in order to promote change within varying organisations. Heuristic inquiry is auto-biographical, and seeks answers to a usually personal problem or question through self-reflection (Gray, 2014).

Mixed-methods research has not been classically defined as a methodology, but a method. However, some researchers advocate the conceptualisation of mixed-methods as a methodology, given its methodological pluralism (Burke-Johnson & Onwuegbuzie, 2004; Burke-Johnson, Onwuegbuzie & Tutner, 2007; Giddings & Grant, 2007; McEvoy & Richards, 2006). For the purposes of this thesis, mixed-methods research, with an exploratory sequential procedure was adopted as the research methodology. The following sections will discuss mixed methods research, strategies for mixing methods, and their advantages and disadvantages. This will be followed by a discussion of the youth participation approach, and its influences on the thesis methodology.

4.5.1 Mixed methods

Research and the resulting data can be split into two primary categories: qualitative and quantitative. Quantitative data are defined as empirical information in the form of numbers, produced by measurement. Qualitative data, on the other hand, can be defined as empirical information about the world, predominantly in the form of words (Punch, 2005). The key difference between the two types of data lies in the process of measurement and the theoretical basis (positivism and constructivism), which has often led to rigid positions on research, coined 'methodological purism' (Johnson et al, 2004; Punch, 2005). Researchers have argued that due to the opposing nature of positivism and constructivism, it is impossible to successfully combine qualitative and quantitative data (Maxwell & Delancy, 2004).

However, more recently, with the decline of methodological purity, research approaches have become more flexible. This is particularly evident in the increased prevalence of mixed-methods approaches, usually supported by a pragmatist perspective (McEvoy & Richards, 2007). Definitions of mixed methods research vary considerably across the literature; Johnson, Onweugbuzie and Turner (2007), for example, provide 19 different definitions, acquired from leading methodologists. The vast majority of definitions conclude, however, that mixed methods involves both quantitative and qualitative research, while some also advocate for the mixing of different methods within a particular research paradigm.

There are a number of advantages to combining quantitative and qualitative research methods. Mixed-methods research can be used in exploratory studies, in order to develop a deeper understanding of a particular phenomenon, or to generate new theoretical acumen. Further, it can provide stronger inferences than a single worldview or method (Teddlie & Tashakkori, 2008). Mixed methods also provide an opportunity for a greater inclusion of views, be they divergent or convergent. Divergent findings may result in a re-examination of the conceptual framework of the research, thus developing the understanding relating to a particular phenomenon. Convergent findings, on the other hand, provide a holistic perspective of a certain phenomenon, and may further understanding relating to the specific components of that phenomenon, and how they interrelate (Teddlie & Tashakkori, 2008; Venkatesh, Brown & Bala, 2013). Finally, the use of mixed methods research is supported by the pragmatist perspective, which was adopted for this thesis (Lipscomb, 2008; McEvoy & Richards, 2006; Mingers, 2002).

4.5.2 Strategies for mixing methods

Creswell and colleagues (2011) described four primary approaches to mixed methods research: convergent, embedded, sequential, and multiphase designs. Convergent methods focus on collecting both quantitative and qualitative data simultaneously, but the data are collected and analysed separately; equal priority is awarded to both types of data, and they are combined during the interpretation of the findings (Creswell et al., 2011). Embedded methods also include the simultaneous collection of qualitative and quantitative data; however, in this case, one type of data is considered primary. During the analysis phase, the secondary data is 'embedded' within the primary data (Creswell et al., 2011). Sequential

methods can be defined as either explanatory or exploratory; explanatory sequential designs focus on quantitative data collection and analysis, which is given priority, followed by the collection and analysis of qualitative data. Such a method is usually employed when the researcher has existing knowledge about the subject being evaluated, and wishes to develop said knowledge. Conversely, exploratory sequential data analysis places more emphasis on the qualitative stage, and quantitative methods are used to extrapolate or generalise the data. Exploratory sequential methods can be employed in cases where researchers wish to develop a new measurement instrument or tool, based on the findings of the qualitative study (Creswell et al., 2011). One such example is the work conducted by Stoller and colleagues (2009); they explored drinking decisions among non-abusive drinkers, given that most research on the subject of drinking decisions is based on abusive drinkers (i.e. those who meet the DSM-IV alcohol abuse criteria). They employed a combination of focus groups and Internet postings to identify the types of drinking decisions made by their target population; subsequently, a survey was developed to estimate the prevalence of the newly identified decision factors among non-abusing drinkers (Stoller et al., 2009). Finally, multiphase designs allows for multiple research projects with a common aim to be conducted within a general mixed-methods framework (Creswell et al., 2011).

4.5.3 Exploratory sequential design in the current research

As previously mentioned, for the purposes of this thesis an exploratory sequential procedure was utilised, with the final aim of developing and testing a PMPU questionnaire. This decision was influenced by a number of considerations. Firstly, as discussed in the literature review (Chapter three), extant literature on PMPU focussed primarily on quantitative approaches, adopted an addiction perspective to PMPU, and very rarely included the views and experiences of participants in the questionnaire design process. Given the limited availability of information on PMPU, and the critiques regarding existing PMPU assessment questionnaires, the development of a new questionnaire was considered necessary. As discussed in chapters two and three of this thesis, previous research on PMPU was conducted from a researcher-driven perspective, and viewed through an ‘addiction’ lens which may not be appropriate, or the best fit for its assessment. Therefore, the perspectives and experiences of youth were a fundamental part in the development of the questionnaire.

In the current research, three studies were employed: a qualitative study (focus groups), a series of consensus building sessions (used for the development of the questionnaire), and a quantitative study (online survey) which applied the questionnaire to a sample of NZ adolescents. The three studies were conducted and analysed separately.

A central feature of mixed methods design is the integration of data, in order to minimise the disadvantages and maximise the advantages of each form of data and research method; this integration may occur at different stages of the research process, depending on the study aims and design (Creswell, Klassen, Plano Clark & Smith, 2011; Hanson, Creswell, Clark, Petska & Creswell, 2005; Ivankova, Creswell & Stick, 2006; Teddlie & Tashakkori, 2006). In this thesis, data integration occurred at two different stages: firstly, the questionnaire design which took place in the second study involved the inclusion of key themes from the focus groups (study 1, Chapter 5). Secondly, in the final discussion (Chapter 8) findings from the qualitative and quantitative studies were compared, in order to identify similarities and differences between the two sets of data.

4.5.4 Strengths and weaknesses of sequential exploratory design

The strengths and weaknesses of sequential exploratory designs are summarised by Creswell and Plano-Clark (2011). When compared to other methods, the sequential exploratory design is simple and straightforward to implement, and is the best method when extant research on the subject is limited. Furthermore, the addition of the quantitative phase may increase the acceptance of the research findings by quantitatively oriented audiences (Creswell & Plano-Clark, 2011; Hanson, Creswell, Clark, Petska & Creswell, 2005). Nevertheless, there are some limitations associated with this particular design. Firstly, there are potential time constraints involved, as it is not possible to conduct studies concurrently; instead, each study is conducted separately, and the second study cannot be commenced prior to the completion of analysis for the previous study (Creswell & Plano-Clark, 2011). Secondly, some of the practical limitations of both qualitative and quantitative research may be applicable in sequential exploratory studies, such as lengthy recruitment periods, particularly for difficult to reach populations, such as adolescents. Thirdly, findings from the initial qualitative phase may require changes to subsequent phases, and therefore a degree of flexibility is necessary.

4.5.5 Participatory research

During the 1960s, shifts both within academia and socio-political movements resulted in challenges to the positivist status quo, and in an exploration of new practices of inquiry and social theories. Subsequently, consideration was given to the role of the researcher, the role of community participation, ownership of knowledge, and the importance of power relationships suffusing the research process (Wallerstein & Duran, 2008). From these questions and explorations regarding different roles emerged a new participatory research paradigm, which included a wide variety of terms and approaches, with different disciplines often developing their own; examples include classroom action research in the field of education, industrial action research in the field of organisational psychology, and street science in public health (Wallerstein & Duran, 2008).

Participatory approaches to research first emerged in the 1940s, under the name 'action research'. Kurt Lewin developed the concept of action research as an attempt to address gaps between research and practice; he described it as a "a comparative research on the conditions and effects of various forms of social action and research leading to social action", that uses "a spiral of steps, each of which is composed of a circle of planning, action and fact-finding about the result of the action" (Lewin, 1946). The core feature and purpose of action research is to solve a particular problem, and subsequently produce guidelines for best practice (Denscombe, 2010).

Further developments arose in Africa, Asia and Latin America during the 1970s, when social science and education academics began working with community-based organisations, and started shifting the concept of knowledge from one developed by the academy, to knowledge which arose from people's experiences (Wallerstein & Duran, 2008). Freire (1970) in particular influenced the move from viewing communities as objects of study to community members participating in the inquiry.

Participatory research eschewed positivist aims of determining objective truths, and suggested traditional methods of inquiry de-valued experiential or lived knowledge, reinforced the passivity of research subjects, and obscured other voices (Wallerstein & Duran, 2008). Instead, participatory research adopted emancipatory approaches and drew on critical social theory, which approaches knowledge as socially and historically constructed. Within the participatory research field, a particular subset which is of concern for the

purposes of this thesis is youth participation. The following section will provide a brief account of the historical background of youth participation, followed by a description of Hart's Ladder of Participation.

4.5.5.1 Youth participation

A number of definitions of youth participation have been proposed; for example, the U.S. National Commission on Resources for Youth (1976) describe it as “involving youth in responsible, challenging action, that meets genuine needs, with opportunity for planning and/or decision making affecting others, in an activity whose impact or consequences extends to others”. The New Zealand Ministry of Youth Development defines youth participation as “creating opportunities for young people to be involved in influencing, shaping, designing and contributing to policy and the development of services and programmes” (MYD, nd.)

Participatory approaches within the field of child and youth research were rare prior to the 1990s (Moules & O'Brien, 2012). Earlier conceptualisations primarily focussed on children as incomplete, viewing them from the prism of what they will potentially become, as opposed to what they are, and therefore that they had less knowledge and competence than adults (Alaen, 1990). Additionally, the predominant view regarded young people as incompetent, deviant, and in need of control (Lansdown, 2001). This resulted in research being conducted from an 'adultist' perspective, often discounting the experiences of children and young people. For example, even when researching children's experiences, some social scientists chose to do so through 'adult proxies', such as teachers or parents, as opposed to allowing the children themselves to provide answers and knowledge (Waksler, 1986).

During the late 1980s, perspectives regarding children began to shift; in 1989, the UN adopted the Convention on the Rights of the Child, which outlined guidelines for the provision of services and protection from abuse, as well as the need for young people to participate in decisions which affected them (UN, 1989). In the UK, the Butler Sloss report (1989) (an investigation regarding child abuse) concluded that, due to professionals such as social workers and doctors focussing on what they viewed as the children's best interests, they ignored the young people's own views and wishes; the report recommended that professionals should not treat children as 'objects of concern'. This coincided with critiques

by social science researchers of the ‘adultist’ approaches taken in child and youth research, and resulted in researchers attempting to find new ways of working with, as opposed to on, children (Valentine, 2016). This primarily focussed on addressing the distribution of power in research, and allowing young people to inform and transform research practices (Fox, 2013).

4.5.5.2 Types of youth participation

There have been a number of models which have been developed to illustrate the different types of youth or child participation. The most widely referred to model is Hart’s Ladder of Participation (1992), which identified eight possible levels of youth participation:

1. Manipulation: the use of young people by adults to support causes that are described as ‘young-people inspired’
2. Decoration: indirect use of young people to help or support a cause
3. Tokenism: relates to the appearance of young people having a voice, and their perspectives being included, while not having any choice regarding how they participate
4. Assigned but informed: young people are assigned a specific role, and are informed about how and why they are involved
5. Consulted but informed: relates to young people providing advice and input on programs and projects that were designed by adults; young people are informed of how their input will be used
6. Adult-initiated, shared decisions with young people: this level can be described as Participatory Action Research, as programs or projects are initiated by adults, but decision-making power is shared with young people
7. Young people-initiated and directed: at this level, young people initiate and direct a program, while adults are only involved in a supportive role.
8. Young people-initiated, shared decisions with adults: relates to programs or projects which are initiated by young people, and decision-making is shared between young people and adults. This rung of the ladder can be described as youth-adult partnerships, as projects operating at this level would empower young people, while also providing them access to the expertise and life experience of adults

While Hart's model is often employed or cited, it has also been criticised, particularly relating to its linear conceptualisation, and use of a hierarchical representation to suggest that higher levels are 'better' than lower ones (Head, 2011). McAuley and Brattman (2002), however, suggest that this may not be the case. For example, a project operating successfully at level 4 of Hart's Ladder, may be more meaningful, and more effective, than a project operating poorly at higher levels.

Hart's Ladder serves as a framework for the inclusion of youth participation within the present thesis. The three studies described in the following chapters took a practical, rather than a theoretical approach to youth participation, by asking young people to define what "problematic mobile phone use" means, and use their perspectives and experience regarding PMPU to help develop a psychometric scale. Thus, the research operated at levels 4, 5 and 6 of Hart's model (Hart, 1992).

Adopting a youth participation approach offers access to young people's experiences and knowledge in a way that is less affected by dominant adult perspectives (Dentith, Measor & O'Malley, 2009). Alderson (2004) further argues that 'the advantages of children having greater control over producing and analysing data are that they may enjoy the research process far more... and that the findings may more accurately report children's own views and experiences'. One New Zealand based example of adopting a youth participation approach to research, was the work that Christie and colleagues undertook while developing a screening instrument for alcohol and other drug use in young people (Christie et al., 2007). Young people were consulted, and asked to give feedback on both the content and structure of the instrument, during its development. The scale was found to be reliable and valid, and also have a high level of acceptability from young people (Christie et al., 2007).

4.6 Methods

Crotty (1998) defines methods as the procedures and techniques employed in the process of collecting and analysing research data. For the purposes of readability, in-depth discussions of methods for each study were included in the next. The following section provides a brief description of the population of interest for the research, as well as a general overview of the three studies which comprise this thesis.

4.6.1 Population

The literature describes the population most susceptible to this phenomenon as ‘adolescents’. Unfortunately, the definition of adolescence varies considerably between disciplines. Therefore, a pragmatic approach will be adopted for this research.

The definition of adolescence with the broadest spectrum quotes an age range of 10-25 (APA, 2002.). One might find participants aged 10-19 most easily through schools: 10-12 year olds in intermediate schools, 13-19 year olds in high schools. However, research into New Zealand ownership of mobile phones suggests that only 59% of 12 year olds own a handset, while 76% of 13 year olds own a handset (<http://www.censusatschool.org.nz/news/33000-children-have-their-say/>). This substantial difference may be associated with the transition from intermediate school to high school. It is noted that this research was conducted in 2005; unfortunately, more recent information on mobile phone ownership amongst NZ adolescents could be found. Such statistics, however, are pertinent to the current research, given that including 10-12 year olds would require an entirely different recruitment process, as they would be intermediate-level students, and not high school students. Thus, their inclusion may be too impractical, when considering time and resource restrictions.

While individuals above the age of 18 or 19 are rarely classified as adolescents, for the purposes of this research, they were considered for this study, in order to keep within the broadest definitions of adolescence in the literature. It was important to take into account the numerous transitions that occur after the age of 18: from high school to university, or to full time employment, from living with parents to living with friends, and psycho-social developments that occur in the end stages of adolescence and transition to adulthood (Steinberg, 2005). Due to the fact that throughout the research, participants would be recruited through youth organisations and secondary schools, it was considered that the inclusion of individuals aged above 19 years would be challenging. In conclusion, an age range of 13-19 years was adopted for the current thesis.

4.6.2 Study 1 – focus groups

Study 1 aimed to investigate mobile phone use in New Zealand high school students, and explore objectives 1-3 of the overall research study. As the purpose of this initial study was to explore the views and experiences of young people relating to mobile phone use, it was deemed appropriate that a qualitative approach be employed. This would allow for the collection of sufficiently detailed data, which was used as a platform for the following studies in this thesis. An inductive approach was utilised for this study, not only because it fits with critical realist methodology, but also because it best fulfilled the requirements and aims of this research – as stated above, to explore mobile phone use behaviour in New Zealand adolescents.

Due to the fact that adolescents are not necessarily experts in this field, it appeared that utilising interviews as the data-collection method would not have yielded the level of detail that is required for this study. On the other hand, focus groups would allow for participants to share information, and develop ideas while being recorded, thus potentially producing richer data (Ritchie & Lewis 2003). Participants were audio recorded, and the data were transcribed by the researcher. Transcriptions were thematically analysed, and coded into themes and sub-themes by the researcher; the data were also reviewed by a second coder, to ensure accuracy and consistency of coding.

The focus group discussions included frequency and intensity of use, attachment to their device, reasons behind mobile phone use, and possible problems associated with mobile phone use. Further, participants were asked to discuss what they thought problematic mobile phone use is, and how it affects mobile phone users. This section served to gain a preliminary understanding of mobile phone use habits within the New Zealand high school population. Also, by exploring definitions and understandings of problematic mobile phone use, it provided a platform from which the second study of this project was developed.

4.6.3 Study 2 – developing the questionnaire

Study 2 utilised a modified consensus building method to explore objective 4 of the overall research study, in order to develop a PMPU questionnaire in consultation with New Zealand

high school students. A three step process was employed for the development of this scale, including 10 focus groups of young people aged 13-19.

In the first step, 4 focus groups of young people were asked to produce questions that they would ask their friends if they wanted to find out if that friend had a problem with their mobile phone use. These questions were collated and re-written as Likert scale items.

The second step required four focus groups of young people to evaluate each item by rating it on a scale of 1-10, offer feedback regarding the way it is written, its relevancy to young people and the topic, and produce any items that they felt were missing from the collection they were provided with. The findings were collated, and the items were re-developed using Cognitive Behavioural Theory as a framework. New items were developed based on findings from study 1, the extant literature, and the basic principle of cognitive behavioural theory. These items were developed in order to fully explore the cognitions, behaviour and emotions related to problematic mobile phone use. The questionnaire was also examined and feedback was provided by experts in youth research, clinical psychology, addictions, and survey development.

The final step required two focus groups of young people to evaluate each item and comment on their suitability for New Zealand adolescents, as well as discussing the relevancy of each item.

4.6.4 Study 3 – an online survey

The third study of this thesis sought to explore PMPU within a sample of New Zealand young people. A questionnaire was employed to explore objectives 5, 6 and 7 by collecting data on: demographics, mobile phone use, problematic mobile phone use, and negative consequences associated with PMPU.

The data was collected using an online survey, which may be more attractive to young people, as it utilises a technological medium, rather than a paper version, which might evoke test-taking experiences (Stern, 1999). Research also suggests participants are more likely to answer truthfully if responding to an online or hard-copy questionnaire, rather than person-to-person interviews or focus groups (Stern, 1999). Furthermore, an Internet based survey may

result in more accurate results, as it would nullify the need for data entry into statistical analysis software, thus eliminating the chance of human error, and ensuring the responses are correctly analysed. The section assessing problematic mobile phone use was formed from the final set of items developed in study 2 of this thesis. Initially, a pilot study was conducted, in order to test the survey procedures, and identify any potential issues. Based on this initial study, some changes were made, and the survey was fully implemented.

4.7 Ethical considerations in youth participation research

The inclusion of youth perspectives within a research project, and the conceptualisation of young people as active, as opposed to passive participants leads to a number of practical implications. For example, Robinson and Kellett (2004) note that ‘the transition from viewing children as objects to viewing them as social actors is not simply a matter of ideological reflection, it has a real impact on the conduct of research practice – on the initial choice of topic, the nature of design, and type of methodology’. However, despite the fact that research has increasingly moved towards adopting participatory approaches when focussing on young people, the ethical principles guiding such research have in many cases failed to also evolve: for example, while the concept of ethics, and ethical practices in research are exceptionally important to the safeguarding of all research participants, current guidelines are not necessarily appropriate in every case, and may in some instances violate the individuals’ rights, while attempting to protect them. Skelton (2016), for example, notes that many ethics applications (including those which need to be completed by social researchers) are based on medical research protocols, as evidenced by the presence of questions relating to the collection of bodily secretions or the use of pharmaceutical drugs. Skelton parallels this with the increasing critique of medical principles of safety and ethics in the research environment, using the example of researchers in the United Kingdom arguing that recent National Health Service guidelines included ‘excessive paperwork, restrictions on approaching study volunteers and seemingly arbitrary judgements by ethics committees’ (Randerson, 2006). While this is only one example, it represents current debate among researchers regarding the appropriateness of the ethical guidelines currently in place across the majority of research institutions, and at what point these guidelines cease to protect the participants, and begin disadvantaging them.

4.7.1 Consent

The issues of access to and consenting of young people in research raises a number of difficulties. Firstly, Tymchuk (1992), notes a distinction between consent and assent, where consent refers to an individual agreeing to take part in research, based on the disclosure of relevant information, while assent describes parents or guardians indicating their agreement for a minor under their care to take part in research, subject to the minor's assent. This is evident in New Zealand, where conducting research with young people under the age of 16 requires the consent of a parent or guardian. Valentine (2016) suggests that restricting young people under the age of 18 or 16 from providing consent is derived from Piaget's (1952) conceptualisation of children as passing through a series of age-related developmental stages, which assumes a difference between the ability of children and that of adults to consent.

Sippola (2006) argues that the use of a chronological benchmark to determine competency, and not on cognitive capacity, violates the basic ethical principle of respect for the participants' autonomy. The discrepancy between this standard and statutory age of consent in medical treatment is further noted by the author – for example, in New Zealand it is legal for a woman of any age to seek an abortion, and it is legal for an individual of any age to obtain contraception (despite the legal age for sexual activity being 16 or above). Sippola (2006) also suggests this violation of the participants' rights may result in negative responses from the young people in relation to the consent procedures – refusal to participate, lack of co-operation during the recruitment and research process, or simply forging their parents' signatures.

Conversely, by giving more importance to an adult's consent than a young person's assent, this may affect the process of gaining informed consent – in many cases, a researcher must rely on parents or other gatekeepers to inform potential participants of the study, without the certainty that the young person had subsequently agreed to take part of their own accord, without parental or gatekeeper influence (Valentine, 2016). This concern is also present in the school environment – if children are used to what Ireland and Holloway (1996) term 'rule following behaviour', they may feel pressured, either by authority figures or by their own peers, and against their own wishes, to take part in research. Valentine further notes that researchers conducting studies in schools are often presented to young people as 'surrogate teachers', and enjoy some teacher privileges, such as access to a staffroom; thus, by being

temporarily conceptualised as part of the power structure in a young person's life, researchers may willingly or inadvertently benefit from institutional and societal norms regarding children's compliance (Valentine, 2016).

A further issue regarding adult 'gatekeepers', such as in the case of schools, is that often gaining access to young participants involves a 'chain of negotiation'. Valentine (2016) describes this process as commencing with an evaluation of the school secretary as to the validity of the request for access; this is then forwarded to the Head Teacher or Principal, who evaluate the research in terms of feasibility and educational value, as well as value to the school, followed by an assessment of individual teachers, who might evaluate the study in terms of its time demands and impact upon lessons. While all these processes are designed to filter out inappropriate requests, avoid impacts upon the educational process of young people, and safeguard them from being excessively researched, they also represent a lack of respect for the young people's autonomy, and their ability to decide whether or not to take part in the study (Valentine, 2016; Sippola, 2006). Indeed, every step in the negotiation between researcher and gate-keeper represents an opportunity for potentially willing and interested young participants to take part in a study.

4.7.2 Applying ethical principles in the present research

The conceptualisation of research procedures for the three studies included in this thesis was a balancing act between the guidelines and restrictions found within general ethical requirements, and the inclusion of young people as active research participants.

Acquiring consent at different levels primarily followed best practice ethical principles – first, consent was gained from the various institutions (schools and after-school programmes) from which young people were to be recruited. Given the relatively large number of participants necessary to fulfil the aims of the research, a more youth-friendly option was unrealistic.

Regarding parental consent, an overarching 'opt-out' approach was taken for this research. In the case of each study, parents were informed that their young person had been invited to take part in a research project, and if they did not wish for them to participate, they would have to

inform their young person of this. In particular, in the case of the school based study (Chapter 7), the researcher did not have the ability to prevent anyone from taking part, given its anonymous nature.

Providing adequate and appropriate information to participants was a key consideration in the research. France (2004) argues that information provision and informed consent represent key aspects of providing young people with a participatory role in the research, particularly given the risk that once consent or access is gained from adults, less attention or importance is ascribed to adequately informing young participants. In order to achieve this, all documents which were provided to the participants were first evaluated by a youth research expert. Further, in the first two studies (Chapters 5 and 6), the researcher allocated 10 minutes at the start of each data collection session for the purposes of discussing the aims of the study, what it involved, what the potential risks were, and the participants' right to opt out of the study at any stage during the session.

Participant consent, as opposed to assent, was obtained for every study – it was argued that the subject matter was very relevant to young people, and they would be capable of offering their own consent, despite being under the age of 16. For the first two studies, consent was obtained via a signed document, after the study, its aims and potential risks were discussed with the participants. Given that the third study employed an online data collection method, written consent was not possible; instead, participants had to indicate their consent by “checking” an option on the online survey which stated that they agreed to take part in the study; this electronic consent form was placed after the Participant Information Sheet.

The physical and emotional safety of participants was a primary consideration in the procedure development: first, the issue of location was explored – conducting the research in a place where participants would feel safe and comfortable, while also affording them privacy from adults. For the first two studies, the research took place on the premises of participating organisations; other options, such as asking participants to travel to University of Auckland premises, were considered but were found to be both impractical and conflicting with the aforementioned principles. However, the research was undertaken in enclosed spaces (as opposed to an open-space meeting room, for example), thus providing participants with

privacy. In the case of the third study, participants could complete the survey from any location where they had access to a computer and Internet.

It was also important to consider the potential emotional and psychological impact the research might have on participants; while discussions and questions were designed to be as innocuous as possible, topics such as problematic use of mobile phone technology could have possibly lead to realisations by some participants that their own use might represent a problem. Thus, support was offered to all participants, should they need it; in the case of after-school care organisations, this was achieved by informing the various Group Leaders (adults who were responsible for the young people during their presence at the organisation) of the potential risks, and possibility of the subsequent need for some young people to discuss their mobile phone use, as well as information being provided to the participants regarding Youthline, an organisation which provides confidential face to face and phone counselling for young people (www.youthline.co.nz). In the case of schools, guidance counsellors were informed of the study, and of its potential risks, in case any student wished to discuss the research; participants were also provided information regarding Youthline, as well as the availability of a guidance counsellor at their school, with whom they could discuss any potential issues.

4.8 Chapter summary

This chapter has provided an overview of the epistemological, theoretical and methodological aspects of this thesis. Methods were briefly described, as specific methods and procedures relating to each study are presented in subsequent chapter (5-7). This research adopted a pragmatism epistemology, and a mixed methods approach; data were collected using both qualitative and quantitative methods. A youth participation approach was also adopted in this research. The following three chapters will outline the qualitative, consensus-building, and quantitative studies included in this thesis.

CHAPTER 5. A QUALITATIVE EXPLORATION OF YOUNG NEW ZEALANDERS' RELATIONSHIP WITH MOBILE PHONE USE

5.1 Introduction

This chapter provides an account of the first in a series of three studies which comprise this thesis. The purpose of this study was to attempt an initial exploration of the relationship between New Zealand youth and mobile phone technology; such an exploration would serve to identify the meaning of mobile phone use to New Zealand adolescents, and to evaluate whether, based on the participants' perspective and experience, problematic mobile phone use behaviour is present within the New Zealand youth community. Very little qualitative research has been conducted on the subject of problematic mobile phone use, and none has been attempted either in New Zealand, or with individuals below the age of 18 as the target participant. Thus, the research has attempted to fill a gap in the literature. The study was also designed to inform the development of subsequent stages of the doctorate.

The contents of this chapter were published as a paper in the *International Journal of Mental Health and Addictions* (Vacaru, M. A., Shepherd, R. M., & Sheridan, J. (2014). New Zealand youth and their relationships with mobile phone technology. *International Journal of Mental Health and Addiction*, 12(5), 572-584), and presented at the 10th International Congress for Adolescent Health.

5.2 Rationale and aims

The need for this study arose primarily from the scarcity of existing qualitative research on the subject of problematic mobile phone use. As detailed in Chapter 3, investigative efforts into this field have been predominantly used a quantitative methodology, with the primary purpose of identifying the prevalence of PMPU and its associations with various psychosocial variables (Bianchi & Phillips, 2005, Jenaro et al., 2007, Lopez-Fernandez et al., 2013, Lu et

al., 2011, Martinotti et al., 2011, Park, 2005, Sanchez-Martinez & Otero, 2009, Yen et al., 2009).

Further, an a priori, addiction based approach in regards to explorations of PMPU has been adopted in previous research, which may have limited the potential spectrum of understanding of mobile phone use behaviour. Qualitative explorations of PMPU would allow for the inclusion of individual, in-depth experiences related to mobile phone use, and thus provide a platform for the development of a more comprehensive understanding of the phenomenon as a whole (Denzin & Lincoln, 1998).

Finally, as far as the candidate had been able to determine at the time of conducting this study, there had been very little research undertaken into this subject which has taken a qualitative approach to the experiences of young people regarding problematic use of mobile phone technology. It was important to ascertain young people's perspective on this subject, primarily in order to determine whether or not they believed mobile phone use could become a problematic behaviour. If the stakeholder population does not believe their behaviour to be problematic, and furthermore such a behaviour (perceived by adults as problematic) is embraced as the sociocultural norm by young people, then this may raise questions in regards to the validity of exploring this topic from a 'problem' perspective.

Thus, the present study was designed as an initial solution to the problems described above, which needed to be resolved in order for the candidate to confidently proceed with the exploration of problematic mobile phone use. Four research questions were established for the purposes of this study, corresponding to the first three research objectives of this thesis.

1. What does mobile phone use mean to the New Zealand adolescent population?
2. How do youth define and identify problematic mobile phone use?
3. Do young people believe 'problematic' mobile phone use (PMPU) exists in the New Zealand adolescent population?
4. Why do New Zealand adolescents believe individuals engage in PMPU?

5.3 Data collection and analysis strategies

The following section will provide an overview of the different strategies of data collection and analysis in qualitative research.

5.3.1 Data collection

A number of data collection strategies are available to qualitative researchers, such as observation, note-taking, self-completed questionnaires, written texts, interviews or case studies (Buetow, 2007).

Given the overarching aims of the study, in particular the importance of exploring young people's opinions on the subject of PMPU, interview-type data collection was the most appropriate method. However, the interview method itself allows for a number of choices in the way in which it is applied: whether it is via phone, computer or face-to-face, whether it is unstructured, semi-structured, or structured, and most importantly for this study, whether it is an individual or group interview (focus group) (Buetow, 2007; Fontana & Frey, 2000).

While individual interviews and focus groups may appear similar in nature, they are inherently different in a number of aspects. For example, analysis of the effectiveness of individual interviews suggests that this method allows for more production of individual ideas than focus groups. Fern (1982) determined that each participant in a focus group on average produced only 60-70% as many ideas as individuals who took part in individual interviews. Interviews are also seen as more confidential and personal, allowing the researcher to focus on one individual at a time, and potentially engage in a deeper discussion of the topics (Billups, 2012).

Focus groups, on the other hand, have a number of advantages: firstly, the data produced by this method are not limited to the sum of the information and opinions that participants produce, but is enriched and deepened by the interaction between participants. This phenomenon, called the "group effect", results in the exploration of consensus and diversity of participant opinions, while also allowing further discussions based on the processes of queries and explanations participants offer each other (Dey, 1993; Billups, 2012).

Focus groups also allow for participants to support each other during discussions, and provide a less intimidating environment than that of interviews. As the current study involved the participation of young people, it was felt that a comfortable and supportive environment would be more beneficial to both the participants, and the research process (Billups, 2002). Focus groups are also more effective for research constrained by time or resources, as a broader range of discussions and richer data can be produced in one focus group session, than in an interview (Buetow, 2007; Frey & Fontana, 1991).

5.3.2 Data analysis

Denzin and Lincoln (1996) argue the importance of defining the ‘strategy of inquiry’ a researcher aims to adopt when utilising qualitative methods. However, there is no ideal technique for analysing qualitative data, and the choice of technique must match the researchers’ worldview, and the research aim (Braun & Clarke, 2006; Dey, 1993). Several techniques are available to researchers, including discourse analysis (Budd & Raber, 1996), ethnography (Graneheim & Lundman, 2004), content analysis (Stemler, 2001), phenomenology (Groenewald, 2004), grounded theory (Glasser & Strauss, 1967), and thematic analysis (Braun & Clarke, 2006; Guest, MacQueen & Namey, 2011; Thomas, 2006).

Of these possible techniques, thematic analysis was found to be the most appropriate for this research. Firstly, thematic analysis does not adhere to a particular research paradigm, and can therefore be applied to a wide range of worldviews; therefore, it fits well with pragmatism, and mixed methods research (Alhojailan, 2012; Joffe, 2012). Secondly, thematic analysis shares a number of advantageous features with some of the previously mentioned analysis methods; for example, similarly to grounded theory, it can be used to develop theories or models to explain a particular phenomenon, however thematic analysis does not require the use of time-consuming axial coding (Thomas, 2006). As in phenomenology or discourse analysis, thematic analysis allows the researcher to play an active role in interpreting the data (Guest, MacQueen & Namey, 2011). Finally, thematic analysis has been found to be an appropriate approach for youth-based research (Foster-Fishman, Law, Lichty & Aoun, 2010).

The coding strategy in thematic analysis can be inductive or deductive; deductive coding is usually used to test a hypothesis, or to confirm findings from previous research, and therefore the codes are produced from extant literature (Braun & Clarke, 2006). Inductive coding involves developing codes from the data, and the researcher does not refer to existing models or theories until the coding procedures are completed (Burnard, Gill, Stewart, Treasure & Chadwick, 2008). However, neither of these strategies was found to be appropriate for the current study. A deductive approach would have been problematic, given the scarcity of previous qualitative research on young people's perspectives on and experiences with problematic mobile phone use, and the lack of explanatory models or theories for PMPU. Conversely, an inductive approach requires the researcher to be free from preconceptions or biases, and given the researcher's previous work on PMPU, this would not have been possible. Therefore, a general inductive approach to thematic analysis was adopted (Thomas, 2006).

The general inductive approach involves reading through the data, developing themes and categories, and transforming the themes into models or frameworks. General inductive procedures, however, are less structured compared to other coding approaches (Thomas, 2006). While the general resulting themes are produced based on the study objectives, the more specific sub-categories are derived from the data; therefore, this analysis allows the researcher to decide what is more or less useful in the data. However, given that the primary focus of the general inductive approach is to address the research objectives, and therefore it is possible for it to constrain the emergence of themes unrelated to the initial study aims.

5.4 Methods

5.4.1 Participants

As previously noted in Chapter 3, previous studies into problematic mobile phone use have not found significant associations between demographic characteristics and PMPU indicators, excepting age and gender. Thus, there were two inclusion criteria: age, and ownership of a mobile phone.

The age range for this study was determined based on three factors: firstly, a definition of the adolescent age (which may be fairly arbitrary, as there is no universally standardised definition). For the purposes of the present study, the American Psychological Association definition of adolescence was utilised, which stipulates that an individual may be considered an adolescent while between the ages of 10 and 18 (APA, 2002).

Secondly, the age at which mobile phone ownership in New Zealand becomes sufficiently prolific to warrant inclusion into the study was also considered. This factor was chosen in order to circumvent the potential inclusion in the recruitment process of participants who are unlikely to own a mobile phone, and who would therefore be ineligible to participate. The Broadcasting Standards Authority assessed mobile phone ownership in New Zealand, and determined that ownership rises sharply at the age of 12 or 13 – it was suggested that this increase is parallel to the change from intermediate school to secondary school (BSA, 2008).

Finally, the standard age bracket for students attending secondary school in New Zealand was taken into account. This third factor was considered, in order to ensure that the population recruited for this study was similar to that which will be recruited for the quantitative study of this project, which will be 13-19, given that the generalised age bracket for secondary school students in New Zealand is 13-19 (www.stats.co.nz).

Based on these three factors, it was decided that the most appropriate inclusion criteria for age bracket was 13-19.

5.4.2 Sampling

A specific sampling frame was employed to ensure recruitment was balanced with regards to gender and age - males aged 13-15, males aged 16-19, females aged 13-15, females aged 16-19, and a group consisting of males and females, aged 13-19. It was important to separate participants below the age of 16 from those aged 16 and above, Separation of younger from older participants was undertaken to provide the participants with an environment that would be as unthreatening as possible, and where they would feel able to freely speak their minds (Raby, 2010). Youth organisation representatives, called ‘Group Leaders’, were also present when the focus groups with participants aged 13-15 took place. Separation by gender was undertaken in order to reduce the chances of participants being influenced by social

desirability bias – that is, producing answers which they thought would be socially desirable, in order to impress or connect with their colleagues of the opposite sex (Raby, 2010).

5.4.3 Recruitment

During the design of the recruitment process, it was first necessary to determine the setting where participant recruitment would take place; schools were considered to be the first choice, as the majority of individuals within the study's age bracket would spend approximately half their waking hours in the school setting (Hill, 2006). However, it was recognised that engaging with schools may prove difficult, and time constraints did not allow for a drawn-out recruitment process. Consequently, youth-oriented organisations were chosen as the setting for recruitment instead. The recruitment process took place in several stages:

Firstly, an initial invitation email was sent to each of the managers of five randomly selected organisations which offered after-school activities for young people. The email included a short description of the study and what would be involved, the Participant Information Sheets for managers, parents and participants, as well as the Consent Forms for managers and participants, and a request to set up a meeting in order to discuss the project in greater detail. This email was followed up by a phone call to each organisation, a week later.

Upon acceptance of the meeting request, the candidate met with the managers and "Group Leaders", and provided them with details of the study, as well as hard copies of documents which had been previously sent via email. In order to prevent any undue pressure being placed upon the young people who were associated with the organisations, it was decided that the Group Leaders would make the initial approach regarding taking part in the study.

If the Group Leader and organisation manager deemed the number of interested individuals as sufficient to warrant the organisation's participation in the study, the researcher was then permitted to meet with the young people, and discuss the study with them. The young people were provided with Participant Information Sheets for themselves and their parents. Again, in order to prevent any feelings of coercion, the young people were asked to discuss their choice regarding participation with their Group Leader, as opposed to with the researcher. Upon collection of sufficient affirmative responses, the Group Leader or organisation manager

liaised with the researcher, and confirmed a separate meeting, which would serve as the focus group.

5.4.4 Focus group schedule design

In order to ensure congruity between each focus group, it was necessary to develop a set of questions or themes (focus group schedule) to guide the general focus of these sessions. These questions were designed through a three step process:

Firstly, the candidate drafted between four and six questions for each of the overarching research questions of the study. During this phase, attempts were made to maintain a youth-friendly vocabulary, by avoiding superfluous jargon and complicated language, while retaining a high degree of professionalism and academic standard. For each overarching research question, the corresponding questions were designed in such a way as to address different facets of the subject, and elicit detailed responses from the participants. With this in mind, prompts were also designed for each focus group question. Particular care was taken not to include the words “addiction” and “dependence” in any of the questions or prompts, in order to avoid specifically leading the participants towards discussions of addiction. Instead, the researcher relied on spontaneous accounts of such behaviour to initiate dialogue regarding problematic mobile phone use.

These questions were then presented to four different academics within the University of Auckland: two experts on adolescent research, and two experts on qualitative research. Each was asked to read through the questions carefully, and provide feedback to the candidate across several domains: the appropriateness of the language for the intended participants, the degree to which each set of questions represented the overarching research question, the logical flow of the session, and whether any additional questions were necessary, in order to address the aims of the study. The feedback was presented to the candidate in verbal format, and the corresponding changes were made to the focus group schedule. The feedback primarily focussed on the phrasing of the questions – for example, leading questions were re-designed to be broader (e.g. specific questions around mobile phone use, such as ‘Do you use your phone for entertainment purposes’, were transformed into one broad question: ‘What do

you think are the main reasons that you and your friends use your mobile phones for?’). The final focus group schedule is included in Appendix 1.

The final step in the development of these questions was piloting them. Adolescents aged 16-19 were recruited through a snowballing method. It was decided that for the purposes of the pilot, more mature participants would be appropriate; this choice would also allow the participants to consent to being involved in the study with parental consent also being necessary, thus simplifying the recruitment process. A total of 11 participants were recruited and divided into two groups according to gender, in order to best emulate the procedures of the study. Upon completion of the focus groups, the participants were asked to comment on the questions, identifying any potential issues and suggesting changes that might be effective in circumventing those issues. Additionally, the recordings were transcribed, and the data was analysed, in order to ascertain whether the way in which the questions were worded elicited appropriate responses.

5.4.5 Data collection

Data collection took place between July-November 2011. Focus groups took place on the premises of participating organisations – this was both the preference of the researcher, and of the organisations. Allowing the research to take place in a familiar and non-intimidating environment assured a measure of comfort and security, which was deemed crucial for the participants’ well-being throughout the research process. Additionally, having the focus groups on organisational premises meant that in the case of any unforeseen circumstances or outcomes, professional staff were on hand to address the situation appropriately.

The procedure for each focus group followed a pre-determined protocol. First, participants were again supplied with Participant Information Sheets, were asked to read them prior to the commencement of the discussion, and were given the opportunity to have any questions answered. Confidentiality and anonymity were discussed with each group, reiterating the fact that due to the nature of focus group methodology, confidentiality could be guaranteed, but anonymity could not. Each participant was then asked to sign a Consent Form. Once completed, the researcher asked if it was OK to begin recording, and after confirmation was received, commenced the discussion.

Each focus group was digitally audio recorded. In order to provide the participants with the full attention of the researcher, no notes were taken during the discussions; the recordings were then transcribed verbatim by the researcher.

5.4.6 Data analysis

Several steps were taken to ensure the rigour of the analysis procedures, and the overall trustworthiness of the results produced (Thomas 2006).

The transcripts were analysed using a general inductive approach, as described by Thomas (2006). The coding process was conducted using NVivo 9 software. The data were examined in detail several times, in order to initiate the development of preliminary themes or categories, and generate understanding of the text as a whole. The process of category development described by Thomas (2006) was adhered to – this involved the identification of “upper level categories”, or themes, from the aims of the study, and the development of “lower-level categories”, or subthemes, from coding. This was followed by an examination of uncoded text, and overlapping of categories. The process was finalised through the continued refinement of the main themes and subthemes, including re-defining, merging, and separation of themes, until a satisfactory result was achieved.

A number of processes were employed to assure the ‘trustworthiness’ of the data.

1. Independent parallel coding: a researcher external to the main team was provided with a transcript from one of the focus groups, after signing a confidentiality agreement. They were asked to examine the text and produce a set of themes related to the research objectives. These themes were then compared against the themes produced by the main researcher (MV), and examined for any significant discrepancies.

2. Check of interrater reliability: A researcher was provided with a transcript of a focus group and the main themes initially developed, and was asked to identify the text which belonged to those particular categories. The researcher was also asked to sign a confidentiality agreement, in order to ensure that the data would remain confidential.

3. Stakeholder checks of coding: A group of young people aged 16-19 known to the researcher was recruited for this process. A preliminary draft of the main themes and

subthemes was provided, and they were asked to comment on the categorisation of the themes, and the congruence between their own experiences and the themes developed by the researcher. The participants were also asked to sign confidentiality agreements.

5.5 Results

Of the five organisations which were invited to take part in this research, three agreed. A total of 45 participants were recruited for this study, inclusive of those which took part in the pilot – 19 males and 21 females. Further details of their characteristics are depicted in Table 5.

Table 5: Age range and number of participants in each focus group

	Age bracket	Number of participants
Females	13-15	11
	16-19	15
Males	13-15	6
	16-19	13

Once data analysis was completed, five main themes were determined, each with a number of subthemes. These are summarised in Table 6. Detailed descriptions of each theme and subtheme are presented after Table 6.

Table 6: Themes and subthemes resulting from focus group data

Theme	Subtheme
Practicality	Multiple functionality
	Ease of contact
	Safety
Socialisation	Maintenance of social relationships
	Initiation of new relationships
	Private socialisation/pseudo-emancipation
	Avoidance of unwanted social contact
Negative effects of MPU	Bullying
	Social misunderstandings
	Sleep deprivation
	Joint damage
Attachment to the mobile phone	Salience
	Excessive attachment
Addiction to the mobile phone	Characteristics
	Addiction to socialisation
	Addiction to phone functionality

5.5.1 Practicality:

When participants were asked about their general use of mobile phones, they first described the technology as playing an important role in their daily lives, due to its usefulness and practicality. They principally described their phone as convenient, due to it encompassing several functions in one device.

“It’s kinda like everything in one, if that makes sense. You can communicate, you can entertain, you can write notes, and you can go online, instead of having a laptop, having a book, having a notepad. It’s quite handy, I find.” (Male, 16-19)

Most participants agreed that the mobile phone played multiple roles in their lives, and were not used solely as a means of contacting other people. The use of the technology for academic and entertainment purposes was identified by many, although it was also mentioned that ownership of a “Smartphone” was key, as older phones have limited features.

The issue of safety was also mentioned a number of times. Young people describe their phone as a safety line when in an emergency, due to the instant ability to contact help. It was quoted as one of the main predominant reasons they were first given a mobile phone, and why they feel the need to always have access to it.

“...my mum always says, “just take it with you”. It`s more a security thing, so you are able to keep in contact. Overprotective parents always say “take your phone with you, text me that you`re ok” because bad things can happen, and it`s like a way to prepare.” (Female, 16-19).

Participants mentioned the ease with which one could get in contact with another person, regardless of temporal or spatial limitations, as playing the most significant role in their usage of mobile phone technology:

“It`s the convenience of it, you can do it anywhere, you don`t have to be close to a person, you don`t have to meet up with them.” (Female, 13-15)

This perspective was expressed by all participants, and it was stressed that the primary function of the mobile phone was communicating with their peers, particularly when situations did not allow for face to face interaction:

Like, when you`re lazy and stuff, and you don`t want to see them, so you like txt them instead. So like, you can kick it at home, but you can be kicking it with your friends as well, but through txt. Through the cyber world, or something. (Male, 13-15)

5.5.2 Socialisation:

When asked to elaborate on the different roles mobile phone technology played in their social interactions, the young people described a series of processes that allowed for the from the maintenance and propagation of their social life, development of romantic relationships, sustaining privacy and avoiding unwanted contact.

Discussions were initiated by a description of the participants` desire to maintain contact with their peers, in order to avoid feelings of isolation.

“It’s like you need to communicate, to stay normal, a little bit. It’s like, it’s just weird, not talking to people, when you’re by yourself. And sometimes you just want to keep talking.” (Male, 13-15)

Others suggested the need for cyber-socialisation may not only be due to the individual’s desire for contact, but may also be influenced by the expectations of others:

“...it comes down to peer- pressure and expectations. When it comes to something like this, when somebody texts you, you think you have to text them back almost as soon as possible.” (Male, 16-19).

They also described the mobile phone as a tool for the initiation of new relationships, both romantic and platonic: *“Sometimes some people just build relationships over texts but they haven’t got any relationship in person”*. However, the usefulness and viability of relationships which were initiated without prior knowledge of the other person was brought into question on several occasions.

“...but then I think they know that it doesn’t amount to anything, it’s just a relationship in texts, unless you actually know this person previously... then a text doesn’t mean anything, it’s nothing.” (Female, 16-19)

Participants spoke of the mobile phone as a source of private socialisation – by communicating through SMS, users had the ability to engage in private conversations while in a public forum. It also allowed for pseudo-emancipation, by providing a medium of communication which cannot be monitored by parents, either for content or for the timing of the communication.

“...texting is a lot more private. I don’t want my parents hearing me talk to girls and stuff...I don’t want them to hear me say stuff... And then, talking to your mates, you know how you say stuff you don’t want your parents hearing, and all that.” (Male, 13-15)

“I probably wouldn’t be allowed to call someone at 2 in the morning...you’re meant to be asleep, so if they hear you, they’d be like, go to sleep! But if I’m texting, my parents won’t know about it...” (Female, 13-15)

Participants suggested that mobile phone technology may also allow its users to engage in conversations that they would not normally initiate in a face-to-face context. This ranged from asking questions they would otherwise feel “stupid” asking, to romantic exchanges:

“...if you had like a stupid dumb question, coz I ask dumb questions, and if I didn’t wanna ask them in real life, it would be easier to ask through txt... coz you can’t see their reaction” (Female, 16-19)

“It’s easier to txt your bf and stuff, it’s easier to txt them than just say it straight up... coz otherwise people just get shy, coz it gets awkward, like eye contact and just looking at each other and stuff...” (Female, 16-19)

While much of the discussions was centred on the role of mobile phone technology in extending one’s social network, its usefulness in avoiding unwanted social contact was also elaborated upon. Some participants were noted that their mobile phone had been occasionally used as a social barrier, when wanting to escape an awkward situation. This behaviour was seen as the norm, and had no negative connotations attached to it.

“Sometimes, in awkward situations, when you’re by yourself, and you have nothing to do, you just check your phone, but you know you haven’t gotten a text.” (Male, 16-19)

“Yeah, because you block yourself out, antisocial, it’s like an invisible shield.” (Male, 16-19)

This technique was also employed when an individual wished not to be approached by someone they did not wish to speak to.

“If I’m waiting for my mum to come pick me up from school or something, and I see people around me that I don’t really like, I just pull out my phone and start playing Angry Birds or something...people don’t randomly approach other people, if they look busy...” (Female, 16-19)

5.5.3 Negative effects of mobile phone use:

This theme encompassed the accounts participants produced relating to negative effects resulting from mobile phone use. Predominantly, this related to social harm, bullying in particular. It was suggested that when communicating via an impersonal medium such as SMS, it is easier to “be mean”, because the perpetrator does not have to face their victim. The barriers that might deter someone from usually behaving in an offensive or hurtful manner are absent in the cyber world.

“I think the bullies feel like they can hide behind the technology. It’s easier to say things over technology than to someone’s face, it’s gutless really... people don’t have the guts to confront you, at school or something so then that night they’ll just send you something” (Male, 16-19)

The issue of message misinterpretation was also identified by a number of young people. Due to the lack of body language, facial expressions, and verbal tone, which comprise a significant role in the communication process, SMS messages can often be misinterpreted. The majority of participants indicated this had led to minor misunderstanding. However, in some instances, they suggested it can lead to relationship problems.

“Well, somebody was texting this other person, but they were trying to be sarcastic; they were boyfriend and girlfriend. But the other person took it to heart, and they broke up because of it... So, I reckon that if she had said it on the phone, this wouldn’t have happened” (Male, 13-15)

The participants described their tendency to engage in “deep and meaningful” text conversations during the evening. They explained it was a behaviour that adolescents engage in, akin to “reading a book before bed”. However, lengthy conversations during the night may have an impact on young people’s sleep. Participants reported some concern for their friends, due to knowledge of the negative effects sleep deprivation has on health.

“You shouldn’t text late at night, coz I know people who text until like 2 or 4 in the morning, and then they get sleep deprived and it affects your health” (Female, 16-19)

Some said they would simply catch up on sleep during other times, regardless of the impact on their other commitments.

“I sleep during school time, sometime.....if it’s boring. You just catch up on your sleep then. But if you’re at home, and just kicking it, you just keep yourself awake, doing stuff.” (Female, 13-15)

A small number of participants also reported physical damage due to their overuse of the SMS function, in particular when owning a “button phone”, which has significant impact on the finger joints, as opposed to a touch screen type device.

“I think I have to go to the doctor’s, coz it’s getting so sore. My thumb is kinda sore...I guess it’s worse when you have a button phone” (Male, 16-19)

5.5.4 Attachment to the mobile phone:

“Attachment to the mobile phone” encompasses participant descriptions of mobile phone use behaviour which they suggested was prolific, though in some individuals escalated to concerning levels. When the young people were asked to elaborate on their relationship to their mobile phone, many chose to describe it as an essential item, which never left their side. The phone was not described as serving a particular purpose which required it to be in the immediate presence of its owner – the participants, however, stressed the link between continuous access to their handset, and their overall comfort and security:

“I take it everywhere with me. It pretty much never leaves my side. I just need it with me all the time, I feel insecure without it.”(Male, 16-19)

However, they expressed concern for a subset of their peers, whose attitude towards their handset was disrupting their everyday life. Such behaviour was described as a continual preoccupation, which the participants deemed exterior to the normal range of adolescent behaviour.

“I think, they`re just so used to texting all the time that it`s become a habit ... They feel like they need to do it .. A girl in my cabin, she didn`t take her phone and she needed to borrow my friend`s phone just every five seconds, to text her boyfriend.” (Female, 16-19)

The participants described the behaviour of this “preoccupied” subgroup of their peers in terms of emotional responses, when deprived of access to their device. While generically, a feeling of “emptiness” or “insecurity”, examples also ranged towards the more extreme side of the emotional spectrum:

“There`s this girl in my year and she quite often gets her phone taken off her. And if it lasts for more than a week, she`s been really quite grumpy and gets angry, cause she just wants it” (Female, 16-19)

Other participants chose to liken their handset to an indispensable physical attachment:

“It`s like losing an organ.....if I don`t have it with me it`s like I don`t have my clothes” (Male, 13-15)

5.5.5 Addiction to the mobile phone:

This theme arose spontaneously in the groups, and describes the idea that some individuals may display “addictive-like” behaviour towards mobile phone use. Many participants agreed that only a small number of the adolescent population would be sufficiently attached to their device, in order to be considered “addicted”:

“It sounds really bad, but I`m pretty sure, that`s a small percentage of people, that are that attached. The media says, teenagers are so obsessed, but in reality most of us aren`t” (Female, 16-19)

Conversely, some young people suggested mobile phone addiction was so prevalent among their peers, that it had become a normal part of their behaviour:

“People text so much that it becomes more like an everyday thing – you get an urge to check your messages, see if there is anything new, things like that. It`s kind of a normal thing now” (Male, 13-15)

When asked why they believed some adolescents engaged in problematic mobile phone use, the participants hypothesised that it was a result of the user`s fear of face-to-face interaction, or their inability to engage in such.

“It’s probably because they’re not confident in themselves to meet up, have a conversation face to face. If you can’t say it face to face, then it obviously doesn’t mean much in text...but that’s not very many people...most teenagers go and meet up somewhere, go to the movies” (Male, 16-19)

They further suggested the person was not addicted to their mobile phone, but to the communication.

“Just like when people send heaps of texts, non-stop, that’s like addicted; not to the phone, but just to like connecting to other people...It feels really lonely, if you don’t talk to anyone at all...Some people struggle, if they don’t talk to anyone...” (Male, 16-19)

Others reported the prolific number of games and applications available on the more expensive handsets as being the reason behind people becoming addicted to their phone:

“I think it has so many things in it that can make people addicted to it, there are so many things, like all this entertainment and stuff.” (Female, 13-15)

When asked to explain how they would identify an individual who might be addicted to their handset, three significant factors were highlighted. Firstly, the preference for communication through the mobile phone, as opposed to face to - face communication, despite being in a social setting. Participants were adamant that such behaviour was inappropriate, and suggestive of addictive-like attachment to their mobile phone.

“When they’re socialising with other people, and like constantly texting.” (Female, 16-19)

“What I hate is when people are so addicted, it gets rude, texting at the wrong places, at the wrong times. Those people that always text in class; it’s not the right time or the place... even in restaurants, it’s rude.” (Female, 16-19)

A second factor highlighted by the young people was a constant, but purposeless preoccupation with their device.

“...when they pull out their phone, but they don’t do anything with it. Like, they pull it out, and they put it back in, and then they pull it out again, it just becomes a habit.” (Male, 16-19)

“...the need to check, every single minute of the day, even though you might not have the need to be communicating something important.” (Male, 13-15)

Thirdly, participants suggested that anxiety or feelings of emptiness and loss associated with an inability to engage in mobile phone use would be indicative of addictive behaviour

“I don’t think it would be a problem, if let’s say you took someone’s phone away for a day, and they were still fine. It would be a problem if they were overreacting, and saying “oh my gosh, where’s my phone?”, and just constantly talking about their phone, that would be a problem.” (Female, 16-19)

5.6 Discussion

This study aimed to explore the relationships young people have with mobile phone technology, with a particular focus on the existence of problematic mobile phone use within the target population, and what ways, if any, young people had of identifying such behaviour. The findings suggested young people believe one can become overly attached, or “addicted” to their mobile phone or to communication via their device, and negative consequences may be experienced due to this.

The first research question outlined for this study was: “*What does mobile phone use mean to the New Zealand adolescent population?*” Participants described mobile phones as items for communication and socialisation, providing the user with the convenient ability to contact their peers at any given point. These findings are congruent with previous research on the role of mobile phone technology and adolescent socialisation and relationship management, which has found that mobile phone devices can attain a central role in this process (Geser, 2006; Reid & Reid, 2004; Vanden Abeele et al., 2014; Walsh et al, 2007). Discussions focused on the part mobile phone technology plays in the maintenance, development and

avoidance of social contact; participants spoke of mobile phones as tools for interaction which would otherwise be removed from their comfort zone – one such example would be asking questions which the individual might deem awkward or embarrassing. By removing the need to face the other party and observe their reactions during conversations, mobile phones provide their users with a degree of social security (Srivastava, 2005).

Physical security was also discussed and identified by many as the original reason for them obtaining a mobile phone; access to the device allows the users to feel as though they are always able of contacting somebody, in case of an emergency. This point is supported by the literature. For example, Walsh and colleagues (2007) investigated the gratifications attached to mobile phone usage, including ‘security gratification’, which was described as being able to contact other people in case of an emergency. The study reported that “security gratification” was reported most often by participants as playing a role in their mobile phone usage (Walsh et al., 2007).

The role of the mobile phone in the pseudo-emancipation of adolescents from their parents was also apparent, with young people using the technology to engage in conversations on subjects and during times which they thought would be disapproved of by their parents. The relationship between mobile phone use and the beginning of the emancipation process has been previously described in the literature (Ling, 2005; Vanden Abeele et al., 2014). In some cases, the relationship between mobile phone use and emancipation was discussed with negative connotations attached; for example, a strong relationship was found between the degree of usage of mobile phones and boundary testing in adolescents, with heavy users being more likely to engage in “deviant behaviour” (Ling, 2000).

The second question of this study related to the young people’s definition and identification of problematic mobile phone use behaviour. Interestingly, participants drew a distinction between attachment and addiction which has not been identified in previous studies, as far as the candidate was able to ascertain. Attachment was described by participants as the “need” or “wish” of the individual to have access to their mobile phone at all times; some participants chose to describe the loss of a mobile phone as similar to having no clothes, or missing an organ. Other studies have also reported participants expressing the need for constant access to their phone (Lapointe, Boudreau-Pinsonneault & Vaghefi, 2013; Walsh, White & Young, 2008). Young people in this study viewed attachment to one’s phone as a

prevalent behaviour, and potentially conducive to the development of problems. Further details on what participants conceptualised as mobile phone ‘attachment’ could not be obtained, due to the participants’ self-professed lack of personal experience with PMPU. However, the differentiation between attached and addictive mobile phone use proposed by participants warrants further investigation, as it may suggest that a continuum-based approach to the subject of problematic mobile phone use may be more appropriate than a binary model, as the participants proposed it is possible to engage in mobile phone use to an extent which may create problems, but the individual may not be “addicted” as such.

Participants described a mobile phone “addict” as an individual who engages in such levels of mobile phone use, that it impacts on their “real social life”. Examples were provided of peers whom preferred to socialise via SMS, despite being surrounded by their peers, even in contexts or settings that were focussed on social interactions. While mobile phone “addicts” may engage in behaviours similar to those who are “attached” to their phone, participants felt that the most significant distinction was whether the person preferred interacting in the real world, or in the cyber world, with cyber world preferences being a clear indication of addiction, in the participants’ opinion. Walsh, White & Young (2008), however, reported participants’ definitions of PMPU as being centred on experiencing negative consequences as a result of mobile phone use, and compulsive use (i.e. feeling a need to answer SMS messages or calls, over-use, such as calling people for no reason). However, the participants in Walsh, White & Young’s study were of a different age group (16-24), which might explain the difference in how they view PMPU.

The third research question for this study was “*Do young people believe ‘problematic’ mobile phone use (PMPU) exists in the New Zealand adolescent population?*” The young people in the present study produced unprompted accounts of behaviour which they described as “addictive”. They described their understanding of mobile phone “addicts” as individuals who allowed their usage of mobile phone technology for communication purposes to escalate to such levels that it interferes with real-life social interaction. However, disagreement was observed with respect to what causes young people to become “addicted” – while some suggested it was the communication to other individuals, others purported it was in fact the multitude of entertainment features the mobile phone presents. This issue can be paralleled with a similar discussion, related to problematic use of the Internet, where researchers have debated whether the Internet itself has any “addictive” properties, or whether the activities

supported by the Internet are “addictive”. Davis’ (2002) model of Problematic Internet Use in fact accounts for both scenarios, describing them as “specific” and “generalised” Internet usage. Within the “specific” category are included several sub-categories, including communication, gambling, gaming, shopping and pornography. While it has not yet been established, it is possible that mobile phone use behaviour follows a similar line, with users either focussing on its communication capabilities, or on the entertainment features of a phone.

This preference for cyber communication described by participants was thought to be the result of a fear of or inability to engage in face-to-face interactions, due to a lack of social confidence. Other participants suggested it was a result of “needing” to connect to other people, due to feelings of loneliness when not in contact with their peers. Interestingly, quantitative studies have found correlations between PMPU measures, and measures of loneliness (Guzeller & Cosnuger, 2012; Park, 2005), poor self-esteem (Bianchi & Phillips, 2005; Ha et al., 2008; Yang et al., 2010), and anxiety (Jenaro et al., 2007; Demirci et al., 2015; Ha; Hong et al., 2012; O’Connor et al., 2013; Tavakolizadeh et al., 2014). The description of mobile phone “addicts” produced by the participants is supported by previous research, which has suggested that the mobile phone itself does not have any inherent “addictive” properties, but the continuous communication and interaction may do (Reid & Reid, 2004).

When asked whether they believed problematic mobile phone use existed in New Zealand society, the majority of participants replied in the affirmative, while some were unsure, as they had not seen anything to suggest its existence. Participants produced several accounts from their own experiences of people engaging in problematic mobile phone use; this included individuals who became upset when separated from their mobile phones, wishing to borrow other people’s phones in order to contact friends or significant others, or engaging in mobile phone use during inappropriate times, such as at the dinner table, or during classes. Previous qualitative studies on the subject of PMPU have also reported divergent views in regards to whether one could become ‘addicted’ to their mobile phone; Walsh, White & Young (2008), for example, found that while some participants believed mobile phone addiction to be a frequent occurrence (“I think a lot of people are addicted to their phone (Female, 17)), other suggested that it was not possible to become addicted, as it was “just a tool, an aid to everyday life (Male, 22)” .

Participants also spoke of several negative effects, as a result of mobile phone use. They emphasised the ease with which bullying can occur via this medium, and suggested it was a result of the lack of consequences for engaging in such behaviour. A meta-analysis of 80 studies investigating the prevalence of bullying behaviour found that approximately 15% of young people experience some form of cyber-bullying, including through the mobile phone medium (Modecki, Minchin, Harbaugh, Guerra & Runions, 2014).

Sleep deprivation due to late-night SMS conversations was also reported by participants. This behaviour was described as typical of most teenagers, although it did also raise concerns with regards to the resulting health effects. Sleep deprivation has been previously linked to excessive mobile phone use, and researchers identified a range of negative health effects this could lead to, including lowered levels of immunity, impaired cognitive functioning, and increased susceptibility to certain types of cancers (Westen et al., 2006).

Finally, pain in fingers from overuse of the SMS function was discussed. Due to the high level of impact “button phones” have on joints, and the lack of dexterity of the thumb when compared to the other human digits, pain and damage in the thumb is not unheard of. Similar complaints have been documented, such as Menz (2005) who reported treating an adolescent girl for what he termed “texting tendinitis”, which was concluded to be caused by excessive texting.

The final question of this study was concerned with whether young people in New Zealand engaged in problematic mobile phone use, and the participants’ opinions regarding the reasons underpinning such behaviour. Participants were generally unsure of why this process took place, but suggested it may involve people’s tendency to be shy, or socially awkward. As the mobile phone provides a highly controlled medium for communication, where the each individual is allowed ample time to script and edit their responses, and personal attributes such as attractiveness or social skill are quite attenuated, individuals may feel safer and more comfortable socialising in this environment. This is further augmented by the fact that individuals are exempt from facing the person they are conversing with, and are thus removed from physical responses such as facial expressions or body language, making the conversation “less awkward” (Reid & Reid, 2004).

A second idea was proposed by participants, which centred on the hypothesis that young people may become so accustomed to socialising through remote media, due to social

convention or peer pressure, that it becomes second nature. Thus, removal from their usual socialisation environment may elicit psychological or emotional discomfort.

5.6.1 Strengths and weaknesses of the study

The choice of qualitative methods employed in this study was one of its strengths, and allowed the researcher to explore problematic mobile phone use in a different manner than previous inquiries into the subject, thus allowing a youth voice to emerge on the issue. The findings represent an in-depth perspective of adolescents' relationships with mobile phone technology. Furthermore, the focus on adolescent perspectives serves as a useful contrast to previous examinations of the concept of mobile phone addiction, which have been primarily conducted from an adult perspective researcher-driven (as opposed to youth directed or influenced). The sampling frame employed also allowed for the collection of diverse views on the subject of mobile phone use, by ensuring acceptable representation of the target population, in terms of age and gender. Finally, the findings of this study provide a platform for future studies on this topic; for example, the differentiation between mobile phone attachment and mobile phone addiction is a unique finding, and therefore warrants further examination.

However, the generalisability of the results is limited by the research sample – more specifically, its homogeneity. The participants were all recruited from one city – therefore, their geographical similarity may mean the results are not representative of New Zealand youth. Further, the young people who participated in the research were not specifically identified as “addicts” during the recruitment process. While they might have secondary knowledge and views on mobile phone “addiction”, it is not certain whether any of the participants had personal experience with “addictive” mobile phone use. Finally, the focus group schedule was created by the researcher – while it was piloted with young people, who suggested changes to the questions, the items did not originate from young people themselves.

5.7 Conclusion

The findings of this study suggest that young people in New Zealand recognize and can identify problematic mobile phone use, and have some concerns in this area. Participants indicated the prevalence of such behaviour to be limited in their experience, which differs from findings of previous research on the subject. Overall, this study provides a good platform for the further evolution of understanding relating to problematic mobile phone use behaviour. More significantly, it represents the first step in the development of a youth-based Problematic Mobile Phone Use questionnaire, which is the aim of Study 2, described in the following chapter of this thesis.

CHAPTER 6. DEVELOPING A YOUTH-INFORMED PROBLEMATIC MOBILE PHONE USE QUESTIONNAIRE

6.1 Introduction

This chapter describes the second of three studies which comprise this thesis. The aim of the study was to develop a youth-informed Problematic Mobile Phone Use Questionnaire. Firstly, a description of different consensus building methodologies is presented, followed by a discussion of the relevant methodological, theoretical and pragmatic considerations of the study. Sampling, procedural and data analysis approaches are then described, followed by the resulting findings. Finally, a discussion of the methods and results of this study are presented.

6.2 Research aims and methodological considerations

As discussed in chapter 3 of this thesis, existing PMPU measurement or diagnostic scales have been developed either directly or indirectly based on DSM-IV criteria, took an addiction-based approach, and were based on an adult view of mobile phone use behaviour. These instruments have also been criticised due to their lack of theoretical underpinnings (Billieux, 2012), and therefore it was concluded that the implementation of such instruments for the purposes of this thesis would not be advisable; thus, in order to explore PMPU in New Zealand youth, the development of a new questionnaire became necessary.

In order to address some of the limitations present in existing measures, a youth participation approach was adopted for the development of the new PMPU measure; however, the literature on PMPU offered no guidelines on how this might be achieved. Two studies were found, which included the views and experiences of their target population into the

development of their PMPU measure – Walsh and colleagues (2010) stated that the development of the items for their instrument was guided by findings from an earlier qualitative study, which had sought to explore mobile phone use behaviours. Pamuk and Atli (2016) also included findings from a qualitative study with university students relating to feelings regarding their mobile phone device. However, both studies also based their instruments on existing PMPU literature and DSM IV and 5 criteria for substance use; furthermore, the articles did not report any systematic method for the item development, and therefore they could not be used as templates or guidelines for the purposes of this study.

An exploration of the literature surrounding similar subjects, such as Problematic Internet Use was undertaken, in order to establish whether youth-informed approaches to developing questionnaires had been undertaken; however no such examples could be found at the time. The search was expanded into other addiction-related areas, and two New Zealand based examples were found: Christie and colleagues (2007) developed and tested an alcohol and drug screening instrument for young people. While the researchers engaged in significant consultation with their target population on the structure, understandability, acceptability and face validity of their instrument, the items had been created by the researchers themselves. Given the earlier critique of existing PMPU in relation to the adult focus they had adopted, the method employed by Christie and colleagues was not suitable for the purposes of this study.

The second example of a youth-informed addiction-related questionnaire was Rossen's (2006) doctoral thesis, which aimed to construct a youth-friendly gambling screening tool. Similarly to the previous example, while adolescents had been included in the development of the questionnaire, the methodology was predominantly expert focused and, therefore, it was not suitable. The candidate contacted both of the aforementioned researchers, seeking

suggestions on the most rigorous method which might be implemented in order to achieve the aims of this study. Based on the feedback received, a review of methodologies which aim to achieve consensus of opinion, choice or judgement was undertaken. The following section provides a brief overview of the three most predominantly used consensus building methods: Nominal Group Technique, Interactive Group Method, and Delphi Technique.

6.2.1 Consensus building methodologies

Rohrbaugh (1981) states that judgements produced by groups are superior to judgements produced by individuals – following this line of logic, youth-informed items would be best produced by groups of young people, as opposed to individuals. In order to achieve this, the use of consensus building methodology would be required.

Three main types of consensus building methodology exist: Interactive Group (IG), the Nominal Group Technique (NGT) and the Delphi Technique (DT), which are outlined below.

1. Interactive group discussions are the most widely used strategy for achieving group consensus and decision making, and simply involve the unstructured discussion of a statement or problem set by the group leader. Such a session would be finalised by a consensus decision, or majority voting procedure.
2. Nominal group technique is based on a structured format which allows individuals seated around a table to reach joint decisions. It involves several phases, including silent and individual idea generation, a round-robin process of idea collaboration and recording where each participant in turn provides an answer, until all ideas are exhausted, and finally anonymous rating of the produced ideas (Van De Ven & Delbecq, 1974).

3. The Delphi technique, unlike NGT, usually does not allow participants to directly consult with one another. This process employs a series of questionnaire phases in order to obtain the opinion of experts, with the aim of achieving consensus. The Delphi technique is recognised as particularly effective in the investigation of novel and/or judgemental subject areas (Rohrbaugh, 1979)

6.2.1.1 The choice of Nominal Group Technique:

Delphi technique offers reasonably structured guidelines for its implementation; however, participants are not permitted to communicate with each other, which would potentially mean a reduction in the generation of ideas (Rohrbaugh, 1981) and the physical separation between researcher and participants would result in limited opportunity for clear explanation of the study aims. Therefore, DT was discarded as an option.

IG, on the other hand, provides very little guidance and structure, simply requiring a “discussion” of a statement or problem set by the group leader, which is finalised by a majority voting procedure. Again, this process was deemed unsuitable for the purposes of the study.

However, an analysis of the effectiveness of IG, NGT and DT revealed that NGT was most successful in the generation of original ideas, and participants reported most satisfaction in regards to how the process was carried out. NGT is also more cost effective, particularly in comparison to DT (Van De Ven & Delbecq, 1974). Further, NGT offers clear, structured and detailed guidelines for its implementation, and finally, has been found to be useful and appropriate in working with young people by other researchers (MacPhail, 2001). Therefore,

NGT was chosen as the most suitable approach for the development of a youth-informed PMPU scale.

Traditionally, Nominal Group Technique involves a four step process (Van De Ven & Delbecq, 1974).

1. Generating Ideas: The group leader presents the question or problem to the group, and directs participants to produce ideas in brief phrases or statements, and to write them down.

The process of idea generation is conducted privately and silently

2. Recording Ideas: Group members engage in a round-robin feedback session to concisely record each idea (without debate at this point). The group leader writes each idea on a flip chart that is visible to the entire group. While the repetition of ideas is unnecessary, participants can be encouraged to include ones which may be similar to those already presented, if they provide a different emphasis or variation. This process is undertaken until all ideas are recorded

3. Discussing Ideas: Each idea is discussed by the group, in order to determine its importance. This step provides an opportunity for members to express their understanding of the logic and the relative importance of the item

4. Voting on Ideas: Individuals vote privately to prioritize the ideas. The votes are tallied to identify the ideas that are rated highest by the group as a whole. After members rank their responses in order of priority, the group leader creates a tally sheet on the flip chart with numbers down the left-hand side of the chart, which correspond to the ideas from the round-robin. The ideas that are the most highly rated by the group are the most favoured group actions or ideas in response to the question being posed

6.3 Cognitive Behavioural Theory

As discussed in Chapter 3 of this thesis, existing PMPU measures have been criticised for their atheoretical approach to item development (Billieux, 2012); thus, it was necessary to adopt an appropriate theory which could be employed to guide item development in this study. The following section will discuss the historical and theoretical roots of Cognitive Behavioural Theory, its central concepts, as well as its strengths and criticisms. This will be followed by a brief discussion of previous applications of Cognitive Behavioural Theory in the field of behavioural addictions or problematic behaviours, and finally a description of the role of Cognitive Behavioural Theory in the current study will be provided.

6.3.1 Historical context of Cognitive Behavioural Theory

Cognitive Behavioural Theory is based on the union of behaviourist theory and various cognitive models. The Behaviourist tradition first emerged from learning theory, the development of systematic research, and clearly defined techniques; the behavioural approaches developed by John B. Watson are considered to be one of the first comprehensive attempts to describe behavioural theory, with Watson being considered as the most influential person in the development of behaviourism (Watson, 1924; Craighead, Craighead & Ilardi, 1995). Watson argued that behaviour should be the sole focus of behaviourism and psychology, with cognitive processes being considered to be outside the field of scientific inquiry (Watson, 1924; Watson, 1930).

Behaviourism was further influenced by B.F. Skinner, in particular relating to the principles of reinforcement and operant conditioning (Craighead et al., 1995). Interestingly, while both Watson and Skinner were behaviourists, both also included cognitions in their accounts of

human behaviour: for example, Hopp, Reitman and Jewel (2008) argue that Watson's inclusion of 'speaking to oneself' as an observable behaviour suggests that Watson viewed thinking as 'subvocal speech', and therefore considered cognitive processes as a component in human behaviour.

Joseph Wolpe's theory of reciprocal inhibition and his work on systematic desensitisation represents another significant contribution to the field of behaviourism (Wolpe, 1958). Systematic desensitisation, used to treat phobias, is considered to be the most thoroughly tested behavioural procedure of its kind (Emmelkamp, 2004). However, it has also been critiqued for its failure to include the role of relationships and cognitive factors (Breger and McGaugh, 1965).

The dissatisfaction of psychoanalysts such as Aaron Beck and Albert Ellis with the psychodynamic model and the strict behaviourist approach lead to the development of CBT. Thus, the early work produced by Ellis (1962) and Beck (1967) rejected the emphasis on unconscious processes outlined by the theories of Freud, instead focussing on cognitive and emotional processes, and arguing that people can be aware of the factors that lead to compromised cognitions and negative affect.

Ellis (1962) developed the theory of rational emotive behavioural therapy based on his clinical work, in particular his emphasis on the patients' problematic thoughts, and the corresponding positive effects in the patients' cognitions, emotions and behaviours (Carter, Forsys and Oswald, 2008). Similarly to Ellis, Beck (1970) identified distorted cognitions in his patients, and proposed that cognitive therapy aimed to modify the patients' maladaptive cognitions. Beck emphasised the importance of cognitions, and their role as a "bridge" between an external event, and a person's subjective emotional response to that event. Beck designed cognitive techniques, which aimed to train the patient in identifying their own

maladaptive cognitions, and to make appropriate corrections to said cognitions (Beck, 1970). Further contributions to the development of CBT include Bandura and Mischel's social learning theory, Meichenbaum's self-instructional training, D'Zurilla and Goldfried's problem solving therapies, and Meichenbaum's stress inoculation training (Carter, Forys, and Oswald, 2008).

Dobson and Dozois (2001) discuss four factors that lead to the development of Cognitive Behavioural Theory, in addition to the dissatisfaction regarding the behavioural and psychoanalytic approaches that dominated the field of psychology until the 1960s. These include the identification of problems in clinical practice, which underscored the need for a cognitive-behavioural approach; expanding research on the cognitive aspects of human functioning; the growing body of research which supported the efficacy of cognitive behavioural interventions, and the growth of Cognitive Behavioural Theory as an organisational construct and body of work.

6.3.2 Central concepts of Cognitive Behavioural Theory

Cognitive Behavioural Theory is best described as an umbrella-term for a set of related theories which have evolved from the clinical experiences, theoretical writings, and empirical studies of psychologists focussed on human behaviours and cognitions (Carter, Forys & Oswald, 2008; Hupp, Reitman & Jewell, 2008; Nurius & Macy, 2008; Kalodner, 2011). The central premise of Cognitive Behavioural Theory is that cognitions, emotions and behaviours are intricately linked, with each of these components continually impacting and influencing the others. More specifically, Cognitive Behavioural Theory posits that cognitions about the self, relationships, the world and the future shape emotions and behaviours, which

subsequently shape thought processes in a continuous and reciprocal feedback loop; this process is illustrated in figure 3 below (Dobson & Dozois, 2001; Beck, 2002).

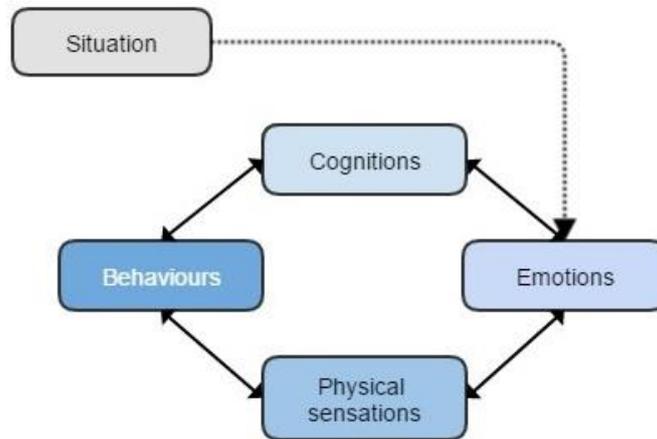


Figure 3: Cognitive behavioural model (based on Beck, 2002; Dobson & Dozois, 2001)

Kendall (2006, p.7) describes the cognitive behavioural framework as placing “greatest emphasis on the learning process and the influence of the models in the social environment, while underscoring the centrality of the individual’s mediating/information processing style and emotional experiences”. Hupp, Reitman and Jewell (2008) identify three key components in this definition: learning from direct experience, social learning, and cognitive and emotional mediation. Thus, while the cognitive-behavioural processes may be similar across human beings, the mediation of the environmental influences and the content of these processes is unique to every individual.

Nurius and Macy (2008) summarise Cognitive Behavioural Theory into three main principles: cognitive processes affect behaviour; cognitive processes can be monitored and altered; and desired behaviour change can be achieved through cognitive change.

The vast majority of evaluations regarding the strengths of Cognitive Behavioural Theory have centred on its therapeutic and clinical applications (Beech, 2000; Carter, Forys & Oswals, 2008; Hupp, Reitman & Jewell, 2008; Nurius & Macy, 2008; Kalodner, 2011). However, given that cognitive behavioural therapy is defined as the application of cognitive behavioural theoretical principles in a clinical setting (Nurius and Macy, 2008), such evaluations may apply to the theory, as well as the application of Cognitive Behavioural Theory.

One of the main strengths of Cognitive Behavioural Theory is the extensive research it has been subjected to during the course of its development. As discussed in the previous section, the development of the theories and therapies underlying Cognitive Behavioural Theory first began in the 1920s (Watson, 1924); since then, the various theories under the Cognitive Behavioural Theory umbrella have been applied and tested, and the methods operationalising the theoretical foundations of cognitive behavioural therapy were found to be effective in clinical practice (Nurius & Macy, 2008).

Cognitive behavioural therapy benefits from a broad spectrum: it has been applied to a wide array of psychosocial problems, including depression, anxiety, substance use, violent offending, chronic pain, and difficult family relationships (Berlin, 2002; Deblinger, Steer & Lippman, 1999; Ronen & Freeman, 2007; Nurius, 2007; Spillane-Grieco, 2000). It has also been successfully applied with a wide range of clients, with varied socioeconomic and cultural backgrounds (Nurius & Macy, 2008). This high degree of variability of use illustrates the versatility and adaptability of Cognitive Behavioural Theory (Macy, 2006).

While Cognitive Behavioural Theory has been widely used, both in research and treatment of an extensive range of disorders, it has also drawn criticism. For example, some researchers are concerned that Cognitive Behavioural Theory does not give sufficient weight to

contextual factors of human functioning, such as gender, sexual identity and culture, as well as external factors which might have direct effects, such as oppression or poverty (Kantrowitz & Ballou, 1992).

Further, Cognitive Behavioural Theory has been criticised for the lack of testing of its underpinning theoretical basis; Hayes (2004) and Orsillo and colleagues (2004) reviewed existing literature on CBT, and have highlighted several concerns, such as the lack of sufficient demonstration of how problematic cognitions are acquired, and how they can be measured without the inclusion of associated affect, such as anger or fear; the lack of direct evidence which demonstrates that cognitions predict and cause behaviours; findings from some studies suggest a bidirectionality between cognitions and affect, therefore raising questions regarding the assertion that cognitions lead to emotions.

6.3.3 Application of Cognitive Behavioural Theory to Problematic Behaviours

Cognitive Behavioural Theory has been predominantly applied to the assessment and treatment of mood disorders, anxiety disorders, eating disorders, as well as schizophrenia, anger and violent offending, sexual offending, chronic pain and marital distress (Nurius & Macy, 2008; Epp & Dobson, 2010). However, a number of researchers have employed Cognitive Behavioural Theory as the underlying theory guiding their explorations of various problematic or addictive behaviours. A brief exploration of such examples was undertaken, in order to determine whether any previous applications of Cognitive Behavioural Theory in the field of problematic behaviours might be used as a guide for the current study.

Frost and Hartl (1996) proposed a cognitive behavioural model of compulsive hoarding; this model aimed to provide a theoretical framework for the development and testing of

hypotheses regarding compulsive hoarding. The authors employed four central concepts in the development of their model: information processing deficits, problems in forming emotional attachments, behavioural avoidance, and erroneous beliefs about the nature of possessions. While the authors describe each of these concepts, and their relationship to compulsive hoarding, a central model explaining how these concepts interact in the case of a compulsive hoarder was not provided.

Kellett and Bolton (2009) proposed a cognitive behavioural model of Compulsive Buying (CB), which was composed of four distinct phases: 'Antecedents', which related to early developmental experiences and their influence on the development of CB-related cognitions, particularly relating to strong psychological attachment to possessions. 'Triggers' described both internal cognitive triggers, such as negative affect, and external environmental triggers, such as the retail environment. 'The act of buying' related to the processes a compulsive buyer underwent while shopping, including affect and mood alteration, and high levels of absorption leading to dissociation from the surrounding environment. Finally, 'Post-purchase' described the cognitive, behavioural and affective negative results of the purchase. The authors implemented this model as a CB evaluation method for a case study, and found that each of the four phases proposed in the model were represented in the client's experiences with CB.

Examples of Cognitive Behavioural Theory applications to problem gambling were also found. Sharpe and Tarrier (1993) proposed a cognitive-behavioural model for the development and maintenance of problem gambling; however, the model was specific to problem gambling, influenced heavily by reinforcement and operant and classical conditioning concepts, which have not been explored in the PMPU literature. Blaszczynski & Nower (2006) also developed a pathways model of problem and pathological gambling,

which included Cognitive Behavioural Theory concepts. However, similarly to the previously discussed example, Blaszczynski & Nower's model primarily focussed on operant and classical conditioning, as well as emotional and biological vulnerabilities of potential gamblers. Sharpe (2002) proposed a cognitive-behavioural model of problem gambling which took into account the various biological, psychological and social aspects of problem gambling. As with the previous examples, Cognitive Behavioural Theory was only one component of the model, and drew heavily on the extant problem gambling literature.

Raylu & Oei (2004) aimed to develop a Gambling Related Cognitions Scale; their item development was based on cognition categories identified in previous research on problem gambling, as well as cognitions identified in general addiction studies. They produced a 23 item questionnaire, which assessed illusions of control, predictive control, interpretative bias, expectancies, and perceived inability to stop gambling. The measure was found to have high levels of validity and reliability; further, it was found that scores achieved on this questionnaire differentiated between problem and non-problem gamblers, further supporting the importance of gambling related cognitions in the development and maintenance of problem gambling (Raylu & Oei, 2004). Unfortunately, the questionnaire was based on gambling-specific cognitions, and therefore it could not be used for the current study,

Forrest, King & Delfabbro (2016) developed a cognition questionnaire which aimed to assess cognitions relating to Internet Gaming Disorder (IGD). The questionnaire was composed of 22 items, based on six central cognitions which previous accounts had suggested may be associated with problematic gaming. Exploratory factor analysis produced four factors, labelled Perfectionism, Cognitive Salience, Regret, and Behavioural Salience; Cognitive Salience in particular was found to be significant in predicting problematic gaming status, while Behavioural Salience did not. The authors suggest the study's findings support

previous models of problematic video-game playing, which had emphasised the importance of gaming-related cognitions, as opposed to behaviours, in the development and maintenance of IGD (Forrest, King & Delfabbro, 2016).

Davis (2001) proposed a cognitive-behavioural model of Pathological Internet Use (PIU). He argued that PIU can manifest as two distinct ‘symptoms’: generalised pathological Internet use, which describes a general overuse of the Internet, wasting time on the Internet without a clear purpose. Conversely, specific pathological Internet use refers to dependence on a specific function of the Internet, such shopping, gambling, and pornography. Davis posited that the roots of these pathological behaviours are maladaptive cognitions, which may result from situational cues, Internet use, and psychopathology. These maladaptive cognitions lead to either specific or generalised PIU, which in turn lead to problematic behaviours, or behavioural symptoms of PIU. The model developed by Davis is shown in Figure 4 below.

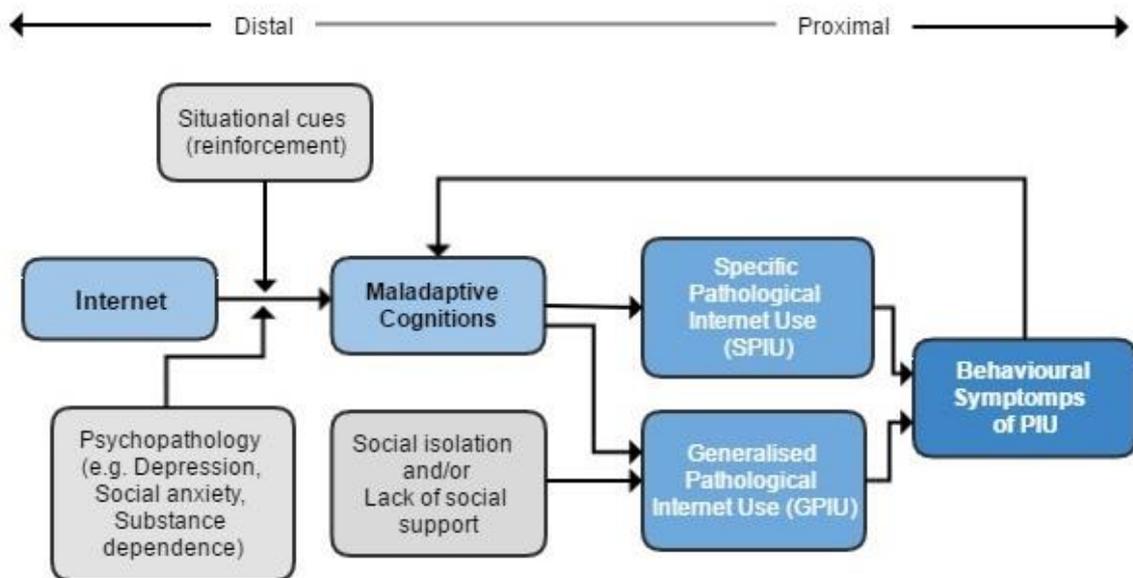


Figure 4: The Cognitive Behavioral Model of Pathological Internet Use (Davis, 2001)

This model has been implemented by a number of researchers (Caplan, 2002; Caplan, 2010; Gamez-Guadix, Orue & Calvete, 2013; Gamez-Guadix, Calvete, Orue & Hayas, 2015) in the development and implementation of PIU questionnaires. Caplan (2002) developed the Generalised PIU scale based on examples of cognitions, behaviours, and outcomes provided by Davis (2001), items from previously developed PIU scales which were conceptually similar to generalised PIU behaviours and cognitions, as well as items which were developed by Caplan, based on the theoretical definition of PIU provided by Davis. Exploratory factor analysis produced seven factors, including ‘Mood Alteration’, ‘Social Benefit’, ‘Negative Outcomes’, ‘Compulsivity’, ‘Excessive Time’, ‘Withdrawal’, and ‘Interpersonal Control’, which the author found to be consistent with the original theory. The questionnaire was found to have high internal consistency as well as construct validity, and was thus deemed to be both valid and reliable (Caplan, 2002). Based on subsequent research, the questionnaire was revised in 2010, with the new version being composed of five subscales, each of which included three items; the subscales were named ‘Preference for Online Social Interaction’, ‘Mood regulation’, ‘Cognitive preoccupation’, ‘Compulsive Internet use’, and ‘Negative outcomes’. Confirmatory factor analysis provided further evidence for the instrument’s validity and reliability. Other researchers (Gamez-Guadix, Orue & Calvete, 2013; Gamez-Guadix, Calvete, Orue & Hayas, 2015) also subjected the instrument to confirmatory analyses, as well as evaluations of its test-retest reliability, further determining its reliability and validity. While some differences were found across the different studies (for example, Caplan (2010) argued that deficient self-regulation preceded one’s preference for online social interaction and mood regulation through Internet use, Gamez-Guadix and colleagues (2015) found that increased deficient self-regulation was a result of the other aforementioned factors), overall the Cognitive Behavioural conceptualisation of PIU was found to be valid and reliable.

6.3.4 The role of Cognitive Behavioural Theory in the present study

One of the decisions which needed to be made for this study was the degree to which Cognitive Behavioural Theory would be implemented into the questionnaire development process; the primary consideration in this decision was the thesis' overarching youth-participation focus. Therefore, a balance was needed between ensuring that young people's opinions played a significant role in the questionnaire development, and allowing for the inclusion of researcher-developed items. Several options to resolve this issue were considered: one possibility was to begin the questionnaire development process by creating a set of initial items which would explore PMPU-related problematic cognitions, behaviours and emotions, based on the extant literature. A second option was to allow young people to develop the initial set of items, while being guided towards cognitive-behavioural concepts (for example, being asked to consider what types of thoughts, emotions and behaviours might be exhibited by someone who engaged in problematic mobile phone use behaviour). The third option which was considered involved asking young people to develop and edit an initial set of items, based on their general understanding of PMPU; these items would then be supplemented by researcher-developed items, if necessary.

The first possibility was discarded, for several reasons: firstly, young people's involvement would be significantly diminished, which would be at odds with the general approach and aims of this thesis. Secondly, this first option would require thorough knowledge around the cognitions, behaviours and emotions related to PMPU, in order to allow for the development of a thorough set of items. Unfortunately, the extant PMPU literature did not provide sufficient viable information which could be used as a starting point for the development of this questionnaire; more specifically, not enough was known about PMPU-related cognitions and behaviours, given that at the time this study was being conceptualised, the subject has

never been explored from a cognitive behavioural lens. In an ideal scenario, it would have been possible to identify adolescent problematic users of mobile phone technology, and explore their experiences regarding problematic cognitions and behaviours relating to MPU; such information could have subsequently been used to develop an initial set of items for a cognitive behavioural PMPU questionnaire. Baboushkin, Hardoon, Deverensky and Gupta (2001), for example, sought to determine the underlying cognitions of gambling behaviour in university students. Sixty self-selected participants were asked to engage in a range of computer-simulated gambling activities, and verbalise their thoughts while playing. Based on the findings, the authors were able to develop a series of 24 cognitions underlying gambling behaviour. While such an approach would have been useful for the further development of understanding relating to PMPU processes, it was not possible in the current study: the primary issue related to identifying and recruiting of participants. Given that the study focuses on PMPU, the cognitions underlying “normal” MPU would not have been very useful, and therefore problematic users would have been necessary. Identifying problematic mobile phone users raised some concerns: firstly, this would have involved the use of a previously developed PMPU measure. Given that such measures have been predominantly based on the DSM criteria for dependence/use disorder, they may not be entirely appropriate for young people. Secondly, there were ethical concerns relating to ascribing an ‘addiction’ label to young people, especially given that PMPU has not been included in any official diagnostic manuals. Thirdly, the researcher did not have any psychology or counselling training, and therefore it would not have been appropriate to explore sensitive issues, such as problematic cognitions, especially with a vulnerable population such as young people.

The second option was also discarded, as it conflicted with the exploratory aims of the thesis; constricting young people’s opinions to a specific direction could have led to important

PMPU-related aspects being ignored, as they might not have related directly to the concepts of problematic cognitions, behaviours or emotions. Furthermore, as with the first choice, this option also did not fit well with the youth participation approach, as young people would not have been able to express and contribute their full range of PMPU-related knowledge, opinions and experience.

Therefore, the third option was chosen: allowing young people to develop and edit the initial questionnaire items. These items were examined by the researcher, in regards to how they fit with the basic concepts of Cognitive Behavioural theory, and supplementary items were created, in order to address any gaps in the questionnaire (further details on this process are provided in section 6.7.4).

An exploration of previous research which has included the views of participants in the questionnaire development process was undertaken, in the hopes that such examples might act as a guide for the current study. Unfortunately, while previous examples of youth-participation or participant-inclusion approaches being employed for the development of questionnaires were found, they either provided little information on the specific process involved, or did not include participants in the initial item development. For example, Pamuk and Atli (2016) state that the development of the initial set of items for their PMPU scale based on qualitative data obtained from university students on their feelings regarding their mobile phone device, as well as reviews of the existing literature on the subject, and the DSM 5 criteria for substance use disorder and Internet gaming disorder. The development of the initial item pool for Walsh, White & Young's (2010) Mobile Phone Involvement was guided by findings from a qualitative study conducted by Walsh and colleagues in 2008, which sought to explore mobile phone use behaviours, as well as Brown's criteria for behavioural addiction (1993). Christie and colleagues (2007), conversely, provide more detail about the

youth-consultation process undertaken for the development of the SACS, but the initial item development was conducted by the authors, not by the young people. Therefore, existing examples of participant-inclusion approaches for the development of questionnaires did not provide sufficient information to be used as a template for the current study.

While general guidelines on item development predominantly focus on researcher-driven processes (Hinkin, Tracey, & Enz, 1997; Boynton & Greenhalgh, 2004), some do mention the inclusion of consultation with proposed respondents in the item development process, particularly to assure face or content validity (Rattray & Jones, 2007). Unfortunately, no information could be found regarding evaluations of the effectiveness, reliability or validity of researcher-developed versus participant-developed items or questionnaires.

Thus, the most pragmatic option was to base the questionnaire on the participants' views and experiences, while using Cognitive Behavioural Theory, the extant literature, and expert feedback to guide the overall development.

6.4 Modifying the Nominal Group Technique

During the development of this study, it became apparent that multiple consensus building sessions would be necessary for the construction of a PMPU instrument, as one session with one group of young people would not represent a robust process. However, none of these techniques provides a strategy for the collating of responses from multiple sessions. For example, if using NGT, each group would produce different ideas, which would then be ranked. If one were to collate the items produced by each group, there is no guarantee that the participants would agree with the ranking assigned to items produced by other groups. Therefore, if a study requires the use of iterative sessions, it would mean the alteration of one

of these techniques – this being the situation faced with for this particular research. Furthermore, Bartunek and Murningham (1984) suggest that participants may be inclined to rank the statements or items they produced higher than those produced by other participants, due to a sense of ownership and pride associated with their particular contributions. This suggests a need for two separate sessions, conducted with different groups – one involving item generation, and another involving item ranking, to reduce chances of bias.

An altered version of the NGT, involving a three step process, was developed and utilised for the purposes of this research.

The first phase was designed to correspond with Parts 1 and 2 of classic NGT, and involved participants developing initial items.

The second phase required participants to assess the items created in the first phase, and suggest alterations to wording and content, corresponding with Parts 3 and 4 of Nominal Group Technique. This phase also included expert feedback, and introduction of researcher-developed items.

The third phase was designed to allow participants one final say on the structure and wording of the items, after changes were made in phase 2.

Figure 5, shown below, illustrates this process. Further details of each phase and their underpinning rationale are provided in the following sections.

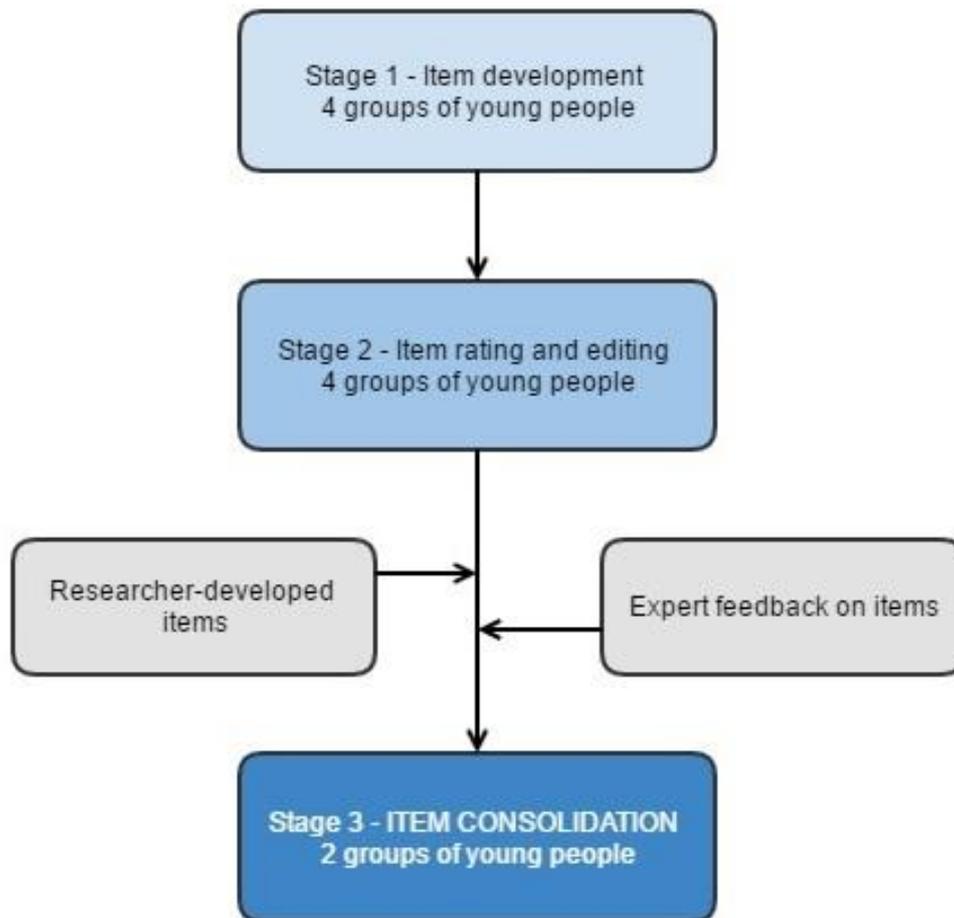


Figure 5: Modified NGT process employed in the current study

6.5 Methods

6.5.1 Participants

Chapter 5 detailed the rationale underpinning the inclusion criteria for participation in this research: age, and ownership of a mobile phone. In the previous study, young people aged

13-19 were recruited; for the purposes of the current study, the age range was limited to those aged 16-19. This decision was made in order to increase the chance that participants had owned a mobile phone for an extended period of time and would have more experience of mobile phone use, and therefore would be more likely to be able to produce items which reflected their own involvement. Recent information on mobile phone ownership amongst New Zealand adolescents is scarce; at the time this study was conducted, the best information available came from the Broadcasting Standards Authority, who released a report in 2008 regarding the mobile phone use patterns of NZ adolescents. It was reported that ownership of mobile phone devices increases sharply at the age of 12 or 13, with 62% of young people in this age group being a mobile phone carrier (BSA, 2008). In light of this, the majority of potential participants would have a minimum of three years' experience with mobile phone use, which was deemed to be adequate for the purposes of the study.

Other recruitment options which were considered included a preliminary screening of potential participants, such as asking how long they had owned a mobile phone. However, given that it would have been impossible to verify such information, the strategy was not adopted. Employing one of the previously developed PMPU scales to screen participants was also considered, however it was likewise discarded, given that the current research was not conducted from a behavioural addiction perspective, while the extant instruments were. Thus, the limited age range was considered to be the most pragmatic option.

6.5.2 Recruitment and sampling

Representative sampling is not a necessary feature of Nominal Group Technique; however, given the aims of the study, obtaining a broad and diverse sample was considered an

advantage, as it would capture a wider range of opinions and experiences relating to mobile phone use. Discussions regarding recruitment methodology mirrored those conducted for the first study: recruiting young people through approaching schools was not used, due to time constraints not allowing for a drawn-out recruitment process. Consequently, a similar process to that implemented in Study 1 was adopted, and youth-oriented organisations were chosen as the recruitment setting.

Firstly, a list of youth-oriented organisations which offered after-school activities in the Auckland region was compiled. A stratified sampling approach was adopted, based on the decile ranking of the schools linked to each of the youth organisations, in order to ensure a wide range of opinions and experiences are captured in the study. Decile ranking is defined as ‘a measure of the socio-economic position of a school’s student community relative to other schools throughout the country’, with values ranging from 1 to 10; schools given a decile ranking of 1 are the 10% of schools with the highest proportion of students from low socioeconomic backgrounds, while a decile 10 school would be in the top 10% of schools with the lowest proportion of students from low socioeconomic backgrounds (<http://www.education.govt.nz/school/running-a-school/resourcing/operational-funding/school-decile-ratings/>). Decile ranking was chosen as a defining characteristic, as it would indicate an individual’s access to economic resources. Variation in such access would at least partially dictate what type of mobile phone one would be able to afford, and the charges associated with their use. This might, therefore, create differences in individuals’ experiences with mobile phone technology, and thus was taken into account when developing the sampling frame.

The organisations were grouped into three categories, according to decile: group A comprised organisations in deciles 1-3, group B comprised organisations in deciles 4-6, and group C

comprised organisation in deciles 7-10; the organisations which had been recruited for the purposes of Study 1 were removed from the list.

Ten organisations were recruited for this study: three from group A, three from group B, and four from group C. Invitation emails were sent out to the managers of each of the organisations, inviting them to take part in the study. The email included a short description of the study and what would be involved, the Participant Information Sheets for organisation managers, parents and participants, as well as the Consent Forms for organisation managers and participants, and a request to set up a meeting in order to discuss the project in greater detail. This email was followed up by a phone call to each organisation, a week later. This process was continued until a total of 10 organisations were recruited.

Upon acceptance of the meeting request, the candidate met with the managers and “Group Leaders”, and provided them with details of the study, as well as hard copies of documents which were sent via email. In order to prevent any undue pressure being placed upon the young people who were involved with the organisations, it was decided that the Group Leaders would make the initial approach regarding taking part in the study.

If the Group Leader and organisation manager deemed the number of interested individuals as sufficient to warrant the organisation’s involvement in the study, the researcher was then permitted to meet with the young people, and discuss the study with them. The young people were provided with Participant Information Sheets for themselves and their parents, and were asked to consider whether they would like to take part in the research. Again, in order to prevent any feelings of coercion, the young people were asked to discuss their choice regarding participation with their Group Leader, as opposed with the researcher. Upon collection of sufficient affirmative responses, the Group Leader or organisation manager

liaised with the researcher, and confirmed a separate meeting, which would serve as the Nominal Group Technique session.

The groups were separated by gender, in order to reduce the chances of participants being influenced by social desirability bias in relation to members of the opposite gender– that is, producing answers which they thought would be socially desirable, in order to impress or connect with their colleagues of the opposite gender. It would also partially address the possibility of shyness, or fear of producing ideas which might be judged by the opposite sex.

The sessions took place on the youth organisation premises – this was both the preference of the researcher, and of the organisations. Allowing the research to take place in a familiar and non-intimidating environment assured a measure of comfort and security, which was deemed crucial for the participants' well-being throughout the research process. Additionally, having the sessions on organisational premises meant that in the case of any unforeseen circumstances or outcomes, professional staff were on hand to address the situation appropriately. Participants were each offered a \$20 movie voucher, as a thank you for their involvement; food and drinks were also provided for the participants, at the conclusion of each session.

6.6 Phase 1

6.6.1 Aims

The objective of this phase was the development of preliminary items, which might be included in the questionnaire. This initial phase was the subject of significant debate within the supervision team – specifically, whether to include a set of preliminarily constructed

items, based on the literature and the findings from Study 1, which would guide the participants through the development of further exemplars. However, it was decided against such an approach, as the candidate theorized the inclusion of such items would potentially narrow the focus of the participants in to developing similar items, as opposed to producing original ideas.

6.6.2 Procedures

For the first phase, four separate NGT sessions were employed – two for each gender. Each group was recruited from a different youth organisation, in order to maintain the previously discussed strategy of capturing as broad a range of views as possible. A total of 44 participants were recruited for this phase. Details on each group are presented in Table 7 below.

Table 7: Characteristics of Phase 1 groups: gender, decile, and number of participants

Group	1	2	3	4
Decile	1-3	4-6	7-10	7-10
Gender	Female	Female	Male	Male
No of participants	9	11	13	11

The procedure for each NGT session followed a pre-determined protocol: First, participants were again supplied with Information Sheets, were asked to read them prior to the commencement of the discussion, and were given the opportunity to have any questions answered. Confidentiality and anonymity were discussed with each group, reiterating the fact that due to the nature of the methodology, confidentiality or anonymity could not be

guaranteed, as the researcher could not control what the participants discuss after the session. Each participant was then asked to sign a consent form. Once completed, the researcher asked if it was OK to begin the study, and commenced the discussion.

Each session started with a general explanation of the study aims, the topic of PMPU, and an in-depth description of the study procedures. As with study 1, the words “addiction” or “dependence” were avoided, in order to not influence participants towards a particular frame of thinking. Participants were then provided with pens and paper, and asked to “think of and write down as many questions as you can that you would ask someone, if you wanted to find out if they had a problem with their mobile phone use”. “Problem” was defined as anything which might cause the user physical, social, or mental (psychological) harm. This part of the session was conducted in silence, so that participants were all able to come up with original ideas, based on their own thinking and experiences. A standard time frame of 15 minutes was allocated to this part, although flexibility was employed when necessary.

Once participants completed this process, they were asked to engage in “round-robin feedback” – that is, going around the room with each person reading out one of the questions they had written down. No debate or discussion was allowed at this stage, only recording of ideas. This would be continued until all examples had been called out. During this process, the researcher recorded all questions in an Excel document.

Following the NGT procedures, once all ideas had been recorded, participants were asked to score each question they had produced, on a scale of 1-10, in terms of how useful they believed it was in determining whether one had a problem with their mobile phone use. However, it was necessary to deviate slightly from the usual NGT procedures –protocol dictates that such scoring should be done anonymously, with the ideas having been written up on a whiteboard. However, in this case it was not possible, as there were too many examples

recorded. As an alternative, the candidate read out each question the participants had produced, and asked participants to silently score each question as it was read out, and to record these scores on a sheet of paper. When this process was completed, participants were asked to call out the scores they had allocated for each question; their responses were recorded on the Excel spreadsheet. Once all questions had been scored, average scores were calculated, and the items arranged in descending order, based on their average score.

Finally, participants were asked to discuss the items which received low scores – the items could either be re-worded, or removed from the list, based on the participants' opinions. A cut-off score of 5 was determined by the group, and each item with an average score below 5 was evaluated and either edited or removed. Once this process was completed, participants were thanked for their time, and each provided with a Movie Voucher, as a 'thank you' for their participation.

6.6.3 Analysis

Once all four NGT sessions were completed, the ideas which resulted from the sessions were collated into a final list, which comprised 78 items. The items were analysed for duplicates, which resulted in the removal of 23 items, leaving a final collection of 55 items.

As the participants were asked to produce questions, as opposed to statements, in order to avoid confusion and additional complications, it was then necessary to transform the questions into statements which could be used in a Likert-scale format, as had been envisioned for the final format of the questionnaire. Likert scales were developed by Rensis Likert in 1932, for the purpose of measurement of attitudes; they involve a series of statements, or items which respondents evaluate based on their level of agreement or

disagreement. The original scale Likert developed was rated on 5 points, ranging from “Strongly Approve” to “Strongly Disapprove” (Likert, 1932). For the purposes of this study, a 7 point scale was adopted. This choice was made as recent studies have found that scales with fewer options (i.e. 3 or 5 point scales) have poorer reliability, validity and discriminating power (Cummins & Gullone, 2000; Finstad, 2010; Preston & Colman, 2000).

This process was conducted by the candidate, under the guidance of the supervision team. For example, one item in its original state was “*Do you check your phone before you go to bed?*” This was converted to “*I check my phone before going to bed*”.

While one could argue that a degree of subjectivity was involved in this procedure, given the purpose of phases 2 and 3 was to allow young people to review and make changes to the wording and content of the items, it was not considered a significant issue. However, in order to ensure the rigour of the process, once the conversion from questions to statements was completed, the supervision team and a survey expert were provided with a document detailing the original and converted versions for each item. They were asked to comment on the converted versions, and detail any changes which might be necessary. Small wording changes were suggested to increase clarity; however, the general structure and content of the items was found to be acceptable.

During the analysis of the stage 1 results, a previously held discussion re-emerged: whether researcher-created items should be introduced at this stage. A key aspect during this study was balancing the input from young people with the candidate’s knowledge of the subject matter, and ensuring that the final outcome was as robust as possible. Given that in stage 2 of the study, participants would have the opportunity to introduce new items into the pool, it was decided that the inclusion of researcher-developed items would be premature at this stage.

In order to further clarify the general direction of the questionnaire, the existing items were thematically analysed in order to determine which concepts were being explored through the items and, therefore, whether any crucial aspects had been missed. This process was primarily implemented to explore what themes emerged from the items, as opposed to finalising which items fit together – it was planned that principal components analysis conducted in study 3 (chapter 7) would determine official item categorisation.

Once this process was completed, independent parallel coding and checks of interrater reliability of coding were conducted. A researcher external to the supervision team was provided with a list of the items, after a confidentiality agreement was signed. They were asked to examine the list and produce a set of themes or categories related to the research objectives. Another researcher was also provided with a list of the items, as well as the categories produced by the candidate; they were asked to allocate the items into the pre-existing categories based on their views of the best item-category fit.

The findings of the external researchers were then compared against the categories produced by the candidate, and examined for any significant discrepancies. Small differences were found, which were discussed with the supervision team, and changes were made accordingly. Six categories were determined through this process: *Mobile phone use*, which related to technical aspects of handset use; *Attachment*, which focussed on the individual's psychological and emotional link to their device; *Preoccupation*, which focussed on behavioural processes suggestive of attachment; *Withdrawal*, which detailed possible psychological and emotional outcomes of separation from one's mobile phone; *Negative effects*, which related to potential physical and social negative outcomes resulting from one's use of mobile phone technology; and finally, *Communication*, which examined the role of

mobile phone technology in one's communication and socialisation behaviours. The allocation of items into these six categories is detailed in the table below.

Table 8: Items resulting from phase 1 of the NGT process

Mobile phone use

- How long have you owned a mobile phone?
- Are you on prepay, or contract?
- How much money would you usually spend on top-ups in a month?
- How many SMS messages would you usually send in a day?
- How many SMS messages would you usually receive in a day?
- How many calls would you usually make using your mobile phone in a week?
- How many calls would you usually receive on your mobile phone in a week?

Attachment

- The first thing I do when I wake up is I check my phone
- The last thing I do before going to sleep is use my phone
- I couldn't imagine life without a phone
- I would be ok with another person using my phone
- I feel safer if I have my phone with me
- I panic if I don't have my phone on me
- I keep my phone in my pocket during exams, for comfort
- I'd rather lose a body part than live the rest of my life without a phone
- I would answer a txt or call in the middle of the night
- I would judge somebody, if they didn't have a phone
- I sometimes txt or call people in the same house as me
- I couldn't last a day without my mobile phone
- I can txt without looking at the keypad
- I keep important info, such as my bank account details, in my phone

Preoccupation

I constantly check my phone, even when I am with friends

I often check my phone, put it away, then check it again straight after

I carry an extra battery with me, in case my phone battery dies

I often find myself playing with my phone, when I am meant to be doing something else

Sometimes I think I can hear my phone ringing or feel it vibrate, even if it isn't.

I always make sure I have my phone with me before I leave the house

I feel the need to check my phone every 15 minutes

I sometimes check my phone while talking to people in person

I sleep with my phone under my pillow

I always have my phone on me

I am always upgrading my phone to the newest model

I never turn my phone off during the day

When my phone is taken away from me, I feel sad

Withdrawal

I feel worried when I don't have a phone with me

If I didn't have my phone with me, I would borrow someone else's

I would purchase a phone, even if the price doubled

I would still send txts, if the price of txting doubled

If I cannot access my phone, I become annoyed

When I receive a txt during an inappropriate situation, I start feeling anxious, because I can't check it

I feel uncomfortable if I am away from my phone for a long period of time

When people around me are txting, I feel like I am missing out

Negative effects

I have lost sleep because I was up txting during the night

I use my phone to procrastinate against doing school work

I would rather stay at home and txt people than go out

I check my mobile phone while driving

My fingers have hurt because I was txting so much.

I think it is appropriate to use my mobile phone during family meal times

I txt while walking

Communication

Often I am the person who sends the initial txt

My phone is my main means of communication

I think mobile phones are the best way of communicating

I feel more comfortable discussing emotional issues over txt than face to face

I use up all of my txts for the month

I always txt during class

6.7 Phase 2

6.7.1 Aims

The aim of Phase 2 of this study was item editing and rating (in terms of their usefulness in determining whether one had a problem with their mobile phone use) – this corresponds to the second part of Nominal Group Technique. As discussed earlier in this chapter, the rationale behind the division of the item creation and item rating processes revolved around the idea that participants may be inclined to rate the statements or items they produced higher than others, due to a sense of ownership and pride associated with their particular contributions. While a rating process was employed in Phase 1 of this study, this was to allow

participants a collective decision on which items to officially submit at the end of the NGT session. In this phase, participants were able to consider the item pool as a whole and would, therefore, be better able to assess the importance and usefulness of the items, as well as suggest any additions they might feel were necessary.

6.7.2 Procedures

Similarly to the phase 1, four separate NGT sessions were employed – two for each gender, with each group being recruited from a different youth organisation (organisations which had been recruited for stage 1 were excluded from the sampling for this phase, to ensure that a wide range of opinions were captured by the study). A total of 39 participants were recruited for this phase. Details on each group are presented in the table below.

Table 9: Characteristics of Phase 2 groups: gender, decile, and number of participants

Group	1	2	3	4
Decile	1-3	4-6	7-10	7-10
Gender	Female	Female	Male	Male
No of participants	10	9	12	8

As with Phase 1, the sessions followed a pre-determined protocol which was designed to mirror the second part of a classic NGT meeting. First, participants were again supplied with Information Sheets, were asked to read them prior to the commencement of the discussion, and were given the opportunity to have any questions answered. Confidentiality and anonymity were discussed with each group, reiterating the fact that due to the nature of the methodology, confidentiality and anonymity could not be guaranteed. Each participant was

then asked to sign a consent form; upon collection of the documents, the researcher asked if it was ok to begin the study, and pending confirmation, commenced the discussion.

The researcher provided participants with a brief explanation of the aims of the study and a description of Phase 1 procedures, in order to contextualise the task they were asked to perform. Following this, each participant was supplied with a copy of the item pool collated in Phase 1, and asked to undertake two tasks. Firstly, to examine each item, and evaluate how useful they believed it would be in assessing whether a person had a problem with their mobile phone use (as with Phase 1, “problem” was defined as anything which might cause the user physical, social, or mental (psychological) harm), and to denote their evaluation by assigning each statement a score from 1-10, where 1 meant “Not at all useful”, and 10 meant “Extremely useful”. Secondly, participants were asked to think about any changes to the wording of the items which they believed might improve it, as well as any items which were missing, and they believed would be a useful addition to the pool. This process was conducted in silence, as discussion of the items might result in participants shifting their opinions, and for the purposes of this study, each individual’s experiences and opinions were important. Upon completion, participants were asked to return the documents to the researcher, thanked for their time, and each provided with a Movie Voucher, as a ‘thank you’ for their participation.

6.7.3 Analysis

After all four sessions had been completed, ratings for each item were collated and averaged to produce an overall score. Comments provided for each item were also collated, duplicate comments removed, and findings were collated into the tables below.

Table 10: Scores and comments for items in the 'Mobile phone use' category

Items	Mobile phone use	Average Item Rating
1	How long have you owned a mobile phone?	6.56
Comments:	<i>If it is their first phone, or have they had multiple, may want to include another question</i>	
2	Are you on prepay, or contract?	5.44
Comments:	<i>And why? Find out whether by choice, deals or parents etc? Doesn't matter, take out</i>	
3	How much money would you usually spend on top-ups in a month?	7.38
Comments:	Nil	
4	How many SMS messages would you usually send in a day?	8.47
Comments:	<i>To be honest I'm not sure that people would know how many txts they sent daily Sometimes very difficult to remember how many exactly, so approx.</i>	
5	How many SMS messages would you usually receive in a day?	7.66
Comments:	Nil	
6	How many calls would you usually make using your mobile phone in a week?	5.69
Comments:	<i>Less relevant than txting</i>	
7	How many calls would you usually receive on your mobile phone in a week?	5.78
Comments:	<i>Less relevant than txting</i>	

Table 11: Scores and comments for items in the 'Attachment' category

	Attachment	Average Rating
8	The first thing I do when I wake up is I check my phone	8.65
Comments:	<i>Ask the reason for checking the phone in the morning e.g. people may use it as an alarm, so have to check it to turn it off, but not be addicted to their phone</i>	
9	The last thing I do before going to sleep is use my phone	8.06
Comments:	<i>Same as above, so if answered yes ask to specify why as they could just be setting an alarm for the morning</i>	

10	I couldn't imagine life without a phone	8.34
Comments:	Nil	
11	I would be ok with another person using my phone	6.53
Comments:	<i>Shows attachment well</i>	
12	I feel safer if I have my phone with me	7.53
Comments:	<i>Not really an issue</i>	
13	I panic if I don't have my phone on me	7.94
Comments:	Nil	
14	I keep my phone in my pocket during exams, for comfort	6.84
Comments:	<i>Not by choice – have to take it out/show we don't have it. "Would you prefer to have it with you?" maybe</i>	
15	I'd rather lose a body part than live the rest of my life without a phone	5.66
Comments:	<i>Very far fetched, make it more realistic</i>	
16	I would answer a txt or call in the middle of the night	6.66
Comments:	Nil	
17	I would judge somebody, if they didn't have a phone	5.43
Comments:	Nil	
18	I sometimes txt or call people in the same house as me	6.16
Comments:	<i>This is just lazyness</i>	
19	I couldn't last a day without my mobile phone	7.91
Comments:	Nil	
20	I can txt without looking at the keypad	7.59
Comments:	Nil	
21	I keep important info, such as my bank account details, in my phone	5.5
Comments:	<i>No-one would admit to this on a survey Although this is a good question, it may be a bit personal to ask Trust in phone security is a real issue</i>	

Table 12: Scores and comments for items in the 'Preoccupation' category

	Preoccupation	Average Rating
22	I constantly check my phone, even when I am with friends	8.41
Comments:	Nil	
23	I often check my phone, put it away, then check it again straight after	8.06
Comments:	Nil	
24	I carry an extra battery with me, in case my phone battery dies	4.81
Comments:	<i>Far-fetched</i>	
25	I often find myself playing with my phone, when I am meant to be doing something else	8.13
Comments:	Nil	
26	Sometimes I think I can hear my phone ringing or feel it vibrate, even if it isn't.	8.06
Comments:	<i>Sometimes this happens because of some sciency thing not due to addiction</i>	
27	I always make sure I have my phone with me before I leave the house	7.97
Comments:	Nil	
28	I feel the need to check my phone every 15 minutes	7.91
Comments:	Nil	
29	I sometimes check my phone while talking to people in person	7.31
Comments:	Nil	
30	I sleep with my phone under my pillow	6.91
Comments:	<i>Far-fetched</i>	
31	I always have my phone on me	8.38
Comments:	<i>This may not be a sign of addiction, more of a safety net, or because they have been told by their parents</i>	
32	I am always upgrading my phone to the newest model	6.84
Comments:	<i>Phones may also be used as an accessory</i>	

33	I never turn my phone off during the day	7.88
Comments:	Nil	
34	When my phone is taken away from me, I feel sad	8.16
Comments:	Nil	

Table 13: Scores and comments for items in the 'Withdrawal' category

	Withdrawal	Average Rating
35	I feel worried when I don't have a phone with me	7.53
Comments:	Nil	
36	If I didn't have my phone with me, I would borrow someone else's	6.94
Comments:	<i>This could be dependent on circumstances, they may need to contact someone</i>	
37	I would purchase a phone, even if the price doubled	6.34
Comments:	<i>Depends on circumstances, people may be told to keep phones by parents but not addicted</i>	
38	I would still send txts, if the price of txting doubled	7.44
Comments:	<i>Depends on circumstances, people may be told to keep phones by parents but not addicted</i>	
39	If I cannot access my phone, I become annoyed	7.72
Comments:	Nil	
40	When I receive a txt during an inappropriate situation, I start feeling anxious, because I can't check it	7.5
Comments:	Nil	
41	I feel uncomfortable if I am away from my phone for a long period of time	7.28
Comments:	Nil	
42	When people around me are txting, I feel like I am missing out	8.94
Comments:	Nil	

Table 14: Scores and comments for items in the 'Negative effects' category

	Negative effects	Average Rating
43	I have lost sleep because I was up txtng during the night	8.13
Comments:	Nil	
44	I use my phone to procrastinate against doing school work	8.47
Comments:	Nil	
45	I would rather stay at home and txt people than go out	6.34
Comments:	Nil	
46	I check my mobile phone while driving	6.53
Comments:	Nil	
47	My fingers have hurt because I was txtng so much.	6
Comments:	<i>Sometimes people have more or less stamina for txtng so can vary from person to person Far-fetched</i>	
48	I think it is appropriate to use my mobile phone during family meal times	5.97
Comments:	<i>This varies between families and different cultures. This may be acceptable in some households</i>	
49	I txt while walking	6.66
Comments:	<i>People can multitask, in a rush it may be to save time, may not be an addiction</i>	

Table 15: Scores and comments for items in the 'Communication' category

	Communication	Average Rating
50	Often I am the person who sends the initial txt	6.78
Comments:	Nil	
51	My phone is my main means of communication	8.66
Comments:	<i>Maybe give examples e.g. email, facebook, face to face</i>	
52	I think mobile phones are the best way of communicating	7.97
Comments:	Nil	
53	I feel more comfortable discussing emotional issues over txt than face to face	7.81
Comments:	Nil	
54	I use up all of my txts for the month	7.84
Comments:	Nil	
55	I always txt during class	8.78
Comments:	Nil	

Based on the previously defined cut-off score of 5, only one statement received an overall rating which would suggest that it would not be useful for this questionnaire: *“I carry an extra battery with me, in case my phone battery dies”*. However, a number of other items received feedback, including comments such as “far-fetched”.

The panel of experts previously contacted for the purposes of Phase 1 were engaged in a discussion about which items should be removed from the list, and which items should be altered, in light of the results from Phase 2. Based on these discussions, items 1-7 were shifted to a theoretical Demographics section, and items 24, 32, and 50 were removed. A number of items were also edited, or reversed. Further details are provided in the following section.

6.7.4 New item development

The questionnaire items produced during phases 1 and 2 of this study were examined by the researcher, in conjunction with the supervision team, and as a result it was decided that the development and inclusion of other items was warranted. Item development was primarily based on the concepts of problematic cognitions, emotions and behaviours, as well as the existing literature regarding problematic mobile phone use behaviour, and the findings from the qualitative study conducted as part of this thesis.

First, the existing items were reorganised, in order to better reflect the three components of Cognitive Behavioural Theory: four categories were created, termed ‘Problematic behaviours’, ‘Problematic cognitions’, ‘Problematic emotions’, and ‘Negative consequences’.

Problematic Behaviours comprised three subsections: *Behavioural preoccupation*, which related to behaviours exhibiting one’s preoccupation with their mobile phone device; *Use in inappropriate situations*, which as the name suggests, focused on the use of mobile phones in circumstances which most people would consider inappropriate, and finally *Priorities*, which investigated how important the mobile phone was for an individual, when considering monetary resources and existing commitments. Only one new item was developed for the Problematic Behaviours section: ‘I call or txt my friends in the middle of the night’. This item was based on the descriptions provided by participants in the first study of this thesis, regarding some young people engaging in conversations until late at night, and suffering negative consequences as a result, such as not being able to stay awake at school the following day.

Problematic Cognitions was composed of six subscales, including *Cognitive preoccupation*, which was related to the individual’s psychological focus on their device; *Attachment*, which

denotes the emotional and cognitive attachment to their phone, *Positive expectations*, which explored beliefs regarding mobile phone use and positive psychosocial outcomes, *Negative expectations*, which evaluated any held beliefs and opinions regarding negative associations between mobile use and psychosocial factors; *Use in inappropriate situations*, which evaluated beliefs and opinions regarding the use of mobile phones during inappropriate circumstances (as opposed to the subsection of the same name in the Problematic Behaviours category, which aimed to evaluate the incidence of such behaviours within the target population), and finally *Communication*, which explored opinions regarding the role of mobile phone technology in everyday communication and socialisation processes.

The *Positive Expectations* subscale was entirely researcher-developed. The three items which comprised this subscale aimed to explore outcome expectancies, which have been linked to the development and maintenance of alcohol use disorders (Thush & Wiers, 2007; Thush et al., 2008). Furthermore, positive expectancies have been included in other cognitive-behavioural questionnaires which aimed to explore problematic behaviours (Caplan, 2002; Raylu & Oei, 2004). The three items focussed on potential positive outcomes relating to mobile phone use: ‘Receiving lots of messages means that people are thinking about you’; ‘People who receive lots of txts are popular’; ‘If you have a mobile phone, you are more likely to be included in social and fun events’.

Two items were developed for the *Negative Expectations* subscale; they were designed to mirror the positive expectations items: ‘I think that if I didn’t have a mobile phone, I would be excluded by my friends’ and ‘If somebody doesn’t reply to my txt, I think they probably dislike me’.

The *Use in inappropriate situations* subscale was also solely researcher-designed; it was based on the focus group findings, where participants described that one of the indicators of

mobile phone ‘addiction’ would manifest as using one’s mobile phone during inappropriate situations, such as while socialising, or while at dinner. This subscale aimed to explore whether beliefs that mobile phone use is more important than social protocol played a part in PMPU.

The final subscale was *Communication*, and explored preferences for communicating via mobile phone, as opposed to face-to-face. A preference for cyber communication was also included by Caplan (2002), and was described by participants from the qualitative study.

Problematic emotions included two subscales, *Positively-reinforcing* and *Negatively-reinforcing emotions*. The majority of items in the Negatively-reinforcing emotions subscale were developed by young people, with the exception of ‘If I don’t receive any txts for a while, I feel sad’, which was based on accounts from the first study. Two of the three items in the Positively-reinforcing subscale were researcher-developed: ‘I feel happy when I receive a txt’, and ‘Hearing my phone ring makes me feel excited’; the items were based on the findings from a qualitative study conducted in Australia (Walsh, White & Young, 2008).

The final scale explored negative consequences; four items were created by the researcher: one item related to cyber-bullying (based on comments from the qualitative study), one item related to social problems due to mobile phone use (based on comments from the qualitative study), one item related to experiencing back or neck pain (based on reports from the NZ Chiropractic Association regarding the increasing number of young people seeking chiropractic help for phone-related back or neck pain), and the final item related to financial problems, which have been identified in other PMPU-related qualitative research (James & Drennan, 2005; Walsh, White & Young, 2008).

In total, nineteen items were added to the questionnaire; in addition, a number of the items produced by young people were edited in order to increase clarity and address any grammatical issues. Some items were also reversed – for example, “*I always have my phone on me*” became “*I don’t always have my phone on me*”. Reversing items is considered a part of best practice survey design, as it prevents respondents from answering carelessly, and ensure fuller measurement of an attitude or opinion (Weijters & Baumgartner, 2012).

The changes made to the questionnaire items are detailed in tables 16-19.

Table 16: New, edited and reversed items in the 'Problematic behaviours' pool

Problematic behaviours	<u>New</u>	<u>Edited</u>	<u>Reversed</u>
Behavioural preoccupation			
The first thing I do when I wake up is check my phone			
The last thing I do before going to sleep is use my phone			
I keep my phone in my pocket during exams, for reassurance		<u>X</u>	
I would not answer a non-urgent txt in the middle of the night		<u>X</u>	<u>X</u>
I often check my phone, put it away, then check if again straight after			
I feel the need to check my phone every 15 minutes			
If for some reason I didn’t have my phone with me, normally I would not borrow someone else’s			<u>X</u>
I make sure I have my phone with me before I leave the house			
I call or txt my friends in the middle of the night	<u>X</u>		
I don't always have my phone on me			<u>X</u>
I never turn my phone off during the day			
I sleep with my phone under my pillow			
I don't txt or call people in the same house as me			
I can't txt without looking at the keypad			
I don't keep important info, such as my bank account details, in my phone			

Use in inappropriate situations			
I constantly check my phone, even when I am with friends			
I don't check my phone while talking to people in person			<u>X</u>
I use my phone to procrastinate against doing school work			
I don't use my mobile phone during class time			<u>X</u>
I use my mobile phone during dinner with family or friends		<u>X</u>	
I don't check my phone and answer txt messages while driving			<u>X</u>
Priorities			
I would not purchase a phone if the price doubled			<u>X</u>
I would still send txts, if the price of txting doubled		<u>X</u>	
I often play on my phone instead of doing school work			
I do not upgrade my phone just because a newer model came out		<u>X</u>	<u>X</u>
I often find myself playing with my phone, when I am meant to be doing something else			

Table 17: New, edited and reversed items in the 'Problematic cognitions' pool

Problematic cognitions	New	Edited	Reversed
Cognitive Preoccupation			
If I am not using my mobile phone, I think about my mobile phone			
Sometimes I think I can hear my phone ringing or feel it vibrate, even if it isn't.			
Attachment			
I couldn't imagine life without a phone			
I'd rather lose a body part than live the rest of my life without a phone			
I would not be ok with another person using my phone			X
I couldn't last a day without my mobile phone			
Positive expectations			
Receiving lots of messages means that people are thinking about you	X		

People who receive lots of txts are popular	X		
If you have a mobile phone, you are more likely to be included in social and fun events	X		
Negative expectations			
I think that if I didn't have a mobile phone, I would be excluded by my friends	X		
If somebody doesn't reply to my txt, I think they probably dislike me	X		
Just because somebody didn't have a mobile phone, I would not judge them			X
Use in inappropriate situations			
I think it is ok to txt while in a social situation	X		
It's ok to txt during class times	X		
I don't think it's ok to use a mobile phone during family dinners	X		
I don't mind if people use their mobile phones while at the cinema	X		
Communication			
I think mobile phones are the best way of communicating			
I don't think txt messages are the best way to communicate with friends		X	
I find it easier to talk about private and emotional issues via txt		X	
I am less nervous talking to the opposite sex via txt, than face to face	X		
I prefer talking to friends through txt than face to face	X		

Table 18: New, edited and reversed items in the 'Problematic emotions' pool

Problematic emotions	New	Edited	Reversed
Negatively enforcing			
When my phone is taken away from me, I feel lonely		X	
I feel uncomfortable if I am away from my phone for a long period of time		X	
When I receive a txt during an inappropriate situation, I start feeling anxious because I can't check it			
If I cannot access my phone, I become annoyed			
I don't panic if I don't have my phone on me			X
Not having my mobile phone with me would not cause me to worry			X
When people around me are txting, I feel like I am missing out			
If I don't receive any txts for a while, I feel sad	X		
Positively enforcing			
I feel happy when I receive a txt	X		
Hearing my phone ring makes me feel excited	X		
I feel safer if I have my phone with me			

Table 19: New, edited and reversed items in the 'Negative consequences' pool

Negative consequences	New	Edited	Reversed
I have lost sleep because I was up txting during the night			
I would rather go out than stay at home and txt people			X
I have gotten into a car crash or gotten a ticket because of using my mobile phone while driving		X	
My school work has suffered because I spend so much time on my mobile phone		X	
My fingers have hurt because I was txting so much.			
I have not been bullied via txt	X		
My back and/or neck have hurt from bending over my mobile phone for long periods of time	X		
I have had problems because I spent so much money on my phone	X		
I have gotten into disagreements or fights with my friends and/or significant other because of misunderstanding txt messages.	X		

6.7.5 Expert feedback

As part of the item development process, expert feedback was considered crucial, as the candidate was not a youth expert, nor a psychologist, or a statistician. Therefore, a panel of experts was constructed, including a statistics expert, a clinical psychologist, a youth researcher, and an addictions expert. The inclusion of the addiction expert was debated, as this research seeks to eschew an addiction framework. However, a number of the items developed by young people did have addiction-like connotations, for example those previously included in the “Withdrawal” section, and therefore their expertise was considered relevant to the current study.

Each of the experts was contacted via email, and asked to participate in this phase of item development. Once they agreed, they were each supplied with a copy of the questionnaire items, and requested to provide feedback on each item – whether they believed it to necessitate wording changes, removal, or keeping the items as they were.

Once feedback was received from all four experts, the comments were collated and the questionnaire was reviewed. Based on this review, wording changes were made to a number of the statements, and some items were entirely excluded. For this version, the categorisations were removed, as the conceptual development process for which they were necessary had been finalised. Table 20 represents the final version of the questionnaire, for Phase 2.

Table 20: Final pool of items

1.	One of the first things I do when I wake up is check my phone
2.	One of the last things I do before I go to sleep is use my phone
3.	I would not answer a txt or call in the middle of the night
4.	I often check my phone, put it away, then check it again straight after
5.	I feel the need to check my phone every 15 minutes, or more frequently
6.	Except in an emergency, I would not borrow someone else's phone
7.	I cannot leave the house without having my mobile phone with me
8.	I call my friends in the middle of the night
9.	I txt my friends in the middle of the night
10.	I always have my phone with me
11.	I never turn my phone off during the day unless I absolutely have to
12.	I sleep with my phone under my pillow
13.	I don't txt or call people in the same house as me
14.	I constantly check my phone, even when I am with friends
15.	I don't check my phone when I am talking to someone in person
16.	I don't use my mobile phone during class time
17.	I use my mobile phone while eating with family or friends
18.	I would still send txts, regardless of what it would cost
19.	I often play on my phone instead of doing school work
20.	I often find myself playing with my phone, when I am meant to be doing something else
21.	When people around me are txting, I feel like I am missing out
22.	I feel safer if I have my phone with me
23.	I panic if I don't have my phone on me
24.	When my phone is taken away from me, I feel lonely
25.	I feel uncomfortable if I am away from my phone for a long period of time
26.	When I receive a txt during an inappropriate situation, I start feeling anxious if I can't check it
27.	If for some reason I can't use my phone, I become annoyed

28.	Not having my mobile phone with me does not cause me to worry
29.	Sometimes I think I can hear my phone ringing or feel it vibrate, even if it isn't.
30.	If I am not using my mobile phone, I think about my mobile phone
31.	I would not be ok with another person using my phone
32.	I couldn't imagine life without a phone
33.	I think txting is the best way of communicating with friends
34.	I'd rather lose a body part than live the rest of my life without a phone
35.	I would judge somebody if they didn't have a phone
36.	I couldn't last a day without my mobile phone
37.	Receiving lots of messages means that people are thinking about you
38.	People who receive lots of txts are popular
39.	If you have a mobile phone, you are more likely to be included in social and fun events
40.	If I don't receive any txts for a while, I feel sad
41.	I think that if I didn't have a mobile phone, I would be excluded by my friends
42.	If somebody doesn't reply to my txt, I think they probably dislike me
43.	I feel happy when I receive a txt
44.	Hearing my phone ring makes me feel excited
45.	I think it is ok to txt while out with friends
46.	It's ok to txt during class times
47.	I don't think it's ok to use a mobile phone during family dinners
48.	I don't mind if people use their mobile phones while at the cinema
49.	I don't think txt messages are the best way to communicate with friends
50.	I find it easier to talk about private and emotional issues via txt
51.	I am less nervous talking to the opposite sex via txt, than face to face
52.	I prefer talking to friends through txt than face to face
53.	I have lost sleep because I was up txting during the night
54.	I would rather go out than stay at home and txt people
55.	My school work has suffered because I spend so much time on my mobile phone
56.	My fingers have hurt because I was txting so much.
57.	I have not been bullied via txt
58.	My back and/or neck have hurt from bending over my mobile phone for long periods of time
59.	I have been in trouble because I spent so much money on my phone
60.	I have been in disagreements or fights with my friends and/or significant other because of misunderstanding txt messages.

6.8 Phase 3

6.8.1 Aims

As Phase 2 involved significant changes being made to the structure, content and wording of items presented to young people, it was necessary to allow the target population a final opportunity to edit the wording. This final phase was somewhat unique, as it did not seek further additions to the pool of items, but rather explored young people’s opinions regarding the way in which the items had been constructed. While this process is not a usual component of classic NGT methodology, it did provide significant value to the overall process of developing a youth-informed questionnaire, by allowing the target population to have a final say on whether the manner in which these items are presented was appropriate for them.

6.8.2 Procedures

Two groups totalling 25 participants were recruited for this phase; as with previous phases, the groups were divided according to gender. Each group was recruited from a different youth organisation. Further details are provided in the table below.

Table 21: Characteristics of Phase 3 groups: gender, decile, and number of participants

Group	1	2
Decile	1-3	4-6
Gender	Female	Male
No of participants	11	14

Similarly to Phases 1 and 2, the sessions followed a pre-determined protocol, although as previously mentioned, this final phase was not strictly part of classic NGT methodology. First, participants were again supplied with Information Sheets, were asked to read them prior to the commencement of the discussion, and were given the opportunity to have any questions answered. Confidentiality and anonymity were discussed with each group, reiterating the fact that due to the nature of the methodology, confidentiality and anonymity could not be guaranteed. Each participant was then asked to sign a consent form; once the forms were collected, the researcher asked if it was ok to begin the study, and commenced the discussion.

The researcher provided participants with a brief explanation of the aims of the study and a description of Phase 1 and 2 procedures, in order to contextualise the task they were asked to perform. Participants were each supplied with a copy of the final version of the questionnaire, and requested to consider each item, and whether they would make any changes to the wording. Once completed, participants were asked to return the questionnaires to the researcher, and were each provided with a Movie Voucher as a thank you for their time and participation.

6.8.3 Analysis

Following the same procedure implemented in Phase 2, the comments received were collated into one document. A review of these comments showed that the participants were supportive of the way in which the items had been constructed, and no comments suggesting any changes were made. Therefore, the questionnaire was considered finalised and ready for implementation, as presented in Table 20.

6.9 Discussion

The current study aimed to develop a youth-informed Problematic Mobile Phone Use questionnaire. A total of 108 young people were involved in 10 NGT sessions to create, edit and approve items for this questionnaire. As this study predominantly focussed on questionnaire development, and the survey itself was not tested, the discussion will likewise focus on the development, as opposed to the resulting items.

The central aim of this study was to develop a youth-informed Problematic Mobile Phone Use questionnaire. A modified consensus building methodology, based on the Nominal Group technique, was adopted in order to develop a structured, procedure which still allowed for the inclusion of literature-informed items as well as expert opinion. The final product comprises 60 items, which seek to evaluate three primary concepts relating to problematic mobile phone use behaviour, as informed by CBT and youth experiences: Maladaptive Behaviours, Maladaptive Cognitions, and Negative Consequences. The items were categorised into these three overarching concepts based on thematic analysis and expert feedback, with the caveat that such categorisation may change once the questionnaire was implemented, and principal components analysis was conducted.

This questionnaire is unique within the Problematic Mobile Phone Use literature, in two significant ways. Firstly, the adoption of Cognitive Behavioural Theory as the underpinning model allows for the exploration of PMPU behaviour through a lens which is different from that used in previous studies, where an addiction-based, DSM approach has been taken, in one form or another. Further discussions on the limitations associated with the use of DSM criteria were provided in Chapter 3, and will therefore not be detailed here. However, irrespective of any critiques relating to the extant PMPU research, the adoption of a different theoretical perspective is in itself valuable, as it allows for variation in the conceptualisation

of a behaviour about which very little is known. Such variation would encourage broadening the scope of understanding related to the PMPU phenomenon.

Furthermore, while the general strengths of CBT were discussed in section 7.2 of this chapter, it is worth noting that the use of CBT for the purposes of designing a PMPU questionnaire represents an advantage, due to the broadness of the theory. Exploring PMPU in terms of cognitions and behaviours allows for a more expansive investigation of the concepts underlying this behaviour, without the constrictions of specific addiction or dependence criteria, such as those outlined by the DSM-IV. However, it does not remove the exploration of PMPU completely from the field of behavioural addictions: as discussed earlier in this chapter, CBT has been applied in the exploration and evaluation of a range of behaviours, including gambling, gaming, and Internet use. Indeed, similarities may be observed between the subcategories identified in this questionnaire, and those present in previously designed problematic behaviour questionnaires; for example, 'behavioural preoccupation' and 'cognitive preoccupation' mirror the behavioural and cognitive salience concepts proposed by Brown (1993) for his theory of behavioural addiction.

A second aspect which differentiates this study from other explorations of PMPU, is its aim primarily employed the views of the target population in the construction of a scale. The majority of PMPU scales which were reviewed as part of this thesis had utilised items which had been solely researcher-developed, with two exceptions: Walsh and colleagues (2010), and Pamuk and Atli (2016). Therefore, the adoption of this strategy constitutes two primary strengths: the inclusion of stakeholder views in the development and subsequent exploration of an emerging concept, and the modification of a consensus building methodology which allows for the inclusion of information external to participant opinions into the overall process. Thus, the current study arguably constitutes a template which might be followed by

others wishing to adopt a similar methodology for questionnaire development, irrespective of the subject matter.

Initially, a thematic comparison between the youth-informed questionnaire and previously developed PMPU instruments was considered necessary for the contextualisation and positioning of this study within the literature. Upon further reflection, however, such an attempt was deemed superfluous. Given the significantly different approach taken in developing this questionnaire when compared to other examples, a comparison would not produce any worthwhile findings – any resulting differences would be due to the absence of an addiction-based framework, and any similarities could be easily justified through the simple fact that all relevant scales seek to explore the same concept, in one way or another. However, it is notable that a number of items which were developed as part of this process can also be found in existing PMPU questionnaires – however, the concepts which those items seek to examine differ to the concepts being explored as part of this questionnaire. For example, the questionnaire developed by Guzeller & Cosguner (2012) includes a withdrawal & tolerance subscale, which is comprised of items such as ‘When I can’t use a mobile phone, I am exasperated’, or ‘I think life without mobile phones is boring and futile’. The questionnaire developed as part of this study includes similar items, such as ‘if I cannot access my phone, I become annoyed’ or ‘I couldn’t imagine life without a mobile phone’; however, these items aim to explore problematic emotions and cognitions related to PMPU, as opposed to withdrawal and tolerance. The Smartphone Addiction Inventory developed by Lin et al (2014) explores compulsive behaviour through such items as ‘I feel distressed or down once I cease using smartphone for a certain period of time’, while in the case of the current questionnaire, a similar item (‘I feel uncomfortable if I am away from my phone for a long period of time’) seeks to explore problematic emotions, rather than behaviour. This similarity

between items, and the concurrent divergence between the PMPU-related concepts they seek to evaluate, serves to evidenciate that an addiction-based perspective is not the only possible option for exploring PMPU. It also brings into question how accurately addiction-based items can be formulated for a problematic behaviour, which is an issue that has been identified by other researchers (Billieux et al., 2015).

6.9.1 Limitations

While the uniqueness of this questionnaire development has been hitherto championed as a strength, it also naturally involves certain limitations. Firstly, the modified methodology employed for the development of the items, while based on a rigorous concensus building technique, had never been implemented before. Therefore, while very reasonable step had been taken to ensure that the entire process is as rigorous as possible, no claims can be made regarding the overall reliability and validity of the process.

Secondly, an aspect of debate throughout the design and implementation of this study was the inclusion of expert-generated items into the pool. It is possible to argue for any variation of the item development process: for example, commencing the study with a pre-existing set of items which had been developed by the researcher, based on existing information regarding PMPU was an option given serious consideration, as this is the method suggested by questionnaire-development guides (Hinkin, Tracey, & Enz, 1997; Boynton & Greenhalgh, 2004). Part of this debate was that while young people are prolific mobile phone users, when compared to the rest of the population, this does not result in psychology or statistics related expertise, and therefore allowing them to initiate item development would be risky. This

would suggest the need for significant researcher input, in order to ensure the desired direction of the study was maintained.

Alternatively, eschewing researcher-driven items altogether was considered. Given that any researcher-developed items would have to be informed by literature which was critiqued earlier in the thesis, the use of such information in the development of a new questionnaire would appear counter-intuitive and counter-productive. Furthermore, given the overarching aim of the research to produce a set of items which were based on young people's opinions and experiences, the introduction of other items could appear superfluous.

Ultimately, the strategy which was adopted aimed to address concerns posed from both angles – through allowing young people to develop the initial set of items and suggest content and wording changes throughout the process, the final product was significantly based on the views, opinions and experiences of the target population. However, the introduction of literature-informed items allowed for the maintenance of an appropriate direction and context for the study as a whole.

6.10 Conclusion

Overall, this study represents an important step in the shift away from an addiction-based ideology relating to PMPU, and provides an initial platform from which further enquiries about this concept might be initialised. However, it is worth noting that the usefulness of the final product, i.e. the developed questionnaire, cannot be assessed until it is implemented, and appropriately tested within a sample of young people. Therefore, final evaluations of the overall success of this study must be conservative until the finalisation of study 3, which will be detailed in the following chapter.

CHAPTER 7. AN ONLINE SURVEY OF NEW ZEALAND ADOLESCENTS AND THEIR MOBILE PHONE USE

7.1 Introduction

Previous chapters have discussed the limitations of existing studies on the subject of PMPU, particularly relating to instrument construction; although the statistical validation of such instruments is often thorough, the atheoretical approach taken in their development has raised concerns regarding their effectiveness in assessing PMPU (Billieux et al., 2015). Furthermore, existing PMPU instruments have predominantly been researcher-developed, with no exploration of young people's experiences with PMPU being included in the instrument development. Therefore, this has suggested a need for the development of a theoretically-supported instrument which evaluates PMPU. This chapter describes the final of the three studies which comprise this thesis, which aimed to implement the youth-inspired Problematic Mobile Phone Use Questionnaire developed in Study 2. A description of the theoretical and methodological assumptions underpinning survey research methods, and data analysis is provided in the first section of this chapter. This is followed by a description of the survey piloting procedures. Finally, the methods, results and discussion of the main survey are provided.

7.2 Research aims

The data collection and analysis processes were guided by the following objectives:

1. To implement the survey developed in Study 2, using a sample of New Zealand young people
2. To perform preliminary validity and reliability evaluations of the PMPU instrument
3. To quantify PMPU levels, and levels of any constructs underlying PMPU
4. To explore the relationships between demographic characteristics, mobile phone use behaviours, and PMPU

5. To explore the relationships between demographic characteristics, mobile phone use behaviours, PMPU, and negative consequences resulting from PMPU

These research aims correspond with objectives 5 -7 of this thesis, detailed in the introductory chapter.

7.3 Methods

7.3.1 Study design

For the purposes of the current study, a cross sectional design was employed. Cross-sectional studies are a type of observational study (others including cohort and case-control studies) in which exposure and outcome are determined simultaneously for each subject, and it is carried out at one time point, or over a short period of time; i.e. it is a ‘snapshot’ of a group of individuals (Carlson & Morrison, 2009; Levin, 2006). Cross sectional studies are usually used to determine prevalence, and are useful in identifying associations between variables. Cohort studies and case control studies can then be used to explore associations in further detail (Mann, 2003). Furthermore, they are relatively inexpensive to conduct, and take less time than other types of studies (Levin, 2006). However, cross sectional studies are limited, as it is not possible to establish causation from the findings. Furthermore, it is difficult to explore rare phenomena using cross sectional study design, as even in large samples, evidence of a particular phenomenon may not be found during a limited time period (Levin, 2006; Mann, 2003).

7.3.2 Sample

In keeping with the population that has been targeted throughout this PhD, this study also focussed on adolescents aged 13-19; as discussed in chapter 4, this is the standard age bracket for students attending secondary school in New Zealand (stats.co.nz).

7.3.2.1 Sampling framework

Sampling refers to the selection of individuals to be included in a study, based on the characteristics of the population of interest. There are several types of sampling methods available, which are broadly categorised into two groups: probability and non-probability sampling (Creswell, 2013).

Probability sampling uses randomisation, and ensures that all members of a specific population have a chance of being selected. This can include random sampling, where every population member has an equal chance of being selected; stratified sampling, where the population is divided into subgroups, and participants are randomly selected from those groups; systematic sampling, which employs a particular system for the selection of participants, such as every 3rd person on a particular list (Creswell, 2013; Trochim & Donnelly, 2001). Conversely, non-probability sampling does not involve randomisation. Types of non-probability sampling include convenience sampling, where participants are recruited based on availability, purposive sampling, where members of a specific group are purposefully recruited, or snowball sampling, which involves recruiting participants, and subsequently asking them to help recruit other participants (Creswell, 2013; Robson, 2002).

For the purposes of the current study, homogenous purposive sampling was employed. The primary goal of purposive sampling is to target a particular characteristic of the population of interest, based on the research question; in the current study, participants are targeted based on their age group (adolescents) and their mobile phone use (participants must own a mobile phone). Data arising from purposive sampling cannot usually be generalised across the entire population, however, given that this study does not aim to generalise the results, this is not necessarily a weakness (Creswell, 2013; Robson, 2002).

7.3.2.2 Sample size

One of the many issues relating to sample design is determining the sample size (Fowler, 2009); this is affected by a number of considerations, including the type of data being collected, the aim of the research, time and budgetary constraints, the power of the study, and whether the study needs to have a particular level of power. For example, the required sample size is often unknown during qualitative research, and this is determined during the on-going

data analysis process, until saturation is reached (Punch, 2005). In quantitative research, sample size calculations include the power of the study (the ability of the study to detect true differences in outcome between the control and intervention groups – this is often set at 90%, thus suggesting a 10% possibility of a false negative), the level of significance (the likelihood of detecting an effect where it does not exist – i.e. a false positive, often set at 5%, indicating a 5% chance of erroneously identifying a significant effect), the underlying population event rate, and the size of treatment effect (Kirby, Gebiski and Keech, 2002).

In the current study, the sample size was determined based on the requirement of Principal Components Analysis (PCA). There has been wide debate in the literature regarding the necessary sample sizes for this analysis – while it is generally accepted that larger samples are better, some researchers provide guidelines for this issue (Mundfrom, Shaw and Ke, 2005). While Gorsuch and Kline (1983) suggest a minimum of 100 participants, Comrey and Lee (1992) go in further detail, and state that 50 participants is very poor, 100 is poor, 200 is fair, 300 is good, 500 is very good, and 1000 is excellent. Other researchers suggest an item to sample ratio, with Cattell (1978) recommending a sample three to six times the number of variables, Everitt (1975) suggested a minimum ratio of 10:1, while Hair and colleagues (1995) argued for 20:1. In consultation with a statistician, for the current study the sample size was aimed at 500 participants (10 times the number of variables).

7.3.3 Measurement tool

The measurement tool employed in this study was the PMPU questionnaire which resulted from the Nominal Group Technique sessions in study 2.

The survey comprised three separate sections: Section A, which included demographic questions, Section B, which included mobile phone use questions, and Section C, which was comprised of the PMPU questionnaire designed in study 2.

Section A included eight questions, which asked the participants their gender, age, ethnicity, relationship status, living situation, work status, employment status, and the availability of a landline at their residence.

Section B included six questions, which asked the participants how long they had owned a mobile phone, their monthly expenditure for mobile phone usage, and the frequency of sending and receiving calls and SMS messages per week. Their inclusion serves the aim to ascertain whether there is any relationship between general mobile phone use behaviour, and PMPU.

Section C comprised 60 items, 52 of which aimed to evaluate the participants' problematic mobile phone use, while eight evaluated their experiences with negative consequences resulting from PMPU. The items were scored on a 1-7 Likert scale, where 1 referred to "strongly disagree", and 7 referred to "strongly agree".

7.3.3.1 Validity

Validity, or more specifically measurement validity, is concerned with whether an instrument actually measures what it is intended to measure. There are three types of validity measurement: content validity, empirical validity, and construct validity (Punch, 2002; Anastasi and Urbina, 1997).

Content validity is concerned with whether the entire content of a conceptual definition is represented in the instrument, or measure (Punch, 2002); it is split into two concepts: face validity and sampling validity. Face validity refers to the degree of certainty a researcher has that the instrument is appropriate, and that the items included in the measure in fact relate to the construct it is aiming to assess; this would rely on the researcher's own judgement, and the subjective opinions of other experts in the subject area. However, there are no replicable, precise procedures for evaluating the face validity of an instrument, and subsequently the method can be influenced by the subjectivism of those involved in the evaluation (Frankfort-Nachmias and Nachmias, 1996). Sampling validity, on the other hand, relates to whether the target population is adequately sampled, or represented by the measuring instrument – that is, whether the content of the instrument adequately represents the feature or construct being examined. A difficulty arises in ensuring the “item universe” is adequately sampled, and that all major aspects of the behaviour or feature are represented in the measure (Anastasi and Urbina, 1997).

Empirical validity relates to the relationship between an instrument and its outcomes (Frankfort-Nachmias and Nachmias, 1996), or the effectiveness of a test in predicting an individual's performance or behaviour (Anastasi and Urbina, 1997). While various methods of evaluating empirical validity have been developed, the most commonly used is predictive validity, which is estimated by comparing the results obtained from one instrument with those obtained from another instrument which seeks to examine the same construct (concurrent validity); researchers may also evaluate predictive validity by predicting the results they expect to obtain in reference to an external measure, named a "criterion". Frankfort-Nachmias and Nachmias (1996) offer the example of a newly-constructed IQ measurement instrument, whose results are compared against the grades obtained by participants (where the criterion is the participants' grades); an instrument with high predictive validity would see a strong correlation between the scores obtained on the IQ measure, and the participants' grades.

Construct validity evaluates whether an instrument is related to the concepts and theoretical assumptions employed by the instruments' developers (Frankfort-Nachmias and Nachmias, 1996). There are a number of ways to establish an instrument's construct validity – one is the convergent-discriminant validity, which is derived from the idea that employing different methods of measuring the same construct should produce similar results. Furthermore, this method suggests that two measures of the same property should correlate highly, while two measures of different properties should not, even if a similar instrument is used (Frankfort-Nachmias and Nachmias, 1996).

For the present study, face validity was established through the questionnaire development process described in Chapter 6. Young people were asked to include their views and experiences of mobile phone use, as well as to evaluate how comprehensible the questionnaire was; the opinions of experts regarding the questionnaire were also sought.

Construct validity was assessed through factor analysis, which is described in section 7.3.5.1.

Predictive validity would have required the use of a second questionnaire, which also aims to explore PMPU. Predictive validity was not assessed, for two reasons: firstly, there are no other youth-informed PMPU questionnaires, and therefore there would be no guarantee that a researcher-developed questionnaire would evaluate the same construct as the tool employed in this study. Secondly, the inclusion of a second questionnaire would have increased the

length of the survey, and potentially resulted in increased attrition rates (Rolstad, Adler & Rydén, 2011).

7.3.3.2 Reliability

Frankfort-Nachmias and Nachmias (1996) define reliability as “the extent to which a measuring instrument contains variable errors”, referring to errors that appear inconsistently between one observation and another, or which vary each time a measurement is attempted; thus, reliability in the social sciences refers to the consistency of the obtained results (Lavrakas, 2008). The literature describes three main types of reliability measurement: test-retest reliability, parallel-forms reliability, and internal consistency (Frankfort-Nachmias and Nachmias, 1996; Punch, 2005; Anastasi and Urbina, 1997, Lavrakas, 2008).

Test-retest reliability is derived from the underlying concept of reliability – it involves the administration of an instrument to the same group of individuals, at two different points in time. The correlation between the two sets of observations would then produce the reliability coefficient. However, this method is limited by the fact that practice would lead to varying degrees of improvement in the test scores of participants; when the tests are administered within a short time span of each other, participants may recall many of their previous answers (Frankfort-Nachmias and Nachmias, 1996; Anastasi and Urbina, 1997)

Parallel-forms, or alternate forms reliability is another method of assessing an instrument’s consistency over time, as well as the consistency of participants’ responses to different test forms; this method also reduces the limitations of the test-retest assessment (Punch, 2005). It involves the administration of one instrument on the first occasion, and the administration of another, equivalent instrument on the second occasion. As with test-retest reliability, the correlation between the scores of the two instruments would provide the reliability coefficient. The difficulty in this case is the degree of equivalency between the two instruments – ideally, the instruments would have been developed independently, with the aim of measuring the same construct. Furthermore, if the behaviour being evaluated is impacted by “practice effect” (that is, whether performance improves with practice), the use of this method will reduce, but not eliminate such an effect (Anastasi and Urbina, 1997).

Internal consistency evaluates whether the items which make up a particular instrument are consistent with each other, given that often multiple items are used to determine the level of a particular behaviour, or trait; it does not, however, estimate an instrument's reliability over time (Punch, 2005). There are two main methods to evaluate internal consistency: the Kuder-Richardson formulas, and the split-half method. Split-half reliability evaluates consistency by treating two or more parts of an instrument as separate scales, and subsequently evaluating the correlation between the splits. Similarly to the parallel-forms methods, a difficulty arises here in ensuring that both halves of the instrument are indeed equivalent. The Kuder-Richardson formulas, of which the most commonly used is the "Kuder-Richardson formula 20", is the mean of all split-half coefficients which result from different splits of a particular instrument (Anastasi and Urbina, 1997).

For the current study, test-retest reliability was not considered, due to time constraints. Parallel forms reliability was considered, however the addition of another PMPU instrument would have likely made the questionnaire too lengthy. Therefore, the internal consistency of the questionnaire was examined, through Cronbach's Alpha.

7.3.3.3 Piloting the survey

Oppenheim (1992) defines survey piloting as "the process of conceptualising and re-conceptualising the key aims of the study and making preparations for the fieldwork and analysis so that not too much will go wrong and nothing will have been left out" (p. 64). Andrews, Nonnecke and Preece (2003) suggest a four stage process for survey piloting:

1. Review by knowledgeable analysts, in order to evaluate the completeness, relevancy, efficiency, scale and format of the questions – this stage was conducted during the development of the questionnaire, in Study 2;
2. A small sample completes the survey using a "think-aloud" protocol, allowing the researcher(s) to observe the process, and follow-up with any queries regarding the questions – this was also completed during the Study 2 procedures;
3. Emulation of procedures – a small sample undergoes the full study process
4. A final check is performed in order to identify any errors that might have been introduced during the piloting process

Given that the first two stages of piloting, as described by Andrews, Nonnecke and Preece (2003), were completed during the previous study (see chapter 6), it was necessary to pilot the methodological procedures of the study, to ensure that the chosen methods did not present any issues. The questionnaire was also reviewed for any errors. The piloting process is described below.

7.3.3.3.1 Participants

In keeping with the population that has been targeted throughout this PhD, this study also focussed on adolescents aged 13-19; as discussed in chapter 4, this is the standard age bracket for students attending secondary school in New Zealand (stats.co.nz).

7.3.3.3.2 Recruitment

Similarly to the previous studies described in this thesis, it was first necessary to ascertain the setting in which the study would take place – the previous two studies eschewed working with schools, due to the potential drawn-out nature of the recruitment process. However, given the necessity for a larger sample size than previously, it was decided that recruiting through schools would be the most viable option.

A pragmatic decision was taken to restrict recruitment to the Auckland region, thus facilitating the potential need to meet with school officials and discuss the study. A list of Auckland secondary schools was compiled from the Ministry of Education database (educationcounts.govt.nz) - schools with an enrolment of below 500 students, composite schools (those that include intermediate school level students, as well as high school) and charter schools were excluded from the recruitment list. Similarly to study 2, schools were divided into three groups, according to decile ranking – group A, comprised of schools in deciles 1-3; group B, comprising schools in deciles 4-6; and group C, which included schools in deciles 7-10; this was done to ensure that the pilot would include participants from varied socio-economic backgrounds, given that access to financial resources may influence their mobile phone use behaviour.

The recruitment process took place between August and October of 2014. For each wave of sampling, ten organisations were randomly selected from each group, and an invitation email was sent out to each of the headmasters/mistresses, or principals; in cases where contact information for the Head of School was unavailable, the email was sent to the school administration, with a request to forward the email to the Head of School.

The email included a short description of the study and what would be involved, the Participant Information Sheets for Heads of School, parents and participants, as well as the Consent Forms for heads of school and participants, and a request to set up a meeting in order to discuss the project in greater detail. This email was followed up by a phone call to each school, a week later. If no reply was received during this time-frame, the relevant schools were removed from the list.

For each school, 10 class groups were to be randomly selected by the school administration to take part in the study – two classes at each year level; this was done in order to not burden participating schools, while supplying sufficient participants to pilot the study methods.

7.3.3.3.3 Survey procedures

The survey was administered through surveymonkey.com, an online survey platform; while other platforms, such as Limesurvey or Qualtrics were available, the candidate was most familiar with Surveymonkey, and therefore a pragmatic decision was taken to utilise it. The first page of the survey comprised the PIS, with an option to "click", signifying the participants had read the PIS; the second page was the consent form, with an option for participants to "click" if they agreed to take part – skip logic was employed for these two pages, meaning that participants were unable to move on to complete the survey, without signifying that they had read the PIS and the CF, and agreed to participate in the study. Page 3 included the Demographics section, page 4 the Mobile phone use section, and pages 5, 6, and 7 the PMPU questionnaire; the PMPU section was split across three pages, as to not overwhelm the participants with 60 items on one page. Skip logic was employed here as well – participants could not move on to a subsequent section if they failed to complete the previous.

Separate surveys, with separate weblinks, were created for each participating school – this was done so that the source of responses would be easily identifiable, and it also allowed the candidate to personalise the PIS and CF for each school.

An advertisement sheet was created for the schools to distribute to each student in the participating classes; this document included a brief description of the study and its aims, a guarantee that students' participation or non-participation would not affect their relationship with the school in any way, guarantees of anonymity and confidentiality, a request for students to give the PIS to their parents (this PIS was attached to the advertisement sheet), and a link to the survey.

Participating students were eligible to enter a draw for one of five \$50 Westfield vouchers (5 were available to each school). In order to preserve the participants' anonymity, a separate survey was created for the prize draw, which was advertised at the end of the research survey – thus, there could be no link between participants' responses, and their prize draw entry.

7.3.3.3.4 Results

In total, two schools agreed to participate, a decile 2 school, and a decile 10 school; 517 advertisements were distributed to students. 76 participants began the survey, of whom 56 completed it – an initial response rate of 14.7%, and a final response rate of 10.8%. This is significantly lower than the 33% response rate that is generally expected of online surveys (Nulty, 2008). Unfortunately, this meant that the survey results, in particular the PMPU section, could not undergo any preliminary analyses, as the sample size was too small.

7.3.3.3.5 Changes

The unexpectedly low response rate in the pilot suggested the need for changes to be made to the recruitment and advertisement methods. In consultation with the supervision team, and a field expert, several changes were made:

1. Recruiting schools solely from the Auckland region no longer appeared to be a viable option - therefore, schools from across the country would be invited to take part
2. Given the low response rate, limiting participant recruitment to 10 randomly chosen class groups would not be efficient, and subsequently all students in any participating school would be invited.
3. The documentation for participants was reviewed, with the aid of a youth research expert. They were found to be too verbose, and the format too formal – therefore, the PIS, CF, and advertisement sheet were shortened, and the language changed to be more youth-friendly.

These changes were submitted to the University of Auckland Ethics committee as an amendment, and approval was granted.

7.3.4 Data collection procedures

The following section will describe the different types of potential data collection methods for this study, explaining the choice of an Internet-based survey.

Surveys are defined as a research method employed by social scientists to scientifically and empirically provide information about people and social phenomena (Lavrakas, 2008). However, there are a number of techniques that can be used in survey research, and one of the most important decisions a researcher must make is what method of data collection to employ (Fowler, 2009). Considerations of population type, question form and content, response rates, costs, and available facilities must all be taken into account when making this decision. Frankfort-Nachmias and Nachmias (1996) describe three methods of data collection: personal interviews, telephone interviews, and mail questionnaires; to this list, it is necessary to also add Internet surveys, given their increasing popularity with the rise of Internet use (Fowler, 2009). Each method has its own strengths and weaknesses, and there is no one method that is ubiquitously superior (Fowler, 2009; Frankfort-Nachmias and Nachmias, 1996).

Personal interviews involve a face-to-face scenario, where the interviewer asks the participant questions designed to produce answers relevant to the research hypothesis; this method is

likely the most successful in eliciting cooperation from most populations, it adds a degree of flexibility as well as control to the data collection process, allows for probing and accurately-followed instructions, and are most useful in the case of long questionnaires. However, it is the most costly alternative, can be geographically restrictive, can lead to bias errors, and the data collection period may be longer (Fowler, 2009; Frankfort- Nachmias and Nachmias, 1996).

Mail questionnaires, as the name suggests, involves the dissemination of surveys to the sample population's residence through post; the method is low cost, reduces bias errors created by interviewers, their personal characteristics and skills, provides increased anonymity when compared to interviewing, and is also more geographically accessible. Conversely, complicated questions and instructions cannot be included, given that the participants would be unable to seek further elucidation, there is no opportunity for probing for more elaborate answers, there is little control over who in fact completes the questionnaires, and suffers from low response rates (between 20-40%, as opposed to interviewing, which has a 95% response rate) (Fowler, 2009; Frankfort-Nachmias and Nachmias, 1996).

Telephone interviews are characterised as a semi-personal data collection method; the method provides better access to certain populations than personal interviewing, the costs are lower, it is likely to have a higher response rate than mail questionnaires, and provides more accurate data (Fowler, 2009; Frankfort-Nachmias and Nachmias, 1996). However, sampling limitations may exist, given that some individuals may not have access to a landline, personal or sensitive questions are difficult to answer over the phone, and there are measurement constraints related to the employment of visual aids, and the need for interviewer observation (Fowler, 2009; Frankfort-Nachmias and Nachmias, 1996).

For the purposes of this study, an Internet-based survey was chosen as the most pragmatic method. Internet surveys were first used in the 1980s through email, and in the 1990s through web-administration (Evans and Mathur, 2005). Internet surveys are perhaps most similar to mail questionnaires, excepting their method of delivery, and share some strengths and weaknesses. Most samples (depending on the availability of Internet) are easy to reach; the cost of data collection is low; the data entry and analysis process is simplified, given that most online survey platforms allow for direct extraction into Microsoft Excel or SPSS

(www.surveymonkey.com); increased convenience, as participants can respond at any time they wish, and take as long as they desire; reduced data collection time, as an online survey can be instantly delivered to participants, and completed questionnaires are returned to the researcher just as speedily; increased flexibility relating to design, skip logic and specific tailoring. However, potential target populations are limited to Internet users, there is little control over who completes the questionnaires, or how accurate and truthful their responses are, there can be privacy and security issues, as well as low response rates – lower than other methods of survey delivery (Evans and Mathur, 2005; Fowler, 2009).

7.3.5 Data analysis procedures

7.3.5.1 Factor analysis

One of the aims of this study was to explore the underlying constructs of PMPU; in order to achieve this, factor analysis (FA) was employed. There are three main types of factor analysis: Principal Components Analysis (PCA), Exploratory Factor Analysis (EFA), and Confirmatory Factor Analysis (CFA). All three FA types summarise patterns of correlations among the observed variables, and reduce the number of observed variables to a smaller number of underlying structures, called factors. PCA and EFA are both usually employed when researchers aim to explore the underlying structure of a particular behaviour, and are used when there is little understanding of the mechanisms present in the behaviour. CFA, on the other hand, is employed when the aim of the research is to confirm whether collected data fit an existing theory regarding the mechanism underpinning a particular behaviour; thus, previous knowledge and understanding of the target behaviour is necessary.

CFA was not employed in this study, given the insufficient understanding of the mechanisms underpinning PMPU. While Cognitive Behavioural Theory was employed to guide the development of the measure, the opinions and experiences of young people were also included, and the two are not necessarily mutually inclusive. Furthermore, while CBT has been employed as a theoretical basis for the development of other questionnaires (Caplan, 2002), this is the first time it has been used to develop a PMPU questionnaire. Therefore, a choice between PCA and EFA was necessary. The questionnaire was designed to explore

multiple underlying constructs of PMPU, and therefore the development of subscales would be necessary. Given that PCA is more suited to the creation of composite subscales, it was chosen as the factor analysis method for this study (Tabachnick & Fidell, 2001; Velicer & Jackson, 1990).

A number of criteria were employed in order to determine the suitability of the data for principal components analysis. Firstly, an inter-correlation matrix for the variables included in the PCA was examined, in order to determine whether at least moderate correlations (≥ 0.3) between the variables were present. If there are no correlations present between the variables, then there would be no common factors to extracted, and the data would therefore not be suitable for this analysis. Bartlett's test of sphericity can also be employed for this purpose: the test examines whether the inter-correlation matrix is an identity matrix (i.e. there are no inter-correlations present). If the test is significant ($p < 0.05$), this indicates the null hypothesis is rejected, and that there are sufficient significant relationships between the variables in order to justify the use of PCA (Bartlett, 1951; Tabachnick & Fidell, 2001). The Kaiser-Meyer-Olkin (KMO) test of sampling adequacy was also employed; this measure assesses whether each variable and their overall sum is suitable for PCA. The measure produces two results: the overall KMO, and the KMO for each individual variable, which is presented on the diagonal of the anti-image correlation matrix. Both values need to be above 0.5, in order to justify the use of PCA.

There are a number of methods which can be used to determine the number of factors that should be extracted. Kaiser's criteria (Kaiser, 1960) involves only retaining factors which have a minimal eigenvalue of 1 (which indicates that a factor would extract at least as much variance as one original variable). Cattell's test requires examination of a scree plot of eigenvalues, and determining the point where the decrease in eigenvalues levels off (Cattell, 1966). In Monte Carlo Parallel Analysis, on the other hand, actual eigenvalues obtained from the analysis are compared against randomly generated eigenvalues; a factor is only retained if its eigenvalue is higher than the randomly generated eigenvalue (Thompson & Daniel, 1996; Tabachnick & Fidell, 2001). The extracted factors can also be examined for interpretability, or whether it is theoretically logical to have a particular number of factors (Pett, Lackey & Sullivan, 2003; Tabachnick & Fidell, 2001).

7.3.5.2 Hierarchical multiple regression

One of the aims of this study was to explore the relationships between demographic variables, mobile phone use, PMPU, and negative consequences experienced as a result of PMPU. In consultation with a statistician, it was decided that hierarchical multiple regression models would be the best technique to assess these relationships.

Linear regressions are used to examine the linear relationship between two continuous variables, by determining whether the linear relationship is statistically significant, examining what percentage of the variance in the dependent variable is explained by the independent variable, and determining the direction of magnitude of the relationship. Multiple regressions are used to predict a continuous variable, based on multiple independent variables. Hierarchical multiple regression, however, allows for the introduction of the independent variables into the regression equation in a particular order. This type of analysis therefore allows for controlling for the effects of particular independent variables. Given that the specific relationships between the different independent variables for this study are not entirely understood, hierarchical multiple regression modelling would allow for a more thorough exploration of the variables. For example, it is not known whether a relationship between gender and PMPU would be entirely mediated by mobile phone use, or whether there is a separate relationship between gender and PMPU, which is not affected by a person's level of mobile phone use.

There are eight assumptions which have to be met, in order to use hierarchical multiple regressions (Tabachnick & Fidell, 2007):

1. The dependent variable must be continuous
2. There must be two or more independent variables
3. There must be independence of observation: i.e. adjacent observations, or errors are correlated; this is tested through the Durbin-Watson statistic. Scores on the Durbin-Watson test can range from 0 to 4, however a score close to 2 is desirable
4. There must be a linear relationship between the dependent variable and the independent variables; this is tested through visual examination of a scatterplot of the studentised residuals against the unstandardized predicted values
5. There data must show homoscedasticity of residuals, which is also tested by plotting the studentised residuals against the unstandardized predicted values

6. The data must not show multicollinearity; that is, independent variables must not be highly correlated with each other. This is evaluated through inspecting the Tolerance and VIF values; Tolerance values have to be higher than 0.1, and VIF must be lower than 10
7. There should be no significant outliers; this is tested through casewise diagnostics
8. Residuals are approximately normally distributed; this is tested through a normal P-P plot of standardised residuals

7.3.5.3 Data reduction

For the linear regression models, several changes to the data were necessary for the independent variables: for example, most of the demographic variables were categorical in nature, and several of these categories had few responses. Therefore, the independent variables were dichotomised. Age was re-categorised into 13-15 years, and 16-19 years; gender was not changed, as it was already dichotomous; ethnicity was re-categorised into “NZ European” and “Other”; relationship status was re-categorised into “Single” and “Other”; living situation was re-categorised into “With parent/s (family)” and “Other”, work status was re-categorised into “Unemployed” and “Other”, landline availability remained unchanged.

While in the original survey, questions regarding length of mobile phone ownership, and smartphone ownership were in the “Mobile phone use” section of the questionnaire, for the purposes of the regression models, they were shifted into the demographics section, as these questions did not ask about mobile phone use behaviour per se, while the remaining questions did. The smartphone ownership question remained unchanged, as it was already dichotomous, while the length of mobile phone ownership was dichotomised into ‘1-3 years’, and ‘4-15 years’, based on the median (4).

The remaining mobile phone use questions were found to have moderate inter-correlations (ranging from $r=.319^{88}$ to $r=.514^{88}$), and therefore a composite scale was created, in order to address this issue. The variables were each dichotomised, based on their median, and a composite scale was created, based on the sum of the variables; scores ranged from 0-6 on this variable, with higher scores indicating higher levels of mobile phone use.

7.3.6 Study procedures

7.3.6.1 Participants

Given that the results of the pilot study provided no reason to change the target population, it remained New Zealand adolescents aged 13-19, who owned a mobile phone. The sampling frame, however, was extended to encompass the entirety of New Zealand, as opposed to just Auckland.

7.3.6.2 School recruitment

Recruitment of schools for this study took place between June and September 2015, and followed a similar process as the pilot: a database of New Zealand schools was created, based on the information available from the Ministry of Education (educationmatters.govt.nz). The exclusion criteria comprised: an enrolment roll of fewer than 500 students; composite schools, and charter schools. The final database included 121 schools throughout New Zealand. Each of these schools was sent an email, detailing the aims and procedures of the study, and an invitation to take part; the email also included the PIS and CF for the head of school, the PIS for parents, PIS and CF for participants, as well as the study advertisement. Where possible, this email was sent directly to the head of school – in cases where contact information for the head of school was not available, the email was sent to the school administration, with a request to forward the email to the head of school. When no response was received within one week of the email being sent, it was followed up by a phone call to each school.

7.3.6.3 Participant recruitment

The advertisement sheet that had been developed during the piloting stage was re-designed, with advice from a youth research expert – the language was simplified, and the layout and structure was made more youthful. However, the vital information regarding the study and its aims, assurances of anonymity, confidentiality, and lack of impact on the participants'

relationship with their school were all retained, as was the request that participants hand the PIS attached to the advertisement to their parents or caregivers.

Participants in this study could also choose to participate in a draw for one of five \$50 Westfield vouchers available for each school. Due to concerns regarding anonymity and confidentiality, a separate survey was created for each school, where participants would be able to enter their details for the draw. This survey was advertised at the end of the primary research survey, to avoid individuals who had not participated in the study including their details in the draw.

7.3.6.4 Data collection

Data collection took place between July and September 2015. Each participating school had its own separate survey and prize draw, in order to keep school data separate. Advertisements which included the tailored survey links were printed for each school, and delivered to them, upon agreement that the school administration would distribute these advertisements to each student present on the day of distribution – they were also asked to keep count of how many advertisements were left over.

7.3.7 Ethical considerations

As with any study which includes human participants, there were a number of ethical concerns which needed to be considered; however, given the target population's age, and the online method through which the survey was administered, particular care was necessary.

Firstly, it was thought that given the nature of the study, individuals between the ages of 13-16 would be able to consent to participating in the research without parental consent. It was not envisioned that completing this online survey would create any issues for the young person – the only possible negative outcome could have been participants becoming aware that their behaviour may be problematic (be it due to their mobile phone use, or the recognition of depressive or anxiety-related symptoms from the questionnaire). Furthermore, the counsellors at each school were informed of the study and these potential risks. In order

to mitigate this, the final page of the survey included details of the counselling services available at the schools, and for the researcher – thus, if any participants had concerns regarding any information they have disclosed during the study, they would be able to seek guidance.

However, parents were informed of the existence of the study, and of their young person's opportunity to take part. It was noted in the parental PIS that if parents did not wish for their child to take part in the study, they would have to make that known to them, as the researcher would have no ability to prevent any individual from participating.

As the questionnaire was a web-based survey, anonymity usually cannot be guaranteed due to the IP addresses being traceable. However, the online questionnaire was administered using 'SurveyMonkey' software utilising 'SSL' encryption to protect any data collected. All collected data were encrypted and stored on a password protected computer on the secure University of Auckland premises. The survey was specifically set up so that it would not collect the IP addresses of respondents (a feature made available on the SurveyMonkey Platform).

The only identifiable characteristic that was collected through this research is participants' phone numbers, which are required for notification of the winners of the prize draw. As previously described, the phone numbers were collected using a secondary survey, which was launched by participants upon completion of the first, thus ensuring that participants' responses and their numbers were kept separate.

7.4 Results

Overall, 121 schools from New Zealand were contacted; of those, 29 declined the invitation to participate in the study, 84 did not reply, and 5 would only accept recruitment of a subset of the student population. Three schools agreed to participate in the study – one was located in Auckland, one was located in Christchurch, and one in Wellington. The schools had a total enrolment roll of 3415 students, and 3283 advertisements were distributed. Eight hundred and nineteen participants began the survey – of those, 664 completed the survey, a completion rate of 81%, and a response rate of 20.2%.

The following sections describe the findings obtained from each section of the survey, the PCA analysis performed on the PMPU questionnaire, and the regression analyses.

7.4.1 Demographics

The majority of respondents were female (n=408, 61.4%) and of NZ European/Pakeha ethnicity (69.1%). There was a relatively even distribution across the age groups, with slightly more participants being aged 13 (n=145, 21.8%). Most participants were not in a relationship (n= 525, 79.1%), lived with parents or family (n=634, 95.5%), were unemployed (n=337, 50.8%), and had a landline available in their residence (n= 578, 87.1%). Table 22 provides full details regarding the participants' demographic characteristics.

Table 22: Demographic characteristics of study participants

Variable	N	%
Age (years)		
13	145	21.8
14	121	18.2
15	134	20.2
16	98	14.8
17	120	18.1
18	42	6.3
19	4	6
Gender		
Male	256	38.6
Female	408	61.4
Ethnicity		
NZ European/Pakeha	459	69.1
Maori	63	9.5
Samoan	21	3.2
Cook Island Maori	5	0.8

Tongan	5	0.8
Niuean	2	0.3
Chinese	27	4.1
Indian	12	1.8
Other	70	10.5
Relationship Status		
Single	525	79.1
Dating	109	16.4
Married	4	0.6
De-facto	6	0.9
Not applicable	20	3
Living situation		
By yourself	6	0.9
With parent/s (family)	634	95.5
With friends/flatmates	12	1.8
With partner	3	0.5
Not applicable	9	1.4
Work Status		
Part-time/casual employment	229	34.5
Unemployed	337	50.8
Not applicable	98	14.8
Landline availability		
Yes	578	87.1
No	86	12.9

7.4.2 Mobile phone use behaviour

Most participants owned a smartphone (n=593, 89.3%), utilised Internet-based communication applications multiple times a day (n=358, 53.9%), and spent between \$10-

\$20 on their mobile phone usage each month (n=346, 52.1%). The length of mobile phone ownership ranged between 1 and 15 years, with an average of 4.41 years (S.D. = 2.54). Over half the participants made and received between 1-5 calls per week (n= 358, 53.9%; n= 394, 59.3%). In terms of SMS sending and receiving practices, most sent and received between 0-100 SMS per week (n= 425, 64%; 412, 61.6%). Table 23 provides further details on participants' mobile phone use behaviour.

Table 23: Mobile phone use behaviours of study participants

Variable	N	%
Smartphone ownership		
Yes	593	89.3
No	71	10.7
Internet-based communication apps		
Never	66	9.9
Weekly	57	8.6
Daily	183	27.6
Multiple times a day	358	53.9
Monthly MP expenditure		
\$0-10	207	31.2
\$10-20	346	52.1
\$20-50	86	13
\$50+	25	3.8
Calls made per week		
0	155	23.3
1-5	358	53.9
5-10	90	13.6
10-20	42	6.3
20+	19	2.9
Calls received per week		
0	95	14.3
1-5	394	59.3
5-10	116	17.5

10-20	41	6.2
20+	18	2.7
SMS sent per week		
0-10	134	20.2
10-50	172	25.9
50-100	119	17.9
100-200	86	13
200-300	35	5.3
300-400	30	4.5
400-500	23	3.5
500+	65	9.8
SMS received per week		
0-10	89	13.4
10-50	165	24.4
50-100	158	23.8
100-200	92	13.9
200-300	47	7.1
300-400	32	5
400-500	21	3.2
500+	60	9

7.4.3 Problematic mobile phone use

The following section reports the findings relating to PMPU. The construct validity of items assessing problematic mobile phone use was evaluated using PCA. The reliability of the items was checked by Cronbach's alpha test. Finally, descriptive statistics of the PMPU subscales are provided.

7.4.3.1 Determining the component structure of the PMPU questionnaire

A total of 664 cases provided valid responses for the 52 items assessing problematic mobile phone use (12.77 cases per variable), therefore meeting the sample requirements for PCA. The 8 items assessing negative consequences were not included in the PCA, as they aimed to assess outcomes of PMPU, as opposed to CBT-related symptoms or processes, as was the case with the main PMPU questionnaire. Prior to running the analysis, the factorability of the items was evaluated against several criteria. Item-total correlations were examined, and it was found that removal of item 17.6 would improve the overall reliability from .941 to .943. All items were moderately correlated (≥ 0.3) with at least one other item, indicating sufficiently adequate relationships among the items to support the use of PCA. The diagonal of the anti-image correlation matrix was examined, and all values were found to be above 0.5, supporting the inclusion of each item in the analysis. The communalities of all items, excepting 17.18 and 18.11 were above 0.3, indicating the items shared some common variance. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.937, exceeding the minimum threshold of 0.5; Bartlett's test of sphericity ($\chi^2 = 14782.939$, $df = 1176$, $p < 0.001$) indicated that there were adequate relationships between the items, supporting the use of PCA. Items 17.6, 17.18 and 18.11 were removed from further analysis.

After determining the factorability of items, the first PCA was conducted in order to determine the number of factors to be extracted; a direct oblimin rotation and 0.3 factor loading threshold were employed. The analysis produced 11 factors with eigenvalues of 1 or above, explaining 51.75% of the variance. Examination of the scree plot suggested 5, 6 or 7 factors. Comparison of actual eigenvalues with 1000 randomly generated variables using Monte Carlo Parallel Analysis (see table 24) indicated a six factor solution. Given the discrepancies, further PCA were conducted with forced five, six and seven factor solution extractions. The seven factor solution had the highest level of interpretability, while the five and six factor solution proved to be more difficult to interpret, and had a high number of items loading on multiple factors. Therefore, a seven factor solution was chosen.

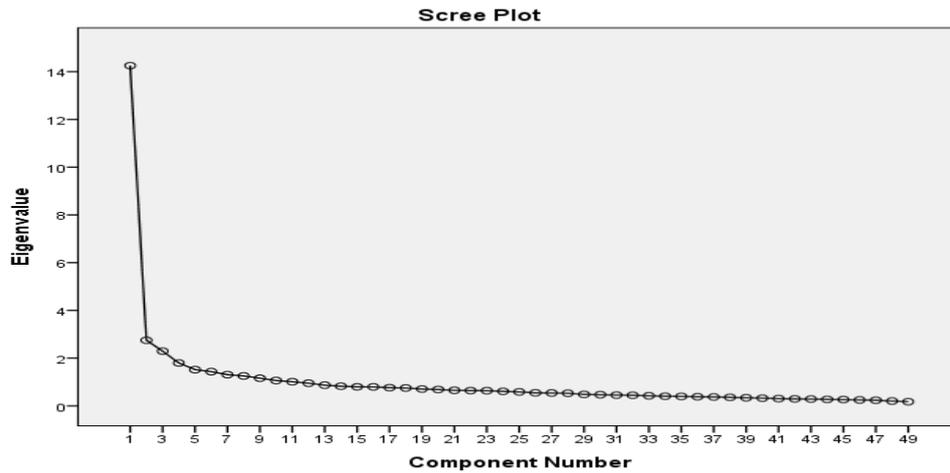


Figure 6: Scree plot for 49 rotated PMPU items

Table 24: Results of Monte Carlo Parallel analysis for PMPU items

Eigenvalue #	Raw data	Means	Percentile
1	14.25	1.56	1.61
2	2.75	1.51	1.55
3	2.29	1.47	1.50
4	1.79	1.43	1.46
5	1.52	1.40	1.43
6	1.44	1.37	1.39
7	1.31	1.34	1.37

The seven factor solution explained 51.75% of the variance. While all items had loadings of 0.3 or above, 13 items loaded onto more than one factor (17.4, 17.16, 17.17, 17.19, 17.20, 18.3, 18.4, 18.5, 18.7, 18.8, 18.10, 18.12, 19.1, 19.3, 19.4, and 19.5). Removal of these factors from the analysis, however, resulted in a far less interpretable solution. Therefore, the factors were retained; in cases where there was a significant discrepancy between factor loadings (for example, item 18.7 had a .311 loading onto factor 1, but a .453 loading onto factor 2), the items were assigned according to the factor with the higher loading. In cases where the discrepancy between loadings was small (for example, item 17.5 had a .454 loading onto factor 1, and a .458 loading onto factor 5), items were assigned based on which factor they fit better, conceptually (Pett, Lackey & Sullivan, 2003).

The PCA of PMPU items resulted in the removal of three items from the overall analysis (17.6, 17.18 and 18.11). The removal of item 17.6 resulted in an improved internal consistency, while items of 17.18 and 18.11 were removed due to low communalities. The three removed items were 'Except in an emergency, I would not borrow someone else's phone' (17.6), 'I would still send txts, regardless of what it would cost' (17.18), and 'I would not be ok with another person using my phone' (18.11). Item 17.6 was designed to assess problematic behaviours, specifically behavioural preoccupation with the mobile phone (the item was reversed). Item 17.18 was designed to assess the problematic behaviours, specifically the prioritisation of mobile phone use above other considerations. Item 18.11 was designed to assess problematic cognitions, specifically high levels of attachment to the mobile phone. It is not clear why these three items specifically did not fit into the overall PMPU factor structure. However, it does not necessarily follow that these items are poor indicators of PMPU; rather, it shows that they were not correlated with the rest of the items in the questionnaire.

The final PCA model consisted of 49 items; table 25 below displays the rotated factor loadings and communalities, as well as Cronbach's alpha scores for each factor.

Table 25: Item factor loadings, communalities, and Cronbach's Alpha scores for the 7 PMPU factors

	Items	Factor loadings							Communi- ty	Cronbach's <i>α</i>
		1	2	3	4	5	6	7		
17.1	One of the first things I do when I wake up is check my phone	.638							.623	.863
17.2	One of the last things I do before I go to sleep is use my phone	.569							.612	
17.7	I cannot leave the house without having my mobile phone with me	.754							.636	
17.10	I always have my phone with me	.770							.598	
17.11	I never turn my phone off during the day unless I absolutely have to	.631							.688	
17.14	I constantly check my phone, even when I am with friends	.512							.465	
18.2	I feel safer if I have my phone with me	.607							.433	
18.3	I panic if I don't have my phone on me	.580							.528	
18.8	Not having my mobile phone with me does not cause me to worry	.509							.610	
18.1	When people around me are txting, I feel like I am missing out		.689						.593	
18.4	When my phone is taken away from me, I feel lonely		.386						.662	
18.5	I feel uncomfortable if I am away from my phone for a long period of time		.381						.709	
18.6	When I receive a txt during an inappropriate situation, I start feeling anxious if I can't check it		.389						.678	
18.7	If for some reason I can't use my phone, I become annoyed		.453						.528	
18.10	If I am not using my mobile phone, I think about my mobile phone		.303						.372	

18.17	Receiving lots of messages means that people are thinking about you		.462					.544	
18.18	People who receive lots of txts are popular		.472					.480	
18.19	If you have a mobile phone, you are more likely to be included in social and fun events		.495					.464	
18.20	If I don't receive any txts for a while, I feel sad		.535					.473	
19.1	I think that if I didn't have a mobile phone, I would be excluded by my friends		.434					.569	
19.2	If somebody doesn't reply to my txt, I think they probably dislike me		.425					.485	
19.3	I feel happy when I receive a txt		.517					.450	
19.4	Hearing my phone ring makes me feel excited		.453					.540	
17.3	I would not answer a txt or call in the middle of the night			.574				.371	.526
17.13	I don't txt or call people in the same house as me			.601				.351	
17.15	I don't check my phone when I am talking to someone in person			.709				.331	
19.7	I don't think it's ok to use a mobile phone during family dinners			.441				.385	
17.16	I don't use my mobile phone during class time				.566			.469	.774
17.19	I often play on my phone instead of doing school work				.545			.359	
17.20	I often find myself playing with my phone, when I am meant to be doing something else				.460			.545	
19.6	It's ok to txt during class times				.620			.525	
17.4	I often check my phone, put it away, then check it again straight after					.303		.594	.796
17.5	I feel the need to check my phone every 15 minutes, or more frequently					.458		.549	

17.8	I call my friends in the middle of the night					.679			.606	
17.9	I txt my friends in the middle of the night					.617			.562	
17.12	I sleep with my phone under my pillow					.569			.530	
17.17	I use my mobile phone while eating with family or friends					.408			.611	
18.9	Sometimes I think I can hear my phone ringing or feel it vibrate, even if it isn't.					.314			.632	
18.12	I couldn't imagine life without a phone						.393		.584	.769
18.13	I think txting is the best way of communicating with friends						.512		.507	
18.14	I'd rather lose a body part than live the rest of my life without a phone						.650		.563	
18.15	I would judge somebody if they didn't have a phone						.632		.526	
18.16	I couldn't last a day without my mobile phone						.508		.416	
19.5	I think it is ok to txt while out with friends						.382		.445	
19.8	I don't mind if people use their mobile phones while at the cinema						.373		.556	
19.10	I find it easier to talk about private and emotional issues via txt							.701	.441	.599
19.11	I am less nervous talking to the opposite sex via txt, than face to face							.694	.408	
19.12	I prefer talking to friends through txt than face to face							.409	.408	

7.4.3.2 Labelling the PMPU factors

As displayed in Table 6.3, factor 1 was comprised of nine items. The items all related to having access to the mobile phone, and included both behaviours (e.g. checking one's phone first thing in the morning) and emotions (panicking if one's phone is not available) relating to access to the phone itself. Given that these items indicated a general attachment to the device, the factor was labelled 'Attachment'. Items within this factor showed excellent internal consistency, with a Cronbach's alpha score of .863.

Factor 2 was comprised of 14 items; most of the items related to positive and negative emotions regarding mobile phone use (e.g. feeling happy when receiving an SMS message; feeling annoyed when unable to check one's phone), while 5 of the items appear to relate more to cognitions (e.g. 'If somebody doesn't reply to my txt, I think they probably dislike me'). However, given the overall focus of the items on emotional aspects of mobile phone use, the factor was labelled 'Problematic emotions'. The factor displayed excellent internal consistency, with a Cronbach's alpha score of .906.

Factor 3 was comprised of four items which related to social rules or etiquette relating to mobile phone use, and was therefore labelled 'Mobile phone use etiquette'. However, the factor displayed less than adequate internal consistency, with a Cronbach's alpha score of .526.

Factor 4 was comprised of four items which related to the use of the mobile phone in order to procrastinate, and was therefore labelled 'Procrastination'. Items within this factor showed good internal consistency, with a Cronbach's alpha score of .774.

Factor 5 included seven items, six of which related to different problematic mobile phone use behaviours, such as sleeping with one's phone under one's pillow, or checking one's phone frequently; one item (18.9) related to thinking one's phone is ringing, when it isn't (phantom ringing). The factor was labelled 'Problematic behaviours'; it showed good internal consistency, with a Cronbach's alpha score of .796.

Factor 6 included seven items which related to different problematic cognitions regarding the mobile phone and its use, and was therefore labelled 'Problematic cognitions'. The factor showed good internal consistency, with a Cronbach's alpha score of .769.

Factor 7 was comprised of three items, which related to the use of the mobile phone to facilitate communication, and was therefore labelled ‘Communication’. It displayed less than adequate internal consistency, with a Cronbach’s alpha score of .599.

7.4.3.3 PMPU subscales

Subscales based on mean scores were created for each of the seven factors, as well as a scale averaging scores achieved across the entire instrument (Total PMPU subscale). For the purposes of interpretability, average scores across each subscale were categorized based on the Likert scale format of the original items; numbers and percentages of participants scoring within each category are presented below, as well as the mean and standard deviation of each subscale. Finally, the proportion of participants scoring an average of 5 or above (indicating some level of agreement with the items) on each of the subscales is presented.

Table 26: Score distributions for each of the PMPU subscales

Score range	1-1.99		2-2.99		3-3.99		4-4.99		5-5.99		6-7		Mean	S.D.	% scores 5-7
	N	%	N	%	N	%	N	%	N	%	N	%			
Attachment	18	2.7	60	9	102	15.4	152	22.9	182	27.4	150	22.6	4.66	1.32	50
Problematic emotions	71	10.8	176	26.5	231	34.7	127	19	58	8.8	1	0.2	3.35	1.15	9
MPU etiquette	75	11.3	143	21.5	173	26.1	178	20.5	82	12.3	13	2	3.41	1.29	14.3
Procrastination	64	9.6	123	18.6	136	20.4	148	22.3	138	20.8	55	8.3	3.87	1.46	29.1
Problematic behaviours	134	20.2	205	30.9	178	26.8	89	13.4	49	6.9	12	1.8	3.03	1.24	8.7
Problematic cognitions	159	23.9	264	39.8	146	22	67	10.1	21	3.1	7	1.1	2.74	1.09	4.2
Communication	80	12	135	20.4	236	35.5	133	20.1	57	8.5	23	3.5	3.33	1.28	12
Total PMPU	31	4.7	173	26	263	39.6	152	22.9	39	5.9	0.9	6	3.51	0.95	6.8

The Attachment subscale had the highest mean (4.66, S.D. = 1.32), as well as the highest proportion of participants scoring an average of 5 or above (n=332; 50%). The Problematic cognitions subscale had the lowest mean (2.74, S.D. = 1.09), and the lowest proportion of participants scoring 5 or above (n=28, 4.2%). The Total PMPU scale had a mean of 3.51 (S.D. = 0.95), and 6.8% of participants (n= 45) achieved a score of 5 or above on the overall measure.

In order to evaluate whether there were any correlations between the subscales, Pearson’s bivariate correlations were computed, and results are displayed in Table 27. All correlations were statistically significant at the .01 level, excepting correlations with the MPU Etiquette subscale.

Table 27: Pearson's correlations for the 7 PMPU subscales

Correlations								
	Attachment	Emotional Preoccupation	MPU Etiquette	Procrastination	Behavioural Preoccupation	Cognitive Preoccupation	Communication	Total PMPU
Attachment	-	.631**	.193**	.560**	.682**	.546**	.337**	.829**
Emotional Preoccupation	.631**	-	.196**	.514**	.649**	.669**	.480**	.884**
MPU Etiquette	.193**	.196**	-	.268**	.315**	.270**	.076*	.380**
Procrastination	.560**	.514**	.268**	-	.591**	.471**	.296**	.704**
Behavioural Preoccupation	.682**	.649**	.315**	.591**	-	.567**	.369**	.837**
Cognitive Preoccupation	.546**	.669**	.270**	.471**	.567**	-	.431**	.783**
Communication	.337**	.480**	.076*	.296**	.369**	.431**	-	.532**
Total PMPU	.829**	.884**	.380**	.704**	.837**	.783**	.532**	-

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

7.4.3.4 Negative consequences

Eight items in the questionnaire assessed negative consequences relating to mobile phone use (19.13-19.20); they were subjected to reliability analysis, and they were found to have poor internal consistency, with a Cronbach's alpha score of .587. However, the analysis showed that deletion of two items would significantly improve the overall reliability; therefore, items 19.14 and 19.17 were removed. The six retained items were found to have good internal consistency, with a Cronbach's alpha score of .78.

The distribution of scores for each item is presented below, as well as the mean and standard deviation. The proportion of participants scoring an average of 5 or above (indicating some level of agreement with the items) on each of the items is also presented.

Table 28: Score distributions for each of the items in the 'Negative Consequences' subscale

Score range	1		2		3		4		5		6		7		Mean	S.D.	% scores 5-7
	N	%	N	%	N	%	N	%	N	%	N	%	N	%			
Lost sleep	172	25.9	105	15.8	113	17	72	10.8	68	10.2	74	11.1	60	9	3.33	2.01	30.3
Problems with school work	197	29.7	138	20.8	129	19.4	69	10.4	78	11.7	26	3.9	27	4.1	2.81	1.72	19.7
Pain in fingers	355	53.5	168	25.3	42	6.3	41	6.5	27	4.1	20	3	11	1.7	1.98	1.45	8.8
Pain in back and/or neck	237	35.7	187	28.2	50	7.5	68	10.2	62	9.3	39	5.9	21	3.2	2.59	1.75	18.4
Problems due to overspending	320	48.2	185	27.9	40	6	44	6.6	31	4.7	29	4.4	15	2.3	2.14	1.57	11.4
Disagreements due to SMS messages.	196	29.5	111	16.7	99	14.9	73	11	87	13.1	57	8.6	41	6.2	3.12	1.93	27.6

The most endorsed negative consequence was lost sleep due to texting during the night, with 30.3% (n= 202) of participants having experienced this to some degree; this item also had the highest mean (=3.33, S.D. =2.01). Conversely, the least endorsed negative consequence was experiencing pain in fingers due to texting, with only 8.8% (n=58) having experienced this to some degree; this item also had the lowest mean (=1.98, S.D. =1.45).

In order to more generally explore the severity of negative consequences experienced by participants, a Total Negative Consequences scale was compiled, based on the total number of consequences a participant experienced. A consequence was considered to have been experienced if a participant indicated some degree of agreement, through a score of 5 or more, on the item evaluating that particular consequence; this threshold was chosen as scores of 5 or more indicated some level of agreement with that particular item (i.e. Slightly agree, Agree, Strongly agree). Table 29 below presents the proportion of people experiencing each number of consequences.

Table 29: Prevalence of Negative Consequences, by item

Number of symptoms	Frequency	Percent
0	322	48.5%
1	124	18.7%
2	96	14.5%
3	65	9.8%
4	33	5.0%
5	14	2.1%
6	10	1.5%

Almost half of the participants (48.5%, n=322) did not experience any negative consequences relating to mobile phone use, while 1.5% (n=10) experienced all of the consequences to some degree.

7.4.4 Exploring the associations between demographics, mobile phone use, and PMPU

One of the aims of this study was to identify the relationships between demographic variables, mobile phone use behaviours, problematic mobile phone use, and negative consequences. In order to achieve this, hierarchical linear regression models were employed, with the Total Negative Consequences scale (described in the previous section) being the dependent variable. Three types of independent variables were employed in this analysis: demographics, mobile phone use, and problematic mobile phone use. Due to the high correlations between the PMPU subscales, eight separate models were needed, with a different PMPU subscale in each model. As discussed in section 7.5.6 of this chapter, several changes were required to the demographic and mobile phone use variables. Table 30 below describes the transformed demographic variables, as well as the Mobile Phone Use scale.

Table 30: Transformed demographic variables

Variable	N	%
Age		
13-15	400	60.2
16-19	264	39.8
Gender		
Male	256	38.6
Female	408	61.4
Ethnicity		
NZ European/Pakeha	459	69.1
Other	205	30.9
Relationship Status		
Single	525	79.1
Other	139	20.9
Living situation		
With parent/s (family)	634	95.5
Other	30	4.5
Work Status		
Unemployed	337	50.8

Other	327	49.2
Landline availability		
Yes	578	87.1
No	86	12.9
Smartphone ownership		
Yes	593	89.3
No	71	10.7
Length of MP ownership		
1-3 years	246	37
4-15 years	418	63
Total Mobile Phone Use		
0	24	3.6
1	117	17.6
2	150	22.6
3	163	24.5
4	128	19.3
5	59	8.9
6	23	3.5

As a precursor to the linear regression analysis, bivariate analyses were conducted in order to explore the correlations between the PMPU subscales and the demographic variables, the Mobile Phone Use scale, as well as the negative consequences and the Total negative consequences scale. The results of these analyses are presented in figures 7-14. Inter-correlations between the demographic variables were also explored, and the results are presented in table 31.

Table 31: Independent variables intercorrelations

		Correlations								
		Age	Relationship Status	Living Situation	Work Status	Ethnicity	Gender	MP ownership	Smartphone Ownership	Landline availability
Age	Pearson Correlation	1	.111**	.013	.092*	.017	-.001	.317**	-.038	.007
	Sig. (2-tailed)		.004	.747	.017	.669	.972	.000	.334	.867
Relationship Status	Pearson Correlation	.111**	1	-.068	.085*	.009	.020	.142**	.034	.027
	Sig. (2-tailed)	.004		.079	.028	.823	.612	.000	.378	.481
Living Situation	Pearson Correlation	.013	-.068	1	-.001	-.040	-.043	-.007	.018	-.005
	Sig. (2-tailed)	.747	.079		.970	.309	.269	.850	.635	.890
Work Status	Pearson Correlation	.092*	.085*	-.001	1	.007	.062	.094*	-.059	-.017
	Sig. (2-tailed)	.017	.028	.970		.861	.109	.015	.130	.653
Ethnicity	Pearson Correlation	.017	.009	-.040	.007	1	.000	-.034	-.011	.094*
	Sig. (2-tailed)	.669	.823	.309	.861		.995	.380	.770	.015
Gender	Pearson Correlation	-.001	.020	-.043	.062	.000	1	.039	-.054	-.095*
	Sig. (2-tailed)	.972	.612	.269	.109	.995		.310	.166	.015
MP ownership	Pearson Correlation	.317**	.142**	-.007	.094*	-.034	.039	1	.108**	-.019
	Sig. (2-tailed)	.000	.000	.850	.015	.380	.310		.005	.619
Smartphone Ownership	Pearson Correlation	-.038	.034	.018	-.059	-.011	-.054	.108**	1	.016
	Sig. (2-tailed)	.334	.378	.635	.130	.770	.166	.005		.686
Landline availability	Pearson Correlation	.007	.027	-.005	-.017	.094*	-.095*	-.019	.016	1
	Sig. (2-tailed)	.867	.481	.890	.653	.015	.015	.619	.686	

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

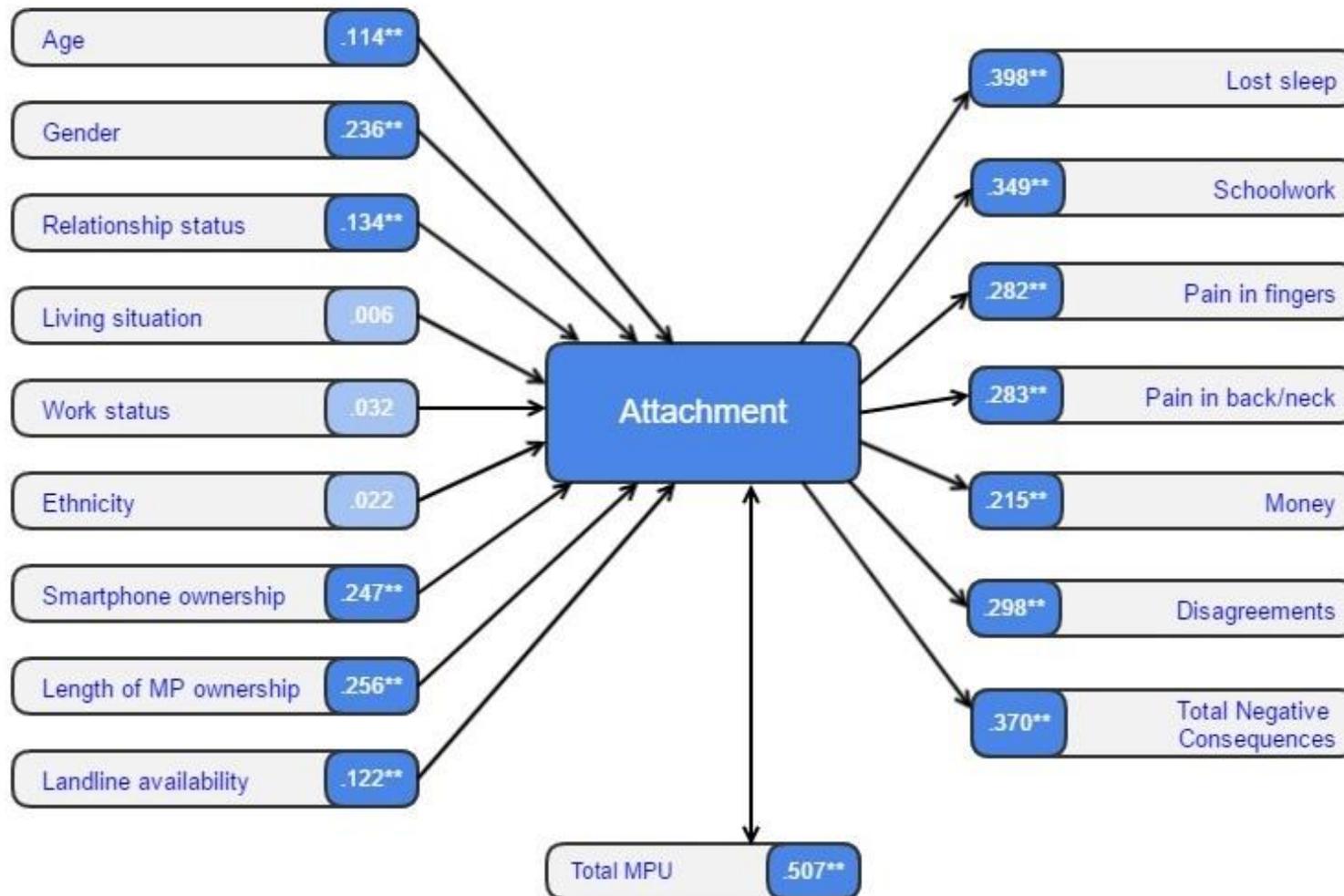


Figure 7: Correlations between Attachment and demographic variables, Total Mobile phone use, and Negative Consequences

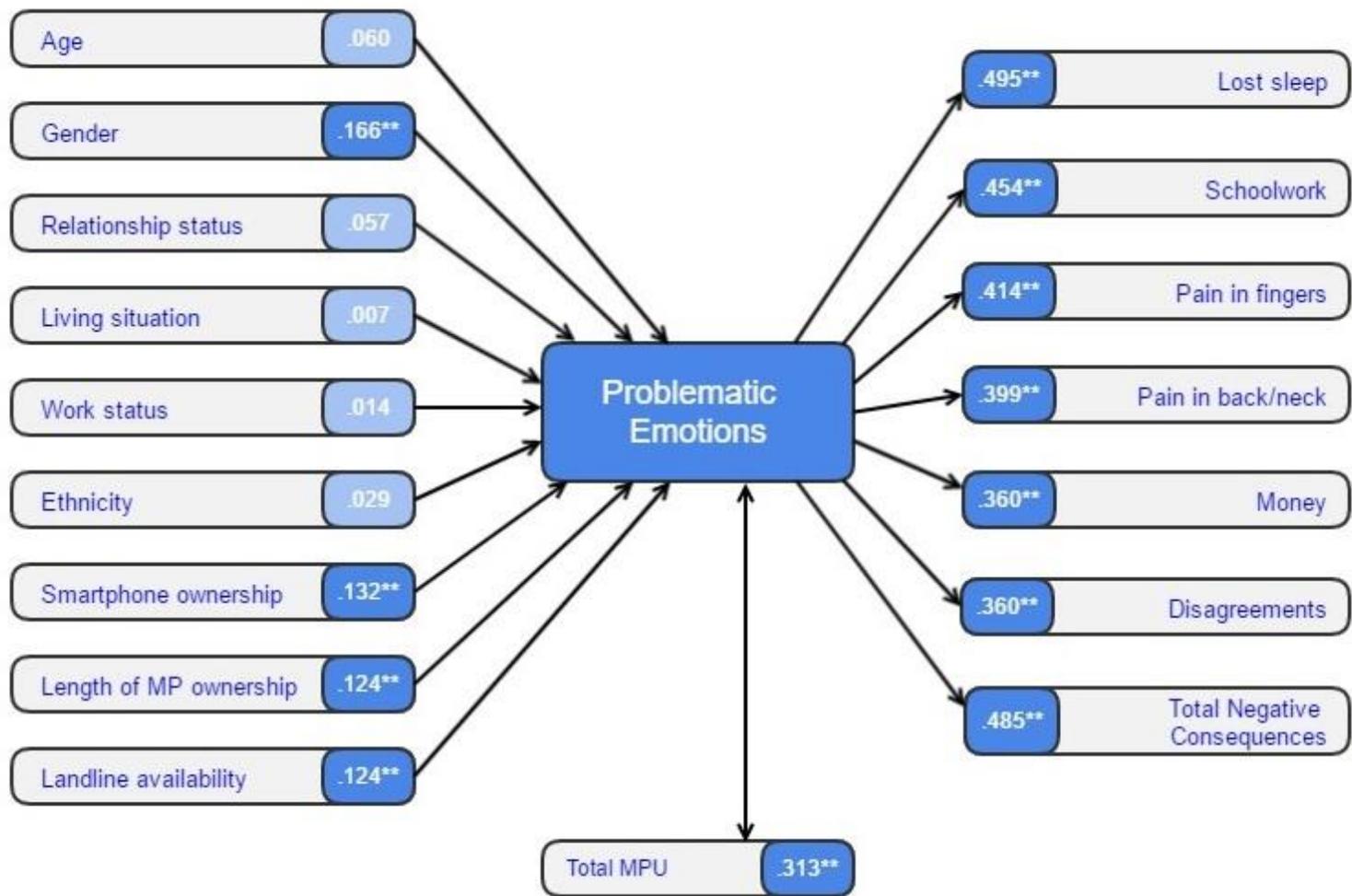


Figure 8: Correlations between Problematic Emotions and demographic variables, Total Mobile phone use, and Negative Consequences

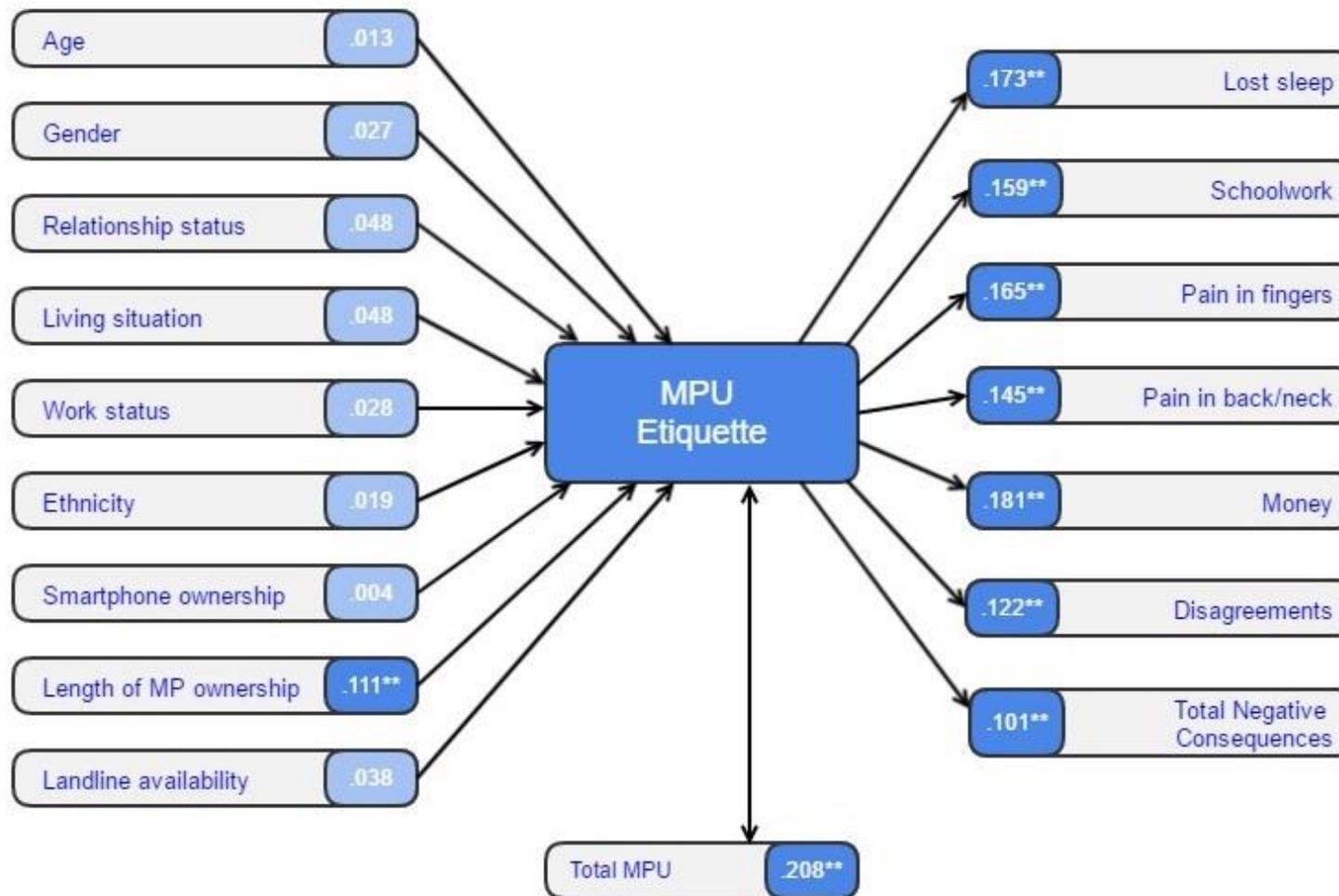


Figure 9: Correlations between Mobile phone use Etiquette, and demographic variables, Total Mobile phone use, and Negative Consequences

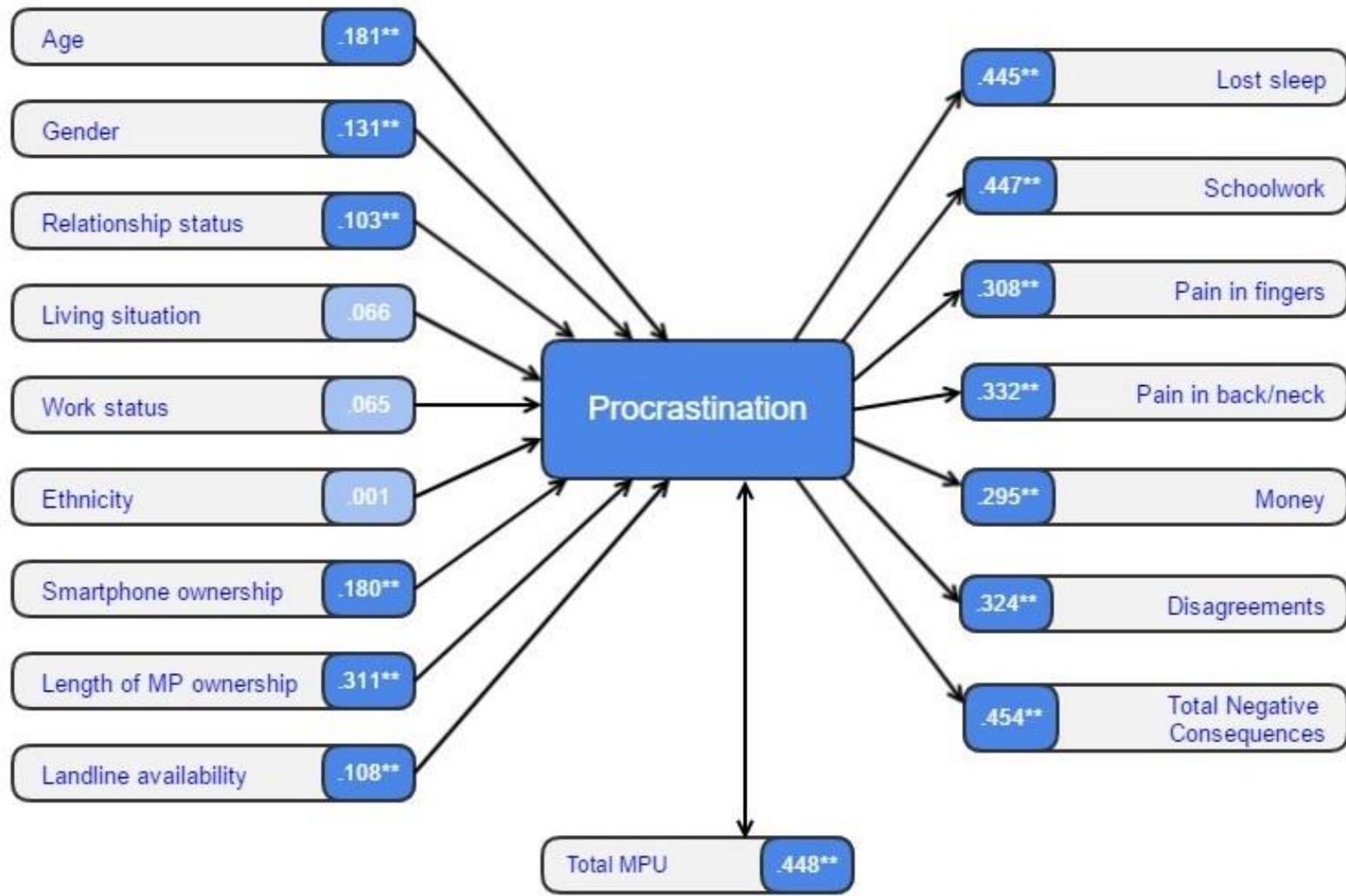


Figure 10: Correlations between Procrastination and demographic variables, Total Mobile phone use, and Negative Consequences

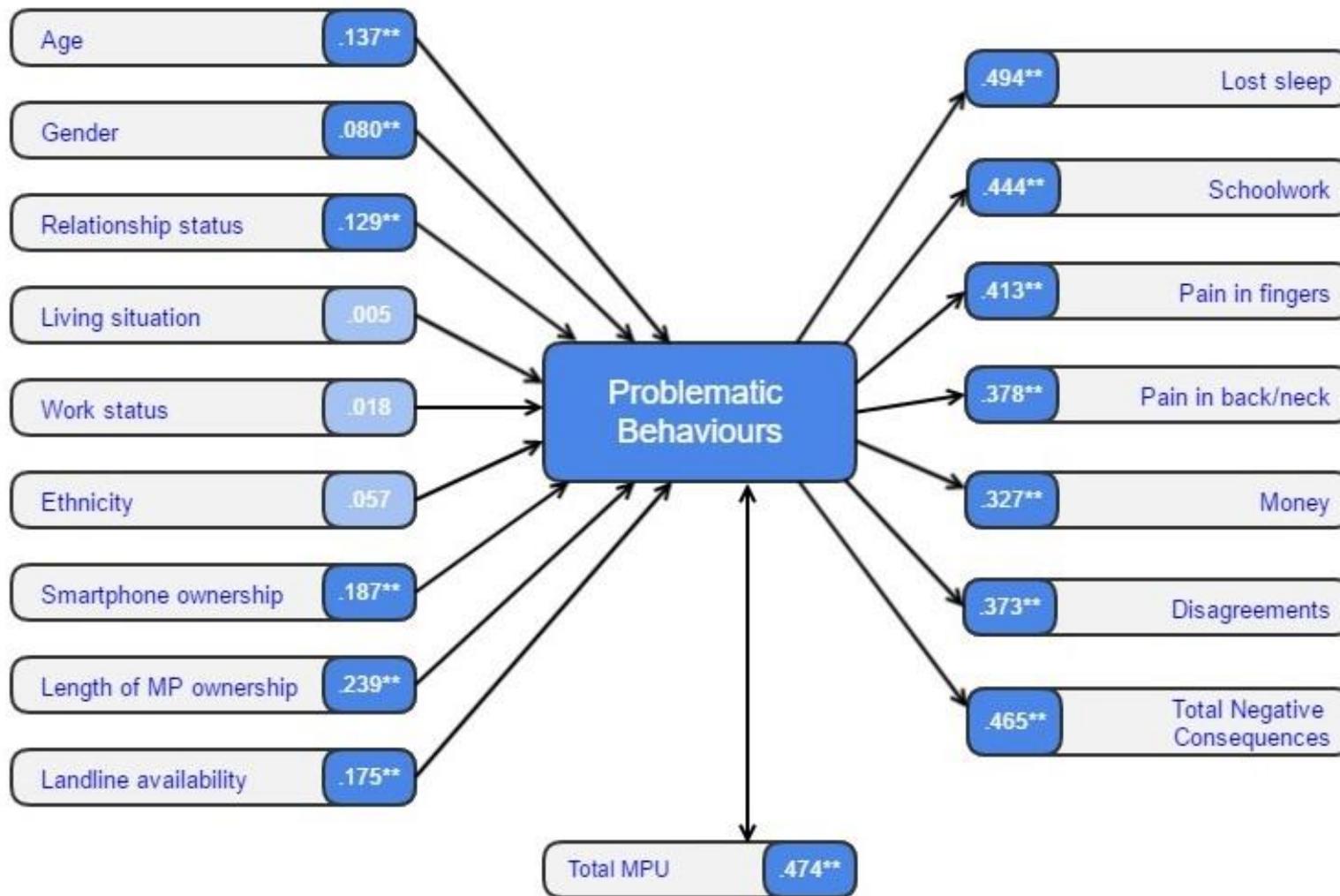


Figure 11: Correlations between Problematic Behaviours and demographic variables, Total Mobile phone use, and Negative Consequences

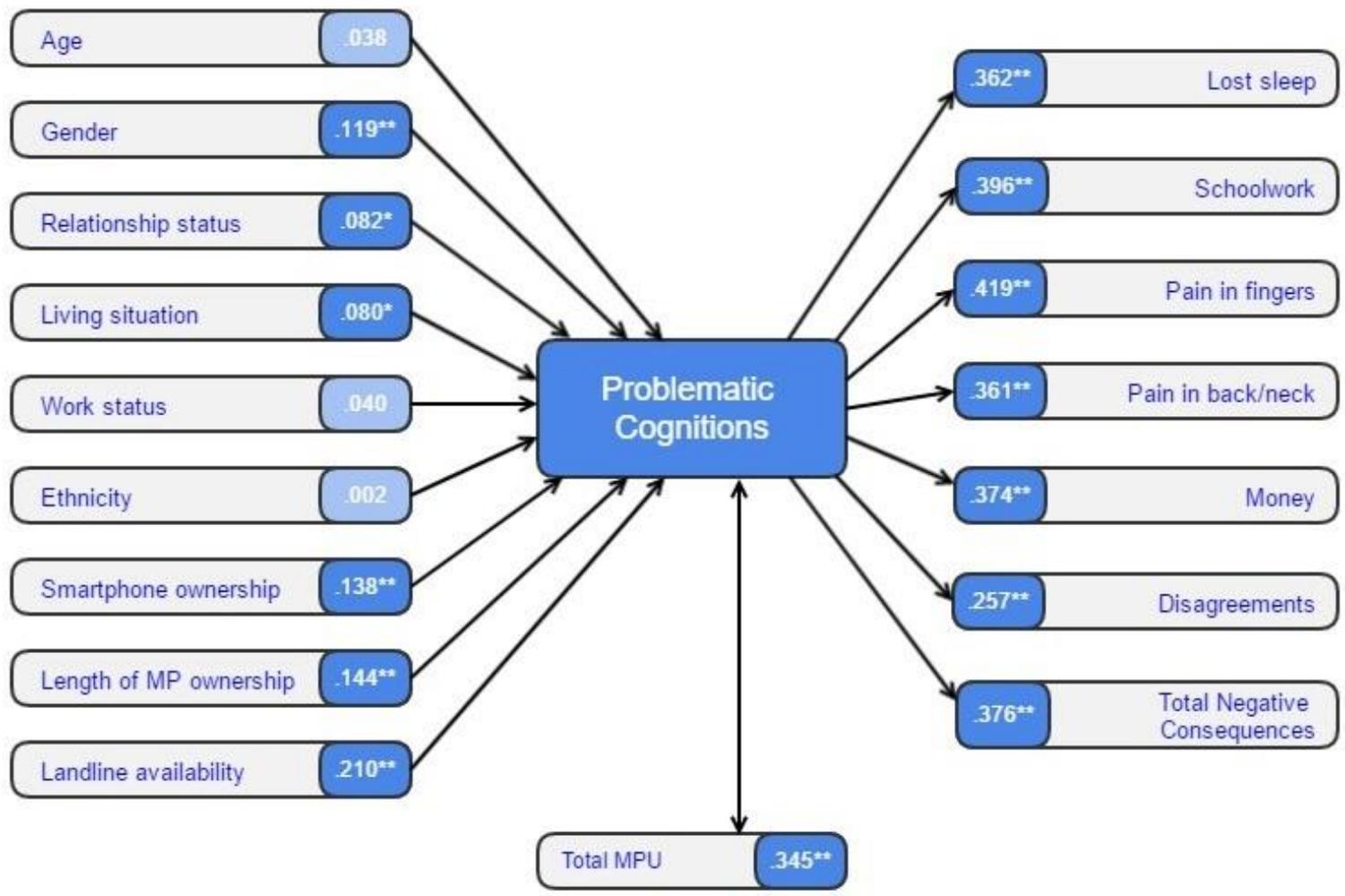


Figure 12: Correlations between Problematic Cognitions and demographic variables, Total Mobile phone use, and Negative Consequences

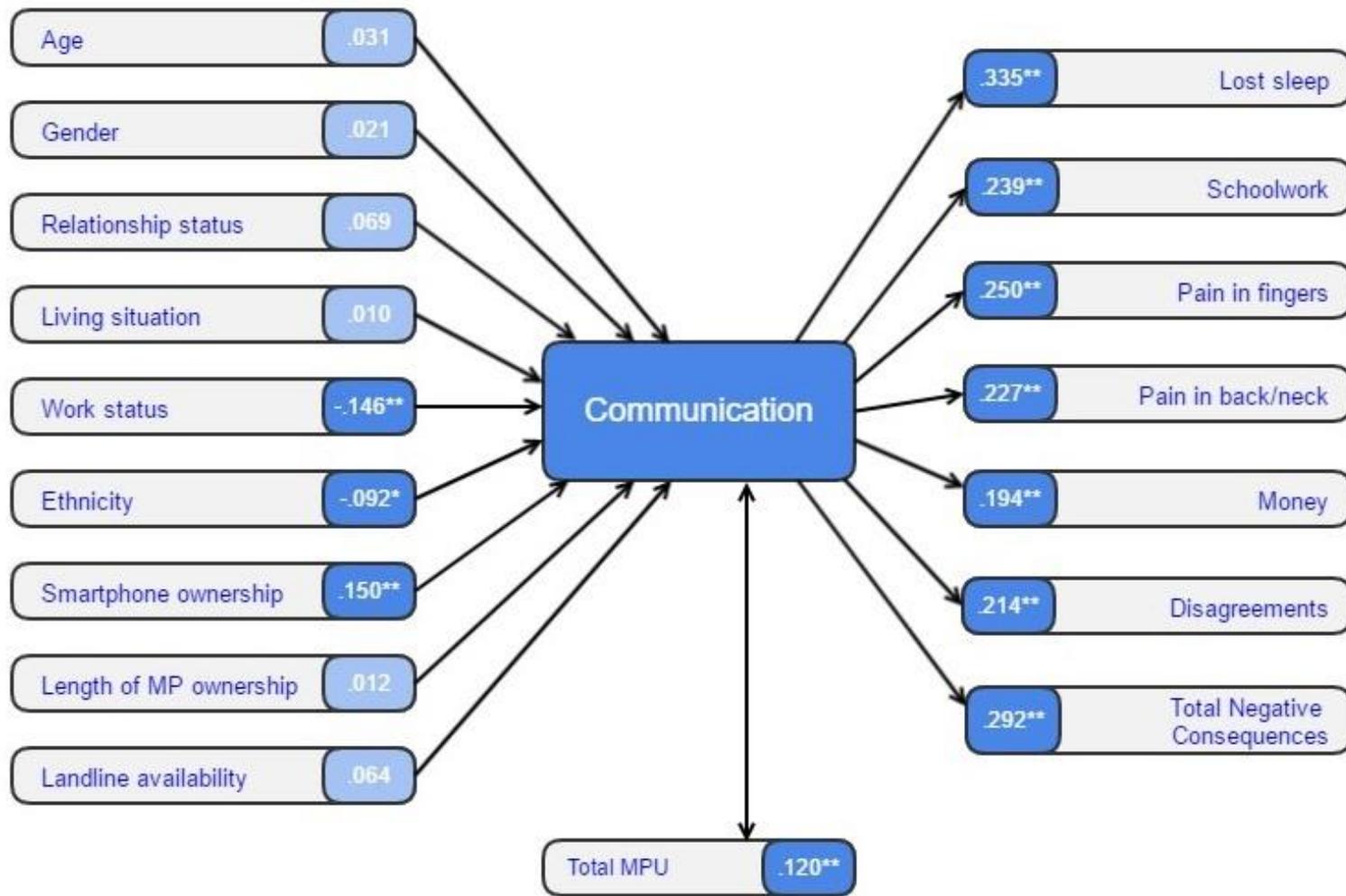


Figure 13: Correlations between Communication and demographic variables, Total Mobile phone use, and Negative Consequences

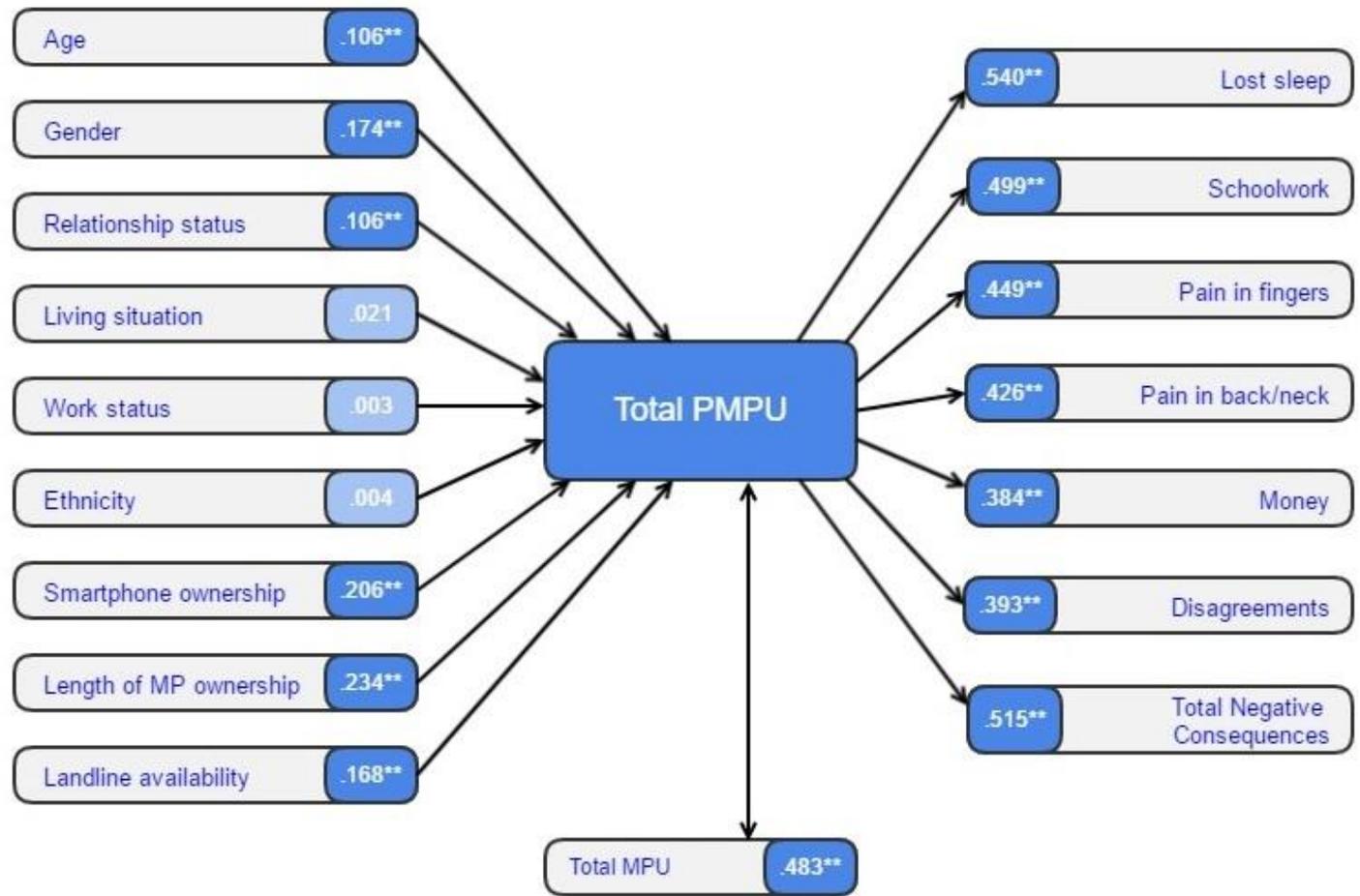


Figure 14: Correlations between Total PMPU and demographic variables, Total Mobile phone use, and Negative Consequences

7.4.5 Predictors of PMPU and Negative Consequences

In order to explore the predictors of problematic mobile phone use and negative consequences, several hierarchical multiple regression models were employed. The bivariate analyses described in the previous section indicated evidence of relationships between demographic variables, the mobile phone use scale, the PMPU subscales, and the negative consequences. Based on these results, two sets of models were developed, in order to explore the relationships between demographics, mobile phone use, PMPU, and negative consequences. The first is a sole model, which explores relationships with PMPU; the second comprises eight models, which explore relationships with negative consequences.

7.4.5.1 Predictors of PMPU

Prior to conducting the hierarchical multiple regression model, the relevant assumptions of this analysis were tested. The dependent variable was continuous, and there were more than two independent variables. Collinearity statistics (Tolerance and VIF values) were within accepted limits, and therefore the assumption of multicollinearity was deemed to be met. A Durbin Watson test result of 1.97 indicated independence of observation. The data was tested for significant outliers; five were identified, and removed from the analysis. Examination of the plot of standardized residuals showed normally distributed residuals. Given the dichotomous nature of the dependent variables, assumptions of linearity and homoscedasticity were not relevant.

A two stage hierarchical multiple regression was conducted, with the Total PMPU scale as the dependent variable. The demographic variables identified as being correlated to Total PMPU were introduced in the first stage; the mobile phone use scale was introduced in the second stage. The variables were entered in this order, in order to explore the association between PMPU and MPU, while controlling for demographic variables. The regression statistics are presented in table 32.

Table 32: Predicting PMPU from demographics and mobile phone use

Variable	B	t	sr ²	R	R ²	ΔR ²
Step 1 - Demographics				.39	.15	.15
Smartphone Ownership	.19	5.30***	.04			
Landline Availability	.17	4.63***	.03			
Relationship Status	.06	1.65	.00			
Age	.05	1.22	.00			
Length of MP ownership	.19	4.84***	.03			
Gender	.187	5.16***	.03			
Step 2- Demographics & MPU				.53	.28	.13
Smartphone Ownership	.014	.38	.00			
Landline Availability	.136	4.08**	.02			
Relationship Status	-.01	-.21	.00			
Age	-.10	-.27	.00			
Length of MP ownership	-.01	-.1.52	.00			
Gender	.108	3.17**	.01			
Mobile phone use	.50	10.88***	.13			

The hierarchical multiple regression showed that at stage one, the model was statistically significant, $R^2=.15$, $F(6, 657) = 19.52$, $p<.000$. Smartphone ownership, landline availability, length of mobile phone ownership, and gender contributed significantly to the model, with landline availability, length of mobile phone ownership, and gender each uniquely accounting for 3% of the variation in PMPU, while Smartphone ownership uniquely accounted for 4% of the variance in PMPU. In this model, smartphone ownership (versus owning a less sophisticated phone), lack of access to landline availability, longer duration of mobile phone ownership, and female gender predicted higher scores on the PMPU measure. The total variance explained was 15%.

At stage two, the model was statistically significant, $R^2=.13$, $F(1, 656) = 118.31$, $p<.000$. The introduction of the mobile phone use variable explained an additional 13% of the variance in PMPU. In this model, only gender, landline availability and mobile phone use were significant predictors of PMPU; the most important predictor was mobile phone use, which uniquely accounted for 13% of the variance in PMPU. In this model, lack of access to landline availability, female gender and higher levels of mobile phone use predicted higher scores on the PMPU measure. The total variance explained was 28%.

7.4.5.2 Predictors of negative consequences

The following section discusses the hierarchical multiple regression models which aimed to assess the predictive relationships of demographic variables, PMPU, and mobile phone use on negative consequences. The first two assumptions are that the dependent variable is continuous, and that more than two independent variables are included; while the negative consequences scale is ordinal, in these models it is treated as continuous, and therefore the first two assumptions were met. Independence of observation was tested through the Durbin Watson statistic; values ranging between 1.985 and 2.054 indicated this assumption was met. Linearity and homoscedasticity between the negative consequences scale and the demographic variables was not possible, given that the demographic variables were dichotomous. Linearity and homoscedasticity between the negative consequences scale, the PMPU subscales, and mobile phone use were evaluated through examination of residual and scatter plots; the assumptions were met, excepting the case of the MPU Etiquette subscale, where no linear relationship was found. MPU Etiquette was subsequently removed from the analysis. Collinearity statistics (Tolerance and VIF values) were within accepted limits, and therefore the assumption of multicollinearity was deemed to be met. The data was tested for significant outliers; five were identified, and removed from the analysis. Examination of the plot of standardized residuals showed normally distributed residuals.

Three step hierarchical models were conducted, with the Negative Consequences scale as the dependent variable. Seven models were needed in total, as the PMPU subscales could not be entered within the same model, given the high levels of multicollinearity between the subscales. For each model, demographic variables were entered into the first step; the demographic variables were chosen based on their correlation with the relevant PMPU subscale, given that the relationship between demographics and negative consequences would likely be mediated by PMPU. In the second step, a PMPU subscale was entered; and in the third step, the mobile phone use scale was entered. The PMPU scales were entered prior to the mobile phone use scale, as it was theorized that high levels of mobile phone use would be determined by PMPU. The results from the seven hierarchical multiple regression models are presented below.

7.4.5.2.1 Predicting Negative Consequences from demographics, Attachment, and mobile phone use

Table 33: Predicting Negative Consequences from demographics, Attachment, and mobile phone use

Variable	β	t	sr2	R	R2	$\Delta R2$
Step 1- Demographics				.18	.03	.03
Smartphone Ownership	.08	2.1*	.01			
Landline Availability	.06	1.47	.00			
Relationship Status	.02	.56	.00			
Age	.01	.14	.00			
Length of MP ownership	.14	3.36***	.002			
Gender	.03	.78	.00			
Step 2- Demographics & Attachment				.36	.14	.11
Smartphone Ownership	.004	.09	.00			
Landline Availability	.02	.47	.00			
Relationship Status	-.01	-.27	.00			
Age	-.10	-.27	.00			
Length of MP ownership	.07	1.66	.00			
Gender	-.02	-.56	.00			
Attachment	.35	9.06***	.11			
Step 3- Demographics, Attachment & MPU				.40	.16	.02
Smartphone Ownership	-.01	-.18	.00			
Landline Availability	.01	.28	.00			
Relationship Status	-.03	-.85	.00			
Age	-.01	-.25	.00			
Length of MP ownership	.05	1.15	.00			
Gender	.09	.31	.00			
Attachment	.28	6.56***	.06			
Total MPU	.16	3.83***	.02			

The hierarchical multiple regression showed that at stage one, the model was statistically significant, $R^2=.03$, $F(5, 658) = 4.57$, $p<.000$. Smartphone ownership and length of mobile phone ownership contributed significantly to the model, accounting for 3% of the variance in Negative Consequences. Smartphone ownership uniquely contributed 1% of the variance, and length of mobile phone ownership uniquely contributed 0.2% of the variance. In this model, owning a smartphone (as opposed to a less sophisticated phone) and a longer duration of mobile phone ownership predicted higher scores on the Negative Consequences scale.

At stage two, the model was statistically significant, $R^2=.14$, $F(1, 657) = 82.09$, $p<.000$. The introduction of the Attachment variable explained an additional 11% of the variance in Negative Consequences. In this model, only Attachment was a significant predictor of Negative Consequences, uniquely accounting for 11% of the variance in Negative Consequences. Higher scores on the Attachment subscale predicted higher scores on the Negative Consequences scale.

At stage three, the model was statistically significant, $R^2=.16$, $F(1, 656) = 14.66$, $p<.000$. The introduction of the mobile phone use variable accounted for an additional 2% of the variance in Negative Consequences. In this final model, only Attachment and Total MPU significantly predicted Negative Consequences, with Attachment uniquely contributing 6%, and Total MPU uniquely contributing 2% of the variance in Negative Consequences. Together, the eight variables account for 16% of the variance in Negative Consequences. Higher scores on the Attachment and Total MPU subscales predicted higher scores on the Negative Consequences scale

7.4.5.2.2 Predicting Negative Consequences from demographics, Problematic Emotions, and mobile phone use

Table 34: Predicting Negative Consequences from demographics, Problematic Emotions, and mobile phone use

Variable	β	t	sr^2	R	R^2	ΔR^2
Step 1- Demographics				.18	.03	.03
Smartphone Ownership	.081	2.1*	.01			
Landline Availability	.057	1.49	.00			
Length of MP ownership	.14	3.69***	.02			
Gender	.03	.77	.00			
Step 2 - Demographics & Problematic Emotions				.49	.24	.21
Smartphone Ownership	.03	.77	.00			
Landline Availability	.001	.03	.00			
Length of MP ownership	.09	2.64**	.00			
Gender	.01	.49	.00			
Problematic Emotions	.47	13.58***	.21			
Step 3- Demographics, Problematic Emotions & MPU			.00	.52	.27	.02
Smartphone Ownership	.01	-.16	.00			
Landline Availability	-.01	-.28	.00			

Length of MP ownership	.06	1.63	.00			
Gender	.01	.46	.00			
Problematic Emotions	.43	12.06***	.16			
Total MPU	.16	4.41***	.02			

The hierarchical multiple regression showed that at stage one, the model was statistically significant, $R^2=.18$, $F(3, 660) = 7.52$, $p<.000$. Smartphone ownership and length of mobile phone ownership contributed significantly to the model, accounting for 3% of the variance in Negative Consequences. Smartphone ownership uniquely contributed 1% of the variance, and length of mobile phone ownership uniquely contributed 2% of the variance. In this model, owning a smartphone (as opposed to a less sophisticated phone) and a longer duration of mobile phone ownership predicted higher scores on the Negative Consequences scale.

At stage two, the model was statistically significant, $R^2=.24$, $F(1, 659) = 184.35$, $p<.000$. The introduction of the Problematic Emotions variable explained an additional 21% of the variance in Negative Consequences. In this model, higher scores on the Problematic Emotions subscale, and longer duration of mobile phone ownership were significant predictors of higher scores on the Negative Consequences subscale, with Problematic Emotions uniquely accounting for 21% of the variance in Negative Consequences.

At stage three, the model was statistically significant, $R^2=.27$, $F(1, 658) = 19.47$, $p<.000$. The introduction of the mobile phone use variable accounted for an additional 2% of the variance in Negative Consequences. In this final model, only Problematic Emotions and Total MPU significantly predicted Negative Consequences, with Problematic Emotions uniquely contributing 16%, and Total MPU uniquely contributing 2% of the variance in Negative Consequences. Together, the six variables account for 27% of the variance in Negative Consequences. In this model, higher scores on the Problematic Emotions and Total MPU scales predicted higher scores on the Negative Consequences scale.

7.4.5.2.3 Predicting Negative Consequences from demographics, Procrastination, and mobile phone use

Table 35: Predicting Negative Consequences from demographics, Procrastination, and mobile phone use

Variable	β	t	sr^2	R	R^2	ΔR^2
Step 1- Demographics				.18	.03	.03
Smartphone Ownership	.08	2.1*	.01			
Landline Availability	.06	1.47	.00			
Relationship Status	.02	.56	.00			
Age	.01	.14	.00			
Length of MP ownership	.14	3.36***	.002			
Gender	.01	.17	.00			
Step 2 - Demographics & Procrastination				.46	.21	.17
Smartphone Ownership	.01	.37	.00			
Landline Availability	.01	.35	.00			
Relationship Status	.00	-.01	.00			
Age	-.04	-1.04	.00			
Length of MP ownership	.02	.587	.00			
Gender	.00	-.01	.00			
Procrastination	.45	12.01***	.17			
Step 3 - Demographics, Procrastination & MPU				.47	.22	.01
Smartphone Ownership	-.01	-.02	.00			
Landline Availability	.01	.14	.00			
Relationship Status	-.02	-.59	.00			
Age	-.04	-.96	.00			
Length of MP ownership	.01	.174	.00			
Gender	.00	-.02	.00			
Procrastination	.39	9.94***	.12			
Total MPU	.14	3.44***	.01			

The hierarchical multiple regression showed that at stage one, the model was statistically significant, $R^2=.03$, $F(5, 658) = 4.57$, $p<.000$. Smartphone ownership and length of mobile phone ownership contributed significantly to the model, accounting for 3% of the variance in Negative Consequences. Smartphone ownership uniquely contributed 1% of the variance, and length of mobile phone ownership uniquely contributed 0.2% of the variance. In this model, owning a smartphone (as opposed to a less sophisticated phone) and a longer duration of mobile phone ownership predicted higher scores on the Negative Consequences scale.

At stage two, the model was statistically significant, $R^2=.21$, $F(1, 657) = 144.26$, $p<.000$. The introduction of the Procrastination variable explained an additional 17% of the variance in Negative Consequences. In this model, Procrastination was a significant predictor of Negative Consequences, uniquely accounting for 17% of the variance in PMPU. Higher scores on the Procrastination subscale predicted higher scores on the Negative Consequences scale.

At stage three, the model was statistically significant, $R^2=.22$, $F(1, 656) = 11.86$, $p<.000$. The introduction of the mobile phone use variable accounted for an additional 1% of the variance in Negative Consequences. In this final model, only Procrastination and Total MPU significantly predicted Negative Consequences, with Procrastination uniquely contributing 12%, and Total MPU uniquely contributing 1% of the variance in Negative Consequences. Together, the eight variables account for 23% of the variance in Negative Consequences. Higher scores on the Procrastination and Total MPU subscales predicted higher scores on the Negative Consequences scale.

7.4.5.2.4 Predicting Negative Consequences from demographics, Problematic Behaviours, and mobile phone use

Table 36: Predicting Negative Consequences from demographics, Problematic Behaviours, and mobile phone use

Variable	β	t	sr ²	R	R ²	ΔR^2
Step 1 - Demographics				.18	.03	.03
Smartphone Ownership	.08	2.1*	.01			
Landline Availability	.06	1.47	.00			
Relationship Status	.02	.56	.00			
Age	.01	.14	.00			
Length of MP ownership	.14	3.36***	.02			
Gender	.01	.17	.00			
Step 2 – Demographics, Problematic Behaviours, & MPU				.47	.22	.19
Smartphone Ownership	.01	.20	.00			
Landline Availability	-.02	-.56	.00			
Relationship Status	-.02	-.51	.00			
Age	-.03	-.76	.00			
Length of MP ownership	.05	1.34	.00			
Gender	-.01	-.87	.00			
Problematic Behaviours	.46	12.5***	.19			
Step 3 - Demographics				.48	.23	.01
Smartphone Ownership	-.00	-.11	.00			

Landline Availability	-.02	-.65	.00			
Relationship Status	-.03	-.96	.00			
Age	-.03	.962	.00			
Length of MP ownership	.04	.174	.00			
Gender	-.03	-.99	.00			
Problematic Behaviours	.41	10.31***	.12			
Total MPU	.12	2.92**	.01			

The hierarchical multiple regression showed that at stage one, the model was statistically significant, $R^2=.03$, $F(5, 658) = 4.57$, $p<.000$. Smartphone ownership and length of mobile phone ownership contributed significantly to the model, accounting for 3% of the variance in Negative Consequences. Smartphone ownership uniquely contributed 1% of the variance, and length of mobile phone ownership uniquely contributed 2% of the variance. In this model, owning a smartphone (as opposed to a less sophisticated phone) and a longer duration of mobile phone ownership predicted higher scores on the Negative Consequences scale.

At stage two, the model was statistically significant, $R^2=.21$, $F(1, 657) = 156.24$, $p<.000$. The introduction of the Problematic Behaviours variable explained an additional 19% of the variance in Negative Consequences. In this model, Problematic Behaviours was a significant predictor of Negative Consequences, uniquely accounting for 19% of the variance in PMPU. Higher scores on the Problematic Behaviours scale predicted higher scores on the Negative Consequences scale.

At stage three, the model was statistically significant, $R^2=.22$, $F(1, 656) = 8.54$, $p<.000$. The introduction of the mobile phone use variable accounted for an additional 1% of the variance in Negative Consequences. In this final model, only Problematic Behaviours and Total MPU significantly predicted Negative Consequences, with Problematic Behaviours uniquely contributing 12%, and Total MPU uniquely contributing 1% of the variance in Negative Consequences. Together, the eight variables account for 22% of the variance in Negative Consequences. Higher scores on the Problematic Behaviours and Total MPU subscales predicted higher scores on the Negative Consequences scale.

7.4.5.2.5 Predicting Negative Consequences from demographics, Problematic Cognitions, and mobile phone use

Table 37: Predicting Negative Consequences from demographics, Problematic Cognitions, and mobile phone use

Variable	β	t	sr^2	R	R^2	ΔR^2
Step 1- Demographics				.19	.03	.03
Smartphone Ownership	.08	2.1*	.01			
Landline Availability	.05	1.23	.00			
Relationship Status	.02	.50	.00			
Living Situation	.03	.70	.00			
Length of MP ownership	.14	3.36***	.02			
Gender	.02	.65	.00			
Step 2 – Demographics & Problematic Cognitions				.39	.15	.12
Smartphone Ownership	.04	1.09	.00			
Landline Availability	-.02	-.56	.00			
Relationship Status	.00	.00	.00			
Living Situation	.02	.51	.00			
Length of MP ownership	.09	2.56**	.01			
Gender	.00	.00	.00			
Problematic Cognitions	.36	9.62***	.12			
Step 3 – Demographics, Problematic Cognitions & MPU				.43	.18	.03
Smartphone Ownership	.02	.41	.00			
Landline Availability	-.03	-.67	.00			
Relationship Status	-.03	-.79	.00			
Living Situation	.00	.12	.00			
Length of MP ownership	.06	1.62	.00			
Gender	-.04	-.81	.00			
Problematic Cognitions	.31	7.96***	.08			
Total MPU	.19	4.89***	.03			

The hierarchical multiple regression showed that at stage one, the model was statistically significant, $R^2=.03$, $F(5, 658) = 4.67$, $p<.000$. Smartphone ownership and length of mobile phone ownership contributed significantly to the model, accounting for 3% of the variance in Negative Consequences. Smartphone ownership uniquely contributed 1% of the variance, and length of mobile phone ownership uniquely contributed 2% of the variance. In this model, owning a smartphone (as opposed to a less sophisticated phone) and a longer duration of mobile phone ownership predicted higher scores on the Negative Consequences scale.

At stage two, the model was statistically significant, $R^2=.15$, $F(1, 657) = 92.51$, $p<.000$. The introduction of the Problematic Cognitions variable explained an additional 12% of the

variance in Negative Consequences. In this model, Problematic Cognitions and length of mobile phone ownership were significant predictors of Negative Consequences, uniquely accounting for 12% and 1% of the variance in Negative Consequences. Higher scores on the Problematic Cognitions scale, and a longer duration of mobile phone ownership predicted higher scores on the Negative Consequences scale.

At stage three, the model was statistically significant, $R^2=.18$, $F(1, 656) = 23.98$, $p<.000$. The introduction of the mobile phone use variable accounted for an additional 3% of the variance in Negative Consequences. In this final model, only Problematic Cognitions and Total MPU significantly predicted Negative Consequences, with Problematic Cognitions uniquely contributing 8%, and Total MPU uniquely contributing 3% of the variance in Negative Consequences. Together, the eight variables account for 18% of the variance in Negative Consequences. Higher scores on the Problematic Cognitions and Total MPU subscales predicted higher scores on the Negative Consequences scale.

7.4.5.2.6 Predicting Negative Consequences from demographics, Communication, and mobile phone use

Table 38: Predicting Negative Consequences from demographics, Communication, and mobile phone use

Variable	β	t	sr^2	R	R^2	ΔR^2
Step 1- Demographics				.14	.02	.02
Smartphone Ownership	.1	2.6**	.01			
Ethnicity	.09	2.41*	.01			
Work status	.02	.42	.00			
Step 2 – Demographics & Communication				.33	.11	.09
Smartphone Ownership	.06	1.55	.00			
Ethnicity	.12	3.24***	.01			
Work status	.06	1.54	.00			
Communication	.30	8.01***	.08			
Step 3 – Demographics, Communication & MPU				.42	.17	.07
Smartphone Ownership	.01	.25	.00			
Ethnicity	.11	3.07**	.01			
Work status	.03	.69	.00			
Communication	.27	7.43***	.07			
Total MPU	.27	7.40***	.07			

The hierarchical multiple regression showed that at stage one, the model was statistically significant, $R^2=.02$, $F(3, 660) = 4.17$, $p<.000$. Smartphone ownership and ethnicity contributed significantly to the model, accounting for 2% of the variance in Negative Consequences. Smartphone ownership uniquely contributed 1% of the variance, and ethnicity uniquely contributed 1% of the variance. In this model, owning a smartphone (as opposed to a less sophisticated phone) and belonging to a non-European ethnic group predicted higher scores on the Negative Consequences scale.

At stage two, the model was statistically significant, $R^2=.11$, $F(1, 659) = 64.07$, $p<.000$. The introduction of the Communication variable explained an additional 9% of the variance in Negative Consequences. In this model, Communication and ethnicity were significant predictors of Negative Consequences, with Communication uniquely accounting for 8% and 1% of the variance in Negative Consequences. In this model, higher scores on the Communication subscale and belonging to a non-European ethnic group predicted higher scores on the Negative Consequences scale.

At stage three, the model was statistically significant, $R^2=.18$, $F(1, 656) = 23.98$, $p<.000$. The introduction of the mobile phone use variable accounted for an additional 7% of the variance in Negative Consequences. In this final model, only ethnicity, Problematic Cognitions and Total MPU significantly predicted Negative Consequences, with ethnicity uniquely contributing 1%, Problematic Cognitions uniquely contributing 8%, and Total MPU uniquely contributing 7% of the variance in Negative Consequences. Together, the five variables account for 17% of the variance in Negative Consequences. In this model, higher scores on the Communication and MPU subscales, and belonging to a non-European ethnic group predicted higher scores on the Negative Consequences scale.

7.4.5.2.7 Predicting Negative Consequences from demographics, Total PMPU, and mobile phone use

Table 39: Predicting Negative Consequences from demographics, Total PMPU, and mobile phone use

Variable	β	t	sr ²	R	R ²	ΔR^2
Step 1 - Demographics				.18	.03	.03
Smartphone Ownership	.08	2.1*	.01			
Landline Availability	.06	1.47	.00			
Relationship Status	.02	.56	.00			
Age	.01	.14	.00			
Length of MP ownership	.14	3.36***	.02			
Gender	.07	1.66	.00			
Step 2 - Demographics				.51	.27	.23
Smartphone Ownership	-.01	-.32	.00			
Landline Availability	-.03	-.75	.00			
Relationship Status	-.01	-.348	.00			
Age	-.02	-.45	.00			
Length of MP ownership	.04	1.07	.00			
Gender	-.04	-.83	.00			
Total PMPU	.52	14.47***	.23			
Step 3 - Demographics				.52	.27	.01
Smartphone Ownership	-.02	-.53	.00			
Landline Availability	-.03	-.81	.00			
Relationship Status	-.02	-.69	.00			
Age	-.02	-.44	.00			
Length of MP ownership	.03	.77	.00			
Gender	-.04	-.96	.00			
Total PMPU	.48	12.29***	.17			
Total MPU	.08	2.12*	.01			

The hierarchical multiple regression showed that at stage one, the model was statistically significant, $R^2=.02$, $F(5, 658) = 4.57$, $p<.000$. Smartphone ownership and length of mobile phone ownership contributed significantly to the model, accounting for 3% of the variance in Negative Consequences. Smartphone ownership uniquely contributed 1% of the variance, and length of mobile phone ownership uniquely contributed 2% of the variance. In this model, owning a smartphone (as opposed to a less sophisticated phone) and a longer duration of mobile phone ownership predicted higher scores on the Negative Consequences scale.

At stage two, the model was statistically significant, $R^2=.11$, $F(1, 657) = 209.47$, $p<.000$. The introduction of the Total PMPU variable explained an additional 23% of the variance in Negative Consequences. In this model, Total PMPU was a significant predictor of Negative

Consequences, with higher scores on the PMPU scale predicting higher scores on the Negative Consequences scale. Total PMPU uniquely accounted for 23% of the variance in Negative Consequences.

At stage three, the model was statistically significant, $R^2=.27$, $F(1, 656) = 4.49$, $p < .000$. The introduction of the mobile phone use variable accounted for an additional 1% of the variance in Negative Consequences. In this final model, only Total PMPU and Total MPU significantly predicted Negative Consequences, with Total PMPU uniquely contributing 17%, and Total MPU uniquely contributing 1% of the variance in Negative Consequences. Together, the eight variables account for 27% of the variance in Negative Consequences. Higher scores on the Total PMPU and Total MPU subscales predicted higher scores on the Negative Consequences scale.

7.5 Discussion

The current study built upon previous work in this thesis, as well as previous research. As discussed in Chapter 3, previous research on PMPU adopted a largely atheoretical approach, employed the DSM-IV abuse/dependence or pathological gambling criteria as the basis for the questionnaire development, and conducted the studies from a researcher-driven perspective, rarely taking into account the views and experiences of the target population. Furthermore, little is known about PMPU in the New Zealand context. With the exception of the researcher's own Honours dissertation (Vacaru & Shepherd, 2010), no published research on the subject of PMPU in New Zealand could be found. Therefore, the current study aimed to fill these gaps in the research, by developing and employing a youth-informed questionnaire, and exploring PMPU in New Zealand. For this purpose, PCA and hierarchical multiple regression models were employed. The main findings of the study, its limitations and conclusions are presented in the following section.

7.5.1 Validity and reliability of the PMPU questionnaire

The face validity of the questionnaire resulted from the youth participation process described in Chapter 6. Young people played an important role in the development of this

questionnaire, by producing items, reviewing their wording, and checking whether the overall questionnaire represents their conceptualization of what PMPU means. Furthermore, experts in the fields of youth research, psychology, addictions, and survey methods provided comments and guidance on the questionnaire, its content and structure.

The construct validity of the questionnaire was evaluated through principal components analysis. Given that this is the first study to apply Cognitive Behavioural Theory to PMPU, it is not possible to compare the outcomes of the PCA with previous studies. The analysis indicated that a seven factor solution of the PCA items would be most interpretable, and therefore the questionnaire moved beyond the primary constructs of Cognitive Behavioural Theory (problematic or maladaptive cognitions, behaviours and emotions), and included concepts such as attachment, procrastination, communication, and mobile phone use etiquette. This is likely a result of the inclusion of young people's views and experiences in the questionnaire development.

The analysis found that 13 of the 49 items cross-loaded onto more than one factor. This indicated that the items likely examined more than one construct of PMPU (Tabachnick & Fidell, 2001). Removal of the items from the analysis, however, produced a far poorer result. The solution was far less interpretable, there were even more items cross-loading, and the way in which the factors loaded made less theoretical sense. The process of removing cross-loading items was undertaken several times, however a better solution than the initial 7 factor solution could not be achieved. Therefore, the cross-loading items were retained, and assigned to factors based on two strategies: if the difference in loading scores was large, the item was assigned to the factor with the higher loading. If the difference in loading was small, the item was assigned to whichever factor made more theoretical sense (i.e. where the item fit better, conceptually) (Pett, Lackey, Sullivan, 2003).

However, this resulted in some subscales including items which do not appear to assess the same construct. For example, the Problematic Emotions subscale includes five items which appear to be more related to cognitions, such as 'I think that if I didn't have a mobile phone, I would be excluded by my friends'. Interestingly, only two of these five items cross-loaded onto the Problematic Cognitions factor, and the factor loadings were smaller. Furthermore, removal of these items from the scale would have reduced the internal consistency considerably (as measured by Cronbach's alpha). Therefore, the items were kept in the

Problematic Emotions subscale. It is possible that the items were more successful in examining the emotional reactions to those specific cognitions, as opposed to the cognitions themselves. For example, ‘If somebody doesn’t reply to my txt, I think they probably dislike me’ could examine the feeling of rejection associated with such a situation, as opposed to the presence of the actual thought in the participants’ cognitive process. Further research, however, is needed to accurately understand the specific role of these items.

7.5.2 Problematic Mobile Phone Use

Seven constructs underlying PMPU were found, as a result of PCA: Attachment, Problematic Emotions, Problematic Behaviours, Problematic Cognitions, Mobile phone use Etiquette, Procrastination, and Communication. Additionally, a scale which comprised all 49 items was created, and labelled ‘Total PMPU’.

The frequency of different constructs underlying PMPU in the target population was examined using a cut-off score of 5. On the Likert scale utilised in this study, scores of 5 or more indicate agreement, and therefore an average score of 5 or more on a particular subscale would indicate that particular PMPU construct had been experienced by a participant. However, the PMPU questionnaire was not designed or envisioned to be a diagnostic measure, and therefore the cut-off score does not imply a diagnosis. It simply identifies whether a participant, on average, has experienced a particular aspect of PMPU, such as problematic behaviours. In the extant research on PMPU, examples can be found of studies which had aimed to establish the prevalence of PMPU; these studies employed different methods to establish a cut-off score. Perry & Lee (2007) determined the prevalence of PMPU determining what percentage of the respondents had reported agreement to strong agreement for each of their six subscales. Jenaro & colleagues (2009) and Kwon and colleagues (2013) determined the prevalence of PMPU by applying the diagnostic guidelines of the DSM-IV for alcohol or substance dependence. Leung (2007) and Toda & Ezoë (2013) established their cut off score based on the highest quartile of their sample’s responses, while Martinotti and colleagues (2011) determined their cut-off score based on a logistic regression analysis between PMPU and other behavioural addictions (gambling, compulsive buying, Internet, work, and exercise).

In this study, 6.8% of the sample achieved a score of 5 or higher on the overall PMPU measure. Previous studies have reported PMPU prevalence ranging from 3% (Perry & Lee, 2007) to 68% (King et al., 2014). There are a number of possible explanations for these variations in PMPU prevalence. Firstly, these studies were conducted in different populations, with different samples; it is therefore unsurprising that the prevalence of PMPU would be different. Secondly, different measures were used: as discussed in chapter 3, 23 original PMPU instruments were found during the literature review process. However, there are likely more, given that only English language articles were included in the review. The authors of these measures took varying approaches to the development of their questionnaires, with some basing them on DSM-IV criteria, others on existing behavioural addiction scales, such as Internet or Television, and others employed Brown's theory of addiction. The variance in PMPU prevalence is therefore not surprising.

Of the seven PMPU subscales, Attachment was the most highly scored, with 50% of the sample population achieving average scores of 5 or higher. The items in this subscale were concerned with general access to the mobile phone device, and negative effects when access is not possible (for example, 'I panic if I don't have my mobile phone with me'). This finding was unexpected, as the questionnaire development was underpinned by Cognitive Behavioural Theory, and therefore it was theorised that the cognitive, behavioural and emotional subscales of PMPU would have been the highest rated. Interestingly, however, this finding mirrors the results of the focus groups conducted as part of the first study in the thesis. Participants in that study distinguished between being 'attached' to one's mobile phone, and 'addicted' to it; attachment was described as a 'need' or 'wish' to have access to one's mobile phone at all times. This conceptualisation is present in the Attachment scale which, as previously discussed, focuses on access to the mobile phone. Furthermore, participants viewed mobile phone attachment as a prevalent behaviour within their community; this, again, is mirrored in the findings of the current study, given that the Attachment subscale had the highest proportion of participants scoring an average of 5 or above.

The differentiation between mobile phone attachment and problematic mobile phone use has not been specifically identified in previous literature. Some authors have differentiated their sample based on the degree of mobile phone use (Jenaro et al., 2007; Sanchez-Martinez & Otero, 2009). Rutland and colleagues (2007) differentiated between problem use and

pathological use in their sample of 115 undergraduate college students; in this case, however, pathological use was defined as encompassing relapse, withdrawal, interpersonal conflict, and mood modification; problem use was defined as tolerance, compulsivity, and preoccupation. While some slight similarities between the current study and that undertaken by Rutland are apparent (such as problem use being defined as preoccupation, which may be similar to attachment), Rutland and colleagues' conceptualisation of PMPU as an addiction mean there are too many divergences between their study and the current one to undertake a more in-depth comparison. The findings of the current study, therefore, require further exploration: it is not clear whether attachment is a precursor to PMPU, a less severe form of PMPU, or simply a result of the social norms which dictate mobile phone use behaviour.

Of the three subscales which aimed to evaluate Cognitive Behavioural Theory concepts (problematic cognitions, problematic behaviours, and problematic emotions), the Problematic Emotions subscale had the highest proportion of participants scoring 5 or above (9%), with problematic behaviours a close second (8.7%), and problematic cognitions last (4.2%). This was interesting, given the importance given to cognitions in Cognitive Behavioural Theory. While the cognitive behavioural model purports that cognitions, affect and behaviours are interlinked, and influence each other in a continuous feedback loop (Beck, 2002; Dobson & Dozois, 2001), it is the cognitively distorted appraisal of a particular event that initiates this process (Dobson & Dozois, 2001). As previously mentioned, this is the first time Cognitive Behavioural Theory has been applied to mobile phone use, and cognitive behavioural models for other problematic behaviours, such as Internet or gaming, do not take into account the affective aspects of the cognitive behavioural process (Caplan, 2002; Dong & Potenza, 2014; Haagsma, Caplan, Peters & Pieterse, 2013). Therefore, relevant comparisons are difficult to make. However, Walsh and colleagues (2010) developed a PMPU questionnaire which had some conceptual similarities to the instrument created in this thesis. The questionnaire was based on Brown's theory of addiction, and included the concepts of cognitive salience, behavioural salience, and euphoria. It can be argued that these criteria hold some conceptual similarity to the problematic cognitions, behaviours and emotions subscales developed in the current study. Walsh and colleagues (2010) found that of the three concepts (cognitive salience, behavioural salience, and euphoria), euphoria had the highest mean score (4.15), while cognitive salience had the lowest (2.54). The questionnaire developed by Walsh was also employed in the researcher's Honours project, and similar results were obtained. Thirty

six percent of participants scored 5 or higher on the euphoria measure, while 20% scored 5 or higher on the behavioural salience measure, and only 12% scored 5 or higher on the cognitive salience measure. These findings indicate that emotions play a more prevalent role in the PMPU mechanism; conversely, it is possible that the current measure did not capture the concept of problematic cognitions as accurately as possible. Further research is necessary, in order to ascertain more precisely the problematic cognitions that underpin the PMPU mechanism.

Three other scales explored facets of PMPU: mobile phone use etiquette, procrastination, and communication. As the name suggests, the first scale examined participants' perceived acceptance of violations of mobile phone use etiquette, in favour of continuing using their mobile phone (for example, I don't check my mobile phone when I am talking to someone in person). However, it was found that this particular subscale had less than adequate internal consistency (Cronbach's alpha = .526) and poor correlations with the other scales ($r=0.193-0.315^{**}$). Therefore, it is suggested that this particular subscale be removed from future uses of the PMPU questionnaire.

The Procrastination subscale examined the use of mobile phones in order to procrastinate against other activities, predominantly school work. Items examining procrastination have been employed in several PMPU instruments (Bianchi & Phillips, 2005; Hong, Chiu, Hunag, 2012; Kwon et al., 2013; Park, 2005). However, none developed a specific subscale which examined procrastination; rather, they were classified under other concepts, such as negative effects, or using the mobile phone for longer periods of time than intended (Guzeller & Cosnuger, 2012; Kwon et al., 2013; Merlo, Stone & Bibbey, 2013). Interestingly, the Procrastination subscale was the second highest rated, with 29.1% of participants achieving a score of 5 or higher; Merlo, Stone & Bibbey (2013) found that 40.7% of their sample used their mobile phone when they should have been doing school work; 8.8% agreed that their mobile phone use keeps them from other important work. However, this does not necessarily mean that it is indicative of PMPU; similarly to attachment, use of the mobile phone to procrastinate may simply be a product of mobile phone use, and all the possible activities it can offer (gaming, Internet use, socialisation, etc). Further research is needed to determine the specific role Procrastination plays in PMPU.

Finally, the questionnaire also explored Communication; more specifically, this subscale focussed on participants' preference for mobile phone-based communication, as opposed to live communication. Similarly to the Mobile phone use Etiquette scale, this scale also had poor internal consistency, as denoted by a Cronbach's alpha score of 0.599. The scale was moderately rated, with 12% of participants indicating agreement with the items in this subscale. This aspect of PMPU has not been explored by many studies, which is unsurprising, given the prevailing focus on DSM-based criteria. Shin (2014) applied their Mobile Internet Usage survey to 283 U.S. participants and 314 Korean participants; the questionnaire included an item which asked whether respondents preferred communicating through their mobile device than through face-to-face interaction. The study reported that 36% of the U.S. respondents and 12.1% of the Korean respondents preferred communicating through their mobile phone. Reid & Reid (2004) propose this preference for virtual interaction is a result of the advantages mobile phone based communication offers: users are able to compose and edit their messages, thereby controlling the way they present themselves to others. Furthermore, the attenuation of personal aspects, such as shyness, attractiveness, or stuttering would allow for a greater freedom of self-expression (Reid & Reid, 2004). Participants in the qualitative study of this thesis also discussed the usefulness of mobile phones for interaction purposes, particularly when it came to subjects which were awkward, or private.

7.5.3 Predictors of Problematic Mobile Phone Use

A hierarchical multiple regression model was employed to explore the relationships between demographic variables, mobile phone use, and PMPU. The analysis found that in this study, PMPU was predicted by gender, landline availability, and mobile phone use: female participants, participants who did not have access to a landline at home, and participants who used their mobile more intensely were more likely to achieve higher scores on the PMPU scale.

The relationship between gender and PMPU is supported by findings from a number of studies (Demirci, Akgonul & Akpınar, 2015; Jenaro et al., 2007; Leung, 2008; Lu et al., 2011; Shin, 2014; Wei & Lo, 2006). Geser (2004) theorises that gender-based differences in PMPU are a result of the different ways in which males and females use mobile phone devices; while females use their mobile phone for socialisation, males employ it for more

pragmatic reasons. Junco and colleagues (2010) found that female participants spent more time talking and their mobile phone, and sent more SMS messages, than their male counterparts. Roberts and colleagues (2014) found that female respondents spent significantly more time per day using their mobile phone than the male respondents (600 vs 458.5 minutes).

The relationship between levels of mobile phone use and PMPU is in line with a number of studies, which reported similar findings (Demirci, Akgonul & Akpinar, 2015; Haug et al., 2015; Igarashi et al., 2008; Lopez-Fernandez et al., 2013; Roberts, Yaya & Manolis, 2014). What remains unclear, however, is whether the relationship is unidirectional, or bidirectional; that is, do high levels of mobile phone use lead to PMPU, or are they a result of PMPU. In the case of Internet use, Davis (2001) suggests that operant conditioning may underpin Problematic Internet Use. The theory suggests that Internet use can result in positive outcomes, and the user is reinforced to continue the activity, thereby leading to higher levels of Internet use (Davis, 2001). It is possible that a similar process could underpin MPU and PMPU.

The relationship between PMPU and landline availability is an interesting result, particularly given that this relationship has not been explored in previous research on PMPU. The mechanisms underpinning this relationship are unclear. However it is possible that lack of access to a landline will result in higher levels of MPU, which could subsequently result in PMPU, in some cases. The size of the relationship between PMPU and landline accessibility is smaller than the effect of MPU on PMPU ($\beta = 0.136$ vs $\beta = 0.5$), however, it is slightly larger than the relationship between gender and PMPU ($\beta = 0.108$).

7.5.4 Negative consequences

Originally, eight items examining negative consequences were designed for this study; during the analysis process, it was found that two items ('I have not been bullied via txt', and 'I would rather go out than stay at home and txt people') had poor correlations with the other six, and removal of those items would improve the scale's overall internal consistency. It is unclear why those two items were poorly correlated, however it is hypothesised that it is a result of their being inversed. Originally, the items were positively worded (i.e. 'I have been

bullied via txt'), but they were transformed into negatively worded items in order to reduce response bias. The data were carefully checked, in order to ensure that no error occurred during the reverse-coding process; given that no errors could be found, it is assumed that the poor correlation of the two reversed items was a result of the items being less comprehensible in their reversed form. Van Sonderen, Sanderman and Coyne (2013) suggest that reversing items may lead to data scores being 'contaminated' by respondent inattention and confusion.

In the extant PMPU literature, negative consequences are not often explored as a separate construct; rather, they form a part of the conceptualisation of the PMPU behaviour (Foerster et al., 2015; Hong et al., 2012; Lopez-Fernandez et al., 2013). This is unsurprising, given most PMPU questionnaires are developed either directly or indirectly based on the DSM-IV criteria for dependence, which include negative consequences as part of the criteria. Unfortunately, this makes comparing the results of this study to previous findings somewhat difficult.

Overall, almost half of the respondents (48.5%) did not experience any negative consequences; however, a small proportion (1.5%, n=10) experienced all six negative consequences to some degree. The most frequently experienced consequence was loss of sleep due to mobile phone use, with 30.3% of respondents having experienced this to some degree (as denoted by a score of 5 or more). Previous research has produced mixed findings regarding mobile phone use and sleep loss. Demirci and colleagues (2015) found that individuals who obtained high scores on the Smartphone Addiction Scale were more likely to have poor sleep quality, and high levels of sleep disturbance. The Mobile Phone Addiction Scale devised by Hong and colleagues (2012) included a question regarding night-time MPU and its effects on sleep, as part of the 'time management and its problem' subscale. The study reported that of the items included in that particular subscale, the item regarding MPU and sleep had the highest mean score, suggesting that particular problem was experienced more often, or more severely than the other problems. Lopez-Fernandez and colleagues (2013) also included a question regarding lost sleep due to mobile phone use; the item achieved a mean score of 3.06 out of a possible 5, being the 14th highest rated item of the 26 included in the questionnaire. Foerster and colleagues (2015) reported their item concerning sleep loss achieved a mean score of 2.47 out of a possible 10, suggesting low frequency of occurrence in their sample of 412 Swiss adolescents. Shin (2014) reported that 24.4% of U.S.

participants and 64% of Korean participants had lost sleep at least once a week due to late night mobile Internet use. The findings of this study regarding sleep loss are somewhat concerning, given that lack of sleep or poor sleep can have significant detrimental effects on the human body. Sleep deprivation can lead to dysregulated metabolic, immune and endocrine responses, leading to weight gain, systemic inflammation, hypertension, and lowered immunity levels (Adams, Daly & Williford, 2013).

Two items in the questionnaire related to physical functioning, specifically experiences with pain in fingers, back and/or neck. 18.4% of respondents had experienced back and/or neck pain due to mobile phone use, while 8.8% had experienced finger pain due to mobile phone use. Previous research on the subject is sparse, and the results vary. Yen and colleagues (2009) found that 7.4% of their sample had experienced compromised physical or psychological functioning as a result of MPU. The study by Haug and colleagues (2015) included a question regarding pain in wrists or the back of the neck while using a smartphone; the item had the lowest mean of the 10 items included in the questionnaire. The Smartphone Addiction Inventory (SPAI) developed by Lin and colleagues (2014) included an item asking respondents if they had experienced back or eye discomfort due to mobile phone use; that item had a mean score of 2.09, of a possible 4 points; it was the 8th highest scored item, of the 26 items which comprised the SPAI. Foerster and colleagues (2015) reported their item concerning aches and pains associated with mobile phone use had a mean score of 2.47 out of a possible 10, suggesting low frequency of occurrence in their sample of 412 Swiss adolescents. Within the NZ context, concerns have been reported regarding the potential negative outcomes of holding one's head flexed forward while looking down at their mobile phone; an article published by the NZ Herald in 2010 described a condition termed 'text neck'. The report included a quote from the NZ Chiropractors Association spokesman, who stated he was treating around 20 people a week for 'text neck' (Binnings, 2010).

In this study, 11.4% of participants had been in trouble due to overspending on their mobile phone. Billieux et al (2008) explored financial problems as a result of MPU; however, financial problems were considered to be a sub-construct of PMPU, rather than a consequence; of the four subscales of PMPU in Billieux's questionnaire, the financial problems subscale had the highest mean score. Conversely, Yen and colleagues (2009) found

that of the five symptoms they explored in a sample of 10191 Taiwanese adolescents, financial consequences had the lowest frequency (5.6%)

The negative impact of PMPU on school work was also examined: 19.7% participants agreed that their school work had suffered due to mobile phone use. Previous findings on the impact of PMPU on school work vary: the Smartphone Addiction Scale developed by Kwon and colleagues (2013) included an item asking if respondents had a hard time concentrating in class, while doing assignments, or while working, due to smartphone use. That particular item had the fourth highest mean score of the 48 items in the questionnaire. Sin (2014) reported that 13% of U.S. respondents and 61.1% of Korean respondents agreed that their mobile phone use had resulted in their school work or job suffering.

Finally, the study explored whether participants had experienced disagreements or fights as a result of misunderstandings in SMS messages; this was a problem identified by participants in the first study of this thesis. The current study found that 27.6% of participants had experienced disagreements due to misunderstandings over SMS message; this would indicate that mobile phone use can have a negative impact on the user's social life. Previous research on this particular negative consequence is rare; however, Merlo, Stone & Bibbey (2013) reported that 10% of their participants agreed that mobile phone use had caused problems in a relationship.

7.5.5 Predictors of negative consequences

One of the aims of this study was to explore any associations between demographic variables, mobile phone use, PMPU, and negative consequences. A three step hierarchical multiple regression analysis was employed for this purpose, and seven models were produced (one for each subscale of PMPU, excepting MPU Etiquette; a model for Total PMPU was also developed). Overall, the number of negative consequences experienced by participants was predicted by levels of mobile phone use, and levels of PMPU, with higher levels predicting a higher number of consequences experienced.

Demographics were entered into the models based on their correlations with each PMPU subscale, given that it was theorised the relationship between demographics and negative consequences would be mediated by PMPU. None of the demographic variables predicted

negative consequences, excepting ethnicity. Unfortunately, of the eight models that were created, only one included ethnicity as an independent variable, as bivariate correlations only showed a relationship between ethnicity and Communication. Given that the relationship between ethnicity and negative consequences is not entirely mediated by PMPU or MPU, however, it is possible that had ethnicity been introduced as an independent variable in all the models, a significant predictive relationship would have been found.

While all of the PMPU subscales were correlated with the negative consequences scale, the size of the effect differed: for example, the Communication subscale had the lowest effect size ($\beta=0.27$), while Problematic Emotions had the highest effect of the subscales ($\beta=0.43$). The Total PMPU scale had the highest overall effect, with $\beta=0.48$.

Interestingly, of the three subscales based on CBT concepts, the Problematic Emotions subscale had the highest effect, while the Problematic Cognitions subscale had the lowest effect ($\beta=0.31$). Problematic Behaviours, conversely, had a slightly lower effect than Problematic Emotions ($\beta=0.41$). These findings further support the importance of Problematic Emotions in the underlying PMPU mechanism. However, as discussed in section 7.2 of this chapter, it is also possible that the items examining Problematic Cognitions are not as successful as those in the Problematic Emotions scale (the internal consistency of the scales also varies, with Problematic Cognitions having a Cronbach's alpha score of 0.769, while the Problematic Emotions scale has a Cronbach's alpha score of 0.906). Further research is required to explore the role of cognitions, emotions and behaviours in PMPU.

7.5.6 Strengths and limitations

7.5.6.1 Strengths

To the researcher's knowledge, this is the first study to adopt a Cognitive Behavioural Theory approach to the exploration of PMPU. The inclusion of young people's views and experiences in the questionnaire, as well as including them in the wording and editing of the questionnaire, represents another unique strength of the research. This study also achieved a reasonably large sample; for example, of the 25 studies which aimed to develop a PMPU

measure that were included in the literature review (Chapter 3), 19 studies had smaller samples than the current study. Finally, other than the researcher's own previous work, this is the only study to have explored PMPU in New Zealand.

7.5.6.2 Limitations

This study is subject to a number of limitations. Firstly, the data were self-reported, and therefore may have been influenced by social desirability bias, or recall bias. Due to the recruitment procedures employed, there was little control over who participated in the study. For example, participants were provided with a web link to the online survey; they could have easily shared that link with friends who had not been invited to participate. Furthermore, the data may be subject to self-selection bias: while all students at participating schools were invited to take part in the study, only a proportion of students accepted the invitation. The decision to participate in the study may have been influenced by the respondents' interest in the subject, or by the incentive offered to take part (Eysenbach & Wyatt, 2002). This is a concern, as individuals who were not especially interested in PMPU (and therefore did not take part in the study) may have provided different answers than those who were interested in the subject. However, other survey methods, such as mail or telephone surveys, are also limited by self-selection bias (Hudson et al., 2004).

A further limitation is due to the sample, which was predominantly female (61.4%) and NZ European/Pakeha (69.1%). The results, therefore, are not generalizable to the entire NZ adolescent population. Furthermore, the study was cross-sectional in nature, and therefore no causative links could be established between the independent and dependent variables. The questionnaire that was developed as part of this thesis was not intended to be a diagnostic tool, and therefore it is not possible to establish with certainty that the individuals achieving high scores on the questionnaire do in fact engage in problematic mobile phone use. It is only possible to state that high scores may be indicative of problematic mobile phone use.

Some limitations related specifically to the statistical analysis – firstly, no correction for the p-value was made, when conducting the bivariate analyses. While employing such a correction (e.g. Bonferroni correction) is usual when conducting multiple tests on the same data, as was the case with the bivariate analyses, in this case the choice was made to eschew

such a correction, for several reasons. Firstly, the results of the bivariate analyses were not reported as final, standalone results – rather, they were solely used to inform which variables should be included in the subsequent regression analyses. Employing a correction may have affected which variables were included, thus influencing the final models. Furthermore, the linear regression analyses in the SPSS software includes a correction for type 1 and 2 errors, and therefore implementing corrections at an earlier stage would have been superfluous.

Finally, the hierarchical multiple regression models may suffer from some limitations. Usually, a continuous variable is used as the dependent variable; in the current study, an ordinal variable was employed, and treated as a continuous variable. This may have affected the ability of the analysis to accurately detect relationships. Furthermore, a number of the independent variables were dichotomous, and therefore the assumptions of linearity and homoscedasticity for the entire model could not be met.

7.5.7 Conclusion

Problematic mobile phone use has been explored academically for over 10 years, predominantly from an addiction perspective. This study provides information on the emotional, behavioural and cognitive aspects underpinning PMPU, as well as other facets which appear to play a part in the PMPU mechanism.

Of the 664 participants in this study, 45 (6.8%) achieved overall scores which may indicate their engagement in problematic mobile phone use. However, frequencies across different sub-constructs of PMPU varied significantly, with Problematic Cognitions being the least frequent (4.2%), and Attachment being the most frequent (50%). While this does not seem like a particularly significant proportion, over half the participants (51.5%) had experienced at least one negative outcome resulting from their mobile phone use, and a small proportion experienced all six (1.5%). Given that these symptoms include loss of sleep (30.3%), pain in back/neck (18.4%), pain in fingers (8.8%), or problems with school work (19.7%), these findings may indicate that PMPU may indeed result in detrimental effects.

The study found a distinction between problematic use and attachment, one which the participants in previous studies comprising this thesis also suggested. While attachment was far more prevalent than other aspects of PMPU, it was not as strongly correlated to negative

consequences as Problematic Emotions, Behaviours or Cognitions. Further studies are needed to explore this distinction, and its potential significance in the overall development of PMPU behaviour.

Overall, this study has found that problematic mobile phone use is likely present in the New Zealand adolescent population, and it can result in negative outcomes for the users. Female participants and those participants who did not have access to a landline were more likely to achieve higher scores on the overall PMPU measure. Individuals who used their mobile phones with higher levels of frequency were also more likely to achieve higher scores on the measure. While it is too early to discuss any potential interventions to address PMPU, it is suggested that further exploration of this phenomenon within the NZ context is warranted.

CHAPTER 8. DISCUSSION

8.1 Introduction

This thesis has explored problematic mobile phone use within a subset of the New Zealand adolescent population. The first study explored young people's conceptualisation of and experiences with PMPU, the second study developed a youth-informed, cognitive behavioural theory guided PMPU questionnaire, and the final study quantitatively explored mobile phone use behaviour, PMPU, and negative consequences relating to PMPU in a sample of New Zealand young people.

The first section of this chapter will summarise the significant findings of the research; this is followed by a discussion of the overarching strengths and weaknesses of the research. The contributions of the thesis findings to the broader literature are subsequently discussed, followed by implications for policy and practice. The final section of the chapter presents potential directions for future research.

8.2 Main research findings

The overarching research aims underpinning this thesis were:

1. To qualitatively investigate the relationships Auckland high school students have with their mobile phone
2. To explore how Auckland high school students define and identify problematic mobile phone use (PMPU)
3. To identify why Auckland high school students engage in PMPU
4. To develop a youth-informed, cognitive-behavioural theory guided PMPU questionnaire
5. To quantitatively explore levels of mobile phone use, problematic mobile phone use, and negative consequences resulting from problematic mobile phone use
6. To explore any associations between demographic variables, levels of mobile phone use, and problematic mobile phone use

7. To explore any associations between demographic variables, levels of mobile phone use, problematic mobile phone use, and negative consequences

The overall findings from this thesis suggest that problematic mobile phone use is present within the New Zealand adolescent population. The focus group participants were aware of the concept, and had either experienced PMPU themselves, or knew or had heard of peers whose mobile phone use was thought to be problematic by the adolescent community. The results from the online questionnaire indicate that 5.8% of the sample experienced some degree of PMPU, based on a cut-off score of 5 out of a possible 7 points (where scores of 5 or above indicate agreement with the questionnaire items). Previous research has reported a wide range of PMPU prevalence results, from as low as 3% (Perry & Lee, 2007) to 68% (King et al., 2014). These variations can be explained by the use of different measures, particularly in this case, as the approach taken to the questionnaire development was different than the addiction-based approach taken by previous studies. A further consideration is the cultural aspect, as different populations have been found to experience PMPU to differing degrees, even when the same measure is being used (Shin, 2014).

Participants described two separate constructs, when asked to define PMPU: mobile phone attachment, and mobile phone addiction. In the participants' view, attachment to one's mobile phone was characterised by a need for continuous access to their handset, despite there not always being a specific need for accessibility to the device. This behaviour was seen as prevalent amongst their peers, and had the potential of resulting in negative consequences. Conversely, mobile phone addiction was defined as preferring cyber-communication over face-to-face interaction, continuous behavioural preoccupation with the device, and feelings of anxiety, emptiness or loss when unable to access the mobile phone. Unlike mobile phone attachment, mobile phone addiction was thought by participants to affect only a small subset of their peer group. Some of the concepts which participants in the qualitative study attributed to PMPU have also been explored in the extant literature. For example, experiencing feelings of anxiety or loss when an individual is unable to access their mobile phone has been included in a number of questionnaires, and at times was conceptualised as an indicator of withdrawal (Bianchi & Phillips, 2005; Haug et al., 2015; Park, 2005; Perry & Lee, 2007; Rutland, Sheets & Young, 2007). The preference for cyber-communication over face-to-face communication has also been explored in previous research; for example, the

questionnaire developed by Jenaro et al (2007) included the item “Do you refrain from going out with your friends in order to spend more time using the mobile phone?”. Walsh et al (2010) included an item relating to behavioural preoccupation in their PMPU questionnaire, as an indicator of behavioural salience: “I often use my mobile phone for no particular reason”. Interestingly, participants in other qualitative studies on PMPU described ‘mobile phone addiction’ differently; for example, participants in Walsh, White & Young’s (2008) study thought mobile phone addiction would be characterised by financial consequences as a result of mobile phone use, or overusing the mobile phone, such as calling other people for no reason.

The distinction between mobile phone attachment and mobile phone ‘addiction’ was also identified in the quantitative study of this thesis. In addition to the factors representing problematic behaviours, cognitions and emotions, an ‘Attachment’ factor emerged from the PCA. This subset of PMPU was significantly more prevalent in the sample than the behavioural, cognitive, or emotional aspects (50% scoring 5 or more out of 7, as opposed to 8.7, 4.2 and 9% respectively). However, Attachment was found to have a lower correlation to the Negative Consequences subscale (.370^{**}) than Problematic Behaviours (.465^{**}), Problematic Cognitions (.376^{**}), or Problematic Emotions (.485^{**}). To the researcher’s knowledge, no other published studies have found such constructs underlying PMPU, and therefore it is not possible to compare the current findings with previous research. However, the findings do suggest a potential continuum of PMPU, with attachment representing mild levels of PMPU, and problematic behaviours, cognitions and emotions suggesting higher levels of PMPU. Such a conceptualisation would be in line with the current approach taken by the DSM-5 to alcohol, substance use and gambling disorders, which are all continuum-based (APA, 2013).

The qualitative study also aimed to explore the reasons underpinning young people’s problematic use of mobile phone technology. While participants were generally unsure as to why PMPU may occur, they proposed that it may be a result of people being shy, or socially awkward, and the mobile phone provides an alternative to face-to-face interaction. This theory has been proposed by other researchers, who argued the mobile phone, or the Internet, offer users a means of forming and maintaining cyber relationships, when face-to-face communication may prove difficult (such as those who are socially anxious) (McKenna et al., 2002; Reid & Reid, 2004). Furthermore, several studies have found associations between

high PMPU scores and high levels of anxiety (Demirci et al., 2015; Hong et al., 2012; O'Connor et al., 2013), poor self-esteem (Bianchi & Phillips, 2005; Ha et al., 2008; Hong et al., 2012; Leung, 2007; Yang et al., 2010), and high levels of depression (Augner & Hacker, 2012; Demirci et al., 2015; Lu et al., 2011; Toda & Ezoë, 2013), all of which can be associated with shyness and poor social skills (Grant, Gayle Beck, Farrow & Davila, 2007; Heatherton, Wyland & Lopez, 2003; Prior, Smart, Sanson & Oberklaid, 2000). Communication through the mobile phone allows the users a degree of control that isn't possible in day to day life – for example, they can take their time responding, and can compose messages, thus controlling the persona they display to others (Reid & Reid, 2004). The quantitative study resulted in the development of a subscale termed 'Communication', which explored participants' preference for mobile phone-based communication. Twelve percent of participants achieved scores of 5 or more on this subscale (where a score of 5 or more indicated some degree of agreement with the items in the subscale), which was a higher proportion than those who achieved scores of 5 or more on the problematic behaviours, emotions and cognitions subscales (8.7, 9 and 4.2% respectively). However, when compared to the cognitive behavioural theory based subscales, the Communication subscale had poorer correlations with the measures of negative consequences, and explained a smaller proportion of the variance in the overall Negative Consequences scale. These results suggest that while a preference for cyber-based communication does play a role in problematic mobile phone use, it is less likely to result in negative impacts for the user. However, such a preference would likely have greatest impact on the user's social relationships and wellbeing; the items which comprise the Negative Consequences subscale did not have a significant focus on the impact on social relationships. Therefore, it is possible that more thorough investigations of the relationship between the preference for cyber-based communication and potential negative impacts for the user's social wellbeing would identify a stronger relationship.

One of the aims of this thesis was to explore associations between demographic variables, mobile phone use behaviour, and PMPU. Landline availability, gender, and mobile phone use behaviour all predicted PMPU, with participants who did not have access to a landline, females, and participants who used their mobile phone with higher frequency all being more likely to score higher on the overall PMPU measure. The findings relating to gender and mobile phone use confirm previous research, which has reported similar results (Demirci, Akgonul & Akpinar, 2015; Jenaro et al., 2007; Leung, 2008; Lopez-Fernandez et al, 2013;

Roberts, Yaya & Manolis, 2014). The relationship between PMPU and landline availability is interesting, given that to the researcher's knowledge, it has not been reported before in published articles. It is conceivable that those individuals who do not have access to a landline would be more likely to use their mobile phone more extensively, and this might result in problematic use; however, given how poorly understood the mechanisms underlying PMPU are, it is difficult to draw any definitive conclusions. The lack of relationship between PMPU and age is surprising, given that it has been reported by a number of studies (Bianchi and Phillips, 2005; Lu et al., 2011). It is possible that given the restricted age range of participants in this study, when compared to previous research, there was insufficient variability in behaviour for any age-related effects to be found.

In regards to negative consequences resulting from mobile phone use, the focus group participants reported bullying, misunderstandings leading to social problems, impacts on duration and quality of sleep, and pain in fingers as potential effects. The survey participants reported experiencing these effects to varying degrees, with impact on sleep being the most highly scored consequence (30.3% of participants scoring 5 or above), followed by misunderstandings (27.6%), and pain in fingers (8.8%). Other consequences included problems with school work (19.7%), overspending (11.4%), and back or neck pain (18.4%). Items for bullying, and preference for cyber-socialisation over face-to-face socialisation were also included in the survey, however they were not included in the final analysis, due to poor internal consistency. Overall, 51.5% of participants experienced at least one negative consequence due to mobile phone use, with 1.5% experiencing all six. In the extant PMPU literature, negative consequences are usually included in the overall PMPU scale, as opposed to being conceptualised as a separate construct, and therefore comparisons across the literature are difficult. However, the findings of this study are echoed in other research, with impacts on sleep (Foerster et al., 2015; Hong et al., 2012; Lopez-Fernandez et al., 2013), pain in wrists or the back of the neck (Foerster et al., 2015; Haug et al., 2015; Lin et al., 2014), financial problems (Billieux et al., 2008; Yen et al., 2009), school work (Kwon et al., 2013; Sin, 2014), and social relationships (Merlo, Stone & Bibbey, 2013) all having been reported by previous studies.

8.3 Strengths of the research

To the researcher's knowledge, excepting his previous work, mobile phone use, problematic or otherwise, has not been explored in the New Zealand context before. The current research therefore represents an important first step in understanding the role mobile phone technology plays in the lives of young New Zealanders.

The sequential, exploratory mixed method design used in this research has helped to take advantage of the strengths of both qualitative and quantitative approaches. The qualitative study allowed for an exploration of young people's knowledge of and experiences with PMPU; the Nominal Group Technique phase allowed for the development of a youth-informed questionnaire, while the quantitative phase helped to assess the extent of PMPU within a subsample of New Zealand adolescents, as well as explore correlations with demographic variables, mobile phone use behaviours and negative consequences. The sequential design also allowed each dataset to be analysed individually, thereby reducing the possibility of mixing methodological assumptions (Creswell, 2011). Furthermore, this design resulted in the identification of unexpected themes, such as the concept of 'mobile phone attachment', and its differentiation from 'mobile phone addiction'. The choice of sequential, exploratory mixed methods also allowed for the development of variables for the online survey, through the inclusion of young people's views, expert views, and theory-guided items.

As discussed in Chapter 3 of this thesis, previous research on PMPU has predominantly taken an addiction-based, largely atheoretical approach, with most questionnaires being based on the DSM-IV/5 dependence or pathological gambling criteria. Through the use of cognitive behavioural theory, the current research has broadened knowledge regarding PMPU; previously unexplored facets of problematic mobile phone use behaviour, such as problematic cognitions, behaviours and affect were found to be relevant to the broader PMPU construct, and related to participants' experiences of negative consequences.

Furthermore, previous research on PMPU was largely researcher-driven, with only two studies having included participants' views and experiences into the development of the PMPU questionnaire (Pamuk & Atli, 2016; Walsh, White & Young, 2011). The current research adopted a youth-participation approach, and employed young people's ideas regarding PMPU as the basis for the questionnaire development. This has allowed for the

construction of an instrument which is specifically designed and appropriate for young people, thus addressing concerns regarding the use of adult scales for an adolescent population (Deas, Riggs, Langenbucher & Brown, 2000). It has also helped to focus on the aspects of PMPU which young people deemed most important, thereby assuring the questionnaire's face validity (Rattray & Jones, 2007).

8.4 Research limitations

Each of the three studies which comprise this thesis has several limitations. The limitations related to each specific study were discussed in chapters 5, 6 and 7; the following section will discuss the overall limitations of the thesis, including definitions, sampling, generalizability and transferability, and methodological limitations.

8.4.1 Definitions and measures

Problematic mobile phone use is an emerging field of research, and as such, there are some inconsistencies in the definitions used for this phenomenon. Some researchers have defined it as 'technostress' (Toda & Ezoë, 2013), others as 'an impulse control disorder that does not involve an intoxicant and is similar to pathological gambling', while others characterised PMPU as mobile phone use which results in negative effects for the user (Augner & Hacker, 2012; Beranuy, Oberst, Carbonell & Chamarro, 2009; Bianchi & Phillips, 2005; Billieux, Van der Linden & Rochat, 2008). Given the dearth of definitive information regarding the nature and classification of PMPU, particularly when this research was first developed, a broad definition was adopted: *any problem caused by mobile phone use, be it physical, social or psychological*. The limitation of this definition is that it does not offer any explanations as to the mechanisms underpinning PMPU behaviour. A further problem arises as a result of discrepancies between this definition and those used by other researchers, given that they could potentially affect the interpretation and comparison of the current findings with those from existing literature.

A further limitation arises from the conceptualisation of PMPU within the present study: while previous research predominantly adopted an addiction-based approach, a cognitive-

behavioural approach was employed for this thesis. This may also limit the degree to which the current findings may be compared with those from previous research. It is worth noting, however, that the addiction and CB theory based approaches may not be mutually exclusive. For example, ‘problem drinkers’ were found to hold both positive and negative maladaptive cognitions relating to alcohol use (Spada & Wells, 2006), and cognitive factors related to alcohol were found to be a strong predictor of drinking behaviour (Hasking, Lyvers, Carlopio, 2011).

8.4.2 Sampling, generalizability and transferability

The samples employed in the studies comprising this thesis were not representative of the general New Zealand adolescent population. The focus group and nominal group technique studies solely included participants from the Auckland region, and therefore their views and experiences regarding PMPU may not be generalizable across the entire adolescent community.

While the focus group and nominal group technique studies included similar numbers of male and female participants, 61.4% of the survey participants were female. One possible explanation is self-selection bias, given that females are more likely than males to experience PMPU, and participants are more likely to take part in research if they are interested in the topic (Fan & Yan, 2010). Alternatively, it may be a result of females being more likely than males to participate in research (Galea & Tracy, 2007; Patel, Doku & Tennakoon, 2003).

The survey sample was also overrepresented by 13-15 year olds, who comprised 60.2% of the overall sample, and NZ European/Pakeha, at 69.1% of the sample. Therefore, the survey findings are not generalizable across the general NZ adolescent population.

As a result of the questionnaire in this thesis being based on New Zealand young people’s views and experiences with PMPU, the findings may not be transferrable to other settings, where the sociocultural norms surrounding mobile phone use may differ. Transferability may be improved by future research through the use of larger and more ethnically diverse samples, as well as exploring the face validity of the questionnaire in other countries.

8.4.3 Methodological limitations

All the data in this thesis were collected using self-report methods, and therefore it is not possible to guarantee the trustworthiness and accuracy of the responses. The quality of the data may have been affected by the accuracy of the participants' recall, particularly in the online survey. Furthermore, given the potentially sensitive nature of the research topic, participants may have provided responses that did not reflect their genuine opinions, experiences or behaviour (Creswell, 2011).

8.5 Contributions to knowledge

This thesis has made several contributions to the body of literature on problematic mobile phone use. This is an emerging area, and as such, there is limited understanding regarding the different factors that may play a part in the development and maintenance of problematic mobile phone use.

Within the PMPU literature, the vast majority of studies have been quantitative in nature; while qualitative research on mobile phone use from a socio-cultural or anthropological perspective are relatively abundant, only three qualitative studies which specifically explored PMPU could be found; furthermore, none of these studies had included participants below the age of 16 (James & Drennan, 2005; Lapointe, Boudreau-Pinsonneault & Vaghefi, 2013; Walsh, White & Young, 2008). The current research, therefore, has helped develop the knowledge surrounding young people's experiences with and conceptualisation of PMPU. This is particularly significant, in light of the relationship between age and PMPU, where younger users are more likely to engage in problematic use.

The second study in this thesis employed an altered version of Nominal Group Technique for the purpose of achieving consensus across multiple groups. At the time the research was conducted, no other systematic method for achieving this goal could be found. The method developed as part of this study could be employed by other researchers as a systematic way of achieving consensus, particularly where participant opinions are wanted or needed as part of a questionnaire development process.

The research findings indicate that maladaptive cognitions, behaviours and emotions play a part in problematic mobile phone use, and are each correlated, by varying degrees, to negative consequences as a result of mobile phone use. To the best of the researcher's knowledge, these facets of PMPU have not been identified or explored in previous research. These findings provide an initial foundation upon which future research can build, in order to elucidate the role of cognitions, behaviours and emotions in the broader PMPU phenomenon. Further, the identification of mobile phone attachment as a potentially separate aspect of PMPU constitutes a unique finding; while it may indicate that PMPU exists on a continuum, with mobile phone attachment at the lower end of the scale, further research is necessary to develop the understanding of its role in PMPU.

Problematic mobile phone use may result in a range of negative consequences, including physical, social and psychological. Previous research has identified some of these adverse effects (Foerster et al., 2015; Haug et al., 2015; Lin et al., 2014), and the present studies further confirmed these concerns. This supports the need for the development of a more in-depth understanding of problematic mobile phone use, and the factors which may lead to its development.

8.6 Implications for policy and practice

The findings of this research indicate that a proportion of New Zealand young people do engage in problematic mobile phone use, and some suffer negative consequences as a result of this use. In the case of officially recognized addictions, such as alcohol, illicit substances, gambling and smoking, policies which restrict or control use have been useful in reducing problematic use and/or harm associated with use (Strang, Babor, Caulkins, Fischer, Foxcroft, & Humphreys, 2012). However, given the ubiquity of mobile phones in New Zealand society, and the significant number of positive aspects associated with mobile phone use, restrictive policies are unlikely to be beneficial. Such limitations would also be present in the case of other behaviours which have the potential of becoming problematic, such as Internet use, gaming, shopping, or sex. Furthermore, New Zealand already has policies regarding mobile phone use which may be hazardous, such as while driving (Land Transport (Road use) Rule, 2004).

Therefore, a possible avenue for addressing the potential negative consequences associated with problematic mobile phone use is adopting a harm reduction approach, which has been widely applied to addictive behaviours such as alcohol (Marlatt, 1996). Harm reduction shifts the focus away from use, and towards the negative consequences or effects of the behaviours; the basis of evaluating these behaviours or consequences are whether they are harmful to the users and to wider society, as opposed to the moral evaluation of the behaviour itself (Marlatt, 1996; Marlatt & Witkiewitz, 2002). Adopting a harm reduction approach in relation to mobile phone use would primarily involve developing a health education program for stakeholder communities; this could include children, young people, parents, and schools. The primary aim of this education would be to raise awareness regarding the potential harms associated with excessive or problematic use of mobile phone technology.

Education packages regarding the safe use of cyberspace are already available to New Zealand schools through Netsafe, the Ministry of Education's strategic partner for cybersafety education ([netsafe.org.nz](https://www.netsafe.org.nz)); further, the Ministry of Education encourages schools to ensure the protection of students in the cyberspace environment (<https://www.education.govt.nz/school/running-a-school/technology-in-schools/safe-and-secure-internet/>). The program offered by Netsafe could be expanded to include safety around mobile phone use. Alternatively, mobile phone specific programs could be developed, and subsequently implemented in schools; for example, school-based substance abuse prevention programs have been found to be effective (Faggiano et al., 2010).

Schools could also construct their own mobile phone use safety programs, which could be delivered by health education teachers, school nurses, or counsellors. One potential approach could be video-based education and modelling, which can be effective in modifying health behaviours (Tuong, Larsen & Armstrong, 2014). Within the educational system, school nurses and counsellors would also need to be informed about the potential hazards of excessive or problematic mobile phone use, both physical and psycho-social. This increased awareness could lead to potential identification of problematic mobile phone use behaviours, which would allow the relevant parties to address such situations.

It is as yet unclear whether problematic mobile phone use warrants clinical intervention; however, several clinics worldwide offer treatment for 'teen cell phone addiction' (<https://paradigmmalibu.com/>), digital media addiction and nomophobia

(<https://netaddictionrecovery.com>). Treatments for other problematic behaviours, such as Problematic Internet Use and sex addiction, have already been tested; meditation awareness training (Van Gordon, Shonin & Griffiths, 2016), motivational interviewing (Thorens et al., 2014) and CBT (Thorens et al., 2014; Young, 2007) were all found to be effective.

While it is unclear at this stage whether there is a need for such services in New Zealand, it would likely be beneficial for clinical experts to be aware of the existence of problematic mobile phone use within the New Zealand youth population, and of the potential negative impacts such use may have on the user. This would include child and adolescent psychologists, and counsellors. Similarly to school-based stakeholders, awareness of PMPU within the clinical community might enable psychologists and counsellors to more easily identify potential problems relating to mobile phone use behaviour, and address them.

8.7 Implications for theory

As previously discussed in Chapter 3 of this thesis, one of the critiques of extant problematic mobile phone use research (and of behavioural addiction research in general) has been the atheoretical approach taken to the exploration of this phenomenon (Billieux et al., 2015). Previous studies have adopted an *a priori* addiction perspective in relation to mobile phone use, and little theory has been used in the investigation of this behaviour; as a result, there is a paucity of PMPU explanatory models or theories.

Billieux (2012) proposed a pathways model for problematic mobile phone use, which described four distinct avenues for the development of this problem: the impulsive pathway, the relationship maintenance pathway, the extraversion pathway, and the cyber addiction pathway. These pathways are illustrated in Figure 8.1 below

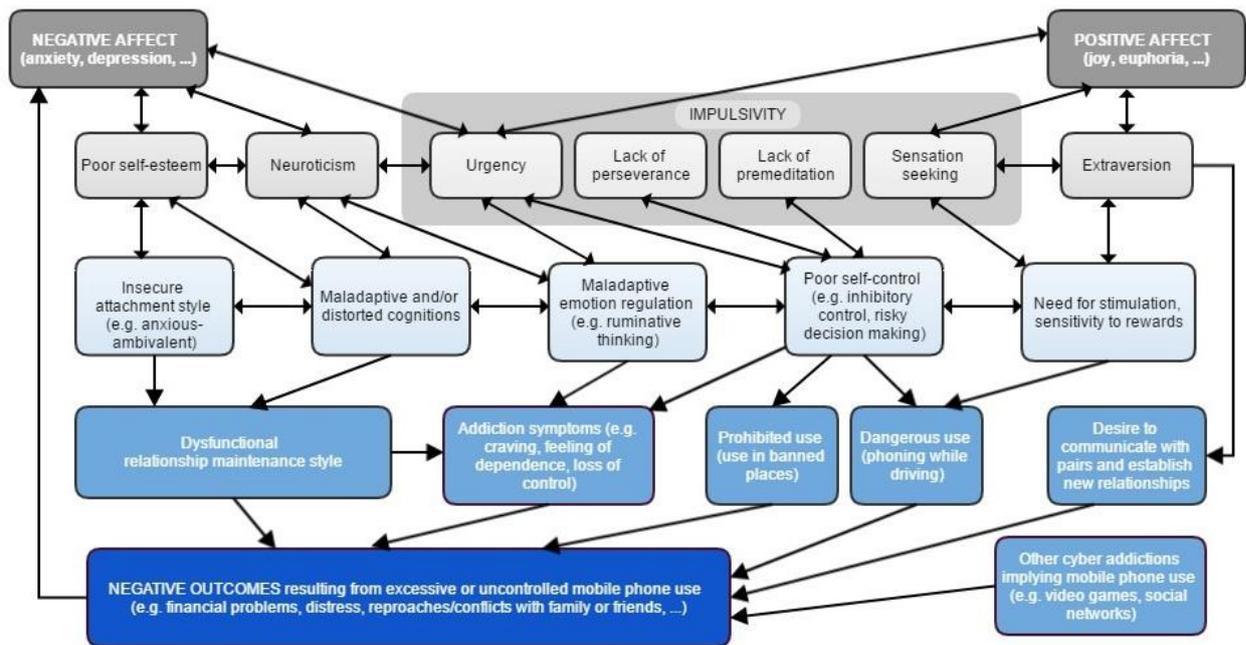


Figure 15: Pathways model for PMPU (Billieux, 2012)

As the model is quite specific, it did not fit well with the overarching exploratory aims of the current thesis, and was therefore not adopted for the purposes of the research. However, the results do appear to confirm some aspects of Billieux’s model. For example, the model includes maladaptive cognitions and emotions as potential factors underpinning the PMPU mechanism, as part of the ‘relationship maintenance pathway’. Billieux theorised that such cognitions and emotions are the result of an individual’s poor self-esteem and high levels of neuroticism, and problematic mobile phone use arises from a constant need for reassurance. Findings from the current study do indicate that problematic cognitions and emotions are correlated with experiencing negative outcomes as a result of mobile phone use. Interestingly, Billieux’s model did not specifically include problematic behaviours associated with mobile phone use, excepting dangerous and prohibited use. The current research has found that problematic behaviours are also associated with negative consequences, and to a higher degree than problematic cognitions.

This model was updated in 2015 (Billieux et al., 2015). The updated model included three different pathways: the Impulsive pathway, which relates to individuals whose mobile phone use is predominantly driven by poor self-control and/or maladaptive emotion regulation; the Excessive reassurance pathway, which relates to mobile phone use for the purpose of obtaining reassurance in affective relationships, and focuses on individuals with low self-

esteem and a high level of neuroticism; and the Extraversion pathway, which suggests some users may be at a higher risk of developing PMPU due to their sociable and outgoing nature, and a heightened need to communicate with peers. The authors suggest that each pathway can lead to a different type of problematic use: the impulsive pathway can result in antisocial pathways of use, characterised by use in inappropriate contexts or prohibited use; the excessive reassurance pathway can result in addictive patterns of use, characterised by addiction symptoms and reassurance behaviours; finally, the extraversion pathway can result in both risky patterns of use (characterised by phone use while driving, and unsafe or risky sexting), as well as addictive patterns of use (Billieux et al., 2015). Unfortunately, at the time this update was published, the doctoral research was far too advanced for the model to be used as a theoretical basis.

Future research endeavouring to develop explanatory models of PMPU might consider including cognitive, behavioural and emotional constructs within the broader contextualisation of this behaviour. This would result in a broader perspective of problematic mobile phone use behaviour, and help further knowledge on the mechanisms underpinning it. The updated model of Billieux et al (2015) also necessitates further exploration, in order to validate the newly proposed pathways. A further research endeavour might evaluate the role of cognitions, emotions and behaviours within these new theoretical pathways. Potential directions for future research are discussed in the following section.

8.8 Directions for future research

This thesis has explored a relatively novel area, and the findings indicate several possible directions for research in this field.

The third study in this thesis included preliminary psychometric testing of the youth-informed PMPU questionnaire; however, further research is necessary, to robustly determine the reliability and validity of the questionnaire itself. Firstly, the test-retest and parallel forms reliability of the instrument need to be established; this would involve having participants complete the questionnaire at two different points in time, as well as completing another PMPU questionnaire. The parallel forms reliability test would be particularly interesting, given that the questionnaire developed as part of this thesis adopted a different approach than

others questionnaires available in the literature; such an exploration would serve as an indicator as to whether the youth-informed questionnaire examines the same construct as those based on the DSM-IV criteria for dependence. Evaluations of the questionnaire's predictive validity and construct validity will be necessary.

Furthermore, it will be necessary to determine cut-off scores for this questionnaire, in order to establish different levels of problematic use. There are a number of methods that can be employed in order to determine cut-off scores for psychometric questionnaires, such as receiver operating characteristics analysis (Humeniuk et al., 2008; Kapci, Uslu, Turkcapar & Karaoglan, 2008; Topp & Mattick, 1997).

The current questionnaire was developed based on young people's feedback, expert input, and the use of CB theory; a number of cognitions, behaviours and emotions related to PMPU were identified in the process. However, it is possible that the items included in the questionnaire are not an exhaustive list. Further research is necessary, in order to determine with greater precision the maladaptive cognitions, behaviours and emotions involved in PMPU, and the questionnaire would need to be augmented accordingly.

As previously discussed, the present study did not employ a representative sample, and therefore the findings cannot be extrapolated to the general New Zealand adolescent population. In order to better ascertain the local situation in regards to PMPU, it will be necessary to conduct a study using a large, representative sample. This would further our understanding of the magnitude of the problem within the New Zealand context, and better inform the potential need for harm-reduction measures or policies.

As discussed in chapter 3 of this thesis, previous research on PMPU has predominantly adopted an addiction-based perspective. Further information regarding PMPU is needed, before it can be accurately ascertained whether this behaviour can officially be classified as an addiction. Currently, nothing is known regarding the biological aspects of PMPU; future studies will need to ascertain whether there are neurobiological similarities between PMPU and officially recognised addictions, such as alcohol or substance use disorders. This might include explorations of which areas of the central nervous system are activated during mobile phone use, and whether there are any differences in activation between problematic and non-problematic users.

A number of studies have reported correlations between participants' age and their scores on various PMPU measures, with younger users achieving higher scores (Augner & Hacker, 2012; Bianchi & Phillips, 2005; Cholz, 2012; Lu et al., 2011; Shin, 2014). However, it is not known whether this problematic use among young people would persist into adulthood. Longitudinal studies would provide better information on mobile phone use behaviour across different stages of development, as well as whether problematic mobile phone use continues across the life course, or is predominantly a feature of the adolescent stage.

8.9 Conclusions

Previous research into problematic mobile phone use has predominantly adopted an addiction perspective, conceptualizing mobile phone use as an addictive behaviour. Further, the research was predominantly based on the researchers' conceptualization of PMPU, with very few studies exploring or taking into account participants' experiences with and conceptualization of PMPU. Therefore, the current research was designed to explore PMPU from the perspective of young people; in addition, the research incorporated Cognitive Behavioural theory into the questionnaire development and findings analysis, thus conceptualizing PMPU in terms of problematic cognitions, behaviours and emotions.

The research findings have shown that PMPU is experienced by some NZ adolescents. Different PMPU constructs were experienced to varying degrees, including mobile phone attachment, problematic cognitions, problematic behaviours, problematic emotions, preference for mobile phone based communication, and procrastination through mobile phone use. Mobile phone attachment was the most frequently reported PMPU construct, and negative cognitions were the least frequently reported. PMPU was predicted by gender, landline availability, and mobile phone use; female participants, those who did not have access to a phone landline, and those who used their mobile phone more frequently scored higher on the PMPU questionnaire than their counterparts.

Negative consequences were also experienced by over half the study sample, including effects on sleep quality, financial problems, relationship problems, neck, back or finger pain, and effects on school work; lost sleep was the most commonly experienced effect, while pain in fingers was the least experienced negative effect. Negative consequences were predicted to

varying degrees by each of the PMPU constructs, with negative emotions being the strongest predictor, and attachment being the weakest predictor of negative consequences. Mobile phone use was also a predictor, with higher levels of mobile phone use predicting higher levels of experienced negative consequences.

The research findings indicate that youth participation involvement could be employed as part of the methodology in future research on PMPU. This would result in a more thorough understanding of PMPU, and how it is experienced. Further, cognitive behavioural theory could also be a potential avenue for further explorations of PMPU, thus providing an alternative approach to the addiction lens that is currently being used in the majority of PMPU related research.

Whether clinical intervention is necessary for PMPU at this stage is unclear, although treatments such as cognitive behavioural therapy are already being used for other problematic behaviours, such as problematic Internet use. Further research on the cognitions, behaviours and emotions associated with PMPU is needed, in order to better understand the mechanisms underpinning this behaviour. However, a harm reduction approach to mobile phone use, particularly for adolescent users, may be useful. This could include informing both young people and their parents about the potential risks of excessive or problematic mobile phone use, as well as skill development for strategies on how to manage mobile phone use. The research comprising this thesis has identified potential starting points for new areas of research in problematic mobile phone use, particularly among young people.

APPENDICES

Appendix 1: Focus group schedule



THE UNIVERSITY OF AUCKLAND
NEW ZEALAND
Social and Community Health
Tamaki Campus
261 Morrin Road, Glen Innes, Auckland
The University of Auckland
Private Bag 92019
Auckland 1142

Focus Group Questions

Introduction:

- Thanking participants for getting involved; introduction of researcher & purpose of study
- Length of time necessary
- Ground rules – not talking over one another if possible, not becoming aggressive or rude, respect for other participants
- Confidentiality cannot be guaranteed; what is said in the focus group will remain confidential as far as the researcher is concerned, and their identity will not be disclosed in any report on this research; audio-taping and note taking; choice to cease participation
- Researcher will assist any participants who might, as a result of topics covered in discussion, want further support within/outside the organization/school
- Any questions participants might have

General discussion:

- What sort of mobile phone do you have?
- Who got it for you?
- What sort of plan/deal are you using?
- Who pays for it?
-

Discussion:

1. What do you think are the main reasons that you and your friends use your mobile phones for?
 - Prompts – what do young people use their mobile phones for most?
 - How often/when do they use their mobile?
 - Are there any other things young people use their mobile phones for, in your experience? Could you give me some examples?
2. Thinking about your group of friends, can you tell me about how often people use their mobile phone?
 - Prompts – do you think this differs from other groups that you know?
3. What would you say the good things about owning a mobile phone are?
 - Prompts - do you think there are any not so good things about owning a mobile phone? Could you tell me about that?
4. On a scale of 1-10, how important is your mobile phone to you? In what way is it important?
 - Prompts- do you think this varies? If so, how?
5. Have you seen or heard about people using their mobile phone so much, that it becomes a problem for them?
 - Prompts - could you tell me more about that?
 - When would you say that people have a problem with their mobile phone use?
6. Have you, or any of your friends, ever experienced problems because of mobile phone use?
 - May require elaboration – such as loss of sleep, money problems, pain in fingers, bullying, sexual harrasment etc.
7. Why do you think that some people can end up having problems with their mobile phone use?

Appendix 2: Participant Information Sheet (Focus groups)



THE UNIVERSITY OF AUCKLAND
NEW ZEALAND

Social and Community Health
Tamaki Campus
261 Morrin Road, Glen Innes, Auckland
The University of Auckland
Private Bag 92019
Auckland 1142

PARTICIPANT INFORMATION SHEET

(Participant/Student)

Mobile phone use and New Zealand adolescents

Name of Researcher: Michael Vacaru

Researcher introduction

My name is Michael Vacaru, and I am currently enrolled in a PhD in health science at the University Of Auckland School Of Population Health. As part of this degree, I am conducting a study on mobile phone use among adolescents.

Project description and invitation – what is the study about?

If you are 13 years old, or older, and you own a mobile phone, I would like to invite you to take part in a study about adolescents and mobile phones. I am interested in the relationship between teenagers and mobile phone use. This

includes discussions on why adolescents use mobile phones, what their mobile phone means to them, and problematic mobile phone use (or 'addiction'). This study will contribute to a relatively recent, but growing body of knowledge on the interactions between humans and technology. No such studies have been conducted in New Zealand before, and this study will be a great starting point for research on New Zealand teenagers and mobile phone use.

Project procedures – what would be involved?

If you choose to be involved in the research, it would mean you and another 5-7 teenagers from your organization participating in an hour long (approximately) discussion. I will tape what you all have to say, so I can be sure that I remember and understand everything that you have said. Participants will be divided into separate focus groups according to age and gender. The discussion will also include the subject of problematic (or addictive) mobile phone use; if anything in the discussion makes you feel uncomfortable, you can ask to have the recording stopped, and you can choose to leave. No-one will mind what choice you make. I will also be able to help get you support, if that is what you want – a counsellor will be on the premises when the focus group is taking place, though they won't be present in the actual discussion.

Your participation is entirely **voluntary** (your choice) and you do not have to take part. In no way will participating affect your relationship with the organisation/school, or its staff. Everyone who takes part will receive a movie voucher, as thanks for your involvement. This study has been funded by the University of Auckland PRESS Account.

Data storage and use – how will what I said be used?

What you tell me during the discussion will go into a larger study about the relationship between adolescents and mobile phones. The results from the research will be published in a thesis, and may be published in academic journals.

The data obtained from this research will be stored electronically, in a computer database, on secure University of Auckland premises. Data will be stored for 6 years, after which it will be completely deleted from the computer database. No information that could identify participants will be used in any report on this research.

A report of the findings of this research will be provided to your organization/school; you and your parents will have access to this report.

The participant consent forms (only record of who participated in the focus groups, as you will need to write down your real name) will be kept separate from the data, to make sure no one can find out who took part in the focus groups. These consent forms will be kept in a locked filing-cabinet on University of Auckland premises, for six years, after which they will be destroyed through shredding.

Right to withdraw from participation

You can choose to not answer any or all questions, to have the recording stopped, or to leave the discussion whenever you like. However, because no identifiable characteristics like your name will be asked for, it will not be possible to pick out what you have said, and remove it from the overall results. Therefore, any information you do provide will not be able to be withdrawn or removed.

Anonymity and confidentiality – will anyone know what I said?

Because this research is done in a group, the other participants will know who you are, and what you have said. I will not ask you to give your name, or any other details through which you may be identified (during the recording, you can use a fake name if you like). Only I, my supervisor, and a transcriber (someone who will be employed to write down what you have said) will ever listen to the tapes. Nobody who reads or hears about the study will know who you are.

Before you decide whether you want to take part, you might have some questions- I would be happy to talk to you. If you have any questions, you can contact me on mvac001@aucklanduni.ac.nz; or on (09) 923 6560

Or you can contact my supervisor, Dr. Robin-Marie Shepherd, on rm.shepherd@auckland.ac.nz or on (09)3737599, extension 86573

Or you can contact the Head of my department (Social and Community Health Department): Associate Professor Peter Adams, on p.adams@auckland.ac.nz or on (09)3737599, extension 86538

For any queries regarding ethical concerns you may contact the Chair, The University of Auckland Human Participants Ethics Committee, The University of Auckland, Office of the Vice Chancellor, Private Bag 92019, Auckland 1142. Telephone 09 373-7599 extn. 83711.

APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE ON for 30th June 2011 (3) years, Reference Number 2011/240

Appendix 4: Participant information sheet (Nominal Group Technique sessions)



THE UNIVERSITY OF AUCKLAND
NEW ZEALAND
Social and Community Health
Tamaki Campus
261 Morrin Road, Glen Innes, Auckland
The University of Auckland
Private Bag 92019
Auckland 1142

PARTICIPANT INFORMATION SHEET

(Participant/Student)

Mobile phone use and New Zealand adolescents

Name of Researcher: Michael Vacaru

Researcher introduction

My name is Michael Vacaru, and I am currently enrolled in a PhD in Health Science at the University Of Auckland School Of Population Health. As part of this degree, I am conducting a study on mobile phone use among adolescents.

Project description and invitation – what is the study about?

If you are 13-19, and you own a mobile phone, I would like to invite you to take part in a study about young people and mobile phones which will run from the 1st of May to the 1st of August 2012. I am interested in the relationship between teenagers and mobile phone use. This includes discussions on how young people view and identify problematic mobile phone use. This study will contribute to a relatively recent, but growing body of knowledge on the interactions between humans and technology. No such studies have been conducted in New Zealand before, and this study will be a great starting point for research on New Zealand teenagers and mobile phone use.

Project procedures – what would be involved?

If you choose to be involved in the research, it would mean you and another 5-7 young people participating in an hour long (approximately) discussion. The process involves participants coming up with potential questions or statements that could be used to identify people who might have a problematic attachment to their phone. The statements will then be ranked, in order of usability/importance. Participants will be divided into separate groups according to age and gender. If anything in the discussion makes you feel uncomfortable, you can choose to leave. No-one will mind if you do so. I will also be able to help get you support, if that is what you want. My supervisor, Dr Shepherd, is a trained counsellor and will be available while the discussion is taking place, though she won't be present on the premises.

Your participation is entirely **voluntary** (your choice) and you do not have to take part. Everyone who takes part will receive a movie voucher, as thanks for your involvement. This study has been funded by the University of Auckland PRESS Account.

Data storage and use – how will what I said be used?

What you tell me during the discussion will go into a larger study about the relationship between adolescents and mobile phones. The results from the research will be published in a thesis, and may be published in academic journals and presented at conferences. Any quotes will be anonymous, and cannot be attributed to any individual.

The data obtained from this research will be stored electronically, in a computer database, on secure University of Auckland premises. Data will be stored for 6 years, after which it will be completely deleted from the computer database. No information that could identify participants will be used in any report on this research.

A report of the findings of this research will be provided to your organisation.

The participant consent forms (only record of who participated in the discussion groups, as you will need to write down your real name) will be kept separate from the data, to make sure no one can find out who took part in the discussion groups. These consent forms will be kept in a locked filing-cabinet on University of Auckland premises, for six years, after which they will be destroyed through shredding.

Right to withdraw from participation

You can choose to not answer any or all questions, or to leave the discussion whenever you like. However, it will not be possible to pick out what you have said/contributed during the discussion, and remove it from the overall results. Therefore, any information you do provide will not be able to be withdrawn or removed.

Anonymity and confidentiality – will anyone know what I said?

Because this research is done in a group, the other participants will know who you are, and what you have said. Only my supervisors and myself will have access to the data that is collected during the discussion. Nobody who reads or hears about the study will know who you are. However, anonymity and confidentiality cannot be guaranteed, as I cannot speak for the actions of the young people who take part in the research.

Before you decide whether you want to take part, you might have some questions- I would be happy to talk to you. If you have any questions or comments, you can contact me on mvac001@aucklanduni.ac.nz; or on (09) 923 6560

Or you can contact my supervisor, Dr. Robin-Marie Shepherd, on rm.shepherd@auckland.ac.nz or on (09)3737599, extension 86573

Or you can contact the Head of my department (Social and Community Health Department): Associate Professor Elsie Ho, on e.ho@auckland.ac.nz or on (09)3737599, extension 86538

For any queries regarding ethical concerns you may contact the Chair, The University of Auckland Human Participants Ethics Committee, The University of Auckland, Office of the Vice Chancellor, Private Bag 92019, Auckland 1142. Telephone 09 373-7599 extn. 83711.

APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE ON 20th April 2012 for (3) years, Reference Number 8057

Appendix 5: Ethics approval for Nominal Group Technique sessions

Office of the Vice-Chancellor Research Integrity Unit

The University of Auckland
Private Bag 92019
Auckland, New Zealand

Level 10, 49 Symonds Street
Telephone: 64 9 373 7599
Extension: 87830 / 83761
Facsimile: 64 9 373 7432

UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE

20-Apr-2012

MEMORANDUM TO:

Dr Robin-Marie Shepherd
Social & Community Health

Re: Application for Ethics Approval (Our Ref. 8057)

The Committee considered your application for ethics approval for your project titled **The mobile phone and New Zealand adolescent society** on 20-Apr-2012.

Ethics approval was given for a period of three years with the following comment(s).

The Committee identified phone bullying as a risk that the researcher must consider. Please consider how this will be handled if it occurs, and ensure that a contingency plan is in place, including access to a psychologist.

The expiry date for this approval is 20-Apr-2015.

If the project changes significantly you are required to resubmit a new application to the Committee for further consideration.

In order that an up-to-date record can be maintained, you are requested to notify the Committee once your project is completed.

The Chair and the members of the Committee would be happy to discuss general matters relating to ethics approvals if you wish to do so. Contact should be made through the UAHPEC secretary at humanethics@auckland.ac.nz in the first instance.

All communication with the UAHPEC regarding this application should include this reference number: **8057**.

(This is a computer generated letter. No signature required.)

Secretary
University of Auckland Human Participants Ethics Committee

c.c. Head of Department / School, Social & Community Health
Assoc Prof Janie Sheridan
Mr Mihai-Alexandru Vacaru
Dr Denise Greenwood
Assoc Prof Elsie Ho

Appendix 6: Online survey questionnaire

Section 1: Demographics

Please tell us about yourself. The information will not be used for identification purposes but will help describe the characteristics of people who completed these questionnaires.

1. Gender

- Male
- Female

2. Please enter your age, in years.

3. What is your current relationship status? Please tick one option

- Single
- Dating
- Married
- De-facto
- Not applicable

4. Do you live...? Please tick one option

- By myself
- With parent/s (family)
- With friends/flatmates
- With partner
- Not applicable

5. Do you have a landline where you live?

- Yes
- No

Not applicable

6. Which best describes your current work status?

- Part-time/casual employment
- Unemployed

Not applicable

7. What is your ethnicity? Please tick all relevant boxes. If your ethnicity is not included in the boxes, please type it in the box below

- NZ European/Pakeha
- Maori
- Samoan
- Cook Island Maori
- Tongan
- Niuean
- Chinese
- Indian
- Other, such as DUTCH, JAPANESE, TOKELAUAN. Please state below:

Section 2:

This next section asks about your general mobile phone use.

8. In years, approximately how long have you owned a mobile phone?

9. On average, how much money would you approximately spend on your mobile phone each month?

3. On average

How many calls would you make on your mobile phone per week?

How many calls would you receive on your mobile phone per week?

How many SMS would you send on your mobile phone per week?

How many SMS would receive on your mobile phone per week?

Section 3:

This is the final section, and it contains some statements people may use to describe their mobile phone use. When answering the questions please think about your overall mobile phone use, including sending and receiving calls, SMS or MMS, or using other features of your phone such as camera, games, or personal organiser.

For each of the statements, please choose one of the seven options which best describe your response (Strongly disagree, Disagree, Somewhat disagree, Neutral, Somewhat agree, Agree, Strongly agree).

Statement	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly agree
The first thing I do when I wake up is check my phone							
The last thing I do before going to sleep is use my phone							
I keep my phone in my pocket during exams, for reassurance							
I would not answer a txt or call in the middle of the night							
I often check my phone, put it away, then check it again straight after							
I feel the need to check my phone every 15 minutes							
If I didn't have my phone with me, I would not borrow someone else's							
I make sure I have my phone with me before I leave the house							
I call or txt my friends in the middle of the night							
I don't always have my phone on me							
I never turn my phone off during the day							
I sleep with my phone under my pillow							
I don't txt or call people in the same house as me							
I can't txt without looking at the keypad							
I don't keep important info, such as my bank account details, in my phone							
I constantly check my phone, even when I am with friends							
I don't check my phone while talking to people in person							
I use my phone to procrastinate against doing school work							
I don't use my mobile phone during class time							
I use my mobile phone during dinner with family or friends							
I don't check my phone and answer txt messages while driving							
I would not purchase a phone if the price doubled							
I would still send txts, if the price of txting doubled							
I often play on my phone instead of doing school work							
I do not upgrade my phone to the newest model							
I often find myself playing with my phone, when I am meant to be doing something else							
When people around me are txting, I feel like I am missing out							
I feel safer if I have my phone with me							
I don't panic if I don't have my phone on me							
When my phone is taken away from me, I feel lonely							
I feel uncomfortable if I am away from my phone for a long period of time							
When I receive a txt during an inappropriate situation, I start feeling anxious, because I can't check it							
If I cannot access my phone, I become annoyed							
I don't feel worried when I don't have a phone with me							
Sometimes I think I can hear my phone ringing or feel it vibrate,							

even if it isn't.								
If I am not using my mobile phone, I think about my mobile phone								
I would not be ok with another person using my phone								
I couldn't imagine life without a phone								
I think mobile phones are the best way of communicating								
I'd rather lose a body part than live the rest of my life without a phone								
I would not judge somebody, if they didn't have a phone								
I couldn't last a day without my mobile phone								
Receiving lots of messages means that people are thinking about you								
People who receive lots of txts are popular								
If you have a mobile phone, you are more likely to be included in social and fun events								
If I don't receive any txts for a while, I feel sad								
I think that if I didn't have a mobile phone, I would be excluded by my friends								
If somebody doesn't reply to my txt, I think they probably dislike me								
I feel happy when I receive a txt								
Hearing my phone ring makes me feel excited								
I think it is ok to txt while in a social situation								
It's ok to txt during class times								
I don't think it's ok to use a mobile phone during family dinners								
I don't mind if people use their mobile phones while at the cinema								
I don't think txt messages are the best way to communicate with friends								
I find it easier to talk about private and emotional issues via txt								
I am less nervous talking to the opposite sex via txt, than face to face								
I prefer talking to friends through txt than face to face								
I have lost sleep because I was up txting during the night								
I would rather go out than stay at home and txt people								
I have gotten into a car crash or gotten a ticket because of using my mobile phone while driving								
My school work has suffered because I spend so much time on my mobile phone								
My fingers have hurt because I was txting so much.								
I have not been bullied via txt								
My back and/or neck have hurt from bending over my mobile phone for long periods of time								
I have had problems because I spent so much money on my phone								
I have gotten into disagreements or fights with my friends and/or significant other because of misunderstanding txt messages.								

That is the end of the questionnaire. Thank you for your time and honesty. Your assistance is greatly appreciated.

If you wish to enter the prize draw, please enter your mobile phone number below

If you have any issues after completing this questionnaire, please contact your School Counsellor on xxx. If you have any questions about the questionnaire, please contact me on m.vacaru@auckland.ac.nz

Appendix 7: Study advertisement (online survey)



A study on New Zealand young people and their relationship with mobile phones **Invitation to take part**

Hi,

My name is Michael, and I am a PhD student in Health Sciences at the University of Auckland. I would like to invite you to take part in a study about young people and mobile phone use.

Taking part in this study would mean completing an online questionnaire that asks about your mobile phone use, and your thoughts and feelings about mobile phones. The questionnaire has been partly designed by young Kiwi people.

Your answers will be completely confidential – no information that could personally identify you will be used. At the end of the study, each school which took part will be sent a summary of the findings – you can also contact me if you would like a copy for yourself.

You do not have to take part in this study – it is entirely your choice. Whether you choose to participate or not will not affect your relationship with your school, teachers, or influence your grades in any way.

Participants who complete the questionnaire can choose to go in the draw for a \$50 Westfield voucher; there are 5 vouchers to be won in each school that is taking part.

If you would like to take part in this study, please go to www.surveymonkey.com/schoolname, and complete the questionnaire. More details about this study are also available on this webpage.

If you have any questions about the study, or what it involves, you can contact me on m.vacaru@auckland.ac.nz or on 09 952 6560.

Thanks 😊

Michael

For any queries regarding ethical concerns you may contact the Chair, The University of Auckland Human Participants Ethics Committee, The University of Auckland, Office of the Vice Chancellor, Private Bag 92019, Auckland 1142. Telephone 09 373-7599 extn. 83711.

APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE ON 21/05/2014 for (3) years, Reference Number **011378**

Appendix 8: Participant information sheet (online survey)



THE UNIVERSITY OF AUCKLAND
NEW ZEALAND

**Social and Community Health
Level 3, School of Population Health
Tamaki Campus
261 Morrin Road, Glen Innes, Auckland
Telephone: (09) 373 7599 ext 86573**

**The University of Auckland
Private Bag 92019
Auckland Mail Centre
Auckland 1142**

PARTICIPANT INFORMATION SHEET

Student

Mobile phone use and New Zealand Adolescents

Name of Researcher: Michael Vacaru

Researcher introduction:

My name is Michael Vacaru, and I am currently enrolled in a PhD (a postgraduate degree which involves conducting research) at the University Of Auckland School Of Population Health. As part of this degree, I am conducting a study on mobile phone use among adolescents, specifically problematic mobile phone use, or “mobile phone addiction”.

Project procedures:

The research involves filling out an online survey regarding mobile phone use, which would take about 30 minutes. Your participation is entirely **voluntary** (your choice) and you do not have to take part. Your School Principal has assured us that participating or not participating in this study will in no way affect your relationship with the school, or its staff, or your grades.

If you participate, you can enter a draw to win a \$50 Westfield vouchers; there are 5 vouchers to be won by students from your school. In order to enter the draw, you will be asked to provide your mobile phone number as a means of contact, if you are selected as a winner

This study has been funded by the University Of Auckland School Of Population Health and the University of Auckland PRESS Account.

Data storage and use:

The results from the research will be published in a thesis, and may be published in academic journals and presented at conferences.

A report of the findings of this research will be provided to your school, who will make it available to students and parents. Alternatively, you may contact me directly if you would like a copy of the report.

The data obtained from this research will be stored electronically, in a computer database, on secure University of Auckland premises. Data will

be stored for 6 years, after which it will be destroyed. No information that could identify students will be used in any report on this survey.

Anonymity and confidentiality:

Every step has been taken to protect your anonymity to the full extent possible in the situation – a secure online survey tool will be used to collect the information. Further, no information that may specifically identify you is requested. Your mobile phone will be required if you wish to enter the draw, but that will automatically go into a separate database, and it won't be possible to link your number to your questionnaire. If you do not wish to provide your mobile phone number, you can still participate in the research, but you will not be included in the prize draw; alternatively, you may withdraw from the study.

Participation:

You have the right to withdraw from the survey at any time – simply close the survey window before completion, and this will signal withdrawal from participation. However, once you complete the survey, it will be impossible to withdraw the answers you have provided from the study.

If you have any questions, I am very happy to talk to you. You can contact me on mvac001@aucklanduni.ac.nz; or on (09) 923 6560.

Or you can contact my supervisor, Dr. Robin-Marie Shepherd, on rm.shepherd@auckland.ac.nz; (09)3737599, extension 86573.

Or you can contact the head of my department (Social and Community Health Department): Associate Professor Elsie Ho, on e.ho@auckland.ac.nz or on (09)3737599, extension 86097.

For any queries regarding ethical concerns you may contact the Chair, The University of Auckland Human Participants Ethics Committee, The University of Auckland, Office of the Vice Chancellor, Private Bag 92019, Auckland 1142. Telephone 09 373-7599 extn. 83711.

APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE ON 21/05/2014 for (3) years, Reference Number **011378**

Appendix 9: Ethics approval for online survey

Office of the Vice-Chancellor
Finance, Ethics and Compliance



The University of Auckland
Private Bag 62019
Auckland, New Zealand
Level 13, 45 Remondy Street
Telephone: 64 9 373 7500
Facsimile: 64 9 373 7432

UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE (UAHPEC)

21-May-2014

MEMORANDUM TO:

Dr Robin-Marie Shepherd
Social & Community Health

Re: Application for Ethics Approval (Our Ref. 011378): Approved

The Committee considered your application for ethics approval for your project entitled **Mobile phone use and New Zealand adolescents: study 3**.

We are pleased to inform you that ethics approval is granted for a period of three years.

The expiry date for this approval is 21-May-2017.

If the project changes significantly, you are required to submit a new application to UAHPEC for further consideration.

If you have obtained funding other than from UniServices, send a copy of this approval letter to the Research Office, at ro-awards@auckland.ac.nz. For UniServices contracts, send a copy of the approval letter to the Contract Manager, UniServices.

In order that an up-to-date record can be maintained, you are requested to notify UAHPEC once your project is completed.

The Chair and the members of UAHPEC would be happy to discuss general matters relating to ethics approvals. If you wish to do so, please contact the UAHPEC Ethics Administrators at ethics@auckland.ac.nz in the first instance.

Please quote reference number: **011378** on all communication with the UAHPEC regarding this application.

(This is a computer generated letter. No signature required.)

UAHPEC Administrators
University of Auckland Human Participants Ethics Committee

c.c. Head of Department / School, Social & Community Health
Mr Mihai-Alexandru Vacaru
Assoc Prof Janie Sheridan

Appendix 10: Copyright approval for use of Davis' (2001) Model of Problematic Internet Use

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Licensed Content Title	A cognitive-behavioral model of pathological Internet use
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Licensed Content Date	Mar 1, 2001
Licensed Content Volume	17
Licensed Content Issue	2
Licensed Content Pages	9
Start Page	187
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Type of Use	reuse in a thesis/dissertation
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Number of figures/tables/illustrations	1
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Are you the author of this Elsevier article?	No
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Original figure numbers	Fig. 1. The Cognitive-Behavioral Model of Pathological Internet Use (PDU).
Title of your thesis/dissertation	New Zealand adolescents and their relationship with mobile phone technology
Expected completion date	May 2017
Estimated size (number of pages)	350
Requestor Location	Michael Vacaru 261 Morrin Road, Glen Innes Building 730, Auckland, 1072 New Zealand Attn: Michael Vacaru
Total	0.00 USD
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Appendix 11: Copyright approval for use of Billieux’s Pathways Model

Grant of Permission

Dear Dr. Vacaru:

Thank you for your interest in our copyrighted material, and for requesting permission for its use.

Permission is granted for the following subject to the conditions outlined below:

Current Psychiatry Reviews, 8(4), 299-307.

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