Problematic Attachment to Social Media: Lived Experience and Behavioural Archetypes

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ABSTRACT

Social media are widely used by people to help satisfying personal and social needs. Examples include the enhancement of self-image, self-esteem, complementarity, relatedness and popularity. However, the relationship with social media can become problematic and lead to hurt various aspects of life, including wellbeing, psychological and emotional state and sociability. Existing literature provided evidence that obsessive and excessive use of social media can be associated with behavioural addiction symptoms such as conflict, mood modification, salience, tolerance, withdrawal and relapse. Research has also shown that social media can be equipped or augmented with tools to help users who are willing to change their problematic attachment behaviour. Designing such behaviour change tools can be challenging because people differ in their problematic attachment to social media. Unlike existing literature, which focuses on understanding the psychological correlates of social media activity and reasons that facilitate attachment. This thesis aims to explore the real-world experience of people who have a problematic attachment to social media and the role of social media design in such attachment. In order to achieve the goal of the thesis, multi-phase qualitative studies with people who experienced problematic attachment have been conducted. This helped to achieve a deep understanding of the role of social media in facilitating problematic attachment and reveal emotions and psychological states associated with it as well as the social media design features which contribute to triggering such states.

The findings emerged through multi-phase qualitative studies helped developing user archetypes characterising how people differ in their problematic attachments to social media. These behavioural archetypes are intended to help the design process of software-assisted solutions to keep a healthy relationship with social media. The thesis evaluates how the archetypes can help a design team communication and engagement and aid a more creative and efficient design process.

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ACKNOWLEDGMENT

DECLARATION OF CO-AUTHORS CONTRIBUTION

The author of this thesis was the first author of all the resulted publications. The contribution of the first author was as follows:

- Forming and articulating the idea and the aim of each paper.

- Deciding upon the appropriate methodology to be adopted in each paper (e.g., following a qualitative approach).

- Designing and implementing the research methods presented in each paper (e.g., developing methods procedures and protocols, recruiting participants, and collecting the data).

- Analysing and interpreting the collected data and drawing the conclusions (e.g., qualitative analyses).

- Reporting the findings and fully writing each paper.

The co-authors contributed to the published papers in terms of verifying and validating the studies' findings by comparing them against the actual responses from the participants. They also provided guidance and feedback on the structure and overall articulation of the papers' message. In addition, they gave insights on the methodologies and also checked the quality of the papers and suggested modifications on some parts of the text. Furthermore, the co-authors enriched the papers with the appropriate terminologies in certain places, especially those related to the venue where the papers were published.

1 CHAPTER ONE: INTRODUCTION

People around the world are embracing the use of social media and it has become deeply interwoven in the population's daily lives. It is particularly popular among young people (Pempek, T. A. et al., 2009). Social media provides the means for people to engage with others, forming and maintaining relationships without the need to participate in real-life social activities (Boyd, D. M. and Ellison, N. B., 2007). For many people, social media is used on a daily basis to connect with friends, organise events and express opinions. As such, social media has had a marked effect on peoples' everyday lives as well as their spiritual fulfilment and well-being.

There is a range of social media platforms and their popularity has increased considerably over time as a means of facilitating both communication and entertainment (O'keeffe, G. S. and Clarke-Pearson, K., 2011) but these online activities can become excessive. Indeed, the number of daily active social media users stood at 2.78 billion in 2018, and the average daily use of social media is estimated to be 135 minutes per day, an increase of 9% over the previous year (126 minutes per day) (Statista, 2018). However, the rate of expansion in the use of social media has prompted academics to examine its impact on the population. Recent studies advocate that social media can have both positive and negative impacts on users (Altuwairiqi, Majid et al., 2019b; Charoensukmongkol, P., 2018; O'keeffe, G. S. and Clarke-Pearson, K., 2011).

The concept of excessive and pathological Internet use was introduced to the scientific research literature in the 1990s and is now an established topic (Young, K. S., 1998b). There is currently a relatively large variety of literature focused on the phenomenon and the risks associated with problematic use of the Internet (Spada, M. M., 2014). Internet addiction is still not classified as a mental disorder and evidence of Internet gaming disorder is still required to be formally included in the *Diagnostic and Statistical Manual of Mental Disorder*s (DSM) (Association, A. P., 2013). This indicates that further research in this area is needed in order to gather evidence that can be used to compile clinical psychological diagnostic criteria to confirm technology addiction, whether for games or social networks (Griffiths, M. D. et al., 2014). This would then mandate having intervention mechanisms in digital media. Despite the growing body of

research in this area, several terms have been used when referring to similar phenomena such as Internet addiction (Chou, C. et al., 2005; Lopez-Fernandez, O., 2018; Widyanto, L. and Griffiths, M., 2006), digital addiction (Alrobai, A. et al., 2014), cyber-addiction, problematic Internet use and compulsive and excessive Internet use (Breslau, J. et al., 2015; De Cock, R. et al., 2014; J Kuss, D. et al., 2014). There is still no agreed term despite the similarities (Kuss, D. and Griffiths, M., 2017; Tokunaga, R. S. and Rains, S. A., 2016). In this thesis, the author will use the term *problematic attachment to social media* to describe a usage style associated with a set of harmful consequences such as negative emotions, destructive psychological states and over-dependence.

Attachment theory (Bowlby, J. et al., 1989) holds that the attachment style is based on interaction between the child and their primary caregiver. Ultimately, these interactions produce an internal model that guides children's behaviour with caregivers, allowing them to feel safe and protect themselves from separation or loss. On the other hand, if the primary caregiver fails to respond to the child's reactions and needs, the child learns to avoid the caregiver and potentially develop independence. When the caregiver provides inconsistent responses to the child's activity, the child may develop an anxious-avoidant attachment. This can happen when people rely on social media to satisfy their social need for relatedness and popularity and when they become overly reliant on the gratification they gain from others recognising them and their interactions online. In other words, social media can become an unreliable source of relatedness and gratification and lead to a problematic attachment style.

According to attachment theory, problematic attachment to social media can be defined as an over-reliance to satisfy social and personal requirements which can eventually prove detrimental to personal and social wellbeing. People may rely on social media to satisfy their personal and social needs, for example, to enhance their self-esteem (Gonzales, A. L. and Hancock, J. T., 2011) and maximise their social capital (Steinfield, C. et al., 2008). This reliance can be problematic and associated with harmful side-effects relating to wellbeing and decision-making; e.g. leading to a hasty posting of pictures due to peer pressure, lower self-esteem as a result of comparing oneself unfavourably to others, believing that one's online material is always a true reflection of reality, poor impulse control and anxiety leading to inappropriate checking of social media; e.g. while driving (Woods, H. C. and Scott, H., 2016).

Hawi and Samaha defined social media addiction as compulsive use of social media, resulting in addictive behavioural symptoms (Hawi, N. S. and Samaha, M., 2017). Recent studies have demonstrated similarities between certain symptoms of social media addiction and symptoms of classic addiction (Griffiths, M. D. et al., 2014; Kuss, D. J. and Griffiths, M. D., 2011). These symptoms include withdrawal (feeling anxious when unable to connect as desired), tolerance (increasing online presence, interaction and accounts), relapse (after attempting to minimise or adjust one's current usage habits), conflict (using social media despite having other priorities) and mood modification (feeling better when receiving Likes and comments). Research has also indicated that excessive and obsessive usage of social media is associated with undesirable life experiences such as reduced creativity, increased anxiety and a neglect of the reality of life (El Asam, A. et al., 2019; Matos, A. P. et al., 2016). Despite increasing awareness of the possible negative effects of excessive Internet use, certain individuals still seem to have strong feelings about, and intimate engagement with, digital devices and tend to ignore the associated risks. Research has shown that when people disconnect or are asked to spend less time on social media and online interactions, they become anxious despite the lack of a clear and justified purpose for that online presence (Paris, C. M. et al., 2015). Excessive use of social media combined with peer pressure to be online can lead people to lose track of the time spent and their interactions online. This has led to proposals for interventions to help people take control of their digital media usage (Ali, R. et al., 2015; Alutaybi, A. et al., 2018).

In the United Kingdom, approximately 15 million Internet users (about 34% of the national population of Internet users) attempted a "digital detox" in 2016. When they went offline, 33% of the participants reported having an increased sense of productivity, 27% felt a sense of liberation and 25% reported that they enjoyed life more. The report also noted that 16% of the participants experienced a strong fear of missing out (FoMO), 15% felt lost and 14% felt neglected (Ofcom, 2017). These figures indicate that many are willing to regulate their online presence and activities but may require help to do so.

Research into the relationship between the use of social media and self-esteem (Denti, L. et al., 2012; Gonzales, A. L. and Hancock, J. T., 2011; Steinfield, C. et al., 2008) concluded that people with low self-esteem tend to overuse social media in an attempt

to enhance their self-image and self-identity, which positively promotes their self-esteem. However, peer interaction and failure to gain recognition may worsen their mood. Other empirical studies have revealed that addiction to social media is linked to negative psychological experiences including anxiety, depression and stress. Moreover, it can also contribute to poor academic performance and lead to dissatisfaction with life (Hawi, N. S. and Samaha, M., 2017; J Kuss, D. et al., 2014; Lepp, A. et al., 2014). In addition, research has emphasised that people who develop excessive and obsessive engagement with social media are more likely to experience undesirable life experiences and this can manifest itself in reduced creativity, increased anxiety and withdrawal from reality (Andreassen, C. S., 2015).

In recognition of this problem, this thesis will explore problematic attachment to social media and the role of social media design in promoting problematic attachment. Despite social media being in certain cases a medium for behavioural and wellbeing issues, it can be designed to accommodate diverse techniques for the self-regulation of problematic attachment styles to improve digital wellbeing (Alrobai, A. et al., 2014). Unlike other cases of problematic usage such as alcohol, social media users can use technology to monitor their usage style and this plays a critical role in allowing users to be better informed as well as conscious. The software can be used to assess whether someone is using a phone or social media in an anxious and uncontrolled way. The author advocates that, as in the case of online gambling, users should have access to appropriate assistance; e.g. self-exclusion as well as lock-out schemes so that they can remain in control of their behaviour if they are worried about problems. Users can authorise the software to alert them when their usage pattern indicates a risk, which may help them to avoid the side-effects of excessive usage; e.g. goal setting technique (Alutaybi, A. et al., 2018). However, to know what such an intervention method should look like, the author argues that there is a need for an in-depth understanding of the real-world experience of people who have a problematic attachment to social media and their different styles of problematic attachment to social media.

Most of the existing literature on social media addiction has focused on psychological perspectives such as the role of social skills (Turel, O. and Serenko, A., 2012) or personality traits (Winkler, A. et al., 2013) in facilitating digital media addiction. Several studies have indicated that certain patterns of social media usage have a

negative impact on psychological well-being (Kross, E. et al., 2013). Despite the research on the psychological aspect of the problem, there is a lack of empirical research that identifies the role of social media design in both triggering problematic usage as well as in helping to regulate it. Previous research (Alrobai, A. et al., 2016) has identified a range of risks in software-assisted behavioural change tools that make their engineering a complex problem and requiring a multidisciplinary approach bringing expertise from information systems and psychology together. These call for further research to gain a deeper understanding of the role that such software can play in combatting problematic attachment to social media.

Most research into social media addiction, online identity and online attachment has utilised offline data collection methods and, hence, are subject to recall bias and limitations in terms of ecological validity. For example, questionnaires (Barke, A. et al., 2012; Monacis, L. et al., 2017), surveys (Lin, J.-H., 2016; Oldmeadow, J. A. et al., 2013) and focus groups (Balakrishnan, V. and Shamim, A., 2013) have been used. The use of offline methods, such as asking participants to recall feelings and experiences, does not capture the lived experience of a problematic relationship with social media in full and, therefore, the current study is motivated to reinvestigate such relationships using live methods such as diary protocols (Iida, M. et al., 2012). This was particularly important when eliciting usage experiences because participants needed to report their experience when it occurred, rather than recall their memory in a questioning session.

1.1   THESIS AIM

This thesis aims to provide insight into the real-world experience of people who have a problematic attachment to social media and create archetypes to represent their different attachment styles.

A multi-phase qualitative research method is adopted using focus groups, diaries and interviews. The diaries are the main method for collecting data to enhance the ecological validity of the thesis method. The archetypes are built around the internal characteristics of the users, the emotions and psychological states accompanying their social media experiences. The behavioural archetypes are intended to enhance the design of software tools that can aid the regulation of social media usage and that can be offered via social media or third parties.

1.2   RESEARCH QUESTIONS

Based on the thesis aim, the following questions are formed to direct the thesis and adjust its boundaries:

Q1: What is the lived experience of problematic attachment to social media?

Q2: What are the emotions and psychological states that typically accompany problematic attachment to social media?

Q3: How could the design of social media contribute to problematic attachment?

Q4: What are their main patterns and archetypes when doing so?

1.3   RESEARCH OBJECTIVES

There are four objectives that must be realised to achieve the stated aim of this research.

Objective 1:   Conduct a literature review on social media addiction and related topics

A literature review will enable a comprehensive understanding in different areas such as the addiction phenomenon, behaviour change, online attachment, dependency, and withdrawal symptoms from both psychological and software perspectives. Moreover, it serves to find different types and patterns of interaction styles and attachment in social media which includes types of people concerning their attachment style, their perceptions of problematic usage, the inter-relationship between the features in the design and the requirements of the user.

Objective 2: Explore problematic attachment to social media and the contribution of the design features in triggering it

Empirical studies will be conducted to understand the various styles of online attachment and problematic engagement. These are to explore people's feelings and behaviour patterns associated with their problematic attachment to social media. Additionally, this will help to explore the social media features that might facilitate problematic attachment.

The exploratory study will involve activities such as a pre-selection survey. This helps to compile an effective sample and establish its demographic data. Multi-phase qualitative studies will be conducted including focus group sessions to immerse the participants in the research problem. Another activity involves conducting diary studies

to achieve the stated aim of this objective and to enhance the ecological validity of the study (see Chapter 3). The data collected from the interview and diary studies will be analysed using thematic analysis. The findings will also be validated and confirmed by means of card sorting in the confirmatory study (see Chapters 4 and 5).

Objective 3: Segmenting users with a problematic attachment to social media into behavioural archetypes

Users of social media differ in terms of their online behaviours. Thus, the author will use the behavioural archetype concept to represent how social media users differ in their problematic attachments. These archetypes are meant to facilitate effective ideation, creativity and communication during the design process and help with the elicitation and customisation of the variability in the requirements and design of behaviour change tools for combatting problematic usage of social media. This will be achieved using a four-phase qualitative study where the diary study method is considered at the initial stage as well as the refinement and confirmation stage to enhance ecological validity (see Chapter 6).

Objective 4: Validating the usefulness and effectiveness of the behavioural archetype as a design tool in the design process of a software-assisted solution to regulate social media usage

A case study will be adopted to validate the usefulness and effectiveness of the users' behavioural archetypes as a design tool in the design process for software-assisted solutions to regulate social media usage.

1.4 OVERVIEW OF THE THESIS METHODOLOGY

The current study explores the lived experience of people with problematic attachment to social media. Thus, the exploratory design will be utilised to achieve the thesis objectives. This type of research design assists in determining the nature of the research problem and exploring the research questions by following an inductive approach and a qualitative methodology. The inductive approach will be used to analyse the data by conducting thematic analysis following (Braun, V. and Clarke, V., 2006). Qualitative methods and procedures will be adopted for the purpose of data collection, including diary studies, focus groups, interviews and group administrated questionnaires. The case study strategy will be used to provide more focus to evaluate the usefulness and

effectiveness of applying behavioural archetypes as a design tool in the design process. Further explanation is offered regarding the thesis methodology and methods which will be utilised to fulfil the stated objectives of this thesis and the rationale behind their adoption in the following chapters.

1.5 OUTLINE OF THE THESIS

The remaining chapters of the thesis are structured as follows:

Chapter Two: Provides a review of the relevant empirical literature, focusing on problematic attachment to social media. Initially, a broader review of social media addiction is presented including withdrawal symptoms for social media addiction, online attachment, preoccupation and salience which accompany the online identity and tendency of social network site users who find it difficult to reform their online identity. In this particular process there are three main areas of interest: behavioural change because they need to manipulate and change their behaviour, their ability to do so is related to self-efficacy and the social media platform which may play an important role in the development of problematic usage and also as a medium for intervention. The chapter then reviews the social and psychological concepts and theories informed through previous studies of social media addiction.

Chapter Three: Outlines the thesis methodology, discussing the research onion model and its various approaches. Then the chapter introduces the adopted data collection methods, the analysis techniques and the sampling methods. The final part of the chapter reflects on the implementation of the data collection methods and the associated procedures and analysis.

Chapter Four: This is the first of four findings chapters. Implementation of the exploratory study in Chapter Three which aims to provide insight into the real-world experience of people who have a problematic attachment to social media. This chapter presents the findings regarding the psychological states experienced by the participants. The second half of the chapter presents the findings regarding social media design features that contribute to triggering such psychological states.

Chapter Five: The second of the four findings chapters. This chapter presents the findings regarding frequent usage experiences encountered by people with problematic attachment and correlated emotions (both negative and positive). The second half of the

chapter presents the findings regarding social media design features that contribute to triggering such emotions.

Chapter Six: The third of the four findings chapters. This chapter conceptualises the user behavioural archetypes and a further analysis is conducted into the exploratory implementation presented in Chapter Three. This chapter presents five behavioural archetypes concerning problematic attachment to social media and reports the participants' feedback obtained from the confirmatory study.

Chapter Seven: The fourth of four findings chapters. This chapter reports on the five user behavioural archetypes, credibility and representative nature using quantitative analysis.

Chapter Eight: Presents the case study design that is utilised to validate the usefulness and effectiveness of the five behavioural archetypes as a design tool in the design process. The remainder of the chapter presents the findings obtained from the case study.

Chapter Nine: This chapter concludes by revising the objectives of the thesis, its contribution to knowledge and addresses recommendations for future research. For the visual map that illustrates the thesis structure (see Figure 1 underneeth).
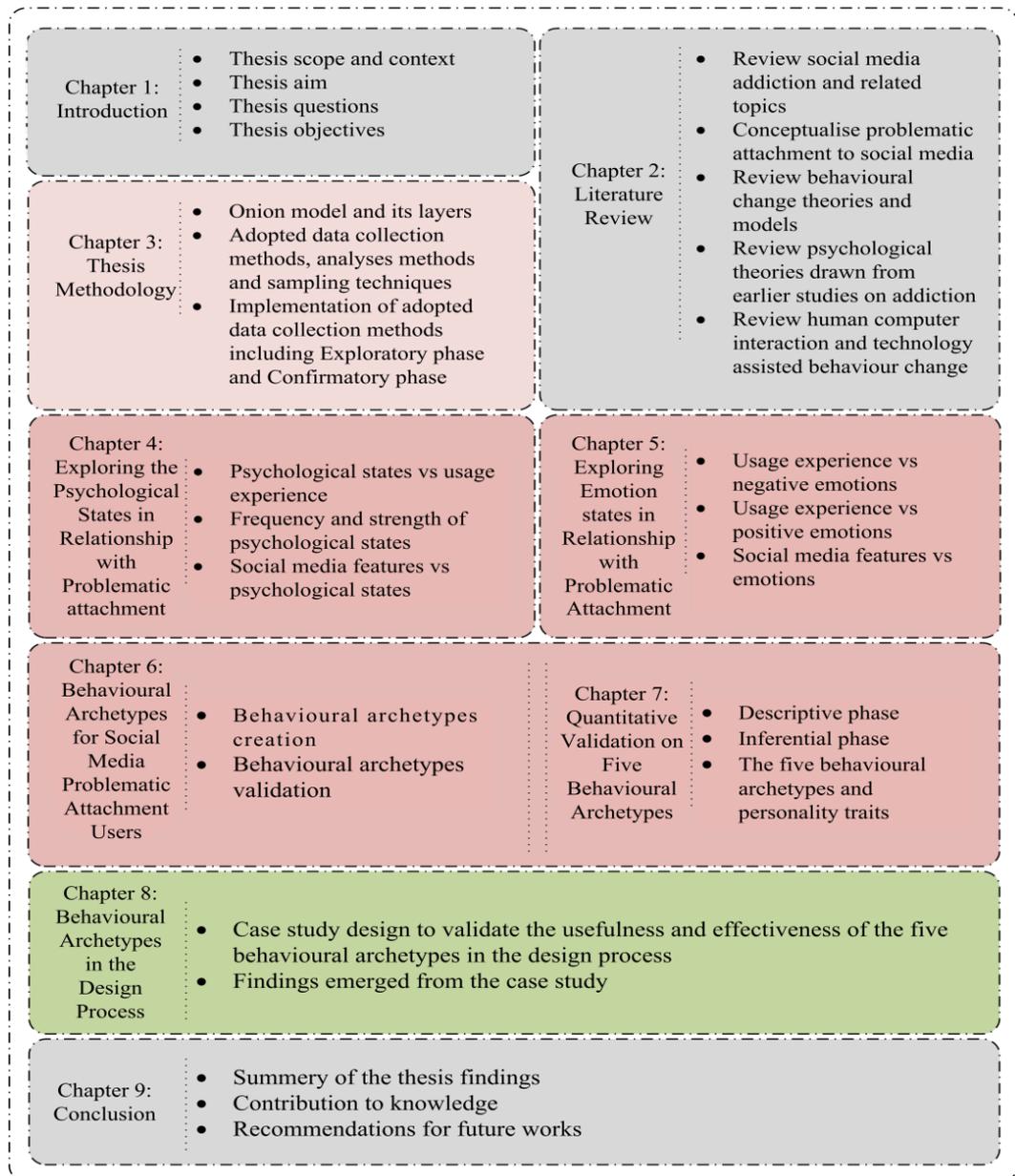
FIGURE 1: VISUAL MAP OF THE THESIS STRUCTURE

1.6 PUBLICATIONS ARISING FROM THIS THESIS

1. Altuwairiqi, M., Jiang, N. and Ali, R., 2019. Problematic Attachment to Social Media: Five Behavioural Archetypes. International Journal of Environmental Research and Public Health, 16(12), p.2136.

2. Altuwairiqi, M., Arden-Close, E., Jiang, N., Powell, G. and Ali, R., 2019, May. Problematic Attachment to Social Media: The Psychological States vs Usage Styles. In Proceedings of the 13th International Conference on Research

Challenges in Information Science (RCIS), Brussel, Belgium (pp. 29-31).

3. Altuwairiqi, M., Kostoulas, T., Powell, G. and Ali, R., 2019. Problematic Attachment to Social Media: Lived Experience and Emotions. In 7th World Conference on Information Systems and Technologies (WorldCIST), La Toja Island, Galicia, Spain.

4. Altuwairiqi, M., Arden-Close, E., Bolat, E., Vuillier, L. and Ali, R., 2019. When People are Problematically Attached to Social Media: How Would the Design Matter?. In Proceedings of IEEE International Conference on Systems, Man, and Cybernetics (IEEE SMC 2019), Bari, Italy.

2 CHAPTER TWO: LITERATURE REVIEW

This chapter provides an outline of the thesis related to problematic attachment to social media, problematic usage related to social media, internet addiction and digital addiction. Additionally, it presents an overview of existing studies mainly from the field of psychology to provide grounding for the problematic attachment to social media and establish clear boundaries for this thesis. Due to the multidisciplinary nature of the problematic attachment to social media, the literature review will also cover aspects related to human-computer interaction and technology adoption.

2.1 INTRODUCTION

Conducting a literature review has to have a scope to determine the context and elements that may contribute to the research problem and its solution. There are two types of literature review that are commonly used in scientific research to summarise different primary studies from different domains: a systematic review and narrative review (Jesson, J. et al., 2011).

The research in digital addiction area is still emergent and the literature is scarce in relation to the digital features and digital design to review systematically. Thus, the research adopted a narrative approach to review the literature to form and articulate the research topic.

This thesis started to review the digital addiction in general, withdrawal symptoms in digital addiction, online attachment, preoccupation and salience which accompanies the online identity and the tendency of social network sites users which find that is difficult to reshape their online identity. In this particular process there are three main area of interest, the behavioural change because they need to manipulate and change their behaviour, their ability to do that which related to self-efficacy and the platform of the social media which may play an important role in the development of problematic usage and also as a medium for intervention.

However, the concept of excessive and pathological Internet use has been introduced to the scientific research literature for over 20 years and is an established topic now (Young, K. S., 1998b). There is currently a relatively large variety of literature on the

phenomenon and the risks associated with problematic use of the Internet (Spada, M. M., 2014). Internet addiction is still not classified as a mental disorder and evidence around internet gaming disorder is still required to be included formally the Diagnostic and Statistical Manual of Mental Disorders (DSM) (Association, A. P., 2013). This indicates that further research in this area is needed in order to gather evidence that can be used to compile clinical psychological diagnostic criteria to confirm the technology addiction whether for games or social networks (Griffiths, M. D. et al., 2014). This would then mandate having intervention mechanisms in digital media. Despite the growing body of research in this area used several terms for referring to a similar phenomenon, such as Internet addiction (Chou, C. et al., 2005; Lopez-Fernandez, O., 2018; Widyanto, L. and Griffiths, M., 2006), digital addiction (Alrobai, A. et al., 2014), cyber-addiction, problematic Internet use and compulsive and excessive Internet use (Breslau, J. et al., 2015; De Cock, R. et al., 2014; J Kuss, D. et al., 2014). There is no agreed term yet despite the similarities (Kuss, D. and Griffiths, M., 2017; Tokunaga, R. S. and Rains, S. A., 2016). In this chapter, the author will use the term social media addiction, digital addiction and internet addiction interchangeably to describe the phenomena in general and the term problematic attachment to social media to describe a usage style associated with a set of harmful consequences such as negative emotions, destructive psychological states and over-dependence.

2.2 SOCIAL MEDIA

Christensson defined social media as collective internet-based communities in which users interact with each other to share information, ideas, career interests and other forms of expression via virtual communities and networks (Christensson, P., 2013). Various online platforms include aspects such as web forums, wikis, and user-generated content sites. In social media, users can create their profile, post content, share videos, and react to others' posts and comments. The 21st century has seen rapid growth in the popularity of social media with a shift from exclusive to populist usage. It is now a common tool for anyone who has access to the necessary technology and has meant a change in lifestyle for all layers of society.

Correa et al. (2010) defined social media as digital mechanisms enabling users to "connect, communicate and interact" with friends or strangers via instant message

(Correa, T. et al., 2010). According to Correa et al., most research on online platform use has been predominantly focused on social media. Raacke and Bonds-Raacke (2008) indicated that social media were virtual collections of members' profiles, for access by other users for the purpose of interpersonal communication (Raacke, J. and Bonds-Raacke, J., 2008). A list of friends for each registered user is created by the virtual collection of profiles and friends has access to each other's' profiles. The list indicates the user's virtual connections with others. Facebook, for example, shows not only a user's friends but notifies users of potential connections.

Studies such as (Ellison, N. B. et al., 2007; Sheldon, P., 2008) indicated that college students used social media to maintain friendships online with existing offline friends, rather than to make new friends. In the survey (Ellison, N. B. et al., 2007), also discovered that Facebook usage strengthens social capital. Other study found that online social media provides a less intimidating place for shy people to interact with others without the awkwardness of face-to-face interaction (Baker, L. R. and Oswald, D. L., 2010). It also means that those who have fewer social skills and therefore less offline communication would have the potential for greater social support and relationships could improve in quality. Lui and Larose (Liu, X. and Larose, R., 2008) discovered that the level of social support received by online interaction helped to improve the quality of life for college students. The benefits of social media go beyond direct interactions such as sending messages to someone through to indirect interactions such as broadcasting and receiving comments and likes.

2.3 SOCIAL MEDIA ADDICTION

Hawi and Samaha (Hawi, N. S. and Samaha, M., 2017) defined social media addiction as the compulsive use of social media mirroring the symptoms of behavioural addiction. Twelve years earlier, Griffiths indicated that these behavioural symptoms contain the following elements: "salience, tolerance, conflict, withdrawal, relapse and mood modification" (Griffiths, M., 2005). Andreassen et al. (2012) reviewed recently published research on social media addiction and confirmed that social media were mostly used for maintaining already existing offline networks (Andreassen, C. S. et al., 2012). This supported the findings of Kesici and Sahin (Kesici, Ş. and Şahin, İ., 2009) that addicted Internet users use social functions more than non-addicted Internet users.

Social media use is linked to personality traits. According to Buffardi & Campbell, people with a higher degree of narcissism tend to use social media more than others because social media provides a means to present their idealised selves (Buffardi, L. E. and Campbell, W. K., 2008). Kuss and Griffiths identified the different ways in which extroverts and introverts utilise social media (Kuss, D. J. and Griffiths, M. D., 2011). They discovered that whilst extroverts use social media to enhance offline relationships, introverts use online social activities to compensate for the deficiency of offline social networks. Many studies were carried out to examine the link between self-esteem and the use of social media (Denti, L. et al., 2012; Gonzales, A. L. and Hancock, J. T., 2011; Steinfield, C. et al., 2008), uncovering an undeniable link between self-esteem and the use of social media. Those with low self-esteem tend to use social media more than those with healthy self-esteem to boost their confidence, self-image and self-identity. Other empirical studies indicate that addiction, such as social media addiction results in negative psychological experiences, including stress, anxiety, and poor academic performance (Hawi, N. S. and Samaha, M., 2016; J Kuss, D. et al., 2014; Lepp, A. et al., 2014).

2.4   STATE OF THE ART REVIEW

Hawi and Samaha defined social media addiction as compulsive use of social media, resulting in addictive behavioural symptoms (Hawi, N. S. and Samaha, M., 2017). Recent studies have demonstrated similarities between certain symptoms of social media addiction and symptoms of classic addiction (Griffiths, M. D. et al., 2014; Kuss, D. J. and Griffiths, M. D., 2011). These symptoms include withdrawal (feeling anxious when unable to connect as desired), tolerance (increasing online presence, interaction and accounts), relapse (after attempting to minimise or adjust one's current usage habits), conflict (using social media despite having other priorities) and mood modification (feeling better when receiving Likes and comments). Research has also indicated that excessive and obsessive usage of social media is associated with undesirable life experiences such as reduced creativity, increased anxiety and a neglect of the reality of life (El Asam, A. et al., 2019; Matos, A. P. et al., 2016). Despite increasing awareness of the possible negative effects of excessive Internet use, certain individuals still seem to have strong feelings about, and intimate engagement with, digital devices and tend to ignore the associated risks. Research has shown that when

people disconnect or are asked to spend less time on social media and online interactions, they become anxious despite the lack of a clear and justified purpose for that online presence (Paris, C. M. et al., 2015). Excessive use of social media combined with peer pressure to be online can lead people to lose track of the time spent and their interactions online. This has led to proposals for interventions to help people take control of their digital media usage (Ali, R. et al., 2015; Alutaybi, A. et al., 2018).

Research into the relationship between the use of social media and self-esteem (Denti, L. et al., 2012; Gonzales, A. L. and Hancock, J. T., 2011; Steinfield, C. et al., 2008) concluded that people with low self-esteem tend to overuse social media in an attempt to enhance their self-image and self-identity, which positively promotes their self-esteem. However, peer interaction and failure to gain recognition may worsen their mood. Other empirical studies have revealed that addiction to social media is linked to negative psychological experiences including anxiety, depression and stress. Moreover, it can also contribute to poor academic performance and lead to dissatisfaction with life (Hawi, N. S. and Samaha, M., 2017; J Kuss, D. et al., 2014; Lepp, A. et al., 2014). In addition, research has emphasised that people who develop excessive and obsessive engagement with social media are more likely to experience undesirable life experiences and this can manifest itself in reduced creativity, increased anxiety and withdrawal from reality (Andreassen, C. S., 2015).

Most of the existing literature on social media addiction has focused on psychological perspectives such as the role of social skills (Turel, O. and Serenko, A., 2012) or personality traits (Winkler, A. et al., 2013) in facilitating social media addiction. Several studies have indicated that certain patterns of social media usage have a negative impact on psychological well-being (Kross, E. et al., 2013). Despite the research on the psychological aspect of the problem, there is a lack of empirical research that identifies the role of social media design in both triggering problematic usage as well as in helping to regulate it. Previous research (Alrobai, A. et al., 2016) has identified a range of risks in software-assisted behavioural change tools that make their engineering a complex problem and requiring a multidisciplinary approach bringing expertise from information systems and psychology together. These call for further research to gain a

deeper understanding of the role that such software can play in combatting problematic attachment to social media.

However, most research into social media addiction, online identity and online attachment has utilised offline data collection methods and, hence, are subject to recall bias and limitations in terms of ecological validity. For example, questionnaires (Barke, A. et al., 2012; Monacis, L. et al., 2017), surveys (Lin, J.-H., 2016; Oldmeadow, J. A. et al., 2013) and focus groups (Balakrishnan, V. and Shamim, A., 2013) have been used. The use of offline methods, such as asking participants to recall feelings and experiences, does not capture the lived experience of a problematic relationship with social media in full and, therefore, the current study is motivated to reinvestigate such relationships using live methods such as diary protocols (Iida, M. et al., 2012). This was particularly important when eliciting usage experiences because participants needed to report their experience when it occurred, rather than recall their memory in a lab session.

In recognition of this problem, this thesis will explore the positive and negative real experience of people who have a problematic attachment to social media and the role of social media design in promoting problematic attachment with more ecological validity method such as diary study. Also, to explore the usage patterns that characterise people with a problematic attachment to social media.

2.5   PROBLEMATIC ATTACHMENT TO SOCIAL MEDIA: DEFINITION

Attachment theory (Bowlby, J., 1969) holds that the attachment style develops based on the interaction between the child and the primary caregiver. Ultimately, these interactions are an internal model for children that direct their behaviour with caregivers, allowing them to feel safe and protect themselves from separation or loss. On the other hand, if the primary caregiver refuses the child's reactions and needs, the child learns to avoid and to refrain from the caregiver. Alternatively, if the caregiver provides inconsistent responses to the child's activity, then the child may develop an anxious-avoidant attachment to the caregiver. This can happen when people rely on social media to satisfy their social need of relatedness and popularity and when they become overly reliant on the gratification they get from others recognising them and their interactions online.

Using attachment theory, problematic attachment to social media can be defined as an over-reliance on social media to satisfy social and personal requirements, which can eventually lead to harms on personal and social wellbeing (Altuwairiqi, Majid et al., 2019). People rely on social media to satisfy their attachment needs, such as enhance their self-esteem (Gonzales, A. L. and Hancock, J. T., 2011) and maximise their social capital (Steinfield, C. et al., 2008). This reliance can be problematic and associated with harm and side effects on their well-being such as impaired decision making, e.g. posting pictures under peer pressure, lowering self-esteem when comparing less favourably to others and believing their online material is a true reflection of their reality, poor impulse control and anxiety leading to checking social media improperly, e.g. while driving (Woods, H. C. and Scott, H., 2016).

2.6   ATTACHMENT STYLES

Bowlby noted that the relationship between infants and their caregivers plays a crucial role in shaping a later development (Bowlby, J., 1969; Bowlby, J. et al., 1989). In the context of social media addiction, attachment theory is applied to enhance the researchers understanding of problematic social media use (Jenkins-Guarnieri, M. A. et al., 2012; Jenkins-Guarnieri, M. A. et al., 2013). Thus, people interact via social media to satisfy their attachment needs, and this engagement may become problematic. For example, individuals with problems in establishing close relations in real social life may use social media in an uncontrolled manner, thinking that they can expand their friends in social media and this provides them with an opportunity to get close with others (Caplan, S. E., 2002; Lin, S. S. and Tsai, C.-C., 2002; Oldmeadow, J. A. et al., 2013).

However, limited numbers of studies have explored the role of attachment style in social media addictive behaviours. The findings of these studies suggest that online behaviours can be different according to individual attachment style (Çelik, Ç. and Odaci, H., 2012; Mikulincer, M. and Shaver, P. R., 2007; Pempek, T. A. et al., 2009; Rom, E. and Alfasi, Y., 2014; Severino, S. and Craparo, G., 2013; Shaver, P. R. et al., 2005; Yaakobi, E. and Goldenberg, J., 2014). Thus, there are three attachment styles dominant in the literature include secure, avoidance and preoccupation (also called fear of missing out 'FoMO') (Bartholomew, K. and Horowitz, L. M., 1991; Hazan, C. and Shaver, P., 1987).

- **Secure attachment:** Associated with people who are feeling comfortable in their online interaction with others and willing to depend on them (Foster, J. D. et al., 2007). People who correspond to secure attachment are usually characterised by positive experiences with significant others, a sense of confidence in others' availability in times of need, and comfort with closeness and intimacy. For example, they are sociable in their online profile and tend to engage online for a long time (Lin, J.-H., 2016).

- **Avoidance attachment:** Associated with people who tend to indicate nervous reaction when others are too close to them and they feel independent (Behrens, K. Y. et al., 2007). People who correspond to secure attachment are usually characterised by holds negative internal representations of significant others, a self-reliance orientation, and a manifested tendency for emotional distance and procrastination. For example, they have rarely established a friendship with others in social media because they are afraid of disapproval from others (Yaakobi, E. and Goldenberg, J., 2014).

- **Fear of missing out attachment (preoccupied):** Associated with people who need to be in relation with others. They are independent of their surroundings and fear of being socially excluded (Permuy, B. et al., 2010). People who correspond to FoMO attachment are usually characterised by strong desired for belonging and acceptance from others. For example, they invest more time and manifest an excessive level of activates in social media to expand their friends.

2.7 TERMINOLOGY RELATED TO PROBLEMATIC ATTACHMENT TO SOCIAL MEDIA

The various terminologies which have been used to describe this type of problematic behaviour include internet addiction, compulsive internet use, internet dependency, internet abuse, problematic internet use and pathological internet use (Caplan, S. E., 2002; Davis, R. A., 2001; Hall, A. S. and Parsons, J., 2001). Considering the controversy as to whether the term addiction should only be used to describe behaviours involving substances use (Chou, C. et al., 2005), in this thesis the term problematic attachment to social media has been used to describe a usage style associated with a set of harmful consequences such as negative emotions, destructive psychological states and over-dependence.

Despite there being no agreed definition for problematic internet use, many researchers have based their definitions on the criteria applied to pathological gambling and substance dependence disorders (DSM-IV-TR, American Psychiatric Association) (Association, A. P., 2000a), due to the similarities in symptomatology between them (Chow, S. L. et al., 2009; Griffiths, M., 2000). Problematic internet use has therefore been identified as any behaviour which fulfils the key criteria for pathological gambling and substance dependence disorders as applied to internet use, (DSM-IV-TR, American Psychiatric Association). Griffiths (Griffiths, M., 2000), noted earlier six criteria for behavioural addictions:

1. Salience: The activity in question dominates the individual's life.
2. Mood modification: Engage in addictive behaviours as a means of management in their moods to feel better.
3. Tolerance: The need to spend more time on the activity in order to get the same "buzz" as when initially engaged with the activity.
4. Withdrawal: The feeling of negative emotions or physical symptoms when the activity is paused.
5. Conflict: The activity leads to conflict with significant people around the individual or self-conflict.
6. Relapse: The activity is continued with just the same vigour after attempts to abstain.

Since researchers have used the term problematic internet use interchangeably to describe behaviours associated with social media usage, internet usage or gaming, and computer usage, confusion has arisen as to whether all these activities are associated with similar behaviour. Young (Young, K. S., 1999) indicated that people are not becoming addicted so much to the internet as to its applications. She suggested that problematic internet use relates to specific online activities such as cybersex, cyber-relationships, online stock trading or gambling, information surfing and computer gaming. However, evidence considering each proposed subtype is limited, leading to a minimal understanding of the potential similarities and differences. An exception is online gaming, which has benefitted from considerable attention largely due to an

increased awareness of its addictive potential, especially in younger children and adolescents (Kuss, D. J. and Griffiths, M. D., 2012; Tone, H.-J. et al., 2014).

2.8   ASSESSMENT RELATED TO INTERNET ADDICTION

Assessing problematic internet use is challenging due to inconsistencies in the criteria, scales, cut-off points, populations assessed and methods employed to differentiate between problematic and non-problematic behaviour (Byun, S. et al., 2009; Chou, C. et al., 2005). Researchers have used qualitative and clinical interview methodologies to address these inconsistencies. Interviews can offer a thorough assessment of the various aspects of this type of problematic behaviour and identify similarities to other pathological behaviours (Beard, K. W., 2005; Chou, C., 2001; Griffiths, M., 2000). An additional approach to assessing problematic internet use is a self-report assessment. Although this type of assessment lacks the advantages of qualitative ones, they are frequently used by researchers in the field, offering a quick and easy way to assess patterns of internet use. Below Table 1 explain some of the most validated and commonly used instruments:

TABLE 1: INTERNET ADDICTION INSTRUMENTS

Assessment Instruments	Author	Acronym	No of items	Theoretical foundation
Compulsive Internet Use Scale	Meerkerk et al., 2009 (Meerkerk, G.-J. et al., 2009)	CIUS	14	Use substance dependence and pathological gambling criteria as a theoretical foundation
Internet Addiction Test	Young, 1998a (Young, K. S., 1998a)	IAT	20	Use pathological gambling criteria as a theoretical foundation
Internet Addiction Diagnostic Questionnaire	Young, 1998b (Young, K. S., 1998b)	IADQ	8	Use pathological gambling criteria as a theoretical foundation
Generalized Problematic Internet Use Scale-2	Caplan, 2010 (Caplan, S. E., 2010)	GPIUS	15	Use substance cognitive-behavioural theory as a theoretical foundation
Problematic Internet Use	Demetrovics et al.,	PIUQ	18	Use pathological gambling criteria as a theoretical

Questionnaire	2008 (Demetrovics, Z. et al., 2008)			foundation
Internet Related Problem Scale	Armstrong et al., 2000 (Armstrong, L. et al., 2000)	IRPS	20	Use substance dependence as a theoretical foundation
Online Cognition Scale	Davis et al. 2002 (Davis, R. A. et al., 2002)	OCS	37	Use substance cognitive-behavioural theory as a theoretical foundation

2.9 THE PREVALENCE OF PROBLEMATIC ATTACHMENT TO SOCIAL MEDIA

Considering the above evidence regarding inconsistencies in diagnostic criteria, definitions and terminology, therefore, prevalence rates show similar patterns of contradictions. There is not only a lack of data, but prevalence rates can also vary among different cultures and societies.

More than six out of ten (64%) adults in the UK claimed to use social media in 2016. The most prevalent users in the United Kingdom are people aged 16-24 (Ofcom, 2017). Additionally, in the United Kingdom, approximately 15 million Internet users (about 34% of the national population of Internet users) attempted a "digital detox" in 2016 (Ofcom, 2017). In Europe, rates in the adolescent population vary between 5.6% and 7.6% in Italy (Villella, C. et al., 2011). Estimates in Norway reach 1% of the general population (ranging from 16 to 74 years of age) with 5.2% presenting internet users at risk of developing problematic internet usage (Bakken, I. J. et al., 2009). In Finland, estimates for boys and girls ranged from 1.7% to 1.4% in a range of groups aged 12 to 18 years (Kaltiala-Heino, R. et al., 2004).

The above percentages illustrate that there are differences in prevalence rates of problematic attachment to social media across various countries. The reason may be due to the lack of a specific scale to determine the characteristics of problematic attachment to social media.

2.10 RISK FACTORS ASSOCIATED WITH PROBLEMATIC ATTACHMENT TO SOCIAL MEDIA

There are a variety of studies conducted in the field to identify factors associated with problematic social media usage. These can be divided into distinct categories: personality traits, social and family, psychological and mental health characteristics (Dalbudak, E. et al., 2013; Kaess, M. et al., 2014; Tang, J. et al., 2014; Weinstein, A. and Lejoyeux, M., 2010).

Research has shown that certain characteristics of personality have been clear among adolescents who have been identified as high-risk internet users or developed problematic internet usage. These include aggressive and confrontational behaviour, psychological problems such as anxiety, depression, dysfunctional coping strategies, self-harm tendencies, lower happiness, poor family structure, use and abuse of substances such as alcohol and tobacco, unhealthy patterns in routine activities such as bedtime and lifestyle, stress, gender and poor academic performance (Fisoun, V. et al., 2012; Kormas, G. et al., 2011; Schimmenti, A. et al., 2014).

Similar to adolescents, students are among the populations that have been extensively evaluated with regard to their internet usage levels. They have been found to be vulnerable as the life changes associated with student life can be stressful, such as stress related to examinations and pressure for success, career concerns and developing of new social conditions (Chou, C., 2001). It has been recommended that students would possibly use social media in an attempt to undertake to cope with these stressful events (Kim, J. and Haridakis, P. M., 2009; Yan, W. et al., 2014). Moreover, it has been argued that the social media has been developed and formed in such a way to satisfy human requirements, as well as the need to be accepted, acknowledged and belonged (Hinić, D. et al., 2008). Thus, it might even be argued that students would possibly use it as a medium to entertainment and have fun.

Research conducted with adult populations has concluded with some of the risk factors associated with problematic social media use. These are gender, the unsatisfactory financial situation (Bakken, I. J. et al., 2009), increased time spent on the internet especially on entertainment activities (Montag, C. et al., 2010), high levels of impulsivity (Lin, M.-P. et al., 2011) depression (Young, K. S. and Rogers, R. C., 1998),

insecure attachment styles (Lin, M.-P. et al., 2011) and low self-esteem (Armstrong, L. et al., 2000). Moreover, one of the negative consequences of excessive social media uses during adulthood concerns problems in family and relationship.

2.11 SIMILARITIES OF PROBLEMATIC ATTACHMENT TO SOCIAL MEDIA WITH SUBSTANCE-RELATED ADDICTIVE BEHAVIOUR

Problematic internet use has been referred to as a type of behavioural addiction, which has been understood as a set of behaviours similar to substance dependence disorders in their phenomenology, tolerance, mechanisms and response to treatment (Grant, J. E. et al., 2010; Leeman, R. F. and Potenza, M. N., 2012; Winkler, A. et al., 2013). Symptomatically, they are similar in terms of salience, mood modification, tolerance, withdrawal, conflict and relapse (Griffiths, M., 2000). One such behaviour which has been highlighted is pathological gambling, having been classified as an impulse and control disorder in the DSM-IV-TR (American Psychiatric Association) (Association, A. P., 2000a). Research has also uncovered high levels of co-morbidity between behavioural and substance addictions (Pallanti, S. et al., 2006; Sussman, S. et al., 2011). The underlying mechanisms associated with their development and maintenance show evidence of similarities (Grant, J. E. et al., 2010). This evidence has led the DSM-5 (APA, 2013) (Association, A. P., 2013) to include pathological gambling and substance dependence disorders under the same category as substance-related and addictive disorders, strengthening the proposition that behavioural and substance addictions are similar in form. Researchers have evaluated problematic internet use using the diagnostic criteria derived from both pathological gambling and substance dependence (DSM-IV-TR, APA, 2000), due to the discernible similarities in their symptoms (Chow, S. L. et al., 2009; Christakis, D. A., 2010; Griffiths, M., 2000). In addition, there is evidence that problematic internet users have lifetime prevalence for substance use disorders from 38% to 55% (Shapira, N. A. et al., 2000), indicative of commonalities, yet requiring further validation in order to be able to make strong conclusions.

2.12 RELATED WORK: STUDIES ON SOCIAL MEDIA ADDICTION

Research on the relationship between the use of social media and self-esteem, e.g., (Andreassen, C. S., 2015; Steinfield, C. et al., 2008; Woods, H. C. and Scott, H., 2016) concluded that people with low self-esteem tend to overuse social media to enhance

their self-image and self-esteem. However, peer interaction and failure to get recognition may worsen their mood. Other empirical studies reveal that social media addiction is linked to negative psychological states, including anxiety, depression and stress. Moreover, it can contribute to poor academic performance and dissatisfaction with life (Alrobai, A. et al., 2014; Alutaybi, A. et al., 2018; Griffiths, M., 2005). In addition, research has shown that people who engage obsessively with social media are more likely to experience undesirable life experiences such as reduced creativity, increased anxiety and withdrawal from reality (Turel, O. and Serenko, A., 2012).

Most of the existing literature on social media addiction has focused on psychological perspectives, such as the role of social skills (Turel, O. and Serenko, A., 2012) or personality traits (Winkler, A. et al., 2013), in facilitating digital media addiction. Several studies indicate that certain patterns of social media use have a negative impact on psychological well-being (Kross, E. et al., 2013).

2.13 TREATMENT AND PROBLEMATIC ATTACHMENT TO SOCIAL MEDIA

The lack of consensus amongst health professionals regarding the treatment of problematic internet use is another area of contention, which has limited the efficacy and validity of various available treatments. To exemplify the problem, Thorens et al. (Thorens, G. et al., 2009) conducted a study examining the beliefs and attitudes of Swiss mental health specialists about problematic internet use. They discovered that despite most health professionals having an increased awareness of the problem, they were less likely to screen, diagnose and treat it, due to the lack of official guidelines regarding methods of assessment and treatment.

Nevertheless, health professionals have used various methods such as cognitive behavioural therapy, motivational interviewing, reality therapy, and group therapy to mitigate the negative effects of excessive internet use. Such psychosocial treatments have proven effective in managing the amount of time spent online as well as alleviating the mental health symptoms connected with excessive internet use (Essig, T., 2012; Winkler, A. et al., 2013). Each type of therapy comes with its own theoretical framework leading to a difference in treatment methods. Despite it being reported that the majority are effective, there is a lack of studies to confirm whether such treatments

are either reliable or valid (except for cognitive behavioural therapy). Studies by Young (Young, K. S., 2007; Young, K. S. and De Abreu, C. N., 2010) considered the effectiveness of cognitive behavioural therapy specifically for problematic internet use, focussing on outcome variables for clients undergoing treatment as regards individual motivation, online time management, improvement in social, engagement in offline activities, and ability to refrain from problematic applications. Clients were assessed in the third, eighth and twelfth sessions and a six-month follow-up and were proven to be able to manage their symptoms by the eighth session. A case study research conducted by King et al. (King, D. L. et al., 2012) has also validated the effectiveness of cognitive behavioural therapy.

Additional treatment for problematic internet use includes pharmacological interventions. Health professionals have administered medicines initially used effectively for controlling substance misuse, and these have been found to be effective for controlling problematic internet use. Research has uncovered in the reward pathway in problematic internet users (Hou, H. et al., 2012; Jun, L. et al., 2010; Kim, S. H. et al., 2011). Such deficiencies could explain the tendency of individuals to misuse substances or indulge in activities such as gambling to alleviate pre-existing feeling high.

Further research needs to be undertaken to ascertain both the long-term effectiveness of these psychosocial and pharmacological treatments and whether combining treatments could maximise efficacy (Huang, X.-Q. et al., 2010; Winkler, A. et al., 2013). Moreover, systematic criticisms have been made regarding most of the studies in this area due to the presence of factors such as the inclusion of a control group, random sample allocation, effect size, and consistency of diagnostic criteria and definitions. It is important for future research to take these factors into account to validate the effectiveness of each possible intervention to address problematic internet use.

Despite the research on the psychological side of the problem and the treatment; there is a lack of research that identifies the role of social media design in both triggering the problematic usage as well as in helping to regulate it. At the same time, on the technical level, there are attempts by leading technology companies in releasing applications for managing addictive digital media behaviours. For example, Apple has recently issued the Downtime feature on its iOS system. This feature helps users monitor the time they

spend on their digital media and control notifications. However, it is questionable whether the feature would work beyond making people more aware of the usage. The research in (Alrobai, A. et al., 2016) identified a range of risks in software-assisted behavioural change tools, making their engineering a complex problem and requiring a multidisciplinary approach bringing expertise from information systems and psychology together. This call for further research to gain a deeper understanding of the role such software can play in combatting problematic attachment to social media.

2.14 BEHAVIOURAL CHANGE THEORIES AND MODELS

Behavioural change provides insight into the factors associated with changes in human behaviour and could prove useful in a range of fields including education (Mintz, J. and Aagaard, M., 2012), health care (Free, C. et al., 2013) and behavioural addiction such as smoking cessation (Velicer, W. F. et al., 1992). The purpose of behavioural change theories is to establish connections between attitudes and behaviours and to reduce the discrepancies between, for example, the gap between the desire for behavioural modification and its fulfilment (Webb, T. L. et al., 2010) through assisting in the formation of plans to achieve the targeted behaviour. In the following section, a variety of theories and models have been proposed to improve our understanding of positive human behavioural changes and also to understand the dynamics of behavioural change.

2.14.1 THE THEORY OF PLANNED BEHAVIOUR

Ajzen articulated The Theory of Planned Behaviour (TPB) (Ajzen, I., 1991) as a social cognition model highlighting the role of the intention to anticipate actions. TPB identifies three components which form the basis of the intention (see Figure 2):

- Personal attitude toward the behaviour as influenced by expectation and the desired outcomes
- Social factors, e.g. social pressure and norms
- The perceived capacity to perform the behaviour

TPB evolved from the Theory of Reasoned Action (Bagozzi, R. P., 1986) by adding the third component which conveys the same meaning of self-efficacy (Terry, D. J. and

O'leary, J. E., 1995). These components can be used to provide frameworks useful in estimating individuals' behaviours (Riekert, K. A. et al., 2013).

This theory helps identify factors needing to change, but not in offering specific suggestions for change (Hardeman, W. et al., 2002). TPB can be aligned to the first processes of the Transtheoretical Model proposed by Prochaska (Prochaska, J. O., 2013), which are consciousness raising, environmental re-evaluation, dramatic relief and social liberation. For example, self- liberation is about one's belief in the possibility of change and can be used to identify effective intervention strategies such as the persuasive principle normative influence (Torning, K. and Oinas-Kukkonen, H., 2009). This could be beneficial if the problem arises from false judgement, e.g. "it is impossible to reduce digital usage".
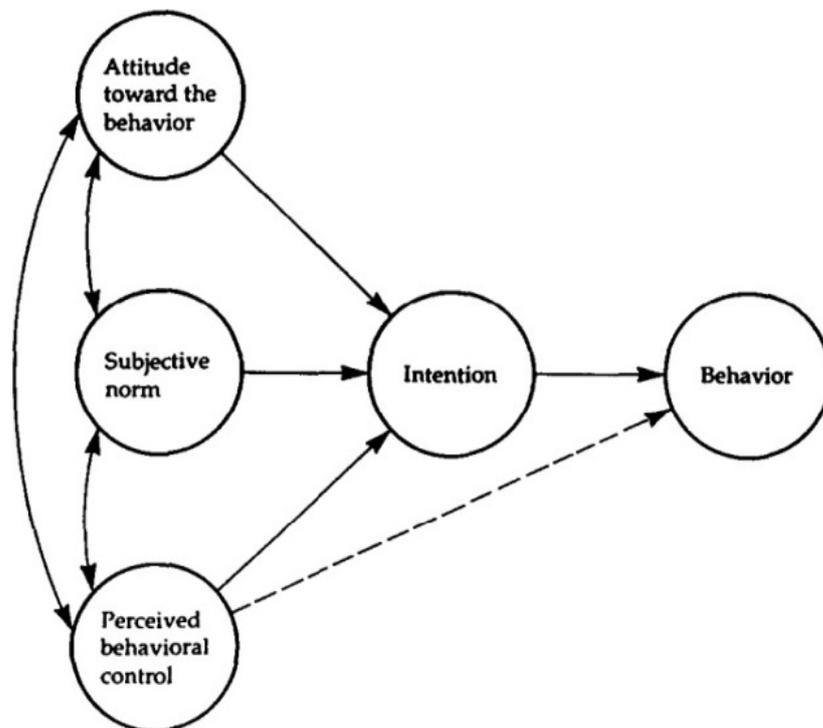
FIGURE 2: THEORY OF PLANNED BEHAVIOUR

2.14.2 SOCIAL COGNITIVE THEORY

The Social Cognitive Theory (SCT) proposed by Bandura (Bandura, A., 1986) is another social cognition model that relies on the individuals' intentions to predict behaviour (see Figure 3). It is similar to TPB in its emphasis on intention but places a

greater emphasis on self-efficacy (Webb, T. L. et al., 2010) and on individuals motivation levels improving through seeing others with similar cases succeeding, thereby increasing their own chances of behavioural change (Mark, M. M. et al., 2011). Torning and Oinas-Kukkonen have mapped these social learning principles as effective persuasive techniques (Torning, K. and Oinas-Kukkonen, H., 2009), illustrating the way that these theories can work together to provide more effective and sustainable behavioural change.
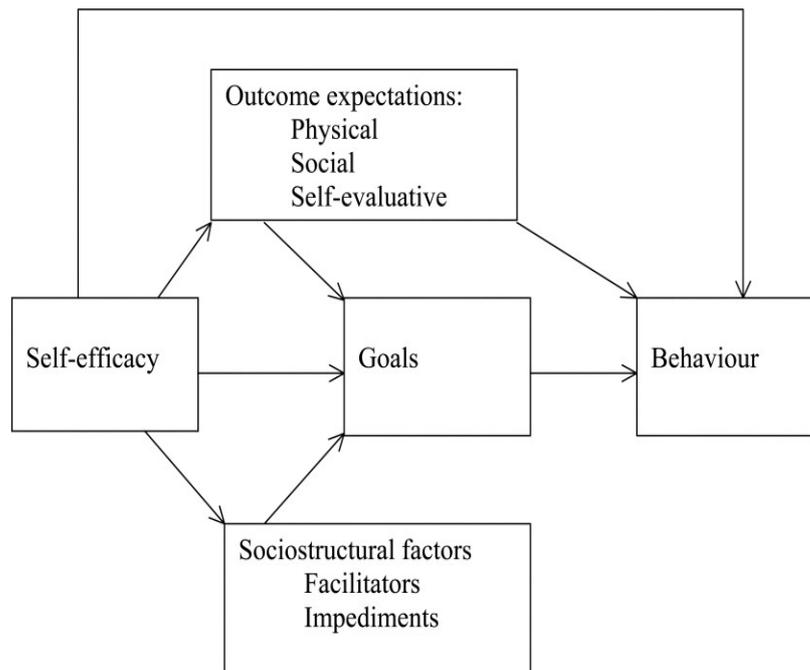
FIGURE 3: SOCIAL COGNITIVE THEORY, SOURCE: BANDURA, 2000

2.14.3 THE CONTROL THEORY

The Control Theory can be defined as "a general approach to understanding the self-regulating systems" (Carver, C. S. and Scheier, M. F., 1982). It requires goal as a "reference value" to contrast to existing behaviour, but it is rarely used as the grounding for interventions for addictive behaviours due to the difficulty in setting goals (Webb, T. L. et al., 2010). However, Webb et al. (Webb, T. L. et al., 2010) suggest that this theory can be useful in supporting other processes and theories of self-regulation (see Figure 4).

Sayette and Griffin (Sayette, M. A. and Griffin, K. M., 2011) argue that difficulties in setting "standards" may prevent behavioural change. Such difficulties arise from skewed standards, e.g. smoking to improve mood, and conflicting goals like healthy living and enjoying the moment.
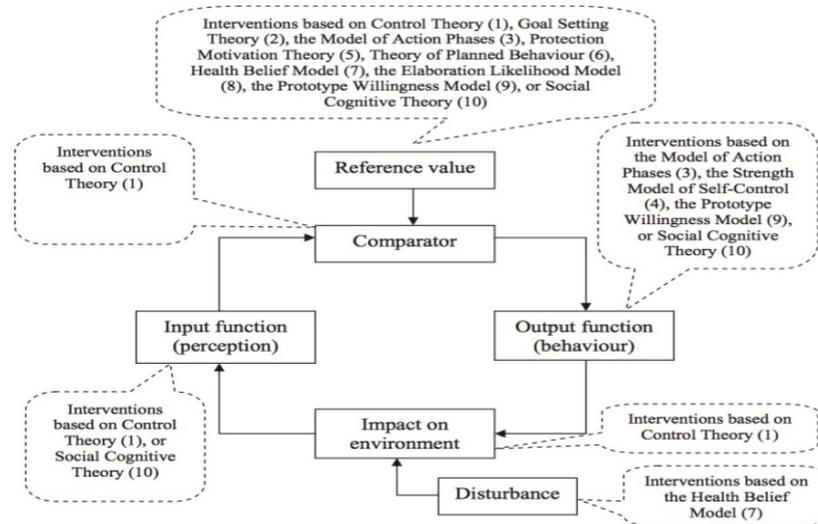
FIGURE 4: USING THE CONTROL THEORY TO INTEGRATE OTHER MODELS FOR SELF-REGULATION

2.14.4 TRANSTHEORETICAL MODEL

Transtheoretical Model (TTM) or stages of change proposed by Prochaska (Prochaska, J. O. and Diclemente, C. C., 1983) is one of the key models in behaviour change research and is widely recognised by many researchers and practitioners. The model describes how people gain positive behaviour or modifies problem behaviour. The central organising construct of the model is the Stages of Change. This model proposes mapping individuals to one of five core stages: pre-contemplation, contemplation, preparation, action, and maintenance. Table 2 describes these five core stages. Additionally, the TTM attempts to integrate core processes of behavioural change (e.g. consciousness-raising, counter-conditioning, and stimulus control) and map them to the stages of the model (Sutton, S., 2001).

TABLE 2: TRANSTHEORETICAL MODEL STAGES

Stages of change	Description
Pre-contemplation	No intention to take action within the

	next six months
Contemplation	Intends to take action within the next six months
Preparation	Intends to take action within the next 30 days and has taken some behavioural steps in this direction
Action	The behaviour has been changed for less than six months
Maintenance	The behaviour has been changed for more than six months

2.14.5 THE HEALTH BELIEF MODEL (HBM)

The Health Belief Model (HBM) was developed in 1950 (Janz, N. K. and Becker, M. H., 1984). The underlying principle of this model is that individuals "must feel personally vulnerable to a health threat", as protective measures would be executed (Nisbet, E. K. and Gick, M. L., 2008). Performing a specific behaviour depends on four factors dealing with one's self-perception and perceived threats (see Figure 5). The HBM model advocates the concept of self-efficacy as its theoretical basis.
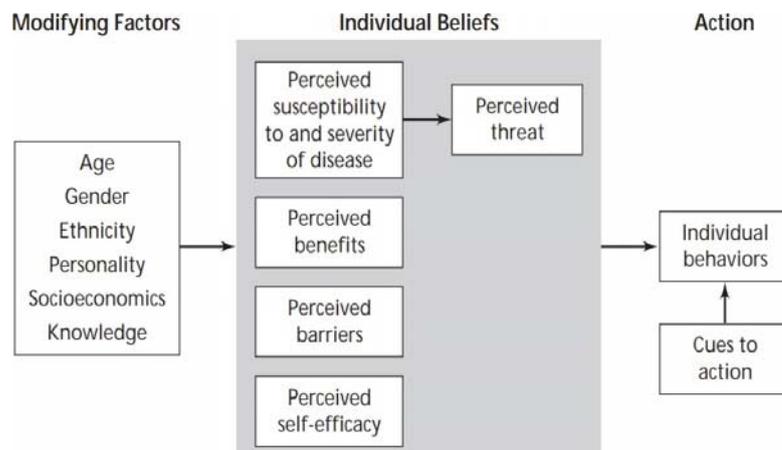
FIGURE 5: HEALTH BELIEF MODEL COMPONENTS, SOURCE: GLANZ, 2008

It is possible that this model might not be adequate when dealing with addiction if individuals are in denial of their addictive tendencies despite the appearance of relevant symptoms. In situations requiring obvious protection such as AIDS risks and cancer screening, this model is used more broadly (Nisbet, E. K. and Gick, M. L., 2008). Webb et al. (Webb, T. L. et al., 2010) argue that there is no published research for HBM-based interventions in the study of addiction, yet it could provide an effective model for internet or social media addiction, despite no scientific work having been done in this

field. Wang et al. (Wang, Y. et al., 2016) discovered that some constructs of the HBM, such as perceived benefits and perceived barriers are risk factors for Internet addiction.

2.14.6 GOAL SETTING THEORY

The Goal Setting Theory posits that setting goals can have a positive impact on performance. The two foundations of this theory are:

- Specificity, i.e. "reference point" in which targeting a specific goal is more effective than 'do-your-best'.
- Difficulty which revolves around the perceived capability and the self-efficacy concept.

In the field of addictive behaviours, goal setting is a significant aspect, where any goal set should push an individual beyond their comfort zone to defeat addiction (Webb, T. L. et al., 2010). Methods for setting up goals still need to be researched further, e.g. whether it should be self-set, provider-set, participatory-set, or set up by recommender systems (Strecher, V. J. et al., 1995). Goal setting is essential to guide monitoring mechanisms and ensure meaningful engagement. Glanz et al. (Glanz, K. et al., 2008) identified three important aspects of goal setting:

- Intention as a core component.
- A goal should be created with the proximity of outcomes in mind (i.e. distal or proximal goals).
- Grounding goals on planned and incremental steps to enhance self-efficacy.

Suggesting goals that are irrelevant to members of a group could severely affect group sustainability; therefore goals should unite individual members in a group, meaning that there should be a "S.M.A.R.T" way of goal setting (Doran, G. T., 1981).

2.14.7 PERSUASIVE TECHNOLOGIES

Persuasive technology attempts to modify human behaviour through gentle persuasion rather than pressure (Cialdini, R. B., 2001; Fogg, B. J., 2002). It focuses on how to design interactive systems and services to influence people's attitudes and promote

positive behaviour change. In the following subsection will present the basic persuasive strategies, models and principles.

2.14.7.1 FOOG'S PRINCIPLES OF PERSUASION

Fogg (Fogg, B. J., 2002) proposes to use computers to change what people think and what they do and provides seven principles to reach that goal: reduction, tunnelling, tailoring, suggestion, self-monitoring, surveillance and conditioning.

- Reduction: making a complex task easier for people, usually by reducing some of the necessary steps to achieve the target.
- Tunnelling: designing systems to promote certain behaviour by taking people step by step through a course of actions.
- Tailoring: encouraging people to modify certain behaviour through the provision of important information.
- Suggestion: proposing ideas at the right time to remind people to perform the behaviour at that time.
- Self-monitoring: enabling people to monitor their behaviour in a certain task.
- Surveillance: observing the behaviour of others, which may cause modified behaviour due to an awareness of being monitored themselves.
- Conditioning: encouraging individuals to carry out the desired behaviour through positive reinforcement.

2.14.7.2 CIALDINI'S PRINCIPLES

Cialdini's (Cialdini, R. B., 2009) proposed a list of evidence-based principles to influence behaviour, providing insight into the psychology of persuasion. The key idea behind this model is influencing and motivating people to accept and share the new behaviour. This model consists of six principles:

- Reciprocity: The practice of giving what is needed to others in order to receive things in return.
- Consistency and commitment: Focusing on align beliefs and values to choice and action.
- Social proof: Individuals are influenced by others behaviour (e.g. social norms) to create a sense of belonging and avoid retribution.

- Liking: Individuals feel obliged to those they like as a result of trust, similarity, or attraction.
- Authority: The right to give orders and consider a professional opinion if an individual lacks relevant experiences such as parents and managers.
- Scarcity: Choosing to obtain something immediately because it will become less available later.

2.14.7.3 FOGG'S MODEL

The Fogg behaviour model (FBM) (Fogg, B. J., 2009) is a psychological framework for motivating people to obtain better options and create new habits. FBM has three factors: motivation, ability, and triggers. The model emphasises that for the target behaviour to happen, people need to have sufficient motivation, sufficient ability, and an effective trigger. All these three factors have to be present at the same time for the behaviour to occur.

- Sufficient motivation: People have to be sufficiently motivated to change their behaviour.
- Sufficient ability: People need to have the ability to perform the behaviour.
- Adequate trigger: They have to be triggered, or prompted, to perform the behaviour at the right time.

2.14.8 THE ROLE OF BEHAVIOUR CHANGE THEORIES IN THE THESIS

The purpose of this thesis is not to develop a new behavioural change model or to devise a method for changing people behaviour. Rather, the thesis is concerned with a better understanding of the lived experiences of those who encounter problematic attachment to social media. Furthermore, the thesis sets out to create behavioural archetypes for those with problematic attachment to social media. These archetypes will then be useful for software designers by helping them to classify users encountering problematic attachment so that tools can be incorporated into social media platforms to help users address and manage their problematic attachment.

Seven models and theories are reviewed in order to identify the principles that underpin them as well as the practical implications for encouraging people to change their

problematic behaviours. These models and theories draw upon approaches used in the empirical literature when discussing various addictions. However, the review overlooked a number of theories that have previously been utilised in social and health psychology to encourage behavioural change. It is possible that these theories will help to understand better the motivations, triggers, behaviours and patterns associated with problematic attachment. Therefore, the intention is to summarise these theories to gain a better understanding of how the behaviour model working. Addictions and problematic attachment are formed by mechanisms associated with emotional, cognitive and physiological processes, so the manifestations of addiction are primarily behavioural (Association, A. P., 2000b). As such, in order to gain a better understanding of addictive behaviours and promote effective interventions, it is likely to be worthwhile investigating behavioural change theories that explain aspects of effective self-regulation.

Among these theories is the theory of planned behaviour (TPB), which states that behaviour is governed by a person's interaction to undertake behaviour. The intention to act is determined by a combination of factors including subjective norms, attitude and perceived behavioural control. Subjective norms stem from social pressures about how people are expected to behave. Attitude is concerned with how a particular person reflects on performing the behaviour (positively or negatively). Finally, perceived behavioural control refers to the degree of difficulty a person attaches to a particular behaviour. It is possible to anticipate how various behaviours will be performed using the TPB, including behaviours relating to technology (Lin, H.-F., 2006; Walsh, S. P. and White, K. M., 2007). According to the TPB, it is changed in beliefs that result in behavioural change.

However, control theory argues that the act of setting a target effectively creates a reference value in a control system, enabling the current state of behaviour (input function) with the desired reference point.

According to social cognitive theory (SCT), individuals accept challenges on the basis of efficacy beliefs. Similarly, efficacy beliefs are the reference when people decide how long to continue when faced with challenges and whether or not failure serves as a source of motivation in future (Bandura, A., 2001). SCT considers the relationship

between beliefs and behaviour to be a reciprocal learning process whereby people choose, respond to and learn from their experiences (Bandura, A., 2001). As with control theory, SCT is understood to entail various processes including self-guidance (based on personal expectations), self-monitoring and corrective self-reactions (Bandura, A., 1986, 1991).

The goal-setting theory involves individuals setting themselves suitably challenging targets and this theory is important when attempting to alter problematic behaviours (Locke, E. A. and Latham, G. P., 2004). There are various levels within this theory and it could involve the use of related techniques designed to alter behaviours such as specific, measurable, attainable, realistic and timely (SMART) goals (Abraham, C. and Michie, S., 2008). Efforts to alter behaviours that are based on goal-setting theory are likely to affect the nature of the reference value in the control process. Most efforts at goal-setting take place in organisational settings and typically relate to improving job performance but goal-setting can also be used for behavioural interventions such as an attempt to control a smoking habit or hasty posting in Facebook. Whitlock et al. (Whitlock, E. P. et al., 2004) evaluated interventions based on behavioural counselling to control alcohol abuse and concluded that interventions were only successful if they included at least two of the three key elements: advice, feedback and goal-setting. Meanwhile, some were employed goal-setting techniques to encourage people to exercise as part of their attempts to stop smoking (Ussher, M. et al., 2003).

2.15 PSYCHOLOGICAL THEORIES DRAWN FROM EARLIER STUDIES ON ADDICTION

Psychological approaches to the explanation of problematic attachment to social media have often been based on concepts that are typical to those of other addictive behaviours, including compulsive or impulsive behaviours, e.g. addictive gambler. There are a variety of psychological theories and models that may contribute to the explanation of problematic attachment, including cognitive theories, personality or identity theories, and social psychology theories. The following subsections attempt to briefly explain some of these theories that are considered to underlie problematic attachment to social media usage.

2.15.1 ATTACHMENT THEORY

Attachment refers to the extent to which an object identified with an individual is used by that person to manage his or her self-identity (Bowlby, J. et al., 1989). The main emphasis of attachment theory is interpersonal relationships, and specifically infant-caregiver interactions.

The findings that have emerged from the limited research into the role of attachment theory in social media indicate that attachment style in social media interaction mirrors that exhibited in an offline setting.

Four attachment styles have been identified. 1) Secure attachment is when people are at ease in their online interaction with others and willing to trust. 2) Individuals with avoidant attachment style demonstrate nervousness when others become too close to them, desiring to maintain independence. 3) Individuals with ambivalent attachment style people are hesitant and anxious about others leaving them. 4) Those with preoccupied attachment feel anxious and uncomfortable without social interaction, e.g. friendships.

2.15.2 MOTIVATION THEORY

Motivation can be key in boosting productivity in the long term, and huge efforts have been expended by organisations to look at ways to motivate staff. There are additional benefits to be gleaned from effective motivation, including enhanced social and mental wellbeing. Numerous studies have explored the impact of motivation on different sectors of the economy, including health care (King, D. et al., 2013), education (Simões, J. et al., 2013) and business management. Motivation has also been widely studied in the discipline of psychology. Various definitions of motivation have been proposed in the psychological field, including "psychological processes that cause the arousal, direction, and persistence of behaviour." (Mitchell, T. R., 1982). Without motivation, there is little to stimulate the will of individuals to behave in a desired manner.

2.15.3 SELF-DETERMINATION THEORY (SDT)

The purpose of SDT is to show the connection between motivation and beginning the process of behavioural change and self-regulation (sub-theories are cognitive evaluation

theory and organismic integration theory). Additionally, cognitive evaluation sub-theory posits the essential roles of intrinsic motivation and extrinsic motivation. Intrinsic motivation means engaging in a behaviour because it is inherently rewarding. On the other hand, extrinsic motivation involves engaging in the behaviour in pursuit of an external reward, such as posting on Facebook in order to obtain new friendships. The underlying psychological needs are autonomy, competence and relatedness (Ryan, R. M. and Deci, E. L., 2000).

- **Competence**: people have the skills and belief to be able to perform the task.
- **Autonomy**: people have freedom and control over their actions.
- **Relatedness**: people are connected to others through positive relationships.

Ryan argues that psychological health requires that all three needs be satisfied. Consequently, intrinsic motivation in problematic behaviour might promote increased usage of social media, resulting in problematic usage as a way of gaining the reward of satisfaction. Organismic integration sub-theory takes this idea further by proposing six motivation regulators (see figure 6).
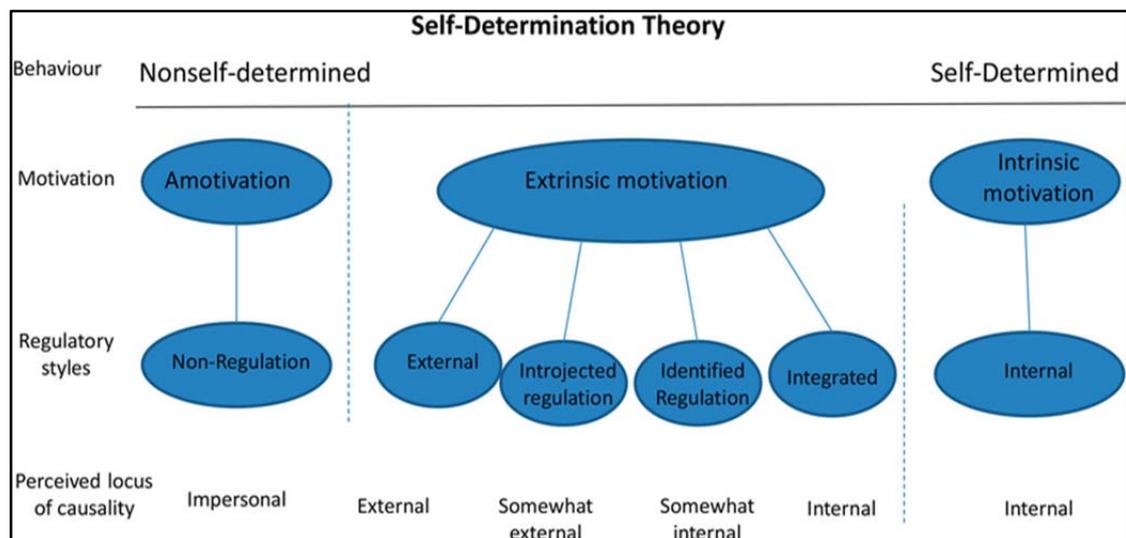
FIGURE 6: THE MOTIVATION CONTINUUM ACCORDING TO THE SELF-DETERMINATION THEORY (RYAN AND DECI, 2000)

2.15.4 SELF–EFFICACY THEORY

This theory has been proposed by Bandura and can be defined as "the degree to which an individual feels confident and capable of performing certain behaviour in specific

situational contexts" (Bandura, A. and Wessels, S., 1994). Bandura has identified four main aspects influencing self-efficacy:

1) Performance accomplishments, which motivate change by reminding individuals of previous success;

2) Vicarious experiences, which represent an individual's knowledge about their capabilities, and can be affected by their social environment;

3) Verbal persuasion, which focuses on the individual's analysis of self-efficacy through, for example, convincing self-talk;

4) Psychological and emotional arousal, defined as activities which indicate an individual's vulnerability or dysfunction, e.g. self-talk techniques to reduce anxious thoughts.

In the context of social network sites, when people believe in their abilities to maintain their social media and form new relationships, this demonstrates a manifestation of self-efficacy in social media interaction.

2.15.5 IDENTITY THEORY

The aim of the identity theory is to explain personal behaviour based on one's role. In this case, identity is shaped by the individual recognising themselves as an object and accepting the classification process referred to as identification. Identification occurs in a structured society, requiring people to group themselves according to their role within society, and in all likelihood having similar behaviour (Hogg, M. A. et al., 1995; Stryker, S., 1968). The notion of self can also be seen as a form of social behaviour (Stets, J. E. and Burke, P. J., 2000).

Role identity focuses on covering the role of an individual occupies with their behaviour while performing that role. Upon taking up the role, individuals will tend to behave in a like manner to others in the same position. Within a group, individuals have different roles that determine how they play out their role in society, based on variations in self-concept. The reciprocal relationships that exist between self and society can be explained by identity theory, which assumes that society is complex since identity is a key aspect connecting social structure with individual actions.

2.15.6 SOCIAL IDENTITY THEORY

Social identity theory is a social psychological theory that classifies group processes and group relationships and clarifies the idea of self-concept emerging from being part of a group (Tajfel, H. and Turner, J. C., 1985). Multiple identities spring from an individual's related groups, impacting on how they behave in different contexts. An in-group refers to groups that an individual has identified with, whereas outgroups refer to similar groups that the individual does not identify with (Stets, J. E. and Burke, P. J., 2000). The mentality of "us" and "them" is created through three processes:

- **Social Categorisation:** People categorise others in order to recognise aspects of which they are and identify shared views and issues. They categorise themselves in social groups, e.g. teachers and doctors. A person often belongs to more than one category, building up a unique concept of self.

- **Social Identification:** Individuals embrace associated group identities, acting out normative behaviour from the group as a whole. As a result of identifying with a specific group, an individual will place emotional significance and self-esteem on that identification.

- **Social Comparison:** People tend to compare their "in-group" to the "out-groups". So, in order to protect their sense of worth, they compare other groups negatively to their own, which may partly explain prejudice and discrimination. Furthermore, individuals are concerned with how others in their group will view their actions and may want to comply to enhance their self-esteem.

2.15.7 SELF-CONCEPT THEORY

Self-concept theory centred on describing ways in which people organise and interpret their inner world of personal existence (Rogers, C. M. et al., 1978). The different aspects of an individual's experiences and roles form his identity. Self-concept is an individual cognitive identity reflecting how one thinks about the self. It is dynamic due to the role that individual occupies and how that role changes over time. Carl Rogers (Rogers, C. M. et al., 1978) suggested that self-concept incorporates a person's real self (actual thoughts and beliefs), ideal self (the person one wants to be) and public self (a

presentational combination of the two). The variance between these different selves will often lead to diminished self-concept.

2.15.8 SELF-PERCEPTION THEORY

Daryl Bem developed self-perception theory and stated that people develop attitudes by observing their behaviour and identifying attitudes that may have triggered a reaction (Bem, D. J., 1972). This theory is based on a position where there was no previous action on a subject due to a lack of experience in this field. The theory suggests that people look at their actions just as an outsider sees a personality and draws conclusions about why they are motivated to do what they did. Moreover, the theory suggests that people incite attitudes without gaining access to inner cognition and moods (Robak, R. W. et al., 2005). A person interprets his own public behaviour in a rational manner in the same way that he attempts to explain the behaviour of others.

2.15.9 SELF-PRESENTATION THEORY

Self-presentation theory was first conceptualised by Erving Goffman (Goffman, E., 1959). It is the process that individuals represent themselves in the social world. This process occurs on the conscious and unconscious levels and is usually motivated by the desire to satisfy others or to meet the needs of the self. Self-presentation can be used as a way to manage others' impressions of themselves. Strategic or tactical self-presentation occurs when people seek to create the desired image or call the response required from others.

2.15.10 SKILL ACQUISITION THEORY

According to Speelman (Speelman, C. P. and Kirsner, K., 2005), skill acquisition is a particular form of learning. Would be adequate to define learning as representing information in memory regarding certain environmental or cognitive events. DeKeyser (Dekeyser, R., 2007) states that the basic claim of skill acquisition theory is that learning a wide range of skills shows a noticeable similarity in the development of the initial representation of knowledge through initial changes in behaviour to ultimately fluent, spontaneous, and highly skilled behaviour.

Furthermore, skills Acquisition Theory argues that adults' primary way of learning new skills is through explicit stages and repeated use. As a form of learning, skill acquisition involves some environmental and cognitive processes. Therefore, learning through doing will enable skill acquisition, which can eventually become routine behaviour (Speelman, C. P. and Kirsner, K., 2005).

2.15.11 SOCIAL ROLES THEORY

The main proposition in social role theory is that individuals within society have different roles based on their gender, incorporating the idea of the division of labour between men and women. Women are assumed to be largely at home, nurturing children and raising them to be well-mannered individuals, whereas men are assumed to have an active role outside the home in earning money and providing for their family's physical needs (Biddle, B. J., 1986).

Through the lens of social role theory, it could be argued that problematic attachment to social media occurs because of failure to realise one's social role. In contemporary times, women have taken on roles in business and in the domestic realm, both parents work, often leaving children on their own. As a result, children seek advice from social media and embrace social media as an alternative to real companionship, resulting in overuse of the social media, a problem which continues into adulthood since it is so addictive and has become connected with their sense of self.

2.15.12 SOCIAL EXCHANGE THEORY

Social exchange theory is a method of depicting society as a sequence of interactions based on expected rewards and punishment (Homans, G. C., 1958). This theory posits that the interactions of people are determined by these rewards or punishment, with people being more predisposed to engage in actions that elicit approval from others as opposed to actions that elicit disapproval.

Excessive social media usage has multiplied because of the perceived rewards. For example, individuals may use social media to promote their work and enhance their reputation. If they subsequently achieve good business, they will directly associate this reward to social media, which strengthening excessive behaviour. To maintain this

status, people will continue using social media for long time; then the behaviour becomes addictive and may evoke negative effects.

2.15.13 RECIPROCITY THEORY

Reciprocity is when rewards are chosen to kind actions and punishment is chosen to unkind actions (Fehr, E. and Gächter, S., 2000). When evaluating the kindness of action, this theory emphasises the need to consider the intention behind an action. Individuals consider which is more beneficial, the promised rewards or the cost involved. Reciprocity is a strong behaviour determinant, with reciprocity theory emphasising the types of bonds, symbolism and obligations that are central to giving and exchange. Describes why different forms of exchange influence the development of trust and affective bonds so differently (Molm, L. D., 1997).

Reciprocity theory is key to understand interaction in social media because of its significant role in online behaviour. For example, in an online forum, when an individual asks a question, the discussion that follows leads to further questions. The reward of an individual's view being given prominence through debate results in that individual following up the discussion until it becomes addictive and may even prevent them from engaging fully with work responsibilities. In online gaming, the compulsion to win is considered to outweigh not taking part in the game, reinforcing its addictive tendencies.

2.15.14 SOCIAL CAPITAL THEORY

Social capital refers to the networks, values, shared norms, and understanding that enhances group collaboration (Burt, R. S., 2000). There are three main forms of social capital: 1) The bonds that emerge from individuals having a similar identity to people such as family members, work colleagues and peers; 2) the link formed between people who have a similar sense of identity such as associates; 3) the connections which ensure that people can be linked up or down their social networks (Lollo, E., 2012).

According to this theory, attachment to social media could result from the networks gained from using social media and their online presence. Users maintain their social networks through frequent chatting and sharing updates. Moreover, social media

enables people to maintain close relationships with those who live in a different location to themselves. Wanting to keep up with a diverse friendship circle can intensify an individual's attachment to social media. Negative effects emerging from the reduction of online presence may include loss of job opportunities or long-distance relationships, potentially leading to stress or anxiety.

2.15.15 SOCIAL PROXIMITY THEORY

Social proximity theory is based on the assumption that people tend to form relationships with people close to them in location as opposed to those who live far away due to a preference for the familiar (Glanz, K. et al., 2008). Moreover, relationships are more likely to flourish among those with whom there is regular interaction. However, emotional proximity can be as important as physical proximity meaning that people tend to form relationships with others who have similar feelings as them.

Developments in social media have made it possible for people who are strangers to know lots about other people before meeting. Video chatting can create a real sense of closeness due to being able to see the other person and all their emotions while conversing. This increases perceived proximity among people despite their physical distance. In addition, the sharing of personal information with social media friends can intensify the sense of emotional proximity, as well as enabling closeness amongst friends who are separated by distance (Amichai-Hamburger, Y. et al., 2013). When online presence is disrupted, this loss of proximity can lead to anxiety and depression.

2.15.16 THE ROLE OF PSYCHOLOGICAL THEORIES IN THE THESIS

Developing problematic attachment to social media and exploring their side effects present an interdisciplinary challenge. The attempt to resolve such problems will involve psychology which is associated with all cognitive, biological, social sciences and Human Computer Interaction. Psychologists have insight and knowledge that helps to explain how people become attached to and dependent on social media. Based on this insight, it is possible to develop more effective interventions and investigate how such interaction may deliver improvements in behavioural change. Indeed, Psychologists have developed an extensive knowledge base about attitudes, behaviours, cognitions

and emotions. As such, psychology can contribute significantly to the existing knowledge of the author about the real experiences of people with a problematic attachment to social media.

Attachment theory is arguably among the most important psychological theories (Bowlby, J. et al., 1989) and is concerned with explaining the nature of the relationship between carers and young children. The attachment has been extensively researched by developmental psychologists, but there has been surprisingly little effort in the empirical literature to clarify its effect in the context of problematic social media use. The styles of attachment have its effect on people's emotions, behaviours and relationships. Therefore, attachment theory was adopted in this research as a model for classifying people with problematic social media use so as to better understand their psychological state, emotions and patterns of use.

Among the many reasons that motivate people to use social media, one of them is that it enables people to communicate with each other. This influences how people express themselves on social media and the way in which they behave online in an attempt to grow their friendship group. As such, this may cause them to form a bond with social media and this advocate the use of attachment theory in this thesis. Moreover, attachment theory helps to explain relationships which are highly influential in determining a person's identity, self-esteem, emotions, behaviours and psychological state.

Reviews of the other psychological theories were also undertaken to expand the author's knowledge in relation to problematic behaviours. For instance, it is necessary to understand identity theory because people use social media to express their identity and present themselves to the world. It is possible to express themselves either through interactions with others online or online profile settings and these channels are used to develop self-esteem as well as their self-concept. This could result in a problematic attachment to social media if they are intent on promoting their self-concept.

Another motivation for people to engage online is to develop a sense of belonging. Humans have a need to belong by becoming involved with others and accepted by them. People can use social media to communicate with other people, thereby satisfying their

need to belong. This is especially attractive when people are able to discuss shared interests. If a person has a particularly strong urge to belong, this could result in them developing a problematic attachment to social media. In addition, social media offers people a way of satisfying a variety of social needs including autonomy, relatedness and competence (Wan, C.-S. and Chiou, W.-B., 2006), all of which are associated with self-determination theory (Ryan, R. M. and Deci, E. L., 2000). For instance, people may choose to engage with others via social media in order to experience a feeling of relatedness and if they believe they are relatively popular, they are likely to feel more competent. On a general basis, users of social media are able to benefit from immediate access to gain satisfaction and they have the ability to manipulate how they present themselves online which may develop their problematic attachment to social media and consequently affect their emotions and online behaviours.

2.16 TECHNOLOGY-ASSISTED BEHAVIOURAL CHANGE

Behavioural change technology, i.e. E-health, are software-based tools to implement a wide range of services for holistic health care, especially for those with limited health care access. Services provided are as varied as simple reminding and monitoring utilities to complex management and interventions systems (Bennett, K. et al., 2010).

2.16.1 THE ADOPTION OF TECHNOLOGY IN HEALTH CARE

In mental health practices, research indicates an increasing need for alternative approaches to health interventions because psychological services have limited resources (Leigh, S. and Flatt, S., 2015). The introduction of IT solutions in health care management has generated technological innovations that could address this limitation. E-health technology for behavioural change is one innovation offering professional interventions and the promotion of health and well-being.

E-health technology for behavioural change has become more widespread in the addiction-related fields. For example, to encourage responsible drinking, an online intervention can be used for alcohol addiction (Bewick, B. M. et al., 2008). Advances in IT and Web 2.0 have enabled a new range of more intelligent, context-aware, continuous and social online interventions. For example, the use of mobile applications

for behaviour modification is becoming a trend, e.g. for smoking cessation (Bricker, J. B. et al., 2014) and diet and eating disorder (Pagoto, S. et al., 2013).

2.16.2 E-HEALTH TECHNOLOGY AND SOCIAL MEDIA ADDICTION

Recent research in social media addiction has largely been conducted from the social science perspective (Ryan, T. et al., 2014), including work by Cam and Isbulan (Çam, E. and Isbulan, O., 2012). Many studies on social media addiction have concentrated on developing measurement scales, e.g. (Andreassen, C. S. et al., 2012; Elphinston, R. A. and Noller, P., 2011), indicating that more research into software design practices and intervention systems is required (e.g. Requirements Engineering and HCI) (Ryan, T. et al., 2014).

Su et al. (2011) developed an intervention system for college students to reduce online usage to address Internet addiction, offering tailored online plans according to individual's usage (Su, W. et al., 2011). The study results indicated that this intervention effectively reduced students' weekly online usage.

Lee et al. (2014) conducted a study on smartphone addiction resulting in the implementation of a management system for smartphone addiction (Lee, H. et al., 2014). The system has four main functions: monitoring, data archive, data analysis, and intervention and treatment. Interventions are provided through the monitoring and analysis of Smartphone usage.

Subsequently, Ko et al. (2015) studied 41 smartphone intervention apps and classified them by four themes: 1) smartphone addiction diagnosing, 2) overuse intervention, 3) children use monitoring and 4) task distraction elimination (Ko, M. et al., 2015). Each app used various persuasive techniques such as self-monitoring, usage tracking and apps locking features. Ko et al. recommended limiting smartphone usage through "self-regulation" strategies based on social cognitive theory (i.e. social comparison and surveillance) (2015) (Ko, M. et al., 2015). This approach has three components: self-monitoring, goal-setting and social learning and competition.

There is increasing interest in research to challenge social media addiction using self-regulation systems, which emphasise addicts' own agency in behaviour change. Ali et

al. have proposed the inclusion of interactive warning labels using timers and avatars in such systems to combat digital addiction (Ali, R. et al., 2015).

2.17 HUMAN-COMPUTER INTERACTION (HCI) ASPECTS

Hewett et al. (1992) defined HCI as "a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them" (Hewett, T. T. et al., 1992). The main aim of HCI is to improve the interaction between users and computers.

A key factor in HCI is user experience (UX) as opposed to the traditional usability framework, which is predominantly concerned with user performance (Law, E. L.-C. et al., 2009). User experience has been defined as "a person's perceptions and responses that result from the use or anticipated use of a product, system or service" (The ISO on Ergonomics of Human System interaction). UX is in flux because user's interaction with the system changes over time due to varying factors such as users' familiarity with the software, the competitive technology and peer reviews and so on. Therefore, UX needs life-long monitoring and asking questions about experiential changes over time should enable recording of these factors (Vermeeren, A. P. et al., 2010). An effective investigation into desirable characteristics can take place when users' values (e.g. comfort, respect and healthy) are taken into consideration.

In HCI, the conceptual overlap between Usability and UX regarding user satisfaction and evaluation methods needs to be considered. UX takes a broader view of users' needs and expectations, taking into account hindrances to a positive long-term experience. Usability adopts task performance, i.e. efficiency and effectiveness as an evaluative method, whereas UX utilises usability measures together with subjective qualities such as motivation and expectations (Vermeeren, A. P. et al., 2010). Some studies discovered that user experience is not negatively affected despite social software such as YouTube, Facebook, Wikipedia not complying with usability principles (Hart, J. et al., 2008). Since Usability ignores "felt experience" such as "pleasure, curiosity, and self- expression" in internet usage, UX takes a more holistic approach.

2.17.1 USAGE OF PERSONAS IN LITERATURE

Alan Cooper first proposed the concept of using personas as a development tool, and in the intervening period, they have become widely utilised because of their ability to incorporate the information of users in the design process reliably. Design teams utilise detailed descriptions of fictitious people so that they are better equipped to determine how a particular product or service will be received by 'real people. Personas afford design teams with valuable insight into the lives of end users that can be utilised during the design process. However, it is widely recognised that relying on personas in isolation will not provide a rounded interpretation of how useful or usable a product may be and, therefore, personas are typically used in conjunction with alternative user-centred methods (e.g. user testing). Pruitt and Adlin recognise that many people remain dismissive of the notion that products and services can be designed to suit a small number of precisely defined user archetypes because in the past the convention was to attempt to satisfy a wide audience of people (Adlin, T. et al., 2006).

Contrary to common logic, Cooper suggests that the best outcomes are achieved when designs are based with a single user in mind provided that user has been accurately composed and constitutes a valid representation. However, literature studies are few in the field of personas, especially in the field of behaviour change which not be in existence. This scarcity in studies is insufficient in order to make meaningful conclusions on the benefits and risks of using personas in the design process for software meant for behaviour change. In the following Table illustrates the benefits of persona use afforded in the literature (see Table 3).

TABLE 3: BENEFITS OF PERSONA USE AFFORDED IN THE LITERATURE

Source	Benefits
(Cooper, A., 1999)	- Enhance focus on users' goals - Enable effective communication regarding users - Minimise changes at the conclusion of the development process
(Cooper, A. et al., 2003)	- Increase unity of approach to design - Facilitate measurement of design's usefulness - Determine the product's feature set

	- Enable effective internal communication
	- Assist related endeavours such as marketing plans
(Grudin, J. and Pruitt, J., 2002)	- Emphasise users' work contexts
	- Enable partial knowledge of users to be contextualised
	- Enable notions about users to be made explicit
	- Enable effective communication regarding users
	- Enhance audience-specific focus
(Long, F., 2009)	- Emphasise developmental focus on the users
	- Result in more user-friendly designs
	- Enable user needs to be made explicit
	- Shape decision making
(Ma, J. and Lerouge, C., 2007)	- Enable effective communication regarding users
	- Increase identification with the intended users
	- Emphasise user needs
(Adlin, T. et al., 2006)	- Enable notions about users to be made explicit
	- Narrowing the target base
	- Result in more effective design decisions
	- Enhance design team engagement
	- Develop empathy for the users

2.17.2 THE DIFFERENCES AND SIMILARITIES BETWEEN PERSONAS AND BEHAVIOURAL ARCHETYPES

Cooper (Cooper, A., 1999) made an initial introduction to the concept of the Persona in the HCI community, which defined a persona as "a precise description of a user's characteristics and what he or she wants to accomplish". The persona is considered a fictionalised representation of a hypothetical group of users, based on the needs, demographics and goals of that group. The biographical characteristics of a persona are used to guide design decisions and help a project team to visualise user segments effectively, thus enhancing their required solutions. However, the behaviour and further characteristics of users in relation to system interaction may not always prove

compatible. In the majority of cases, personas do not include emotional and psychological states or behavioural patterns verifying effective interaction with social media (Floyd, I. R. et al., 2008; Mikkelson, N. and Lee, W. O., 2000).

On the other hand, behavioural archetypes capture patterns and thus facilitate the representation of system users from a behavioural perspective, including emotions and psychological states (Cabrero, D. G. et al., 2016; Chang, Y.-N. et al., 2008). Archetypes were used in this study to assist in identifying problematic online attachment in terms of interaction design, thus providing developers with a viable model for validating user flows and interactive elements. User modelling is employed in HCI systems to improve both the user experience and the design of the system. However, there is no guideline for the graphical representation of the behavioural archetype and personas. Thus the behavioural archetypes in this thesis are represented in a template that is somewhat similar to personas.

2.18 CHAPTER SUMMARY

This chapter presented a review of the state of the art in relation to problematic attachment to social media. The chapter, also, reviewed the potential approaches that could inform the development of the tools, methods and frameworks to build systems that may assist in regulating the problematic attachment. The next chapter will present the thesis methodology, assumptions and choices to achieve the research objectives.

3   CHAPTER THREE: RESEARCH METHODOLOGY

This chapter explains the methodology employed for this thesis, discussing the research onion model, together with the research philosophy, research approach, research strategies, research design, research choice, time horizon and data collection methods and techniques. It also introduces the adopted data collection methods; the analysis techniques and the sampling methods. Then section to introduce the implementation of the data collection techniques. The last two sections will be about ethical considerations and limitations of this thesis.

3.1   RESEARCH ONION MODEL

This section explores the various approaches to planning and carrying out research. According to Sanders et al. (Saunders, M. et al., 2007), it is vital to consider a piece of research from different perspectives. Once the research questions are defined, a researcher must gain an understanding of the key research paradigms that are significant and relevant for a given research study. The aforementioned authors stated that one of the best ways to define the research philosophy, strategy, approaches, choices, and time horizons, as well as the data collection techniques and analysis procedures to be employed, is to follow the so-called research 'onion model' (see Figure 7) that was introduced by Saunders (Saunders, M. et al., 2007). The following sub-sections discuss
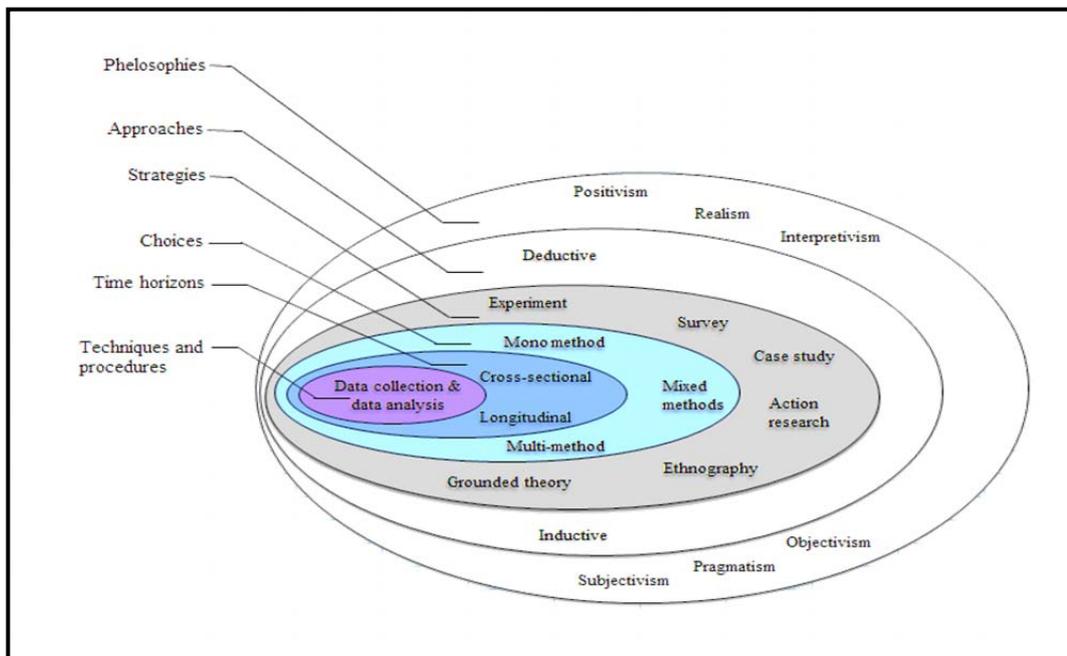
FIGURE 7: ONION MODEL (SOURCE: SAUNDERS, LEWIS AND THORNHILL, 2007)

the different elements of the research onion framework in turn, including the research philosophy, strategies, and approaches, in order to clarify the research process employed for the present study.

3.2 RESEARCH PHILOSOPHIES

This section examines the various research philosophies available to researchers. According to Saunders (Saunders, M. et al., 2007), the term 'research philosophy' primarily concerns the development of knowledge and the nature of that knowledge. The authors distinguished three main research philosophies, each containing sub-categories. While these philosophies provide a foundation for research design and its orientation, research would need careful checking to identify those most relevant for answering the research questions and achieving the goals of a particular research study. The following lists are research philosophies, providing a short definition of each, in order to demonstrate how the most suitable approach for this study was selected.

- *Epistemology* concerns the question of what can be referred to as acceptable knowledge, addressing the matter of whether the social world, including that of businesses and social studies, can be studied using the same principles and practices as those applied to the natural sciences (Bryman, A. and Bell, E., 2003).

  - ➢ *Positivism* concerns a set of epistemological beliefs involving scientific methods that are appropriate for discovering knowledge about the processes by which both physical and human events occur (Saunders, M. et al., 2007);
  - ➢ *Realism* is a philosophical belief that reality exists independently of the observer. As such, it is often contrasted with idealism (Saunders, M. et al., 2007);
  - ➢ *Interpretivism* is a philosophical doctrine that purports that the subject matter of social sciences, which concerns people and their institutions, differs entirely from the subject matter of natural sciences (Bryman, A. and Bell, E., 2003);

- *Ontology* concerns the nature of reality and social entities and is based on philosophical views of how the world operates. According to Bryman (Bryman, A. and Bell, E., 2003), the main question of ontology is whether social entities should be considered to be objective entities that possess a reality that is external to social

actors, or whether social entities should be considered to be social constructions, created by the actions of social actors;

- > *Objectivism* is a philosophical approach to describing the world, according to which social entities exist in a reality that is external to social actors. Therefore an individual can gain a degree of objective understanding by employing inductive and deductive logic;

- > *Subjectivism* purports that social actors create social phenomena and that these social phenomena are in a constant state of revision;

- *Pragmatism* believes the most important issue involved in a research philosophy is the research question itself. Therefore it is possible to employ different philosophic approaches in tandem when conducting a piece of research (Saunders, M. et al., 2007).

The present thesis employed a pragmatic approach. According to Tashakkori and Teddlie (Tashakkori, A. and Teddlie, C., 1998), **pragmatism** as a research philosophy that allows the combining of various paradigms and research types, and avoids vague discussions concerning the nature of knowledge and truth, while concurrently focussing on the research questions of the primary aspect of the research, hence different approaches can be employed to answer the research questions posed.

The present study adopted an **interpretivism** philosophy due to the complexity of the phenomenon under investigation. This approach was also employed because the generalisability of the findings was beyond the scope of this thesis, which was exploratory in nature (Saunders, M. et al., 2009).

3.3 RESEARCH APPROACH

The research approach is the second layer of the research onion. Research approach pertains to the activities which will be carried out in order for the investigator to achieve the research aims and objectives. Saunders (2009) noted that research approaches are based on research philosophies (Saunders, M. et al., 2009). There are three types of research approach, deductive approach, inductive approach and abductive approach. The following subsections explain these approaches in more details.

3.3.1   DEDUCTIVE RESEARCH APPROACH

The deductive research approach is employed when a set of hypotheses have been developed that must be proved or disproved during the process of the research study (Gulati, P., 2009; Wilson, J., 2014). Deductive research follows the roadmap presented in Figure 8:
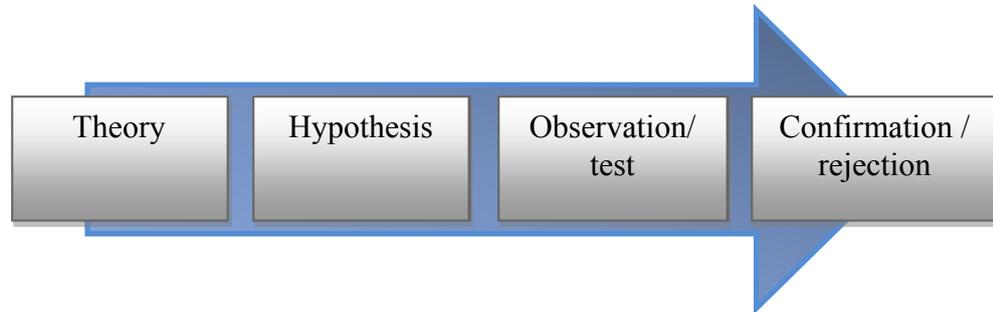
FIGURE 8: DEDUCTIVE RESEARCH ROADMAP

3.3.2   INDUCTIVE RESEARCH APPROACH

This type of research approach does not involve the formulation of hypotheses. Instead, the research process commences with the determination of the aims, objectives, and questions of the research study. The inductive approach was employed for the **present research study**, which sought to investigate the emergent aspects of the problem with which it was concerned, in order to assist in constructing the scope of the study (Bernard, H. R., 2011; Goddard, W. and Melville, S., 2004). The inductive research approach is usually connected with a qualitative methodology and follows the roadmap presented in Figure 9:
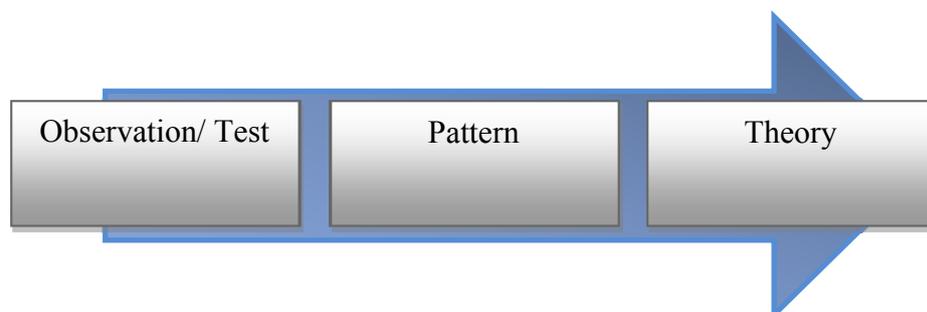
FIGURE 9: INDUCTIVE RESEARCH ROADMAP

3.3.3   ABDUCTIVE RESEARCH APPROACH

In an abductive research approach, the process of a research study concerns puzzles, incomplete observations, and the exploration of unusual facts that are detailed at the outset of the research. The main difference between inductive and deductive approaches is the relevance of their hypotheses to the research. In addition, the deductive approach examines the validity of the available assumptions, or hypotheses/theories, while the inductive approach contributes to the generalisation of a study's outcomes and the development of new theories. Moreover, abductive research commences with a puzzle, or surprising facts, the description of which determines the process of the research study (Bell, E. et al., 2018). The following table (see Table 4) illustrates the core difference between deductive, inductive, and abductive research approaches, with regard to the employment of data, logic, theory, and generalisability.

TABLE 4: DIFFERENCES BETWEEN DEDUCTIVE, INDUCTIVE, AND ABDUCTIVE RESEARCH APPROACHES.

	Deduction	Induction	Abduction
Logic	When using the deductive approach, when the basis is real, then the conclusion must also be real.	When using the inductive approach, the bases of the study are employed to produce untested conclusions.	When using the abductive approach, the bases of a study are employed to produce conclusions that are tested.
Generalizability	Generalities from the general to the specific.	Generalities from the specific to the general.	Generalities by interfacing between the general and the specific.
Use of data	Since it is concerned with a pre-existing theory or theories, the data collection method is employed to assess the validity of the hypotheses or proposition.	The data collection method is employed to identify patterns, phenomena, and themes, as well as to establish a theoretical framework.	The data collection method is employed to identify patterns and phenomena, and then to locate these within the theoretical framework, and analyse them via the subsequent data collection approaches.

Theory	Theory verification.	Theory generation and building.	Theory modification or generation, incorporating the existing theory where suitable, in order to modify the existing theory, or to establish a new one.

3.4   RESEARCH STRATEGY

A research strategy is a methodology guiding the research towards its end goal. Various factors underpin the research strategy including objectives, research questions, philosophical underpinnings and existing knowledge (Saunders, M. et al., 2009).

Research strategies include surveys, experiments, grounded theory, case studies, ethnography and action research. The fundamental research purposes are exploratory, descriptive and explanatory, with the possibility of each strategy being used for all of those purposes (Yin, R. K., 2017). These strategies can be used in interconnected ways, such as using a survey as part of a case study (Saunders, M. et al., 2009). The following subsections are an overview of the six research strategies.

3.4.1   GROUNDED THEORY

The grounded theory focuses on the "systematic discovery of theory from the data of social research" (Smith, K. and Biley, F., 1997), enabling a researcher to lead the study in a flexible way as knowledge increases. The research question(s) underpin the guidelines (Saunders, M. et al., 2009). This qualitative strategy demands iterative and comparative analysis, i.e. "progressive focusing" and is not limited to one particular data collection method, though it does depend on the research questions (Charmaz, K., 2014; Smith, K. and Biley, F., 1997).

Its purpose is to formulate theories and establish analytical processes and frameworks (Creswell, J. W., 2014). In practical terms, a researcher aims to derive code categories from analysing the characteristics of the key social processes and research concept(s) (Smith, K. and Biley, F., 1997). Smith and Biley (Smith, K. and Biley, F., 1997) argued that grounded research is an appropriate strategy to use when minimal research has been

done, particularly to identify relevant variables. Additionally, when there is no theoretical framework to guide the data collection or analysis, it can be an effective strategy.

Inductive reasoning is the predominant emphasis of grounded theory strategy (Saunders, M. et al., 2009). Data obtained can be confirmed by other methods such as interviews, and its results often contain theoretical insights (Saunders, M. et al., 2009). For example, the strategy led to the analysis of the studies referred to in Chapter 6 to build foundational knowledge regarding technology-assisted behaviour change. This emerged from the range of frameworks used to explain the dynamics behind users' addictive behaviours. This thesis is not "full-fat grounded theory" which requires theoretical commitment, whereas Discourse Analysis is a critical step (Braun, V. and Clarke, V., 2006).

3.4.2 ETHNOGRAPHY

Ethnography refers to a systematic way of gleaning in-depth qualitative information about the shared variables within a community in its uncontrolled, natural environment, using both inductive and deductive approaches (Saunders, M. et al., 2009).

Its strength lies in the flexibility it provides researchers to identify patterns of behaviour that people may be reluctant to disclose. It can also determine the next stages of research, such as Interviews and surveys (Lazar, J. et al., 2010).

Ethnographic research includes challenges such as 1) The length of time needed to be fully immersed in the relevant social environment; 2) The subjectivity of the collated information. These challenges pose some validity concerns. Nevertheless, by using multiple sources of evidence, repeated observations and following up with qualitative methods like interviews, a comprehensive and unbiased understanding can be formed through carefully reflecting on the interpreted experiences and opinions of the people.

Ethnography is pertinent when there is a requirement to examine peer groups interactions, behaviours, beliefs, communicative language use and group dynamics such as dominance. It is therefore important to gather insights from both face-to-face and online peer groups in formulating design principles, risks, constraints and governance insights.

3.4.3 CASE STUDIES

A case study research is defined as an inquiry into "a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used" (Yin, R. K., 2017). Lazar et al. (Lazar, J. et al., 2010) narrowed this definition to incorporate any case study pinpointing "a specific instance or a small number of instances within a specific real-life context". It requires conducting an empirical investigation and analysis of a real life situation with the aim to understand a phenomenon (Yin, R. K., 2017), with opportunities to gather quantitative and qualitative data. Case study strategies emphasise particular instance(s), event(s), individual cases or groups implicated in that "case". As a result of the sampling nature, which can be restricted to a single subject, this strategy can justify scientific generalisation (Yin, R. K., 2017).

Case study methods are frequently utilised for explanatory and exploratory research purposes (Saunders, M. et al., 2009), enabling the production of theories, hypotheses or evidence through precise exploration and inspection of individual cases (Lazar, J. et al., 2010). Since they provide "limited confidence", they do not need to be replicated (Kitchenham, B. et al., 1997).

3.4.4 EXPERIMENTS

Experiments are used to investigate the cause and effect between two or more variables. Complex experiments would study the importance and the side effect of a change (Saunders, M. et al., 2009).

This method was not utilised in this thesis as it demands the application of standardised control procedures in order to study the independent variables (Ross, S. M. and Morrison, G. R., 2004), which was not the aim of this thesis. The experiment strategy is more interested in the internal validity concerned with attributing the findings to the applied intervention(s) than in external validity (Ross, S. M. and Morrison, G. R., 2004).

3.4.5 ACTION RESEARCH

Action research is "a flexible spiral process which allows action (change, improvement) and research (understanding, knowledge) to be achieved at the same time" (Bell, E. et al., 2018). The process involves researchers collaborating with participants to scrutinise a problem to identify a solution. It was not utilised for this thesis for the following three reasons. It emphasises an approach to 1) practical problem-solving, e.g. enhancing the service quality, 2) considering how to change organisational practices, and 3) understanding and evaluating the change (Saunders, M. et al., 2009). These practical insights are outside the scope of this study. Finally, as this strategy is concerned with seeing change, an extended involvement and considerable time are needed to examine current practices, plan the change and apply it to move forward with the evaluation (Saunders, M. et al., 2009).

However, fundamental research is often involved when developing a new theory. Fundamental research is driven by curiosity and the desire to expand knowledge in a specific research area. This study concerned exploring of problematic attachments to social media, which is a matter of current concern, and sought to conceptualise and extend the field of research and to fill the gaps in the extant academic literature. The outcomes of applied research are often deemed suitable for addressing a particular problem. Therefore, this research study sought to identify solutions to the problem with which it was concerned. The table below (see Table 5) presents the differences between fundamental research and applied research (Saunders, M. et al., 2012).

TABLE 5: DIFFERENCES BETWEEN FUNDAMENTAL RESEARCH AND APPLIED RESEARCH.

	Fundamental research	**Applied research**
Definition	This research is often conducted to develop new theories.	This research is often conducted to address problems in an organisation setting.
Purpose	This research is linked to the examination, development, refinement, and verification of the research methodology, and also concerns its tools, procedures and techniques.	This research is concerned with knowledge that possesses immediate applicability and is therefore helpful for formulating policies and making decisions.

Nature	This research is inductive since it concerns the discovery of new theories.	This research is deductive because it employs theories as to the base when conducting research.
Common synonyms	Fundamental research is also known as 'basic' or 'pure' research.	Applied research is also known as 'action research'.
Method	Qualitative in nature.	Quantitative in nature.

3.4.6   SURVEYS

Surveys are widely used to gather data from large numbers of people at a low cost (when designed to be self-administrated). As well as questionnaires, surveys include structured observations and interviews (Saunders, M. et al., 2009).

As surveys are predominantly deductive in nature and limited in scope, they cannot provide an exhaustive understanding of the matter being investigated, nor are they an appropriate method for recalling the past experience, such as mood (Lazar, J. et al., 2010) since they may provide biased answers.

3.5   RESEARCH DESIGN

The purpose of a research design is to define a general plan which helps the researcher to answer the research questions (Saunders, M. et al., 2012). Research design can be divided into three types: exploratory design, descriptive design and experimental design. The following sub-sections will explain each type in more details.

3.5.1   EXPLORATORY DESIGN

Exploratory designs are applied to research that seeks to explore new research problems that few if any, previous studies have addressed (Saunders, M. et al., 2012). It assists in developing a base for potential research to support other research designs, such as experimental research and descriptive research. Exploratory research can, therefore, establish the basis of further conclusive studies, and can determine the sampling techniques, research methods, and data collection methods that will prove most effective for a particular study (Singh, K., 2007).

An exploratory design was employed for the present research study because the essential problem of the research had not yet been explored and need to be addressed by carrying out multiple methods to answer the research questions. This type of research design assists in determining the nature of the research problem and exploring the research questions. It follows an inductive approach, and a qualitative methodology, both of which are explained further in the appropriate sections of this chapter. This particular research design does not aspire to provide final answers to the research questions determined; rather it merely identifies the topic of research efficiently.

Advantages of exploratory research design:

- It is adaptable and flexible;
- It is effective for creating a basis for future research;
- By determining at the initial phases the research type, it can potentially save time and resources.

Disadvantages of exploratory research design:

- It generates qualitative information, the interpretation of which can be considered to be biased;
- It generally employs a sample of a modest number that is not able to represent the target population sufficiently. Therefore, the outcomes of the related research study cannot be applied to a wider population;
- The outcomes are often not suitable for practical decision-making.

3.5.2   DESCRIPTIVE DESIGN

Descriptive research can be characterised as a situation whereby researchers have no control over variables. In addition, the descriptive design attempts to determine, describe or identify what is, in contrast to analytical research, which attempts to determine the reasons why something is the way it is (Ethridge, D. E., 2004).

Although this particular study was not able to provide conclusive answers, a descriptive design often helps to provide answers to questions that are related to the specific problem of a research study. This design is often employed as a conduit to more quantitative research design, as its general overview provides indications that are

valuable for determining the variables that should be tested, using a quantitative approach. Moreover, a descriptive research design can generate rich data that is able to engender significant suggestions, although the outcomes resulting from such a research design cannot be employed to disprove a hypothesis, or to identify an ultimate response.

3.5.3   EXPERIMENTAL DESIGN

An experimental research design is employed when the casual relationship timeframe is a priority of a research study, and when reliability is present in the casual relationship, in the sense that a cause will always stimulate a similar impact, and also when the magnitude of the correlation is great (Creswell, J. W. and Creswell, J. D., 2017). The classical experimental design involves the use of a control group and an experimental group. In this design, both aspects are measured according to similar dependent variables. For more extended time periods, an experimental design can be employed to acquire a greater number of measurements, and for a greater number of groups. Viable experiments must possess randomisation, manipulation, and control. This particular research design facilitates the conclusion of the direct causal relationship and restricts alternative descriptions of the research at hand. However, if specific facilities or equipment are required, this research design can be more costly to conduct.

3.6   RESEARCH CHOICE

There are three core approaches to research choice that can be applied to any research design in order to achieve its aims and objectives. These are qualitative, quantitative approaches, and a combination of both (Bell, E. et al., 2018). **A qualitative method** seeks to develop insights into a particular topic from the subjects' perspective (Creswell, J. W. et al., 2007), whereas **the quantitative method** concerns the gathering and assessment of data in the form of numbers, and employs large datasets (Bell, E. et al., 2018; Creswell, J. W. and Creswell, J. D., 2017). Meanwhile, **the mixed method** integrates both the quantitative and the qualitative methods, commencing with one, and followed by the other.

However, in order to address the objectives of this thesis, the author follows a qualitative approach to generate meaning for users experiences which indeed follow interpretivism philosophy and bottom up approach. The quantitative data analysis was

only used in Chapter Seven on a descriptive level to reflect reality in mathematical means and adding thickness to the behavioural archetypes presented in Chapter Six (Hyett, N. et al., 2014; Ponterotto, J. G. and Grieger, I., 2007; Schwandt, T. A., 2014). For example, testing and provide evidence toward stability of the five behavioural archetypes among the diary study period and to get more insight into the strength of the component construct of the archetype such as positive emotions and psychological states. Furthermore, to support that the five behavioural archetypes differ from each other. The use of numbers is a legitimate and valuable strategy for qualitative researchers when it is used as a complement to an overall process orientation to the research. The inclusion of quantitative data in qualitative methodology will add more meaningful and more understanding of the topic under investigation which does not inherently make the research a mixed-method study (Dey, I., 1993; Keating, M. and Della Porta, D., 2009; Maxwell, J. A., 2010).

3.6.1 QUALITATIVE METHOD

Qualitative method is exploratory in nature and focuses on getting insights and understanding of the underlying reasons. Qualitative method is often considered to provide rich data on real-life people and situations and to be more capable of making sense of behaviour (Creswell, J. W. et al., 2007). Furthermore, it helps to understand people behaviour within their context. The characteristics of the qualitative method are as follows:

- The qualitative approach is applicable when the nature of a problem requires investigation. Therefore, this approach was employed for the present study, which sought to achieve a comprehensive understanding of the behaviour of users in terms of their online behaviours. The qualitative approach enabled the identification of how, where, when, and under what conditions such behaviour developed;

- This method assists in collecting data in the real-world context of a subject when the topic of the study means that it is not appropriate for the subjects to attend a laboratory. In the context of the present study, this enabled the identification of the participants' online behaviour within the research context, and therefore the

theories subsequently developed were bottom-up (inductive), rather than top-down (deductive) in nature. In contrast, the theories involved in qualitative research concern data;

- The qualitative method is connected to the inductive research approach, which assists in identifying patterns, themes, and categories. For the present research study, this was achieved through the detailed examination of the data set collected, in order to determine the emergent themes;

- When employing the qualitative methodology, the researcher is the primary facilitator. For instance, for this study, the researcher collected the relevant data via a diary study, a focus group, and interviews with, and assessments of the participants.

It is important to note that the effectiveness of qualitative research derives from the abilities and skills of the researcher, and its finding cannot be considered reliable, as they can suffer from bias in the interpretations and judgements of the researcher. Moreover, the findings cannot be generalised to the wider population. The approach is more suitable for small samples (Albery, I. and Munafò, M., 2008). The below table illustrates the features of qualitative and quantitative research choices, (see Table 6).

TABLE 6: FEATURES OF QUALITATIVE AND QUANTITATIVE RESEARCH METHODOLOGIES.

Qualitative research	Quantitative research
The aim of this approach is to provide an in-depth and complete description of the matter being studied.	The aim of this approach is to categorise the features of the research, to measure them, and then to establish statistical models, in order to describe the matter under observation.
At the outset, the researcher is only able to acknowledge what they are seeking.	At the outset, the researcher knows precisely what they are seeking.
It is suggested to adopt during the initial phase of research.	It is suggested to adopt during the last phase of research.
The design emerges as the research	All aspects of the research are designed

unfolds.	before the data collection stage.
For this approach, the researcher adopts the role of a data collection instrument.	For this approach, the researcher employs tools, such as equipment or questionnaires, to gather numerical data.
The data is available in the form of pictures, objects, or texts.	The data is available in the form of statics and numbers.
This approach is subjective. The participants' interpretation of a particular event is significant and is obtained using, for example, in-depth interviews or observation.	This approach is objective. It seeks the exact assessment and measurement of the target audience, for instance, by employing questionnaires and surveys.
The qualitative approach is richer than the quantitative approach but can be time-consuming and less capable of generalisation.	The quantitative approach can assess a hypothesis more effectively than the quantitative approach but can miss certain details.
The researcher is subjectively involved in the subject under investigation.	The researcher remains separate from the subject under investigation and is therefore objective.

As a qualitative approach likely to follow bottom approach and there is no hypothesis to stand on, the qualitative approach is helpful to:

- The philosophy of this thesis is based on interpretivism philosophy which advocates the usage of qualitative data.
- Understand users' attitude and experiences.
- Enable the researcher to get more insight into users' experiences and explore their usage patterns.

3.7   TIME HORIZONS

According to Saunders (Saunders, M. et al., 2009), the time horizon of a research study is the aspect of a methodology that concerns the properties of the problem being studied. Some studies involve the observation of a process over time, in order to capture the dynamics of a problem, such as those concerning human development. However, it

is possible that the change involved may not be apparent, hence the properties investigated are stable. A research study can adopt a cross-sectional or longitudinal time horizon (Saunders, M. et al., 2009):

- **Cross-sectional time horizon**: can be employed when the answers to a problem can be obtained at a particular time;
- **Longitudinal time horizon**: requires an extended period of time to answer questions of 'why?', employing "a diary perspective" (Saunders, M. et al., 2012).

The time horizon perspective is independent of the research strategy employed for a study, although the cross-sectional time horizon often utilises the survey strategy (Easterby-Smith, M. et al., 2012).

The present thesis employed a cross-sectional approach for several reasons. Firstly, it sought to explore the manifestation of the attachment involved in certain online behaviours and how this attachment is facilitated by the design of social media applications. Since the thesis did not employ the outcomes as an intervention, the cross-sectional approach was applicable.

3.8   ADOPTED METHODS AND TECHNIQUES

In order to achieve the aims of this thesis, qualitative data collection techniques were employed, including a focus group, a diary study, interviews, and observations. A member checking strategy and card sorting techniques were employed to validate the reliability and trustworthiness of the outcomes. This section discusses each of these instruments in detail.

By nature, qualitative data collection methods are exploratory and are primarily concerned with comprehending the underlying motivation and reasons for a phenomenon, together with obtaining insights regarding the topic under investigation. It developed as an approach when it became clear that conventional methods of quantitative data collection were incapable of exploring the behavioural dimensions of phenomena. Qualitative data collection methods are considered to provide rich data concerning real-life situations and individuals and facilitate the comprehension of human behaviour within a particular context. However, as previously stated, the

approach can be criticised for its over-dependency on the researcher's subjective interpretation, its lack of generalisability, and the fact that it cannot be replicated by subsequent researchers.

3.8.1 FOCUS GROUP METHOD

Focus groups are group discussions held with between seven and 12 individuals, in order to obtain their views and experiences of a particular issue that is related to the questions of a research study (Saunders, M. et al., 2009). Focus groups are appropriate for studies in which it is necessary to explore different views related to a similar issue, as they enable the identification of beliefs, attitudes, and opinions (Robson, C. and Mccartan, K., 2016).

Focus groups are led by a moderator, who is responsible for ensuring that the discussion remains focused on the topic under investigation. While focus groups are useful for exploring a topic from different perspectives, groups can be influenced by one or two dominant members, and in some cases, it may be necessary to discourage certain members of the group from participating, due to their poor communication skills, or lack of confidence. In this thesis, focus groups were used in order to immerse the participants within the research objectives and to validate the findings that emerged from the exploratory study. Details and its implementation will be described in **Section 3.11**.

In addition, the focus group was used in this thesis because it is widely used in qualitative research and can enable the following advantages:

- Its enable the author to understand the problem from the viewpoint of the participants in their social context, especially in the exploration stage.
- Its help the author to get more insight into feelings, thoughts and perceptions of people in their own word in relation to their problematic attachment.

3.8.2 DIARY STUDY METHOD

The diary study is a qualitative methodology, involving a "document created by an individual who retains regular records of their life events when these events occur" (Jonathan, L. et al., 2010; Lazar, J. et al., 2010). It involves asking different individuals

to record their personal experience regarding a specific topic, over a period of time. In the context of the present study, it was a useful tool for addressing why and how certain aspect of technology is employed in a natural context. Moreover, diaries can provide insights into a social phenomenon, as they encourage those involved to reflect on their experience in ways that are not possible using other methods of qualitative research, such as interviews, which can also be valuable for gathering data regarding perceptions and emotions. There is three core design that can be applied to the diary study method (Bolger, N. et al., 2003). These designs are interval-design, signal-based design and event-based design. However, interval-based design and signal-based design were merged under the category time-based design.

- **Time-based design**

This involves the participant reporting at a pre-determined time, which can be either random or fixed. The required time of reporting can be accommodated into the schedule of the participant. Research with time-based design diary is often concerned with continuous experiences that can be evaluated over a typical time period (Bolger, N. et al., 2003), e.g. exploring daily levels of stress and mood conducted by Bolger (Bolger, N. et al., 1989);

- **Event-based diaries**

This design involves the participant recording pre-determined events in their diary. It is important that the participant explains the events, with an emphasis on particular aspects of the phenomenon, in order to decrease the number of events occurring and to remove any vagueness. An event-based design is usually appropriate for studies concerned with certain categories of phenomena or processes, especially those that are isolated or rare. For example, Jensen (Jensen-Campbell, L. A. and Graziano, W. G., 2000) reported on an event-based study of interpersonal conflict among adolescence.

However, Time-based design and event-based design are not mutually independent. Combination of these two designs can considerably strengthen a study design. For example, Mohr (Mohr, C. D. et al., 2001) mixed time- and event-based designs to investigate interpersonal experiences and alcohol consumption in different contexts.

Diary study design was used in this thesis to add more ecological validity to the research method which used to collect qualitative data about people problematic attachment to social media from their natural context. The context and timespan in which data is gathered for a diary study make them different other user-research methods. For example, surveys (which are intended to collect self-reported data about users attitudes and experiences outside of the context of the topic being studied), or usability tests (which yield observational data about a specific time or organised set of restricted interactions in a lab setting). In addition, the diary study design is helpful to gather data about people behaviours in relation to their problematic attachment to social media.

3.8.3   INTERVIEW METHOD

This particular method of qualitative data collection involves conducting one-to-one interviews with the participants of a study, in order to identify their views regarding a particular phenomenon, idea, or situation. There are three different interview formats:

- **Structured interviews**: Involve a series of pre-determined questions. The data analysis tends to be easier, as the researcher can compare and contrast the different responses to the same questions;

- **Unstructured interviews:** This form of interview is the least reliable from the point of view of conducting research, as the questions are not pre-determined, and the data is collected informally. It can involve a high level of bias, and the evaluation of the responses provided by the participants can be challenging because of the differences in the structure of the questions;

- **Semi-structured interviews:** This form of the interview involves components of both structured and unstructured interviews, as the interviewer pre-determines a set of questions, but allows for additional questions can be asked during the interview, in order to clarify, or expand on particular issues.

Due to this thesis follow a qualitative approach which concerned with exploring and understanding problematic attachment. The interview was used to elaborate more in the findings of the exploration stage and also to get more insight into the Digital Diet ABC application development process.

3.8.4   OBSERVATION METHOD

Data can also be collecting through observation, which is classified as a form of participatory research, as the researcher is present in the environment of their respondents when recording and/or taking notes (Saunders, M. et al., 2009). Observation can be unstructured or structured. In systematic or structured observation, data is gathered by employing particular variables according to a pre-defined schedule. In contrast, unstructured observation occurs in a more open way, without pre-determined objectives.

Observation is a qualitative research method in academic disciplines such as anthropology, sociology, education, development studies and psychology. It provides a powerful way to capture and understand people's behaviour and attitudes towards particular goals by observing and recording their activities from a distance that does not affect their behaviour (Kothari, C. R., 2004). As this study follows the case study approach, the observation method will be beneficial in the evaluation process of the usefulness of the behavioural archetypes in the design process. It is possible to observe and think about how design team members are using the archetypes in many aspects such as where they find it useful, where they find it challenging, where they find it understandable. It also provides more freedom for both observer and design team members to study, ask and answer questions during the evaluation process. This indeed consolidates the evaluation process. There are four types of observational roles based on the distinctions made by the sociologist (Gold Raymond, L., 1958), which can be applied to any field of research.

Complete observer, observer as a participant, participants as an observer and complete participants are the four types of observation method. In this study, the observer as a participant was adopted because it allows for effective engagement with participants, e.g. asking or answering questions. Additionally, this role minimises bias by restricting the observer to a certain limit of involvement as discussed above, which offers participants more freedom in using the behavioural archetypes.

3.8.5   CARD SORTING METHOD

Card sorting is an established approach to data collection for use when it is necessary to identify how individuals comprehend, assess, and categorise information (Barrett, A. and Edwards, J., 1995). The name 'card sorting' originated in a research study that employed index cards with a phrase or a word written on one side, and additional information or definitions written on the other side of some of the cards (Upchurch, L. et al., 2001). There are two kinds of card sorting exercises: open card sorting, and closed card sorting.

- **Open card sorting**

This approach shares similarities with an open-ended questions approach, as the method involves the researcher asking the participants questions regarding their understanding of a certain phenomenon. As an approach, it is flexible, as it is not limited to one type of response, and it helps the researcher to identify the various classifications within the topic being researched, providing the names or labels that the participants commonly employ. It is a generative, rather than an evaluative approach as it generates the concepts regarding how to label and structure the relevant information, and in the context of the present study, was useful for planning or enhancing the information architecture of a website.

- **Closed card sorting**

This approach is useful when a researcher seeks to identify the participants' perceptions of the information in their theoretical framework. It is more evaluative than open card sorting, since the participants are able to assess the information, and then assign it to categories or labels that are provided by the researcher. It is helpful for clarifying unclear classification levels and provides the researcher with insights regarding those that are employed the most, or which are the most useful categories within their conceptual framework, and those that are ignored.

A variation of the closed card sorting approach is the semi-open/closed card sorting exercise, in which the participants engage in a closed card sort, with the caveat that they are permitted to make changes to the names of the groups, and can add new groups, and remove groups.

Closed card sorting method was adopted in this thesis to validate the findings of the exploratory study. It allows the participants to validate and evaluate the pre-defined categories that emerged from the exploratory phase.

3.8.6   MEMBER CHECKING METHOD

The member checking method is a validation technique used for enhancing rigour in qualitative research by seeking informant feedback from the participants (Birt, L. et al., 2016; Lincoln, Y. S. and Guba, E. G., 1985). It addresses the findings' internal verification by decreasing the possible bias on the part of the researcher. This method was adopted in this thesis and concerned with returning the interpretations and outcomes of a research study to the participants in order to confirm and assess the trustworthiness of the analysis (Doyle, S., 2007). Member checking can be done collaboratively in a focus group discussion or an interview session.

3.9   ANALYSIS METHODS AND TOOLS

The methods involved in data analysis concern the process and approach applied to the analysis of the data collected in a research study, and its interpretation. This thesis utilised qualitative data analysis using the thematic analysis and axial coding analysis. The analysis of the qualitative data obtained is discussed in Chapters Four, Five, and Six. The quantitative data analysis was only used in Chapter Seven to reflect reality in mathematical means and adding thickness to the behavioural archetypes presented in Chapter Six (Ponterotto, J. G. and Grieger, I., 2007). The use of numbers is a legitimate and valuable strategy for qualitative researchers when it is used as a complement to an overall process orientation to the research. The inclusion of quantitative data does not inherently make the research a mixed-method study (Maxwell, J. A., 2010).

3.9.1   THEMATIC ANALYSIS (QUALITATIVE)

According to Vaismoradi (Vaismoradi, M. et al., 2013), thematic analysis is usually considered to be an inadequate approach, as it does not present the methodology of a study in the same way as a content analysis. It is a descriptive approach of the independent qualitative method and can be explained as "a method for identifying, analysing and reporting patterns (themes) within data" (Braun, V. and Clarke, V.,

2006). In term of coding, the central question that must be addressed is that of what constitutes the theme(s) or pattern(s) of a research study. In relation to the research question(s) at the core of a research study, a theme conveys a significant aspect of the data and signifies some degree of meaning, or pattern, in the data set. In the thematic analysis, the patterns or themes within a data set can be identified in one of two ways: deductive, or 'top-down', or inductive, or 'bottom-up'. The inductive approach concerns the fact that the themes identified are connected to the data, hence this type of thematic analysis shares correspondences with grounded theory. According to Braun and Clarke (Braun, V. and Clarke, V., 2006), an inductive analysis is a data coding procedure that does not seek to fit a pre-existing coding frame, or the analytic preconceptions of the researcher, as it is driven by the data.

In contrast, a theoretical thematic analysis can be driven by the analytic or theoretical interests of a researcher, and is therefore explicitly analyst-driven, providing a less rich description of the data in general, but a more in-depth analysis of certain features of the data. The advantages of using a thematic analysis include the fact that it is a flexible and constructive approach for working with collaborators within a participatory research paradigm, can conclude the main elements of large data sets, is manageable for researchers with little or no experience of qualitative methodologies, and can highlight the differences and similarities across a data set (Braun, V. and Clarke, V., 2006). The thematic analysis includes five phases starting with familiarising with data, generating initial codes, searching for themes, reviewing themes and finally naming and reductions themes. The following table demonstrates these phases, (see Table 7).

TABLE 7: PHASES OF THEMATIC ANALYSIS

Phase	Description
Familiarising yourself with your data	Transcribing data (if necessary), reading and rereading the data, noting down initial ideas.
Generating initial codes	Coding interesting features of the data in a systematic fashion across the entire data set, Collecting data relevant to each code.
Searching for themes	systematic fashion across the entire data set,
Reviewing themes	Collecting data relevant to each code.
Defining and naming themes	Collating codes into potential themes, gathering all data relevant to each potential theme.

3.9.2   AXIAL CODING (QUALITATIVE)

Axial coding is a qualitative analysis technique involving linking collected data together with the purpose of revealing codes, categories, and subcategories emerging from participants' voices. It is related to grounded theory, which is a qualitative methodological framework concerned with repeatedly comparing emergent themes within one's data set in order to propose theories as to one's communicative conduct. The process of inductively finding linkages between data (known as coding), may happen in diverse ways such as behaviours, events, activities, strategies, states, meanings, participation, relationships, conditions, consequences, and settings (Strauss, A. and Corbin, J., 1998).

Axial coding involves relating elements, or codes, of data to each other. By using deductive and inductive reasoning, axial coding identifies relationships between open codes. Essentially, axial coding seeks to classify central (i.e., axis) phenomena in one's data, and it is an intermediate or later stage method for analysis involving the integration of categories and subcategories, especially those that reveal themes, new categories, or new subcategories. This methodology can be applied to short textual passages or segments. Hypothetical relationships, or relationships that appear to emerge during the coding process, are continually examined in light of new data or material to ensure credible claims may be made (Allen, M., 2017).

3.9.3   STATISTICS ANALYSIS (QUANTITATIVE)

Descriptive statistics analysis is employed to explain the core elements of the data gathered in a research study. It provides simple conclusions regarding the measures and samples, and collectively, using a simple representation of a graphics analysis, it establishes a virtual foundation for every quantitative analysis of the data concerned. In descriptive statistics, the researcher explains what the data refers to, and is thereby able to present quantitative interpretations in a manageable form.

3.9.4   MAXQDA ANALYSIS SOFTWARE

MAXQDA Analysis Software is a software programme that was specifically designed for use with mixed methodologies and qualitative data analysis that are computer-

assisted, particularly with business and scientific institutions in mind (Kuckartz, A. M. and Kuckartz, U., 2002). However, it is appropriate for qualitative, quantitative, and mixed methods research, as it supports the process of qualitative analysis by facilitating the conduct of different analysis methods, such as those employed in qualitative content analysis and grounded theory. The central elements of the programme are the systematic assignment, or 'coding' of data segments, such as text, tables, images, and media, to major themes, or 'codes', and the ability to note ideas, textual references, or 'memos', directly. The assessment of the data can be affected by classifying the materials into different groups, by employing a hierarchical coding system, assigning weights and colours to the data, and explaining the variables according to the text segments, enabling the easy attainment of analysed outcomes that is one of the advantages of the software (Kuckartz, A. M. and Kuckartz, U., 2002; Saillard, E. K., 2011).

3.9.5   FUNCTIONALITIES OF SOCIAL MEDIA FRAMEWORK

The functionalities of social media framework was proposed by Kietzmann et al. (2011) as a guide for identifying and categorising the characteristics of social media platforms from a functional perspective (Kietzmann, J. H. et al., 2011). The framework is comprised of seven functional blocks (see Figure 10). These functional blocks are identity, conservation, participation, presence, relationship, reputation, and groups. The functionalities framework of social media is called the honeycomb framework. Understanding the functions of social media is a very important task for researchers (Kietzmann, J. H. et al., 2012). The Honeycomb framework was utilised in this thesis as a starting point to classify the features resulted from the exploratory study.

- Identity: This function block reflects the extent to which people adjust their profile in social media and reveal their identities. Identity provides the user identification details such as user name, age, gender, profile and location as well as more contextual information revealing users identity through social media.
- Presence: This function block reflects the extent to which users are able to determine whether other people can be contacted. This may involve knowing the status line of people and whether they are free to be contacted, e.g. available, busy, away and hidden.

- Sharing: This building block refers to the extent to which online content is exchanged, circulated and received by users of social media. For example, e.g. comments and photos.

- Conversation: This block represents the extent to which users in social media communicates with each other. Conversation block provides the setting of the communication tool between the two different users or groups of social media.

- Groups: This functional block represents to what extent users are able to establish communities and sub-communities. The social media group is meant to build homogeneous characteristic communities.

- Reputation: This block represents the extent to which users in a social media setting can identify others ' standing, including themselves. A reputation is a tool that measures the characteristics of the activity level of social media users.

- Relationship: This function block is the extent to which users of social media can be connected to other users of social media. Furthermore, users have a form of association that links them as friends, followers and fans, toward converse, share content and meet with each other.
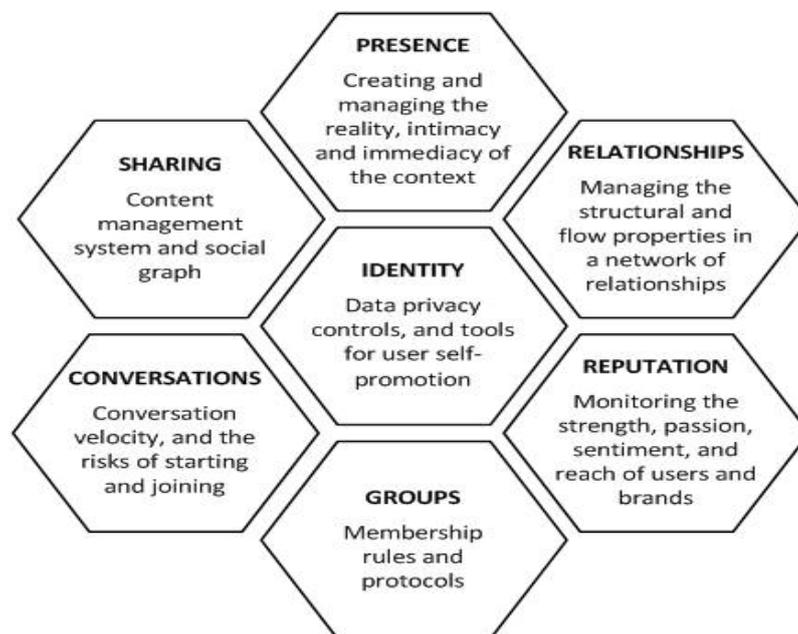
FIGURE 10: SOCIAL MEDIA FUNCTIONAL BLOCKS, SOURCE:
KIETZMANN ET AL. 2011)

3.10 SAMPLING

Sampling can be divided into two main categories: probability sampling and non-probability sampling. In the former approach, each member of the population concerned has a non-zero chance of participation in the research, and chance or randomisation is the main element of the approach (Lazar, J. et al., 2010). In contrast, in non-probability sampling, the samples are selected non-randomly, and therefore, only particular members of populations are selected to participate in a research study (Lazar, J. et al., 2010). The relevant sampling technique to be employed for a research study is selected on the basis of the goals and nature of the research. The present study employed a non-probability sampling technique as:

- It is less complicated than probability sampling;
- It is less time-consuming and more cost-effective than probability sampling;
- Estimation of the population is not required.

A non-probability sampling includes the following sampling techniques:

- **Convenience sampling**

This concerns the selection of research participants who can be accessed easily and is both a commonly employed, and a weak strategy of sampling, since the researcher has little control over the sample's representatives, and can, therefore, cause biased outcomes (Gravetter, F. J. and Forzano, L.-a. B., 2011). However, for exploratory research studies, in which inferences can be the objective, such as in the present study, this approach can be sufficient (Sue, V. M. et al., 2007). Moreover, it is possible to augment the sample's representatives to ensure that the sample is sufficient to provide viable outcomes via an assurance that the sample's inherited attributes are similar to those of other populations;

- **Judgmental sampling**

In this approach, the selection of the participants is based on the judgement and knowledge of the researcher, in terms of the most representative aspects of a target population;

- **Quota sampling**

In quota sampling, the research participants are selected equally from the population, for instance, females and males in equal numbers (Gravetter, F. J. and Forzano, L.-a. B., 2011). While this sampling technique has the inherent attributes of probability sampling, it is non-probabilistic, as the selection is conducted on the basis of judgement, not on a random basis;

- **Snowball sampling**

Snowball sampling is a technique for finding research participants. The initial participant provides the researcher with the name of another participant, who in turn provides the name of a third, and so on (Vogt, W. and Statistics, D., 1999). It can be applied as an 'informal' approach to reach a target population. If the objective of a study is primarily explorative, qualitative and descriptive, then snowball sampling offers practical advantages (Hendriks, V. M. et al., 1992).

3.11 IMPLEMENTATION OF THE ADOPTED DATA COLLECTION METHODS AND STRATEGIES

In order to achieve the aim of the present research study, focus groups, diary studies, and interviews were employed in the exploration phase and confirming phase. Exploring phase (phase I) aims to identify and comprehend the emotions, attachment style, and behaviour of individuals regarding their problematic attachment to social media, such as Facebook and Twitter. Meanwhile, the confirmatory phase (phase II) meant to validate the findings emerged from Phase I. The reason for presenting the implementation of the exploratory study here because it contributed to three Chapters. Thus, it was is better to be presented here to avoid duplication in each Chapter. the other adopted methods are presented within each Chapter related to them. Conceptual framework at the end of the Chapter illustrates all research method adopted (see Figure 13).

3.11.1 PHASE I: EXPLORATORY

This phase aimed to explore people's problematic experience and attachment to social media. It examined the engagement of users with social media, in order to comprehend their lived experience, with an emphasis on social media features. A qualitative method

was adopted, which involved focus groups and diary study methods; diary study was the core method in this stage (see Figure 11).
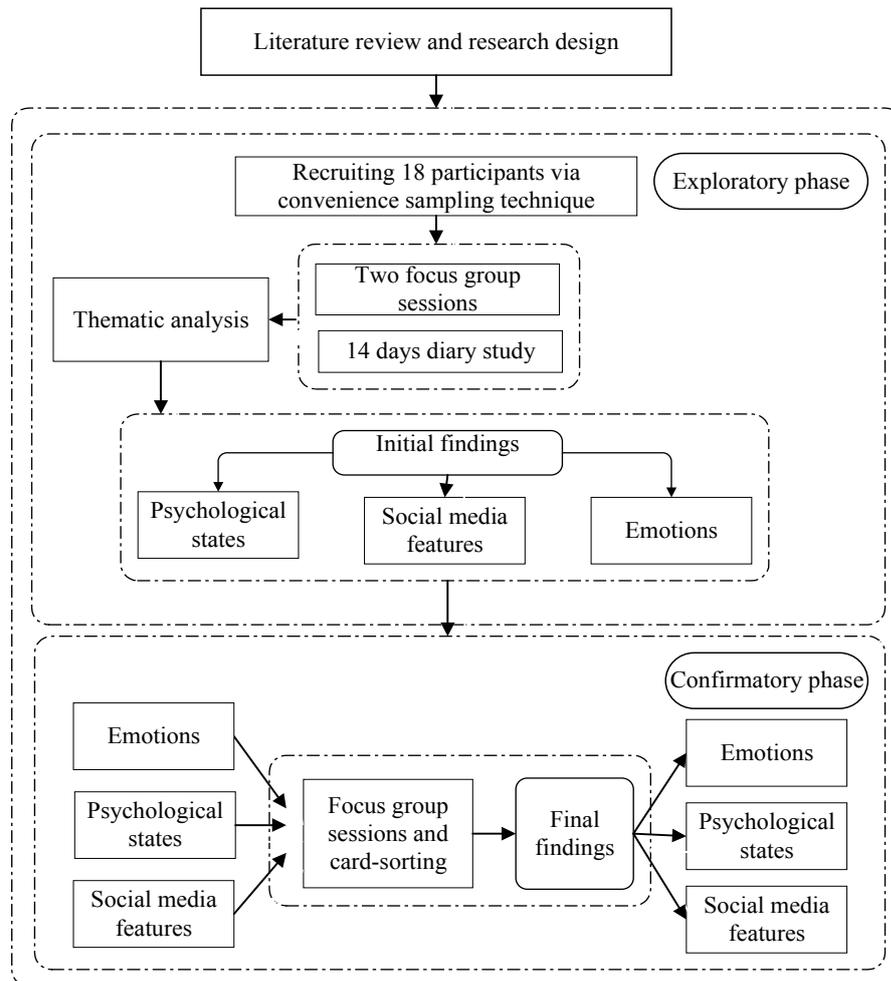
FIGURE 11: OVERVIEW OF THE EXPLORATORY STUDY METHOD

3.11.1.1 STUDY INSTRUMENTS

A qualitative method was adopted, which involved focus groups, diary study and interview methods; diary study was the core method in this stage. A focus group was first used to gather initial insights that were then elaborated via a diary study allowing the capture and refinement of users' problematic experience as lived. These two methods were selected due to their attributes that facilitated the researcher to comprehend the individuals' online interaction experience on a daily basis, as described in Sections **3.8.1** and **3.8.2.**

3.11.1.2 SAMPLE SELECTION

Considering the representative population on social media and the high penetration rate in universities, participants were recruited using convenience sampling in this phase. Eighteen participants aged 18 and over, nine males and nine females were recruited within the authors' institution based on the following inclusion criteria: Participants must be adult social media users and must self-identify as having a problematic attachment to social media. The inclusion criteria were adhered to using a pre-selection questionnaire adapted from the Generalised Problematic Internet Use Scale with necessary adaptations (Caplan, S. E., 2002). For example, "Internet" was replaced with "social media" to reflect the context. The following table (see Table 8) demonstrate the demographics of the participants. For a copy of the pre-selection questionnaire (see Appendix A1).

TABLE 8: DEMOGRAPHICS OF THE PARTICIPANTS

Demographic type	Range	# of participants
Gender	Male	9
	Female	9
Age	18-24	9
	25-34	8
	35-44	1
	45 or Older	-

3.11.1.3 STUDY PROCEDURES

At the outset of the exploratory phase, two focus groups conducted with nine participants each. The focus group study aimed to help participants familiarise themselves with the objectives of the study and to obtain insights into their problematic relationship and attachment with and on social media. For a copy of focus groups materials (see Appendix A2).

To prepare these participants for the diary study in this phase, at the end of each focus group session, specific training on using the Evernote application was provided. Evernote1 was chosen as the application allows users to take notes, pictures, and recordings and share them with the research team on a daily basis. The collaborative feature of the app also allows the facilitator to send questionnaires to team workers

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[1] https://evernote.com/

(Bates, C. and Martin, A., 2013). The diary study with the same 18 participants lasted two weeks and participants completed two tasks. The first was focused on identifying their online experience and online behaviour with an emphasis on social media profiling features and online presence. In the second task, the participants were asked to detach themselves from a specific activity on social media, such as avoiding an instant reply to their friends' messages as much as possible, to discover accompanying side-effects related to psychological states. They had the choice to detach from the essential activity for each. The participants provided their notes three times a day (morning, afternoon and night) using the Evernote application. Daily reminders were also sent through the application. Once the diary study was completed, each participant was invited for a face to face interview to go through their daily entries. For a copy of diary entry examples and it is materials (see Appendix A3).

3.11.1.4 STUDY PROTOCOL

1. A pilot study was conducted to evaluate the study design;
2. A pre-selection survey was conducted;
3. Each participant was emailed a consent form and a participant information sheet explaining the purpose of the study (see Appendices A4 and A5), and what would be expected of the participants;
4. All of the participants were invited to attend one of two introductory focus group sessions to explain the study. Each session included eight or nine participants and sought to familiarise them with study procedures and purpose and to provide examples of how to complete their diaries via the Evernote application. The sessions also provided an opportunity to discuss any issues requiring clarification;
5. The participants created a log by completing diaries questionnaires online via the Evernote application over the course of 14 days;
6. Reminder messages were sent via email and the Evernote application to encourage the participants to update their notes daily;
7. Once all of the diaries were complete, an interview was scheduled with each participant, in order to discuss their overall experience, and to allow the researcher to clarify any observations, or to ask any questions that might have arisen during the study;

8. Each participant was given £20 upon the successful completion of their diary study.

3.11.1.5 ANALYSIS

The data collected from the interviews and the diary study was analysed using thematic analysis (Braun, V. and Clarke, V., 2006). A qualitative diary study was the primary method employed to obtain data concerning individuals' experience of their daily interaction with social media. Thematic analysis is an approach that is generally employed to assess qualitative data by determining the themes and patterns it contains. This approach facilitates the assessment of the data in two primary ways: first using inductive coding, and second by determining the consistency and sufficiency of the information that is relevant to the research questions. The primary means of determining any themes that arise during the process is to highlight any sentences or words in the data set that convey particular ideas that are connected to the research problem and to classify them according to their meanings or patterns (Braun, V. and Clarke, V., 2006). In addition, The Honeycomb framework for Social Media Features Ecology (Kietzmann, J. H. et al., 2011) was utilised as a starting point to classify the features resulted from the study. It is based on seven feature blocks: identity, conversation, sharing, presence, group, reputation and relationship. However, psychological states and social media features were the main findings of the analysis process. The published literature in problem gaming and substance abuse (Griffiths, M., 2005; Tao, R. et al., 2010), reinforced our findings in problematic behaviours. In light of this background, the nature of the social media platform was taken into account.

However, the assessment of the data gathered in the form of the diary entries provided by the participants was founded on the three-level process recommended by (Creswell, J. W. and Poth, C. N., 2017), which involved arranging the data to be assessed by contracting it into themes via a process of coding, including a representation of the data. According to Braun and Clarke (Braun, V. and Clarke, V., 2006), the patterns in a data set can be recognised through a process of data familiarisation, data coding, theme development, and revision. As a result of the volume of information contained in the diary entries, MAXQDA software was utilised to assess the data efficiently and systematically, in a time-efficient manner. An example of the thematic analysis approach employed is presented, (see Table 9) which accorded with that recommended

by Braun and Clarke (ibid.). For more examples in relation to analysis (see Appendix A6).

Data extract	Code
Now, I am ==so excited and happy== because my <mark>followers' number increased</mark>, and my timeline is active, and <mark>lots of friends are re-tweeting my tweets and commenting on them</mark>.	.. Feeling .. Reputation .. Social media features, e.g. sharing

The first stage of the analysis involved arranging the data collected through the diary entries in Evernote into individual participant folders, and then reading the data a number of times, in order to assess its potential themes. After this, the diary notes were then imported into the MAXQDA software and the raw data was encoded, sentence by sentence, and line by line, according to the potential themes determined in the initial stage. Any information related to these potential themes was highlighted, and a further assessment of the data facilitated the combining of these potential themes into categories. The initial findings of the analysis generated the following 13 categories: Role, Online identity, Technical issues, Identity ruining, Drive, Online profile identification, Features, Social media platforms, Motivation, Emotional state, Abnormal behaviour, Context, and Online attachment style.

In the next stage of the analysis, the categories generated were prioritised and interpreted, allowing the subsequent reduction of the categories to the following three: **Psychological states**, **Emotion states**, and **Social media features**. These constituted the categories that were employed for generating the outcomes report, which is discussed in detail in Chapters **4** and **5**. Additional analysis approaches were also employed, e.g., Axial coding in order to create online behaviour archetypes, as discussed in full in Chapter **6**. The five stages of the analysis described above are illustrated below (see Figure 12).
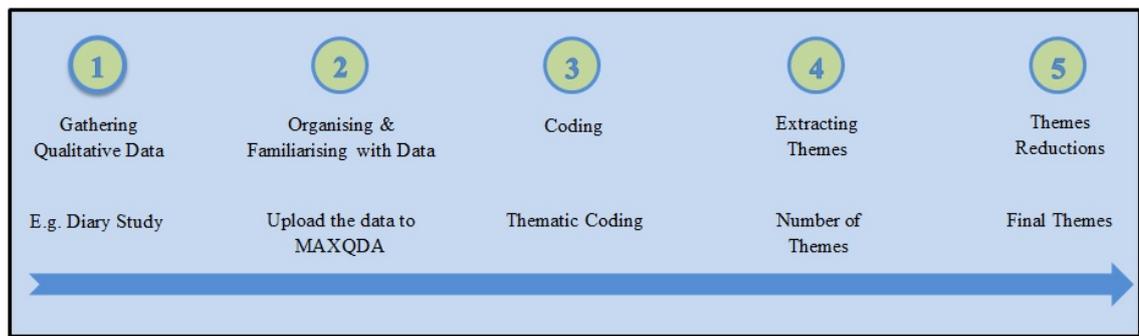
FIGURE 12: CODING STAGES

The data collected from the exploratory study was analysed using thematic analysis (Braun, V. and Clarke, V., 2006). In addition, the Honeycomb framework for Social Media Features Ecology (Kietzmann, J. H. et al., 2011) was utilised as a template based on Kietzmann research and theoretical perspectives to classify the features resulting from the exploratory study. It is based on seven feature blocks: identity, conversation, sharing, presence, group, reputation and relationship. For more details (see section 3.11.1.5). After the first iteration of the analysis, the author found that the pre-defined template in relation to social media features did not cover all related codes. The author then added two categories including direct communication and push notification. For example, the version of the top-level theme related to the social media version was

1. Identity
2. Conversation
3. Sharing
4. Presence
5. Group
6. Reputation
7. Relationship
8. Direct communication
9. Push notification

Actually, the template has not been simplified the analysis but was helping as a starting point. The second level themes include for example,

1. Identity
   1.1. Emotions
   1.2. Psychological states

The third level themes include for example,

1. Identity
   1.1. Emotions
      1.1.1. Positive

1.1.2. Negative
  1.2. Psychological states
The fourth level themes include for example,

1. Identity
  1.1. Emotions
    1.1.1. Positive
      1.1.1.1.   Increase popularity
So, the findings particularly highlighted the role of social media features in promoting problematic attachment to social media.

3.11.2 PHASE II: CONFIRMATORY AND REFINEMENT

This phase focused on refining the findings of the analysis of the first phase regarding psychological states and emotion states and their relations to social media features. To achieve this goal, a closed card sorting technique within focus group sessions was carried out with 14 participants.

3.11.2.1 STUDY INSTRUMENTS

As discussed previously, this study was conducted using a qualitative approach, in order to obtain findings that would provide details regarding people's problematic experience and attachment to social media that are facilitated by the design of social media applications. In order to refine the findings of the exploratory study conducted in Phase I, the findings were refined using focus group sessions and closed card sorting technique.

3.11.2.2 SAMPLE SELECTION

For the card sorting and focus group study, 14 participants were recruited. Six participants were selected from the first phase sample to avoid analysis bias and to increase the credibility of the findings from their perspective's. This has served also as a technique for member checking (Birt, L. et al., 2016), and is one of the strategies employed in qualitative research to validate a study's findings. The other eight participants were recruited from a different cohort following the same recruitment procedure in Phase 1. The inclusion criteria are: Participants must be adult social media users and must self-identify as having a problematic attachment to social media. The inclusion criteria were adhered to using a pre-selection questionnaire adapted from the

Generalised Problematic Internet Use Scale with necessary adaptations (Caplan, S. E., 2002).

3.11.2.3 STUDY PROCEDURES

At the focus group session, the researcher greeted the participants, offered a brief overview of the purpose of the session, and requested that the participants sign a consent form. This was followed by a presentation providing a summary of the findings of the exploration phase (phase I), and an explanation of how these findings were obtained.

Then, a closed card sorting approach was utilised in order to refine the first phase findings. The card sorting technique is useful for gaining participants perspective regarding the findings and their inter-relations and through discussion and observation, to obtain additional feedback. The participants were given the pre-defined primary groups, pens, notes and cards. Cards provided related to every category index concluded from the analysis of the first phase, for instance, psychological states and features. The first card sorting session comprised eight participants where the group was split up into two teams who had to discuss and sort cards, then discuss them with the other team. In the other session, one-to-one meetings with the participants were held in order to obtain their individual views. This, in turn, enhances the process of validation and avoids groupthink (Berg, B. L. et al., 2004). Participants were told to provide the cards and refine the groups as well as the concepts of every category from findings together with the pre-defined cards. Participants were encouraged to "think aloud" as they carried out the sort, describing their reasons concerning the grouping and any possible uncertainties which they might encounter. Upon the completion of the card-sorting task, the participants were required to provide clarifications to some questions pertinent to their experience with the sorting exercise.

3.11.2.4 STUDY PROTOCOL

1. A pilot study was conducted in order to evaluate the study design;
2. The participants were chosen based on the pre-selection questionnaire;
3. The participants were emailed a consent form, together with a participant information sheet verifying the purpose of the study, and the expectations of their involvement (see Appendices B1 and B2);

4. The participants were required to attend focus group sessions at which a closed card sorting exercise was conducted;

5. Preparations for the card sort:

   - In total, 26 cards concerning psychological states, 57 cards concerning emotion states, and 44 cards concerning social media features were printed and numbered, and then labelled with every category (see Appendix B3);

   - Every category card was shuffled before the participants entered the room;

   - A printed copy of the pre-defined primary categories was provided to every participant, for their ease of reference;

   - The participants were provided with a stack of blank cards, notepaper, and a pen.

6. During the session, the researcher commenced by welcoming the participants, then provided a brief introduction outlining the theme of the research, and the purpose of the study. The sessions were scheduled to run for between 90 and 120 minutes, during which the participants are asked to conduct the following two distinct activities:

   - First, the participants were asked to conduct a card sorting exercise that would assist the researcher in gaining insights into the most effective strategy for organising the findings from Phase I into the pre-determined categories, in a way that ensured trustworthiness and validity (see Appendix B4);

   - Finally, the researcher asked questions concerning the participants' experience with the sorting exercise (see Appendix B4) ;

   Every participant was given £10 following the successful completion of the focus group session.

3.11.2.5 STUDY ANALYSIS

In order to examine the results of the closed card sorting exercise, and to determine any patterns that emerged, particularly concerning the concepts and the group names, which the participants either agreed or modified, a spreadsheet was employed to:

a. Record the way in which the cards were grouped by all of the participants;

b. Observe the names, concepts, or/and the terms that the participants selected for each group or card that they sorted, and to record the names and concepts selected that agreed with original, and where amendments were made;

c. Seek commonalities across the participants' responses, and thereby create a new, modified version of the index, themes and categories.

All of the sorting outcomes were entered onto one spreadsheet, with the category, card number, and titles in the first two columns, and the results obtained from each group or individual in the other columns (see Appendix B5). The final version of the concepts and categories, following the amendments produced by the closed card sorting exercise, were presented in Chapter **4** and Chapter **5**. Some of the observations highlighted by the exercise, together with the amendments applied to the categories were as follows:

- Most of the cards were sorted in a manner similar to the pre-defined categories;
- Some of the categories were not self-explanatory and therefore required a key. For instance, 'Nudge' in social media features category, which was renamed 'Push notification'; 'Inactive profile content' in the 'craving' category of psychological states was moved to 'boredom' category and was renamed 'Loss of popularity due to inactive profile'.

3.11.3 ETHICAL CONSIDERATION

To ensure disciplined investigation, Bournemouth University's internal ethics policy was used to guide planning and conducting the thesis studies. Before starting each study, an ethics form was prepared and sent to the URCC Research Ethics Committee for quality assurance and integrity. All requests for thesis studies were granted by the Committee (see Appendix F). The studies procedures presented in chapters three, six and eight were below minimal risk, which means that the potential harm due to participation in the studies is no greater than that experienced by participants in their daily lives. Participants in these studies were fully informed of the objectives and procedures of the studies, the role of participants and the data protection and anonymity procedures. Then, the participants' consents were obtained by signing consents forms

that explain their rights in the study. All the data was anonymised and stored in a confidential place. The audio files were first transcribed and then destroyed.
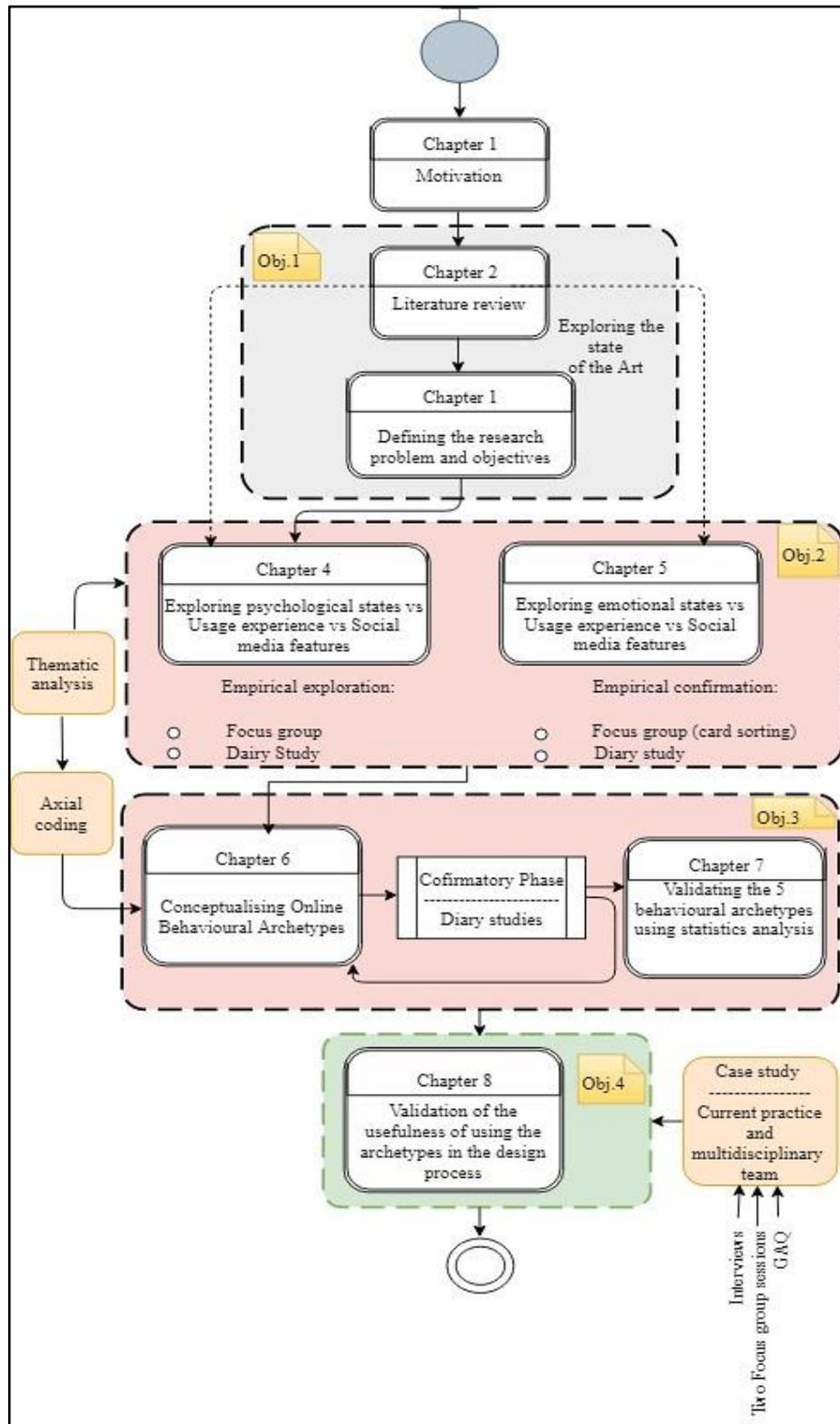
FIGURE 13: CONCEPTUAL FRAMEWORK FOR THE THESIS METHODOLOGY

4 CHAPTER FOUR: EXPLORING THE PSYCHOLOGICAL STATES IN RELATIONSHIP WITH PROBLEMATIC ATTACHMENT TO SOCIAL MEDIA

One major component of the exploratory study was an examination of the extent of psychological states caused by excessive online behaviours among over dependent users. These psychological states, such as anxiety and craving are considered the foundation for further emotional terms such as anger, fear and so on. In this chapter, the author will describe these psychological states in relation to problematic attachment to social media, and the role of social media design in promoting problematic attachment and subsequent psychological states. The following sections present the psychological states and usage experiences in Section 4.3, psychological states and strength in Section 4.4 and social media features with psychological states in the main Section 4.5.

4.1 INTRODUCTION

People around the world are embracing the use of social media; it has become deeply interwoven in the population's daily lives. It is particularly popular with young people (Pempek, T. A. et al., 2009). Social media provides the means for people to engage with others, forming and maintaining relationships without the need to take part in real-life social activities (Boyd, D. M. and Ellison, N. B., 2007). For many people, social media are used on a daily basis to connect with friends, organise events and express opinions. As such, social media has had a marked effect on peoples' everyday life as well as their spiritual fulfilment and well-being.

There is a range of social media platforms, and their popularity has increased considerably over time as a means of facilitating both communication and entertainment (O'keeffe, G. S. and Clarke-Pearson, K., 2011). Indeed, the number of active Facebook users stood at 500 million in 2010, but by 2018, this had increased to 2 billion (Facebook, 2019). However, the rate of expansion in the use of social media has prompted academics to examine its impact on the population. Recent studies advocate that social media can have both positive and negative impacts on users (Altuwairiqi, Majid et al., 2019b; Charoensukmongkol, P., 2018; O'keeffe, G. S. and Clarke-Pearson, K., 2011).

Research on the relationship between the use of social media and self-esteem, e.g., (Denti, L. et al., 2012; Gonzales, A. L. and Hancock, J. T., 2011; Steinfield, C. et al., 2008) concluded that people with low self-esteem tend to overuse social media in an attempt to enhance their self-image and their self-identity, which positively promotes their self-esteem. However, peers interaction and failure in getting recognition may worsen their mood. Other empirical studies have revealed that addiction to social media is linked to negative psychological experiences, including anxiety, depression and stress. Moreover, it can also contribute to poor academic performance and lead to dissatisfaction with life (Hawi, N. S. and Samaha, M., 2017; J Kuss, D. et al., 2014; Lepp, A. et al., 2014). In addition, research has emphasised that people who develop excessive and obsessive engagement with social media are more likely to experience undesirable life experiences as demonstrated by reduced creativity, increased anxiety and withdrawal from reality (Andreassen, C. S., 2015).

Most of the existing literature on digital media addiction has focused on psychological perspectives, such as the role of social skills (Turel, O. and Serenko, A., 2012) or personality traits (Winkler, A. et al., 2013), in facilitating digital media addiction. Several studies have indicated that certain patterns of social media use have a negative impact on psychological well-being (Kross, E. et al., 2013). Despite the research on the psychological side of the problem, there is a lack of research that identifies the role of social media design in triggering the problematic attachment.

4.2 OVERVIEW OF THE RESEARCH METHOD

To obtain more insights into problematic experiences on social media, we conducted a multi-phase qualitative study consisting of an exploratory phase described in the previous chapter in Section 3.11.1 and a confirmatory and refinement phase described in Section 3.11.2. Different qualitative methods were employed in each phase to make sure the data capture and analysis were accurate. The data analysis and the framework used as theoretical underpinning are described in the previous chapter in Sections 3.11.1.6 and 3.11.2.6. The conceptual diagram of the research methods is presented underneath (see Figure 14).
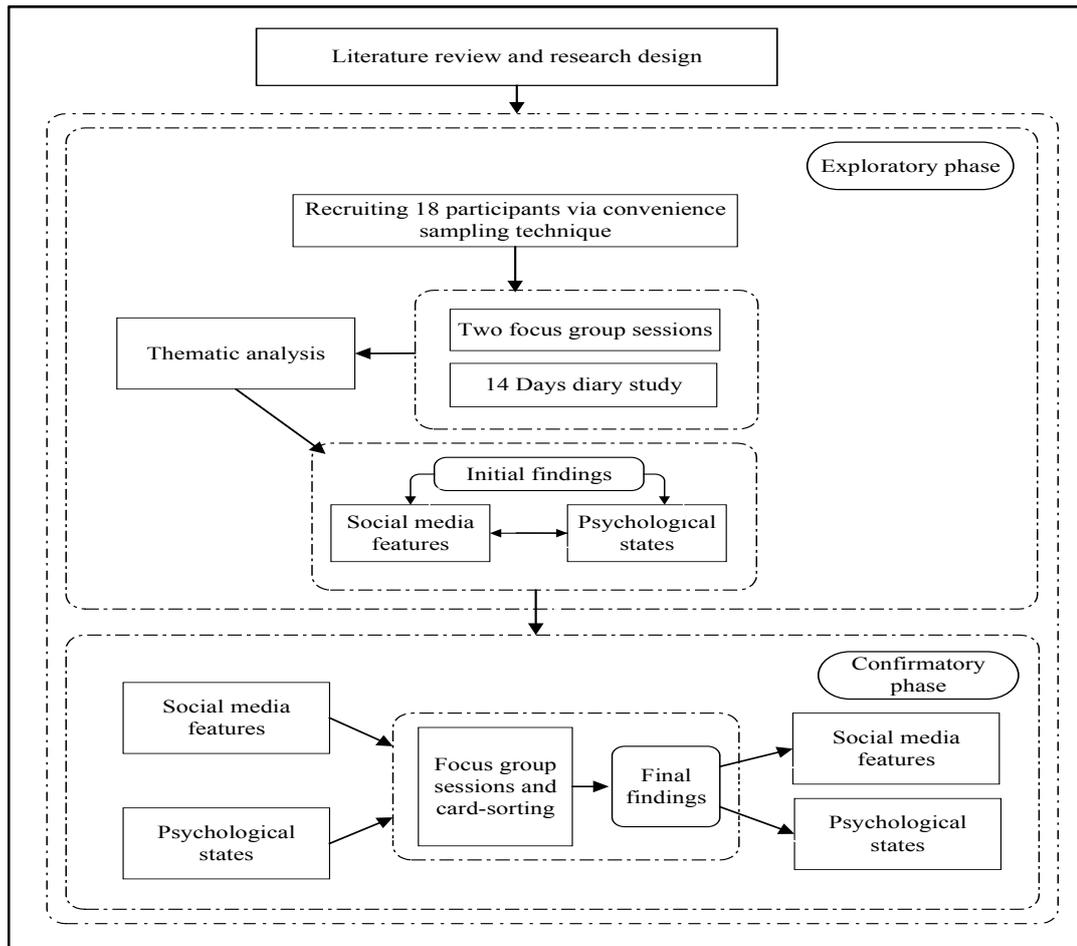
FIGURE 14: OVERVIEW OF THE RESEARCH METHOD

4.3   PSYCHOLOGICAL STATES VS USAGE EXPERIENCE

People may experience psychological states depending on the nature of the interaction on social media. For example, problematic social media attachment may lead to experiencing psychological states such as craving, anxiety, loneliness, loss of interest, depression and boredom. Thus, psychological states accompany and contribute to the individuals' problematic attachment to social media. The author present frequent usage experiences encountered by people with problematic attachment and related psychological states (see Figure 15). The exploration of potential linkages between psychological states, e.g. anxiety and social media, is complex and in its early stages (Shaw, A. M. et al., 2015; Woods, H. C. and Scott, H., 2016).
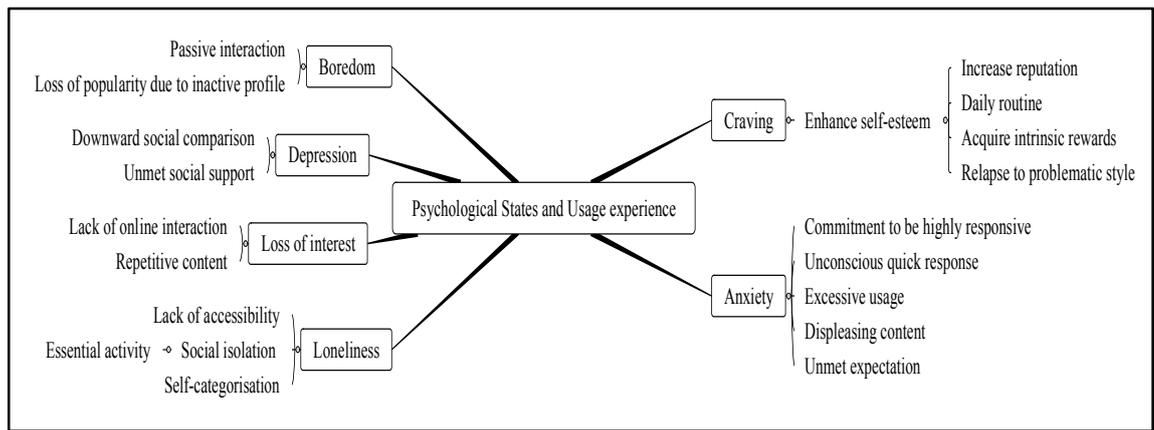
FIGURE 15: PROBLEMATIC ATTACHMENT TO SOCIAL MEDIA: PSYCHOLOGICAL STATES VS USAGE EXPERIENCE

4.3.1 CRAVING

In relation to social media, we define craving as a strong desire to experience and interact in social media platforms (Hormes, J. M. et al., 2014). It can also be defined as a conscious experience that occurs when an individual pays excessive attention to social media. The attention to or perceived attractiveness of social media-related content increases with repeated online engagement.

Craving is a psychological state, which manifests in problematic attachment to social media. It appears that craving to interact in social media allows individuals to adapt, strengthen and improve their self-esteem, resulting in a desire for excessive and impulsive behaviours, but ultimately generating negative effects (Verdejo-García, A. and Bechara, A., 2009). When individuals re-form their online interaction style, cravings can be triggered by positive expectations, which further fuel their problematic attachment. The following are explanations for cravings arising in relation to a problematic attachment:

- **Increase reputation:** Individuals with a problematic attachment to social media crave online interaction to increase their number of friends and likes they acquire, which in turn increases their reputation and their social capital. This could involve excessively updating the content of the user profile such as the profile picture, status or posts; *"I feel craving because I want to increase my followers and bring life to my timelines"*.

- **Daily routine:** Individuals with a problematic attachment to social media may develop a strong craving for social media because they engage online on a daily basis. When behaviour becomes routine, it is also habitual in order to eliminate craving. This encourages social media users to interact increasingly more than they need to, working to improve their self-esteem and satisfy their needs; *"I cannot imagine myself not using social media every day"*.

- **Acquire intrinsic rewards:** Individuals with a problematic attachment to social media may feel negative about their everyday life. This triggers a desire to receive intrinsic rewards through online interaction, minimising their preoccupation with what they might be missing offline. Thus, individuals may engage online excessively to eliminate cravings for positive reinforcement (Greenwood, D. N., 2013); *"The first thing that comes to my mind when I want to feel pleasure, I go to social media"*.

- **Relapse to problematic style:** Individuals might attempt to re-form a problematic attachment style on social media in order to regulate online interactions. Under some circumstances, their cravings could be provoked by positive expectations from online interactions such as those maintained by popularity and relatedness, resulting in a compulsive urge to seek excessive interaction; *"I minimised my online interaction pattern, but I felt that I might lose my social contacts. Then I feel a craving to increase them through online activities"*.

4.3.2 ANXIETY

The anxiety that results from using social media can be defined as a sense of stress, worry or discomfort. This is often due to the user's level of popularity, which may or may not be achieved, or how others perceive the individual on social media. Individuals with a problematic attachment to social media may feel anxious in relation to their online interactions, which may then have a negative impact on their life satisfaction and well-being. Evidence supports the claim that excessive use of social media not only interferes with a performance at work but also undermines psychological well-being (Satici, S. A. and Uysal, R., 2015). Our exploratory study in Phase I revealed that individuals with a problematic attachment to social media might feel anxious when

conducting online interactions. The study found certain situations, in particular, contribute to anxiety:

- **Commitment to be highly responsive:** Individuals with a problematic attachment to social media experience anxiety as a result of the commitment to stay constantly connected to others, causing them challenges when they are unable to check in with their social media (Ryan, T. et al., 2016); *"I feel a little bit tied to social media. It makes me feel like I have another obligation in my life that I have to stick with. Sometimes social media makes me feel like a whole new world of the commitments I have because anyone can hold me at any time by thinking of me., if my mom texts me via WhatsApp and I do not text her back by the end of the day, she gets worried. This creates a bit of anxiety and is annoying sometimes"*.

- **Unconscious quick response:** Individuals with a problematic attachment to social media may act quickly or unconsciously. As a result of their hasty style of engagement, they may experience a level of anxiety that negatively influences their well-being; *"I cannot resist the urge to respond immediately to any activity on social media platforms and this make me feel anxious"*.

- **Excessive usage:** Overuse of social media may cause individuals to feel anxious regarding their problematic attachment. The time they spend online could conflict with their duties and affect their performance, which in turn triggers anxiety; *"I feel anxious when I am delaying important things that I have to do because of using social media for a longer time than I need"*.

- **Displeasing content:** Individuals feel anxiety arising from their problematic attachment when social media content displeases them. This anxiety often occurs after receiving repetitive and ambiguous content, such as receiving advertisements, offers and friend request from anonymous contacts. Additionally, popularity can be affected by an individual reposting such as displeasing content. This can provoke anxiety; *"I feel anxious when I receive an ambiguous email"*.

- **Unmet expectations:** Unmet expectations from an event on social media is considered most likely to cause anxiety in individuals with a problematic

attachment. For example, when individuals decide to re-formulate their presence style and profile online and peer behaviour or expected interaction from peers are below the individual's expectations. The individual may not have received 'likes' on a post as expected, reducing their self-esteem and trigger feelings of anxiety.

4.3.3   LONELINESS

The psychological state of loneliness arises when people feel a lack of genuine communication and authentic connection with others. Individuals with a problematic attachment to social media may feel lonely due to the prolonged time spent on online interactions to maintain relationships, self-presentation and self-image (Savci, M. and Aysan, F., 2016). Two situations resulted from the exploratory study, which determined how participants experienced loneliness:

- **Lack of accessibility:** Inability to use social media due to technical or personal factors or failing in achieving the right amount and quality of interaction may drive individuals to feel lonely. This feeling may increase in individuals with problematic attachment when they are unable to access their social media profiles; *"I felt lonely when I could not access my social media sites"*.

- **Social isolation:** Individuals with a problematic attachment to social media are typically involved in a number of online activities such as chatting, texting, posting and communicating with others. This led to excessive use of social media. This excessive interaction, due to a lack of self-control, can increase the time spent online and provoke the feeling of loneliness; *"I feel isolated from the real world because I stay online most of my time"*.

- **Self-categorisation:** It is one of the situations that trigger loneliness in relation to a problematic attachment to social media. The categorisation means that individuals classify themselves and differentiate between each other based on their class, age, gender and characteristics. For example, an individual user in Snapchat may classify him/herself as a comedian which in turn affects that individual's online behaviour. In addition, self-categorisation is related to group formation and membership which depends on the perceived similarities amongst

group members and the characteristics that define the group identity in a particular context. This categorisation leads to self-evaluation which in turn highlights social isolation and provokes the feeling of loneliness; *"Social media is part of my life but I do not have many contacts because I only make contact with like-minded and educated people, I feel loneliness sometimes"*.

4.3.4   LOSS OF INTEREST

Loss of interest refers to the state when individuals present no intention to maintain the social media activities, including the friendships, comments, and participation they have enjoyed in the past. Individuals who suffer from a problematic online attachment may feel less interested in social media, i.e. no longer care about activities that were previously enjoyable, but still not able to reshape their relation with it. The following situations illustrate how individuals experience a loss of interest in social media:

- **Lack of online interaction:** Individuals with a problematic attachment to social media experience a loss of interest when there is a lack of online interaction. Lack of online activities, communications and friendships may lead to a diminution in access to information and relatedness which in turn decreases self-esteem and triggers a loss of interest; *"I am eager to Facebook, to know the news and communicate with others but I lose that desire if there is no continuous interaction"*.

- **Repetitive content:** Individuals with a problematic online attachment are overly relying on social media to seek information in order to be up to date with events and social communities. However, repetitive content in social media platforms may lead them to quickly lose interest as they are used to receiving new and diverse content all the time; *"New information and activities are exciting to me, but I may feel less interested to social media when the content is repetitive or outdated"*. In addition, loss of interest can be bi-directional when users with problematic online attachment repost the same content through various social media platforms aiming to maximise outreach and impressions. This repetition in reposting content may affect their popularity and relatedness due to others feeling less interested to their profiles; *"I lost my popularity because people are less interested in following me posting the same content on my online profile"*.

4.3.5 DEPRESSION

Depression is the mood or emotional state characterised by a sense of low self-value or a sense of guilt and reduced ability to enjoy life. Social media allows an individual to form connections with others who share similar interests and consequently have greater social capital. Individuals with a problematic attachment to social media may feel depressed in the following situations:

- **Downward social comparison:** Social media users in relation to their problematic attachment may engage in social comparison with others, in order to meet self-evaluation needs. Social capital that individuals acquire, acceptance from others or various online activities that individuals post may give the impression that others are more famous or more active than them. This negative impression may provoke low self-evaluation and facilitate depression (Feinstein, B. A. et al., 2013); *"I think life is not fair because I have a greater number of followers than my friend but frequently I see my friend getting more likes on his posts than me"*. In addition, people are likely to start the social comparison with others due to excessive time spent on social media, and in turn, feel depressed (Steers, M.-L. N. et al., 2014).

- **Unmet social support:** Individuals with a problematic attachment to social media have a number of online friends, possibly more than other users (Marino, C. et al., 2017). Social media platforms provide individuals with communication methods such as messaging, commenting and posting. These enable individuals to perceive social support from their friends and establish intimacy with them which in turn reduces depression (Wright, K. B. et al., 2013). When close friends are not available online to satisfy social support needs, individuals may feel depressed; *"I think my close friends in social media are important for support and life happiness. However, I feel depressed when I do not find them online for an urgent situation"*.

4.3.6 BOREDOM

Boredom is the psychological state experienced by individuals when they have nothing to do in their social media and unable to find alternatives in the real world. They are

available online to occupy their free time and maintain connections with others. However, individuals with a problematic attachment to social media may experience boredom, as explained below:

- **Passive interaction:** Online interaction may have a negative effect on self-esteem. With low self-esteem, the individual may engage in passive interaction such as viewing and scrolling in unconscious mood which results in a feeling of boredom; *"I feel bored sometimes when using social media due to comparisons made. I then lose confidence because of those who are better than me in their posting. When this happens, I prefer to browse rather than posting"*.

- **Loss of popularity due to inactive profile:** Individuals with a problematic attachment to social media may have an occasional inactive online presence, rarely posting even for their friends, which have a negative impact on their popularity. Their accounts appear inactive, and consequently, other users no longer interact or share profiles with them. This, in turn, provokes a feeling of boredom; *"Sometimes my interaction on social media is low which stops friends interacting with me and this makes me feel bored"*.

4.4 FREQUENCY AND STRENGTHS OF PSYCHOLOGICAL STATES

The study conducted a diary with 18 participants for 14 days with three daily diary entries. Out of a possible total of 756 diary entries, written psychological states were provided in 712 entry documents. A total of six themes emerged from this analysis (see Table 10). The table shows a summary of emergent themes, their frequencies, and thematic exemplars. Exemplars were extracted from their original written documents as a means of adding "thickness" to the data (Ponterotto, J. G. and Grieger, I., 2007).

TABLE 10: FREQUENCY-PSYCHOLOGICAL STATES

Psychological States	Frequency	Occurrences	%	Illustrative example
Anxiety	489/756	12	64.68	When I upload photos to Facebook, I feel so anxious till I start to receive a high number of Likes.
Boredom	444/756	10	58.73	I rely on social media to change my mood even at odd times of the day. I feel so bored if no one responds to my posts and messages.
Loneliness	356/756	9	47.09	I feel isolated from society because I stay in my online gaming groups most of the time.

Loss of Interest	311/756	8	41.14	I overly check the updates in social media, but I quickly lose interest and stop reading, still cannot stop checking
Craving	267/756	6	35.32	I can not wait to be online and interact, it is part of my daily routine so not having it even during work hours would feel very strange
Depression	89/756	3	11.77	I do not compare favourably to peers profiles and posts on social media. I stop posting and continue watching, and this makes me feel at times depressed
Entry doc. with code(s)	712	18 participants	94.12	
Entry doc. without code(s)	44		5.88	
Analysed doc.	756		100.0	

It is important to note that no conclusions can be attracted about the prevalence or distribution of psychological states beyond the sample. The large number of diary entries in this longitudinal study provides a good benchmark for how often such themes and concerns arise (Neale, J. et al., 2014). The frequency was computed via MAXQDA analysis software by identifying words such as anxiety, boredom, etc. or a phrase consisting of one of the psychological state variables. Almost all the diary entries (94.12%) included at least 1 of the items in the content of the psychological states while they engaged on social media. This can be inferred as an indicator of manifestation of problematic online attachment. The results indicate a high frequency of anxiety, which was reported by 2/3 of the sample (12 participants), representing 64.68% of the feedback. At the other extreme, depression was reported by only three participants, representing 11.77%.

4.5   SOCIAL MEDIA FEATURES VS PSYCHOLOGICAL STATES

The design features attributed to social media can play a crucial role in promoting problematic attachment and subsequent side-effects. Engineers are faced with challenges of the practical introduction of social media design as well as managing their influences. Side-effects such as anxiety might accompany the ad-hoc change of social media features. Ad-hoc changes, such as limited access to some features for individuals who maintain a high level of digital attachment, may contribute to negative psychological states as a result of the user's loss of popularity.

The Honeycomb framework (Kietzmann, J. H. et al., 2011) was used as a template analysis to help classify the features of social media resulting from the exploratory study (Phase I). The purpose was to investigate the role of the features of social media, as classified by the Honeycomb, in facilitating certain psychological states and problematic attachment patterns. Features such as push notifications and direct communications were added to the seven main features of the Honeycomb to meet the requirements of the study and the findings of the analysis. A detailed explanation of the design features derived from the analysis is provided below. Most features from the honeycomb framework contribute to one or more than one psychological states (see Figure 16).
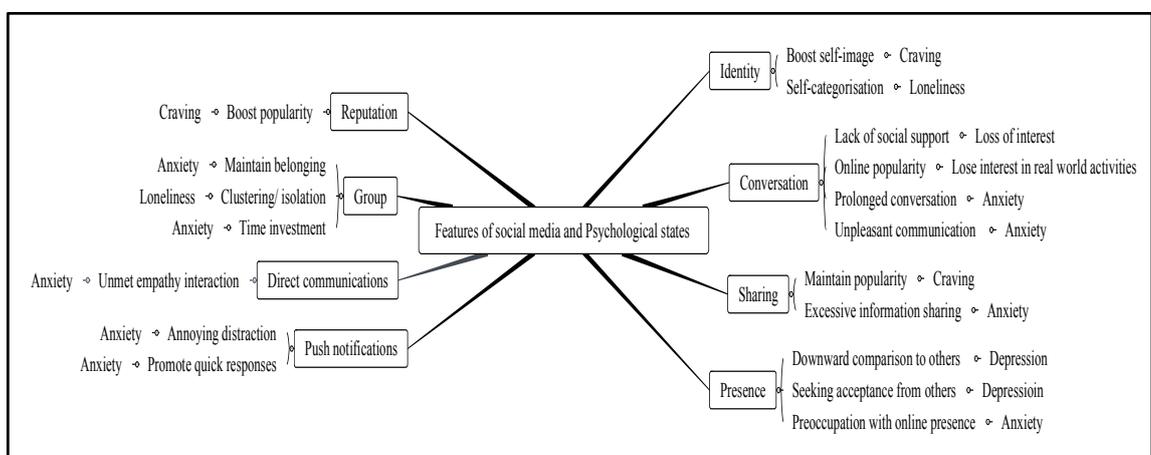
FIGURE 16: PROBLEMATIC ATTACHMENT TO SOCIAL MEDIA: SOCIAL MEDIA FEATURES VS PSYCHOLOGICAL STATES

4.5.1   IDENTITY

Identity is the feature that is required for individuals to set up their account and reveal their identities on social media. Identity feature includes the profile information personal details such as name and picture and the profile content such as the timeline and posts dashboard. When individuals identify themselves, they can disclose aspects of their personal information, including their name, age, gender, status, interests, location, background, and profile picture. The details and level of disclosure of real information are different from one user to another depending on their personality and their reason for using the social media site. For example, the identity could be real with a real name, picture and profile information, or it could be anonymous without enough information leading to the real identity. Alternatively, it could be between the two. There is also an implicit disclosure of their online identity through their online interaction style such as a

quick response when they receive notifications, or through profile content which is present in the timeline, as it is on Facebook. This is an indirect disclosure of online identity and interests. This feature could facilitate craving and loneliness in relation to a problematic attachment to social media.

The identity feature could facilitate craving when individuals interact on social media to maintain their self-concept. However, the identity feature could also be beneficial in reinforcing individual or group identity. Having an identity gives the individual a sense of belonging, which in turn enhances their self-concept and self-esteem. Thus, individuals with a problematic attachment may crave online interaction to boost their self-image. They may feel a craving to create a community and place of belonging, relying heavily on the identity feature to search for similarly identified profiles to interact with; *"I rely on profile information to find people who share the same characteristics such as gender, age and workplace"*.

Online identity could facilitate loneliness. Individuals can express their self through profile information and content. This information leads individuals comparing their profiles to others and self-categorising, which in turn lowers their self-esteem and provokes loneliness; *"In my opinion, journalists are well educated. I feel lonely in social media because I only make contact with people from the same field"*.

4.5.2 CONVERSATION

The conversation feature refers to communication that occurs between social media users via features such as posts, comments, likes, chat, and sharing. Communicating with other users or groups is the primary reason for some individuals to use social media. The conversations can be used to share opinions with like-minded individuals, promote oneself, boost self-esteem, and keep up to date with the latest knowledge. Social media can also provide a secure means of communicating with friends and family. Crucially, if an individual feels that the system is secure, they are likely to be more open and perhaps build relationships. However, this online interaction can lead some users to be more attached to social media and facilitate problematic usage, resulting in anxiety and a loss of interest.

To clarify further, individuals on social media rely on the conversation feature to communicate with others because it is instantaneous and easy to access. This can result

in a problematic attachment and a loss of interest if online friends are unavailable for social support. Additionally, it could facilitate a problematic attachment to social media and drive individuals to communicate online rather than face to face, thus allowing them to boost their online popularity and relatedness in a way which is unproportioned to real-life contacts. Consequently, individuals may lose their interest in and enjoyment of activities in the real world; *"I like to have online conversations with others which make me feel happier than if I did not do anything"*. While considering such imbalance as a problem can be debated, we note here that the participants in our study self-declared considering their relation to social media as problematic in the pre-selection criteria.

The conversation feature promotes a problematic attachment to social media by enabling individuals to engage in online conversations excessively. Individuals are communicating with others and losing awareness of the time spent online by maintaining these relationships. Consequently, individuals could feel anxious about prolonged conversation*; "I rely on online conversation to keep my relationship, but I feel anxious because it is difficult to ignore any conversation"*. In addition, individuals may engage in online conversation excessively to explore others, leading to a problematic attachment. Thus, they may find it challenging to keep a distance from unpleasant communication or content, which in turn triggers a feeling of anxiety. For example, in the real world, individuals can maintain distance between themselves and others through avoiding being geographically close. This can be difficult in the online space, especially for people who overly rely on it for meeting their social needs.

4.5.3 SHARING

The sharing feature is characterised by exchanging and distributing social media content between users. It is a fundamental feature on social media platforms such as Flicker, Facebook, Twitter, and YouTube. For individuals with a problematic online attachment, the sharing feature can facilitate psychological states such as craving and anxiety.

Users feel the desire to increase their popularity and maintain it in social media, which has a positive impact on their self-esteem. The sharing of posts, videos, and content with friends and groups assist them in increasing their popularity. Therefore, individuals may develop problematic attachment because they rely on the sharing feature to maintain popularity and sense of belonging, which may eventually promote a sense of

craving; "I have a good reputation in social media because of my unique stories. I crave to share any news as soon as it is received. Sharing is a powerful technique in social media".

Sharing is an important social activity. Many individuals share information on social media to gain acceptance from others. Sharing behaviour at this stage, facilitated by the design of social media, e.g. promoting certain sharing's according to the interest can facilitate problematic attachment and raise anxiety due to excessive information sharing; *"I worry about sharing too much information in social media, I cannot stop myself from doing this"*. In addition, individuals may feel anxious regarding ambiguous or unpleasant content shared by others. This happens, for example, when users label their friends using Hashtags or name them in a picture while friends are not interested in the content and its context.

4.5.4   PRESENCE

The presence feature is concerned with how users can determine whether or not other individuals can be contacted or available. This could be as simple as being aware of another person's status and whether they are contactable (e.g. away, busy, hidden, and available). The status line on social media offers another way of signalling whether or not an individual is available, e.g. writing in the status line the availability time. An alternative sign of an individual's presence is their degree of engagement via social media. For instance, if they regularly post and chat, then this will have the effect of signalling to others that they are likely to be present at any given time.

Another example is the Last Seen feature in some programs such as WhatsApp and Skype. This subsequently provokes a sense of closeness to others. In terms of group dynamics, presence is indicative of cohesion among a group. In addition, presence can be associated with self-presentation which is associated with facilitating problematic attachment. Therefore, the presence feature can facilitate a problematic attachment which consequently triggers psychological states such as depression and anxiety.

To clarify further, individuals who tend to engage in a lot of social media activities may feel that they do not live up to the lifestyles that others tend to present in their profiles. Such a peer comparison facilitates problematic attachment to social media in which some would try to imitate or compete with peer's online profile. Therefore, this kind of

downward comparison leads to them feeling occasionally depressed. In addition, presence in social media can influence an individual's behaviour. Thus, individuals develop a problematic attachment and rely on their online presence to seek acceptance from others. They are greatly influenced by the behaviour of others or by group norms, which leads them to feel a degree of depression; *"I am a member of more than one group in Facebook, and there are a set of norms for each group to maintain each participants' presence which leads me to interact differently in each group, which make me feel frustrated"*. Moreover, they may feel depressed if they are searching online for their friends, but no one is available to communicate and when they find no updates on their status; *"One activity I enjoy in social media to escape from the real life is communicating with my friends online and checking their status updates. I feel depressed if I could not find one of them online"*.

Additionally, the presence feature could facilitate a problematic attachment and trigger anxiety towards preoccupation with online presence to maintain relatedness and proximity. For example, individuals who engage in social media and overly rely on their presence and availability are preoccupied with the latest update in social media or being available at the right time to interact with others, which in turn promote anxiety feeling.

4.5.5   PUSH NOTIFICATIONS

It is conceptually an event-based mechanism where senders or social media platforms push events and information to others to notify them about what has happened. There are different ways to receive notifications, such as status updates, vibration, voice, email, message, or groups of notifications to notify people that they have received a notification. This is a reinforcement feature and has the indirect implication of triggering people to interact through social media. Therefore, push notification facilitates psychological states in relation to problematic attachment to social media. This can be due to being interrupted while working or resistance to interact (Pielot, M. and Rello, L., 2017).

Push notifications attract people's attention by notifying them concerning online activity. People could receive number of notifications over the day from their social media profiles. The overload of notifications could facilitate problematic attachment to online interaction due to annoying distraction and interrupting tasks, which in turn can

provoke anxiety; *"I get a lot of alerts through WhatsApp and Snapchat and urges me to respond and communicate with others excessively, which makes me anxious"*. In addition, notifications could lead people to promote quick responses, thereby creating hasty behaviour and problematic attachment to social media through a daily routine. Thus, people may feel anxious when they receive notifications, leading them responding quickly; *"I feel anxious about notifications. I cannot stop myself from responding to them when they reach me"*. The low impulse control seems to be a common characteristic in such behaviour.

4.5.6 DIRECT COMMUNICATION

This refers to direct communications between users by means of comments, likes and posts in order to remain connected, return a sense of belonging and increase popularity (Burke, M. and Kraut, R., 2013). A lot of effort is needed to maintain these advantages. Such effort could result in problematic attachment to social media which in turn could trigger psychological states such as anxiety when posts are not responded to especially is reciprocation is expected; *"I feel anxious if I have not received likes and positive comments on my daily posts compared to the time I invested in others' posts"*.

4.5.7 GROUP

Group refers to the ability of users to create communities or sub-communities in social media in order to share their experiences with others. Groups will usually have a specific identity and the group's members will usually share common characteristics in terms of age, family relations, gender and opinion. From the exploratory study, it was clear that the group feature facilitates psychological states in relation to problematic attachment to social media.

Once a user has engaged in a group, they start interacting with the group members to achieve affiliation. In order to develop this affiliation, they will make a greater effort to post and share contents to receive attention from others in the group. This may facilitate the development of problematic attachment to social media. This, in turn, may trigger anxiety towards time investment in these groups or from the effort and excessive use to maintain belonging; *"The use of social media, especially groups, makes me anxious about investing too much time interacting with others to make a good impression"*.

On the other hand, all group members have a common identity with norms and characteristics which distinguish them from other groups. Thus, this may lead them to cluster themselves and consequently trigger social isolation. In case of loss of membership from the group or inability to access it, individuals may feel lonely because there became overly reliant on it without growing alternative options to feel connected; *"I feel loner if I could not access my online group, I feel my group we name it [anonymised for confidentiality reasons] is my comfort zone "*.

4.5.8   REPUTATION

The reputation feature in social media is the extent to which users can determine the popularity of others, including themselves. Reputation can have different meanings on social media platforms. In most cases, reputation is a matter of trust. However, reputation in social media does not only refer to identity but also refers to the content they provide on their profile, which is often evaluated by others. For example, on Twitter, people re-tweet or like content, which in turn adds value to the reputation. In addition, the number of followers on social media determines how popular a person is, since people can follow as many others as possible. Thus, reputation status can be determined by the number of views, followers, or through evaluation system such as Hashtag, which enables individuals to monitor the spread of his content. The reputation feature could facilitate problematic attachment if we take into account that people like to be popular which could positively affect their self-esteem. Thus, this feature may trigger psychological states such as craving accompanied with sacrificing other requirements such as privacy; *"I strive to be one of the famous in Snapchat, I share every moment of my life with others"*.

4.6   CHAPTER SUMMARY

This chapter explored the problematic attachment to social media presented by users in relation to the design features of social media platforms. The findings revealed psychological states associated with problematic attachments and how social media design features facilitated these states. The exploratory study provided an ecological exploration through the use of diary entries for data collection. The findings indicate that problematic users rely on social media to satisfy their social requirements such as

relatedness, learning and promoting self-esteem, and also identified relations between design features and psychological states associated with their online interaction.

5 CHAPTER FIVE: EXPLORING EMOTION STATES IN RELATIONSHIP TO PROBLEMATIC ATTACHMENT TO SOCIAL MEDIA

Another major component of the exploratory study was an examination of the extent of emotional states caused by excessive online behaviours among over dependent users. These emotional states, i.e. anger, fear, joy and so on are feelings associated with people's behaviours, mood, or their relationships with other objects. In this chapter, the author will describe these emotional states in relation to problematic attachment to social media, and the role of social media design in promoting problematic attachment and subsequent emotions. The following sections present the notion of emotion in Section 5.2, the emotional states and usage experiences in Section 5.4, and social media features with psychological states in the main Section 5.5.

5.1 INTRODUCTION

Social media has become prominent in our daily lives (Döveling, K. et al., 2010; Hermida, A., 2016), determining in a major way how an individual shares information (Yang, J. and Counts, S., 2010), forms relationships (Phillips, N. K., 2011) and exchanges knowledge. The use of social media has created a new set of cyber social norms around expectancy and responsiveness as well as group membership and relatedness. While many benefits can be suggested regarding these norms in human communication and socialness; negative experiences emerging from them have become evident. Moreover, research has indicated that excessive and obsessive usage of social media is associated with undesirable life experiences characterised by measures such as reduced creativity, increased anxiety as well as neglecting the reality of life (Andreassen, C. S., 2015).

Despite the increasing awareness of the negative effects of such a problematic us-age style, certain individuals seem to have a strong feeling and intimate engagement with digital devices and tend to ignore the risks associated with it. Research has shown that when some people disconnect from social media or are asked to spend less time and interaction than desired, they may become anxious despite the lack of clear purpose of that online presence (Andreassen, C. S., 2015). The overwhelming use of social media combined with the peer pressure to be online can lead one to lose track of time spent

online and interaction made with social media platforms. The following sections will explain in details the emotional states related to problematic attachment to social media.

5.2   THE NOTION OF EMOTION

The emotions that people experience represent their psychological state, and this cannot be controlled consciously. Emotions arise spontaneously, and may be associated with psychological changes (Dictionary, A. H., 2005). There is debate over the standard of emotion index, and this has resulted in various categorisations of emotions being proposed such as (Parrott, W. G., 2001; Plutchik, R., 2001; Robinson, M. D., 2004). This thesis utilised Parrott's Framework (Parrott, W. G., 2001) to differentiate between primary, secondary and tertiary emotions (see Table 11).

TABLE 11: PARROT'S EMOTIONS FRAMEWORK (SOURCE: W. PARROT, 2001)

Primary emotions	Secondary emotions	Tertiary emotions
Love	Affection	Compassion, Sentimentality, Liking, Caring
	Lust/sexual desire	Desire, Passion, Infatuation
Joy	Cheerfulness	Amusement, Enjoyment, Happiness, Satisfaction
	Zest	Enthusiasm, Zeal, Excitement, Thrill, Exhilaration
	Contentment	Pleasure
	Optimism	Eagerness, Hope
	Pride	Triumph
	Enthrallment	Enthrallment, Rapture
Surprise	Surprise	Amazement, Astonishment
Anger	Irritability	Aggravation, Agitation, Annoyance, Grumpy
	Exasperation	Frustration
	Rage	Outrage, Fury, Hostility, Bitter, Hatred, Dislike
	Disgust	Revulsion, Contempt, Loathing
	Envy	Jealousy
	Torment	Torment
	Suffering	Agony, Anguish, Hurt
	Sadness	Depression, Despair, Unhappy, Grief, Melancholy
	Disappointment	Dismay, Displeasure
	Shame	Guilt, Regret, Remorse

Sadness	Neglect	Embarrassment, Humiliation, Insecurity, Insult
	Sympathy	Pity, Sympathy
Fear	Horror	Alarm, Shock, Fright, Horror, Panic, Hysteria
	Nervousness	Suspense, Uneasiness, Worry, Distress, Dread

5.3 OVERVIEW OF THE RESEARCH METHOD

To obtain more insights into problematic experiences on social media, we conducted a multi-phase qualitative study consisting of an exploratory phase described in the methodology chapter in Section 3.11.1 and a confirmatory and refinement phase described in Section 3.11.2. Different qualitative methods were employed in each phase to make sure the data capture and analysis were accurate. The data analysis and the framework used as theoretical underpinning are described in the methodology chapter in Sections 3.11.1.6 and 3.11.2.6. The author utilised Parrott's Framework (Parrott, W. G., 2001), specifically, the primary emotions in this thesis. This is mainly because the participants may not be fully aware of subtle differences in the secondary and tertiary level, e.g. between worry and anxiety. Induction and analysis around those levels would require a larger scale study. The conceptual diagram of the research methods is presented underneath, (see Figure 17).
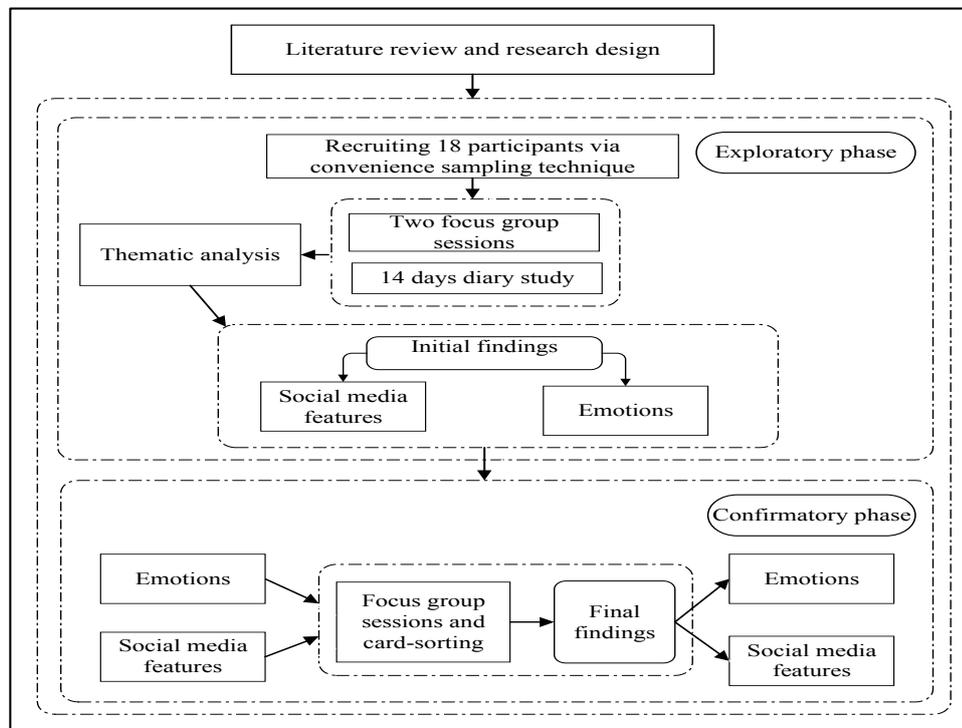
FIGURE 17: OVERVIEW OF THE RESEARCH METHOD

5.4 EMOTIONS VS PROBLEMATIC ATTACHMENT TO SOCIAL MEDIA

Social media can have a significant influence on human emotions such as joy, happiness, anger, sadness, fear as well as surprise. Social media users can take advantage of various features such as posting videos and pictures, commenting on them, posting events, searching for new friends, expressing themselves and sharing daily activities with others. Research has found that young adults used social media to communicate with friends and family (Subrahmanyam, K. et al., 2008). In addition, other research has reported that college students spend most of their time reading about the activities of their friends rather than adding content to their profiles (Pempek, T. A. et al., 2009). Others explained that seeking information and social interaction was a drive to using social media (Johnson, P. R. and Yang, S., 2009). Accordingly, people can experience emotions through online interaction, especially in the case of problematic attachment to social media. Indeed, their problematic attachment to social media may reinforce and provide strength to the emotions evoked by interaction. The following sections will explain the states and examples of these emotions. The following sections present the usage experiences and negative emotions in Section 5.4.1, the usage experiences and positive emotions in Section 5.4.2 and the usage experience and social media features in Section 5.5.

5.4.1 USAGE EXPERIENCE VS NEGATIVE EMOTIONS

Depending on the nature of the interaction on social media, a person may experience either positive or negative emotions. For example, problematic social media attachment may lead to experiencing negative emotions such as sadness, anger and fear. Negative emotions accompany and contribute to the individuals' problematic online attachment to social media. The author present frequent usage experiences encountered by people with problematic attachment and correlated emotions, (see Figure 18). It is important to note that the relation between the experiences and emotions are complex. In this sense, user experience can trigger the negative emotions and vice versa.
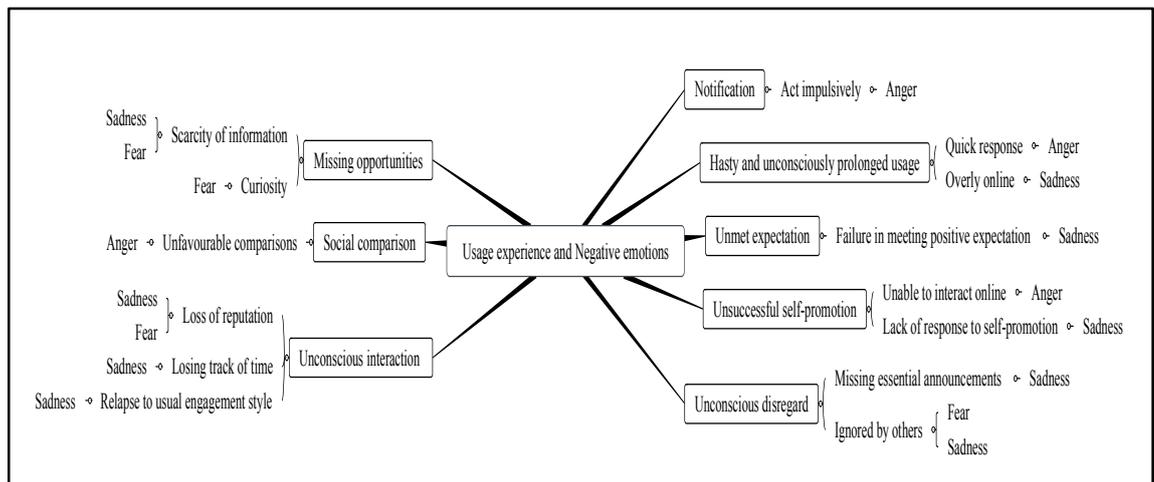
FIGURE 18: PROBLEMATIC ATTACHMENT TO SOCIAL MEDIA: USAGE EXPERIENCE VS NEGATIVE EMOTIONS

5.4.1.1 NOTIFICATIONS

People receive notifications online to inform them about update information from others. There are different styles of receiving notifications, such as status, vibration, sound, email, message or a set of these to notify the people that they have received a notification. However, notifications seem to trigger people with problematic attachment to act impulsively and irresistibly. Reacting uncontrollably due to notifications can evoke negative emotions; *"I dislike notifications. They are annoying [Parrot's primary: Anger], and it interrupts things"*. Even when people are actively trying to reform how they behave online, notifications can trigger negative emotions such as sadness. For instance, even after a conscious decision has been made to deactivate an online account, users may still receive a notification email suggesting that they reactivate their account; *"I have tried to delete my Facebook account, but I failed to do so. The Facebook system kept notifying me via email what my friends had posted; I felt bad because notifications triggered me to reactivate my Facebook page [Anger]"*.

5.4.1.2 HASTY AND UNCONSCIOUSLY PROLONGED USAGE

Hasty usage means that people are acting quickly or unconsciously on social media. People with a problematic online attachment may find themselves interacting online in a hasty style, which may have a negative impact on their work productivity, their concentration and their emotions. The hasty usage triggers negative emotions such as anger and sadness when people engage impulsively with social media in the state of quick response behaviour or being online for extended periods without thinking of it; *"I*

felt angry because I always respond quickly to activities and communications on social media without any self-control [Anger]". Hasty and unconsciously prolonged usage can be to maintain self-presentation and self-concept in front of others through posting too much content; *"I felt sad because I realised I was hasty in posting and commenting on social media [Sadness]"*.

5.4.1.3 UNCONSCIOUS DISREGARD

The notion "disregard" in the context of this paper refers to the state when people are unable or reject to notice, pay attention to or acknowledge someone or something on social media. People with a problematic attachment to social media may ignore others when they are technically available online but unconsciously overlooking messages received from others or neglecting to interact with them in an organised style. For them, social media seem to be an avoidance and escapism tool while having a disciplined interaction is not the main purpose. Social media can be a medium for attachment bonds and communication between people, but those who avoid responding are likely to become more detached from others and may become socially isolated, exacerbating their situation. Therefore, ignoring interaction may lead people to experience negative emotions such as sadness due to missing essential announcements; *"I remember that I was moving between groups in social media unconsciously. One day later, I realised that I had ignored important messages which made me sad [Sadness]"*. People may also feel negative emotions such as fear and sadness when others ignore their presence on social media or ignore their participation; *"Suddenly people on my Facebook site ignored all my posts. I feel sad and afraid that I did something wrong [Sadness]"*.

5.4.1.4 UNSUCCESSFUL SELF-PROMOTION

Self-promotion is an attempt to introduce oneself to others in an ideal or better presented image. People with problematic attachment to social media seem to make an effort to maintain their self-promotion through online interaction, e.g., through posting, commenting and giving likes to others. Self-promoters tend to believe that others will respond to their promotion activities in a positive way. Therefore, when there is no response to their promotion, they feel negative emotions; *"For the past two months I have shared my achievements and activities with my friends in social networking groups, but I have not found enough interaction to feel happy, and that made me feel*

sad [Sadness]". In addition, the negative feelings may affect their self-esteem or may lead to competition and excessive interaction. Conversely, if an individual is unable to interact online and feels incapable of maintaining their self-promotion, they could experience negative emotions such as anger.

5.4.1.5 MISSING OPPORTUNITIES

Missing opportunities means the desire to stay constantly connected with social media network activities out of fear of losing benefits. Thus, people with problematic attachment to social media continually wonder if something may be happening online. They need to feel a sense of relatedness and remaining connected with others via social media. The exploratory study has revealed two facets associated with missing opportunity in relation to problematic online attachment.

The first facet concerns the inability to access news or scarcity of information that can diminish the degree of social interaction. For instance, people who engage online may be afraid of missing news or updates posted by others which may expire within a short time. This situation could result in negative emotions; *"I feel sad because I lost a live story on Instagram from my favourite comedian [Sadness]"*.

The second facet is curiosity. People in social media are interested in what their friends are doing and what latest updates they make on their online profiles to retain a sense of belonging. Their preoccupation with what others do causes curiosity about others' updates which results in excessive use of social media. This can trigger negative feelings; *"I frequently use Facebook because I worry about missing group posts [Fear]"*.

5.4.1.6 UNMET EXPECTATIONS

Expectations refer to what people wait to occur; a belief that is concentrated in the future which may or may not be realistic. An expectation could also be about the behaviour of others. People with problematic online attachment tend to be overly reliant on social media to initiate interaction and gain acceptance from others, and consequently establish expectations amongst each other. Therefore, expectations, when unmet, in relation to problematic attachment may facilitate negative emotions. Expectation could be dual sided when people expect others to like their content and when this does not happen, they may feel that the failure in meeting the expectation of

others; *"I posted pictures on my Facebook account. These pictures were fantastic in my opinion, but I did not receive many likes for them which made me feel disappointed [Sadness]"*.

5.4.1.7 UNCONSCIOUS INTERACTION

Unconscious interaction means that people engage in social media interaction without conscious control or awareness. People with problematic attachment to social media typically lack concentration or self-awareness during online interaction, for example, scrolling and navigating between pages in their social media to retain a sense of interaction but without processing the content. Thus, they will repeatedly miss important information that has been posted and this has a negative impact on their reputation among friends and family, thereby resulting in negative emotions; *"I lost a vital event which made me feel sad [Sadness]. This was because I seemed to be quite unconscious of my presence on WhatsApp. My friend texted me many times, but I did not realise that"*.

In addition, when people experience sadness in relation to problematic attachment to their social media engagement style, they are likely to try to reform that style. Acting unconsciously can be a sign of relapse to their usual engagement style as it indicates a loss of control and deviation from the planned behaviour. Such relapse typically has an adverse effect on their self-esteem and triggers negative emotions; *"I decided to use social media just once a day, but last night unconsciously I logged onto my account many times and felt regret about that [Sadness]"*. Moreover, the unconscious use of social media can result in users losing the sense of time. When too much time is devoted to engaging with others online, this can cause sadness; *"I always spend around 4 hours per day on social media without feeling it. I feel guilty about the time I waste [Sadness]"*.

5.4.1.8 SOCIAL COMPARISON

Social comparison means that people compare themselves to others online in order to meet the need for self-evaluation. The profiles that people create for themselves on social media platforms provide details of their work, personality, thoughts and experiences. Users are free to amend or comment on their profiles to convey their opinions and emotions and satisfy their need to belong. In problematic attachment to

social media, profiles are heavily used for social comparison. Thus, people with problematic social media attachment are typically keen to compare themselves with the profiles of others. Those people, who are involved in this type of behaviour, typically use social media to an excessive degree in an attempt to present themselves in the best possible way. Online profiles disclose information about the identities of users and their activities. This disclosure results in comparisons being made between people in terms of their social characteristics, online image, reputation, belongingness, and how frequently people interact online. Unfavourable comparisons may cause people to experience negative emotions; *"One of my friends is popular on Facebook, and I feel jealous when I see his number of friends growing every day; especially from our group. I ask myself what's wrong with my profile [Anger]"*.

5.4.2   USAGE EXPERIENCE VS POSITIVE EMOTIONS

Social media users can post comments, share activities, upload photos and videos. Like others, people with problematic online attachment to social media often consider social media to be a form of entertainment, but they tend to overly rely on it for self-promotion and increasing popularity and relatedness. While this could result in excessive use of social media and facilitate negative emotions, people may also experience positive emotions as a result of that problematic attachment making it also difficult to replace with other means. These positive emotions are similar to those experienced in everyday life such as love, joy and surprise. The author present the positive emotional states associated with usage experiences typically found in people problematic attachment to social media, (see Figure 19).
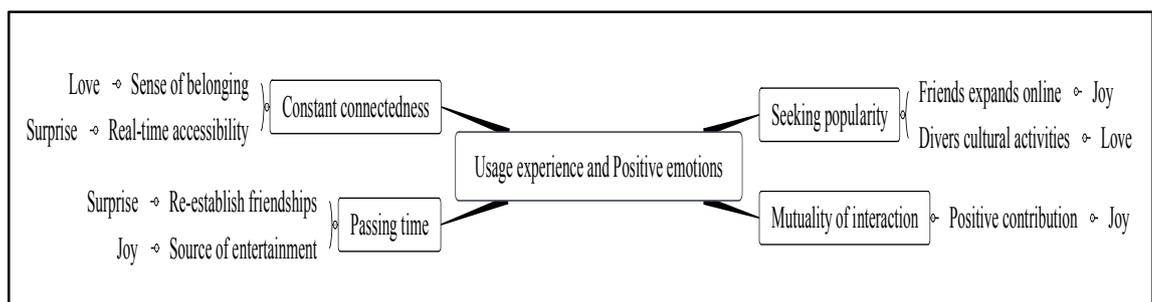
FIGURE 19: PROBLEMATIC ATTACHMENT TO SOCIAL MEDIA: USAGE EXPERIENCE VS POSITIVE EMOTIONS

5.4.2.1 POPULARITY INCREASE

Popularity is the status of being admired, being liked and supported by others. Social media platforms provide users with an opportunity to build social capital and become popular by presenting their profiles in an attractive form to others. However, the desire to belong and be accepted by others can become obsessive and be seen as a sign of problematic attachment to social media. This desire motivates them to utilise social media excessively in an attempt to maintain their self-presentation. As an individual's group of friends expands online, this can result in positive emotions; *"I feel satisfied because I have become popular and an influencer on social media. This requires a high level of online activities to maintain my social standing [Joy]"*. Social media also provide a platform for individuals to express cultural and personal characteristics. Indeed, there have been instances of divers' cultural activities making certain individuals popular. Consequently, these people are likely to experience positive emotions such as arousal [Love].

5.4.2.2 MUTUALITY OF INTERACTION

Mutuality of interaction is a situation in which two individuals' or groups of people are exchanging messages and interacting reciprocally and keeping their engagement active. Social media platforms provide a means for people to engage with each other mutually. Indeed, features such as likes, tags and comments actively encourage people to interact with each other. For people with a problematic attachment to social media, mutual interaction enables them to contribute to what is posted on social media platforms mutually, which seems to be critical, in their case, to boost their self-esteem and positive emotions. For example, if an individual commented on a friend's profile with a positive comment and the friend responds similarly, this provides them with a great sense of satisfaction. Thus, mutuality of reactions on social media could cause users to experience joy, thereby promoting their self-esteem and self-evaluation; *"I feel enjoyment because I made an effort to like my friends' posts, and then I received many likes on my own recent post on Facebook [Joy]"*.

5.4.2.3 CONSTANT CONNECTEDNESS

Social media has provided new means of social communication. Users can choose to engage one-to-one or in a group of friends or relatives. They can communicate and feel connected through posts, texts, audio, photos or video. Also, social media enables

people to post and access information in real-time, regardless of the place and time of the day. Because of such connectivity and real-time accessibility, the distance appears less. However, people with a problematic attachment to social media typically have a high need to have a sense of belonging and connectedness with others. Such possibility to stay connected leads to excessive use but at the same time motivated by some positive emotions such as joy; *"social media helps me to communicate with my family at any time. I feel happy about that [Joy]"*.

5.4.2.4 PASSING TIME

People find engaging on social media to be an enjoyable way of passing the time, and in this sense, it can be regarded as a form of entertainment. Social media offers a means of communication and knowledge and information exchange, but it is equally valid to describe it as a source of entertainment. In addition to posting, sharing and commenting via social media, it can also be used for playing games. About problematic attachment, entertainment of this sort evokes positive emotions; *"I rely on social media when I have a long time to wait or when I have nothing to do. It is the only way to pass the time and make me feel pleasure [Joy]"*. Social media also provides the means to make new friends, re-establish friendships, or to build communities of people with similar interests. Problematic attachment is characterised by relying on that to feel positive emotion such as surprise, thereby enhancing satisfaction; *"I was exploring my friend's contact list, and I found my close friends from primary school, I felt surprised, and I sent her a friend request"* [Surprise].

5.5   SOCIAL MEDIA FEATURES VS EMOTIONS

The design features attributed to social media can play a crucial role in promoting problematic attachment and subsequent side-effects. Through social sites, people can develop an advanced mind-set and information sharing capability, self-presentation and knowledge exchange. Side-effects such as anger might accompany the ad-hoc change of social media features. Ad-hoc changes, such as limited access to some features for individuals who maintain a high level of digital attachment, may contribute to negative emotions as a result of the user's loss of popularity.

A honeycomb framework was used as a template to help classify the features of social media that resulted from the exploratory study (Phase I), and which may facilitate

problematic attachment. Two features, direct communication and push notivication, were added to suit the requirements of the study and ascertain the results of the analysis. A detailed explanation of design features was derived from the analysis is presented underneath, (see Figure 20). Features such as identity, conversation, sharing and presence can contribute to both negative and positive emotions. Meanwhile, features such as group membership, direct communication, and puch notification contribute to negative emotions. However, the relationship and reputation features contribute to positive emotions.
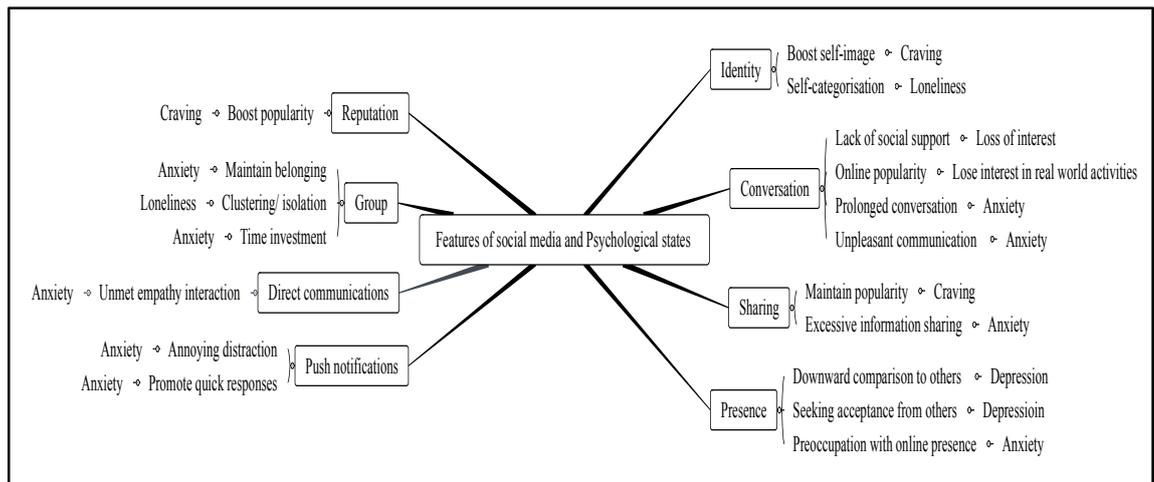
FIGURE 20: PROBLEMATIC ATTACHMENT TO SOCIAL MEDIA: FEATURES OF SOCIAL MEDIA VS EMOTION STATES

5.5.1.1 IDENTITY

Identity data is elicited when people set up accounts on social media platforms such as Facebook. Identity feature include profile information "personal details", such as name and picture, and profile content such as timelines and site-walls. People identify themselves and others, and may disclose aspects of their personal information on these sites, such as their name, age, gender, status, interests, location, background, profile picture and so on. Here information is explicit, clear and expressed in their profile information, and the level of disclosure of real information differs from one to another depending on their personality and their goal when accessing social media. For example, identity could be based on a real name, picture and real profile information, or could be anonymous without any information, leading to the real identity or between the two. There is also an implicit disclosure of an individual's online identity through their online interaction style; this includes quick responses when receiving notifications or

data regarding profile content. Such information is present on an individual's timeline and on Facebook; this supports indirect disclosure of online identity and interests. This feature facilitates negative and positive emotions related to online identity as follows.

In relation to negative emotions: The identity feature might facilitate negative emotions when people interact and self-promote on social media. For example, when a user is reliant on the identity feature to convey their feelings they may use their profile for self-promotion. This can generate negative emotions, such as anger, if they have difficulty accessing this feature or if their profile content does not meet with approval among their friends; *"profile info is helping me to represent my current feelings through status, but I feel anger if I cannot update or access this feature"*. In another example, a user might find the identity feature classifies them in a certain way, causing them to experience negative feelings such as sadness. For example, people on social media identify their personality via profile information, which may then facilitate social comparison among users. This comparison prevents the formation of friendships, and leads to feelings of loneliness and negative emotions; *"I find it difficult to make friends on social media because I focus on profile info before I agree to any friendship or initiate any communication"*.

In relation to positive emotions: The identity feature could facilitate positive emotions when people engage on social media to become more popular. For instance, a professional photographer might use Instagram to promote their work. Inclusion of details that identify who they are enables them to develop a following, thereby enhancing their popularity. Furthermore, successful promotion of this kind can enhance a person's self-esteem, improving their self-perception and enabling them to access positive emotions such as Joy; *"The profile feature helped me a lot in achieving fame by revealing my identity and hobbies"*.

5.5.1.2 CONVERSATION

The conversational feature refers to the communication that occurs between users of social media via features such as posts, comments, likes, chat and sharing. Communicating with other individuals or groups of people is primary reason why some people use social media. Furthermore, there are varieties reasons why these conversations may take place including: share opinions with like-minded people, self-

promotion, boost self-esteem and keep update of the latest knowledge. Social media also provides a secure means of communicating with friends and family. Crucially, if an individual feels that the system is secure, they are likely to be more open and perhaps build relationships. These then make the user more attached to social media and facilitate the formation of an online identity, which then can prompt either negative or positive emotions.

In relation to negative emotions: The conversation feature can improve someone's mood by chatting, commenting and giving likes. Conversations on social media can take place either one-to-one, or as part of a group. If an attempt at conversation does not receive a response, a sender may experience sadness; *"I had several conversations with my friends via social media but could not feel the positive impacts from them, which made me sad"*.

Another way in which conversations can give rise to negative emotions is when there are expectations. In social media, expectations build between individuals and groups that arise from the nature of the relationship between them. For instance, one participant stated that he had sent a message to a friend, and had anticipated an immediate response. However, his friend had not been interested in responding quickly. Once some time had passed without a response, he began to think he was thought of as an unimportant friend, which caused him to feel sadness.

In relation to positive emotions: The conversation feature can support positive emotions among users, due to the ability to connect readily with relatives and friends via chat, text or voice options. This causes people to experience emotions such as joy and love. Furthermore, positive emotions can be manifest when reciprocal positive interactions occur between people, when they engage in mutual interaction features, such as sharing likes or posting positive comments; *"I feel joy when my friends like my posts; In return I do the same to their posts, this has helped me to improve my profile"*.

5.5.1.3 SHARING

The sharing feature is characterised by exchanging and distributing social media content between people. It is a fundamental feature of social media platforms such as Flickr and YouTube. People with problematic online attachment disorders, can respond

emotionally to shares. The following explains how the sharing feature can result in negative and positive emotions.

In relation to negative emotions: People feel negative when their social network fails to distribute their posts as they intended. They feel their profile content is unacceptable or not of interest which results in feelings of anger. In addition, comparisons with how others have perceived and shared information posted by their peers, leads them to reflect on social appraisals and reveals negative emotions such as sadness; *"I felt sad because I posted comedy caricatures on my Twitter account and shared it with my friend, but then many people retweeted my post from his profile and he became popular"*.

In relation to positive emotions: Conversely, sharing information can result in users experiencing positive emotions. Having posted shares to their profiles, people may receive reciprocal interactions. Sharing is a powerful tool for finding and distributing information. When done successfully, people can become popular, which develops their social capital and triggers positive emotions such as surprise and love; *"I felt surprised when I saw the number of my followers jump from hundreds to thousands, this was because my friends shared my profile with others in their social networks"*.

5.5.1.4 PRESENCE

The presence feature allows users to determine whether or not someone else can be contacted instantly. This could be as simple as being aware of another person's status and whether they are online (e.g. away, busy, hidden, and available). The status line on social media also signals whether or not individual is available and responding (e.g. writing in the status line the availability time). An alternative signal for an individual's presence might be their degree of engagement via social media. For instance, if someone regularly posts and chats, then this will signal to others that they are generally likely to be present to engage. This can create a sense of closeness among individuals. In terms of group dynamics, presence is indicative of group cohesion. In addition, presence is associated with self-presentation, which, in turn is associated with the formation of an online identity. For people with problematic online attachments, the presence feature can cause both negative and positive emotions as detailed below.

In relation to negative emotions: The regularity of profile updates can be used to signal the temporal regularity of presence of a user. Alternatively, this could be indicated by referring to the last time they were online. This might result in recurrent usage in an attempt to avoid peer pressure to make new content available over a prolonged period. This pressure to maintain presence could easily result in negative emotions, such as anger; *"In our Facebook group, everyone has to maintain a presence daily, I felt anger, I lost my membership because I could not access the network for two days"*.

In relation to positive emotions: The presence feature can help people identify the location of others. Thus, if people are aware of an individual's location, this helps them maintain contact with him. In addition, signalling one's location helps attract others attention, thereby encouraging interaction, thereby potentially resulting in increased popularity. Therefore, the presence feature can enhance an individual's self-esteem and result in positive emotions, such as joy; *"I use Ghost Mode in Snapchat to show my location on the map, I feel joy that people around the world know my location and can communicate with me"*.

5.5.1.5 GROUP

Group refers to the ability of users to create communities or sub-communities on social media. As a network becomes more social, larger groups of friends can be collective. Groups will usually have a specific identity and the group's members will usually share common characteristics in terms of age, family relations, gender, and opinions. From the exploratory study, it was apparent that the group feature facilitated negative emotions affecting people with problematic online attachment.

Group members share a common identity, exhibiting norms and characteristics that distinguish them from others groups. This may lead them to categorise themselves in a particular way; potentially increasing their confidence, self-worth and self-esteem. However, this might alternatively result in social comparison between members of a specific group or with others in a group, thereby undermining members' self-evaluations if they feel a need for greater interaction to meet targets. Groups also wield influence over members, because they expect users to remain committed to certain behaviours in order to retain membership and align with group norms. Certain aspects

of social media platforms actively promote inclusion and exclusion from groups; for example, by adding, deleting or blocking a friend request. Therefore, group settings have the capacity to stimulate negative emotions, such as fear and sadness; *"recently I joined a journalist group. One of the group norms is to give feedback on each post to avoid exclusion from the group. The group has around 80 participants, and I receive more than 40 posts each day; all of which require my feedback, I experience sadness and fear when feeling that I have to follow the norms"*.

5.5.1.6 DIRECT COMMUNICATION

This refers to direct communications between users by means of comments, likes and posts in order to remain connected, return a sense of belonging and increase popularity (Burke, M. and Kraut, R., 2013). This feature encourage people's to communicate via comments, likes and posts; this enables them to remain connected, encountering a sense of belonging and maximising their popularity, which increases the effort needed to maintain certain advantages. Such effort could result in problematic attachment to social media which in turn could provoke negative emotions, such as fear; *"I feel pressure and fear when losing my connectedness, because I have to make efforts to match what others do"*.

5.5.1.7 PUSH NOTIFICATION

The push notification feature was introduced to reinforce interaction, and indirect implications; thereby influencing behaviour and triggering people to interact on social media. This feature focuses on the influence of gratification and encourages people use of social media. This then facilitates negative emotions in relation to problematic online attachments, which arise due to resistance to interactions or when interrupted while working.

Push notification attracts people's attention by notifying them of activity on their account or on their friends' accounts. People registered with several social media platforms or groups can receive a set number of notifications over the course of a day. Thus, overload of notifications might trigger negative emotions in the course of problematic attachment, such as anger and sadness; *"I could not resist responding to*

social media notifications, I felt sad because this then interrupts me, and forces me to stop my work to check notifications".

5.5.1.8 RELATIONSHIP

The relationship feature explores how people relate to one another. It controls how different people develop communication between them. It emphasises the association between any two people or groups. It might be that individuals can communicate with one another, share objects or merely recognise another person as a social contact. It is the nature of this relationship that ultimately determines how information is exchanged. Some relationships are formal and structured, and this is often the case on sites such as LinkedIn, which allow users to see the degrees of separation between themselves and a target member they may wish to communicate with. This feature emphasises social proximity and social cognition, which then triggers positive emotions where there is a problematic online attachment.

The relationship feature that displays social proximity relies upon profile information concerning someone's identity, interests and background. People seeking out new relationships can search for friends who are similar to them, using information from their profiles. This could trigger emotions, such as joy and surprise; *"I feel happy when I look through the list of accounts to know more about users and get new friends who are interested in the press".*

However, the relationship feature concerns social cognition, which allows people to interact with friends by sharing content, comments, tags and likes, which contribute to the attraction of new friendships. Indeed, individuals commonly rely on social media to form relationships based on reciprocal interaction. This can improve people's self-perception and help enhance their self-confidence, which makes social media a safe zone for forming relationship. One participant said; *"I posted new tweets on Twitter. The tweets were tagged by famous people. Then I got excited and happy, because my follower numbers increased and the timeline was more active".*

5.5.1.9 REPUTATION

The reputation feature on social media concerns the extent to which users determine the status of others relative to themselves. Reputation can be measured by the number of

views, followers, or an evaluation system such as the Hashtag, which enables individuals to monitor the spread of content related to the user profile. Reputation can have different meanings according to the social media platform in question. In the majority of cases, reputation is a matter of trust. Nevertheless, reputation on social media does not necessarily reflect their offline identity, but also refers to the online content provided on their profile, which is then evaluated by others. For example, on Twitter, people re-tweet or like certain content, which in turn boosts their reputation. In addition, the number of followers on social media determines how popular a person is. Since people can follow as many accounts as they wish.

However, for people with problematic online attachment to social media, social media is used as a means of self-promotion or brand promotion. As others evaluate their profile positively, their reputation improves, evoking positive emotions. People feel positive emotions such as joy and surprise when evaluating their growing popularity and improving reputation; *"I am very happy because I became an influencer on social media. I posted a story on my profile on a daily basis, which attracted others' attention, and attracted more followers to my profile. One of the followers surprised me by putting my profile in a Hashtag, which made my number of followers double in a short time. I was gratified to achieve this fame"*.

5.6 CHAPTER SUMMARY

This chapter explored the problematic attachment to social media presented by users in relation to the design features of social media platforms. The findings revealed emotions associated with problematic attachments and how social media design features facilitated these emotions. The exploratory study provided an ecological exploration through the use of diary entries for data collection. The findings indicate that problematic users rely on social media to satisfy their social requirements such as relatedness, learning and promoting self-esteem, and also identified relations between design features and emotions associated with their online interaction.

6 CHAPTER SIX: BEHAVIOURAL ARCHETYPES FOR SOCIAL MEDIA PROBLEMATIC ATTACHMENT USERS

The discussion in the preceding chapters has established a number of issues facing social media users (including their attachment to, and interaction with, social media platforms), which can be exacerbated by online behaviours, as well as associate emotions and psychological states. The accommodation and integration of these distinctions have identified difficulties with styles of online interaction, including the use of social media. This current chapter addresses the differences between peoples in their attachment styles by applying the concept of the Behavioural Archetype, i.e. archetypes beneficial for aiding developers to understand different behaviours, thus improving their capacity to systematically enhance the design of social media. The proposed archetypes have been selected based on users' online behaviours. It should also be noted that the author may tend to use the concepts of 'Behavioural Archetype' and 'Persona' in an interchangeable manner.

6.1 INTRODUCTION

Social media can be designed to accommodate diverse techniques for self-regulation of problematic attachment style in order to improve digital wellbeing (Alrobai, A. et al., 2014). Unlike other cases of problematic usage such as alcohol; social media users can use technology to monitor their usage style and play a critical role in allowing its users to be more informed as well as conscious. The software can be used to assess whether someone is using a phone or social media in an anxious and uncontrolled way. We advocate that, as in the case of online gambling, users should have access to appropriate assistance, e.g. a self-exclusion as well as lock-out schemes, so that they can stay in control of their behaviour if they are worried about problems. Users can authorise software to alert them when their usage pattern indicates risk, which my help them to avoid the side-effects of excessive usage, e.g. goal setting technique (Alutaybi, A. et al., 2018). However, to know what such an intervention method should look like, we need an in-depth understanding of the different styles of problematic attachment to social media.

Relation to social media can exhibit intimacy and become second nature for users to satisfy their social-emotional needs (Rau, P.-L. P. et al., 2008), which makes it difficult

to designing methods to help people manage this relation. Understanding of problematic usage and the different patterns of problematic usage (user archetypes) should inform the design of methods to support behavioural change aimed at improving a person's relationship with social media. For example, archetypes can be seen as a starting point for a personalisation process managed by designers or by users themselves. Archetypes can be used to segment the user population and make self-regulation more informed and problematic relationships and attachment style easier to describe to the design team and their counterpart behavioural insights and change team.

6.2   THEORETICAL FRAMING

The following sections present findings from a review of traditional literature which was carried out to explore the problematic attachment to social media, implementing behavioural archetypes, and get in-depth insights from existing research to guide the analysis and findings discussion presented in this chapter. Literature has been reviewed around users modelling and personas, personal and social factors in problematic attachments to social media and the use of behavioural archetypes in this area.

6.2.1   USE OF PERSONAS AND BEHAVIOURAL ARCHETYPES IN UX DESIGN

The management of problematic attachment is a crucial step in informing how the development of social media can be affecting the behaviour of end users. This information is useful for developers to improve their design to take into account the behaviour of end users, while system development emphasises the benefits of employing user-centred design (UCD). Users can be represented through both segmentation and user modelling methods, such as archetypes and personas describing the characteristics, behaviour and needs of users.

Cooper (Cooper, A., 1999) made an initial introduction to the concept of the Persona in the HCI community, which defined a persona as *"a precise description of a user's characteristics and what he or she wants to accomplish"*. The persona is considered a fictionalised representation of a hypothetical group of users, based on the needs, demographics and goals of that group. The biographical characteristics of a persona are used to guide design decisions and help a project team to visualise user segments effectively, thus enhancing their required solutions. However, the behaviour and further

characteristics of users in relation to system interaction may not always prove compatible. In the majority of cases, personas do not include emotional and psychological states or behavioural patterns verifying effective interaction with social media (Floyd, I. R. et al., 2008; Mikkelson, N. and Lee, W. O., 2000).

On the other hand, behavioural archetypes capture patterns and thus facilitate the representation of system users from a behavioural perspective, including emotions and psychological states (Cabrero, D. G. et al., 2016; Chang, Y.-N. et al., 2008). Archetypes were used in this study to assist in identifying problematic online attachment in terms of interaction design, thus providing developers with a viable model for validating user flows and interactive elements. User modelling is employed in HCI systems to improve both the user experience and the design of the system.

6.2.2   PERSONAS AND SOCIABILITY

This section discusses the relationship between personas and sociability. Researchers have shown that personas set that helps the success of a project tends to have four main features, they are (1) fictional; (2) engaging; (3) goal-directed; and (4) role-based (Cooper, A. et al., 2007; Nielsen, L., 2004). In addition, Floyd et al. (Floyd, I. R. et al., 2008) also noted a number of types of persona: (1) quantitative, data-driven personas (obtained from inherent groupings in the quantitative data); (2) user archetypes (considered similar to personas, but more generic and defined by position or role); and (3) marketing personas (i.e. generated for marketing purposes). Engaging personas can be developed from research that gives insight into the social and cultural background of users. In addition, fictitious information can be used to balance the collected data and give life and more engaging representation.

Personas contribute towards sociability representation and inclusivity in the technology design through the identification of specific groups, i.e. customers, capable of freely interacting under different circumstances, including taking part in social interaction. Personas thus play a role in achieving the goals and desires of end users, addressing limitations and providing guidelines for decision-making in the interaction space, i.e. websites.

Contextual sociology facilitates the creation of personas, through capturing descriptions of the surrounding environment of users, along with their behavioural patterns, attitudes, skills and goals. In addition, the personas thus generated can be employed by sales departments to address common behavioural needs and the potential objections of given personas (Long, F., 2009).

6.2.3 DEVELOPING BEHAVIOURAL ARCHETYPES FOR PEOPLE WITH PROBLEMATIC ONLINE ATTACHMENT

People with problematic online attachment have difficulty managing their usage and maintaining aspects of their offline life such as work, academic performance, friendship and so on. They are often vulnerable to loneliness and anxious feelings. Furthermore, people with problematic online attachment are characterized by denial of the nature of their online behaviour, adverse reactions when they feel their freedom to continue using social media is being limited by reminders and timers, and relapse when they try to regulate their usage of social media and reduce their preoccupation with them (Ann Stoddard Dare, P. and Derigne, L., 2010; Kandell, J. J., 1998; Littrell, J., 2011). Any intervention designed to address problematic online attachment needs to consider differences in the characteristics, personality and problematic style of users as different type of user may require different interventions to meet their social and wellbeing needs.

Developing behavioural archetypes and related scenarios will allow an intervention team to tailor the development of the intervention so that it meets the needs of each archetype (Gallagher, K. M. and Updegraff, J. A., 2011; Keller, P. A. and Lehmann, D. R., 2008; Kreuter, M. W. et al., 2000; Lustria, M. L. A. et al., 2013). Behavioural archetype-based interventions can help with the tailoring of motivational and coping strategies to facilitate the behavioural change process.

6.2.4 PERSONALITY IN PROBLEMATIC ATTACHMENT ON SOCIAL MEDIA

In social media practices, potential online users are divided into segments for the purposes of online marketing. On the other hand, research studies have linked personality characteristics and social media usage from various perspectives, including romantic relationships and self-presentation in relation to the Internet (Lee, E. et al.,

2014; Seidman, G., 2013). Further studies have revealed that narcissistic type of individuals uses Facebook particularly frequently (Buffardi, L. E. and Campbell, W. K., 2008; Mehdizadeh, S., 2010). Researchers have also concluded that this trend is facilitated by Facebook encouraging its users to engage in self-promotion and superficial behaviours, i.e. posting photographs and making status updates. Moreover, a considerable volume of previously published studies have highlighted the role of personality in the use of social media in general (Kircaburun, K. et al., 2018; Mccain, J. L. and Campbell, W. K., 2018; Whaite, E. O. et al., 2018), as well as Facebook specifically.

Most previous research in this field has focused on broad models of personality, of which the most frequently employed is the five-factor model, commonly known as the 'Big Five' (Goldberg, L. R., 1990). The Big Five model is based on the concept that the personality of an individual can be described in terms of scores for the following five factors: conscientiousness; extraversion; openness to experience; agreeableness; and neuroticism. There are more detailed descriptions of these Big Five factors referring to a range of personality traits, i.e. individuals who are open to experience tend to be creative, curious and original, whereas those lacking such openness are generally rather more down to earth and conventional and have a narrow range of interests (Costa Jr, P. T. and Mccrae, R. R., 1992).

The research in (Ross, C. et al., 2009) and (Amichai-Hamburger, Y. and Vinitzky, G., 2010) have investigated the relationship between Facebook usage and the Big Five, concluding that most factors are related to specific patterns, i.e. in comparison with introverts, extraverted individuals generally have more friends on Facebook and belong to more Facebook groups. In addition, individuals demonstrating high neuroticism are more likely than emotionally stable individuals to prefer using the Wall, i.e. the online bulletin board for posts and comments amongst contacts. According to (Ross, C. et al., 2009), a possible reason for the latter result is that the Wall feature allows people with neurotic tendencies to take their time over formulating messages and responses, thus reducing the potential for any unintentional revelation of their internal characteristics.

6.3 BEHAVIOURAL ARCHETYPES CREATION AND VALIDATION: OUR RESEARCH METHOD

The method which has been used to develop behavioural archetypes consisted of four phases, adapted from the traditional method of creating personas (Mulder, S. and Yaar, Z., 2006). The first phase consisted of exploring and gathering qualitative data on users with problematic attachment to social media. The qualitative data emerging from the exploratory methods such as focus groups and diary studies were subjected to thematic analysis (Braun, V. and Clarke, V., 2006). In phase two, axial coding was applied to the themes and categories emerging from phase one in order to define patterns and commonalities and thus segment the participants. Then, in phase three, behavioural archetypes were created for each segment. Finally, in phase four, five high-level behavioural archetypes were developed and validated through a diary study.

The author also reviewed the relevant psychological literature: research on attachment theory (Bowlby, J. et al., 1989; Lorenzini, N. and Fonagy, P., 2013), a cognitive behavioural model of pathological Internet use (Davis, R. A., 2001) and Internet and Facebook addiction (J Kuss, D. et al., 2014; Ryan, Tracii et al., 2014), as well as theories related to identity development, formation and affiliation i.e. identity theory (Hogg, M. A. et al., 1995; Stryker, S., 1968), social identity theory (Stets, J. E. and Burke, P. J., 2000), self-presentation theory (Baumeister, R. F. and Hutton, D. G., 1987; Baumeister, R. F. et al., 2008), social role theory (Biddle, B. J., 1986) and self-concept theory (Epstein, S., 1973). This review revealed a considerable number of sociological and psychological concepts related to problematic online attachment and helped us to develop hypotheses about social media users that were capable of filling the gap between our conceptions and the data-driven behavioural archetypes of users.

To obtain more insight into the four phases conducted to create behavioural archetypes are described in the following subsections of the current section (see Figure 21). Then, the findings are described in Section 6.4, qualitative feedback on the behavioural archetypes in Section 6.5 and quantitative validation in the next Chapter.
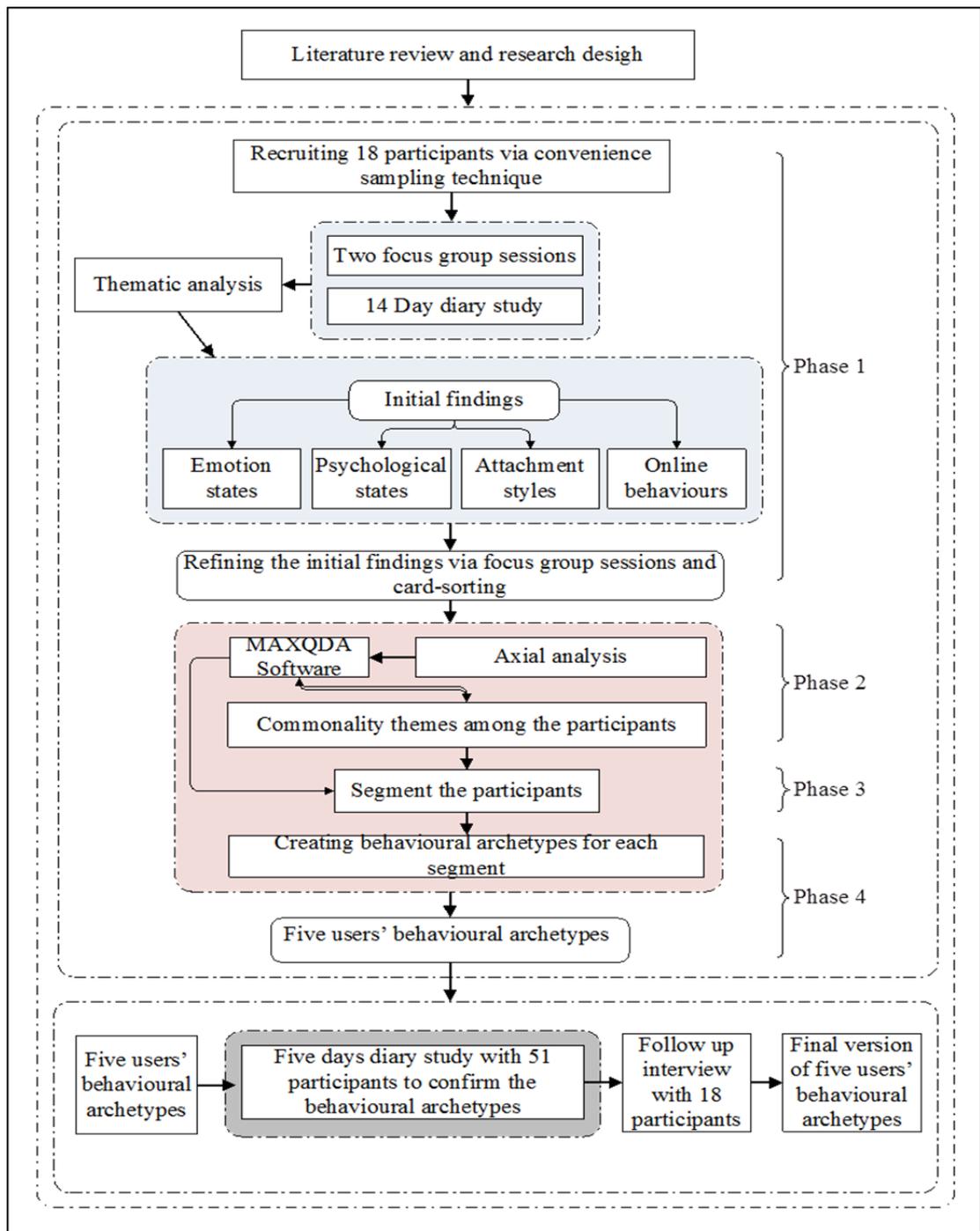
FIGURE 21: OVERVIEW OF THE RESEARCH METHOD AND SEGMENTATION PROCESS

6.3.1   FIRST PHASE: QUALITATIVE STUDY

The aim was to explore people's problematic experiences and attachment to social media. A qualitative approach was adopted, consisting of focus groups and a diary study. The diary study was the core method of data collection in this phase. Focus groups were used to gather preliminary information that was elaborated via the diary

study, which allowed us to capture detailed information about users' problematic experience on a daily basis. For more details, refer to the methodology chapter in Sections 3.11.1 and 3.11.2

The data collected in the first phase were analysed in two iterations (the first iteration was carried out in phase one and the second in phase two). The first iteration was using open coding based on the thematic analysis to break down the data and to identify first-level categories. The conceptual framework for the thematic analysis was based on the theoretical position of Braun and Clarke (Braun, V. and Clarke, V., 2006). The findings were also validated through card sorting. See chapter 4 and 5 for more details on the final findings emerged from the study. Most of the work is published (Altuwairiqi, Majid et al., 2019; Altuwairiqi, Majid et al., 2019b).

6.3.2 SECOND PHASE: SEGMENTATION OF PARTICIPANTS BASED ON THE QUALITATIVE DATA

Segmentation involves taking several data points, as well as creating different groups based on commonalities shared by the members of a given group. The main goal in the development of the behavioural archetypes was to establish patterns and groups similar individuals together. The second iteration in the analysis, which involved using axial coding, helped to generate high-level patterns and relationships between the categories that had emerged from the first iteration. As noted in Section 3.11.1.5, thematic analysis was carried out with MAXQDA. This second iteration in the analysis relied on the functions of MAXQDA that enable a researcher to examine raw data, in order to elicit patterns and the existing commonalities over the extracted themes and sub-themes amongst all the participants (see Figure 22).
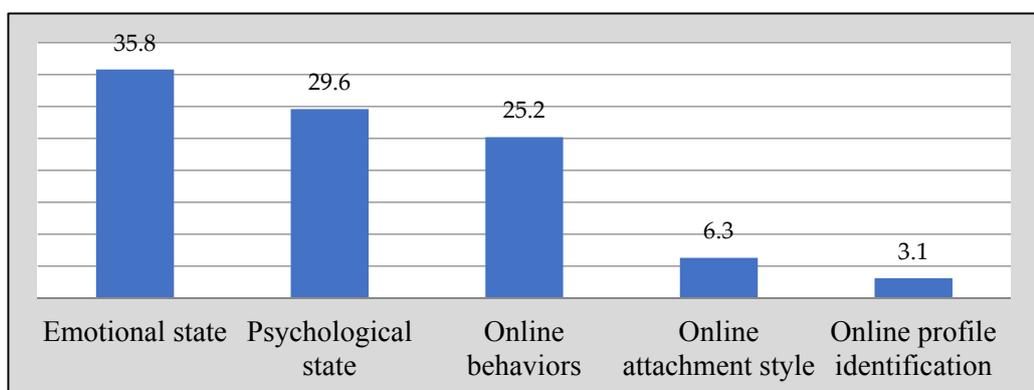
FIGURE 22: COMMONALITIES THEMES AMONG ALL PARTICIPANTS

There are two qualitative methods of segmenting a population: by one dimensional such as by goal or by usage lifecycle; and by two dimensional such as a combination of attitudes and behaviours (Mulder, S. and Yaar, Z., 2006). Segmentation is a complex and challenging process. The author developed the following questions to narrow down the segmentation options:

- What attachment style has contributed to the participant's problematic usage?
- What are the main features of the participant's online behaviour that could be classed as problematic?
- What is the participant's identification for online interaction?
- What online behaviours have contributed to the participant's problematic usage?

Understanding the data and commonalities led to the conclusion that themes (variables) in Figure 22 were common to all the participants. The occurrence percentages varied between commonalities variables due to the varying number of questions related to each variable within the study. After iterative revision and examination of the data and the responses to above questions, the author found that considering a combination of online attachment styles and online behaviours variables can result in critical differences among the participants and ultimately better segmentation. In addition, after confirming the findings from the first phase, it became clear that the two dimensions used in the segmentation process were valid. The segmentation dimensions and process are explained (see Table 12). Segment one consists of 6 participants, segment two of 4 participants, segments three and four of 3 participants and segment five of 2 participants.

TABLE 12: THE SEGMENTATION PROCESS FOR USERS WITH PROBLEMATIC ONLINE ATTACHMENT

		Secure	FoMO	Avoidant
Online behaviours	**Mood modification**			Segment 3
	Irresistible urge and self-disclosure		Segment 4	
	Categories themselves			Segment 5
	Tracking information	Segment 1		
	Kindness and self-presentation		Segment 2	
		Secure	**FoMO**	**Avoidant**
	Online attachment style			

In this table, the Y-axis is independent and represents the online behaviour dimension, comprising (1) kindness and self-presentation; (2) tracking information; (3) self-categorisation; (4) irresistible urges and self-disclosure; and (5) self-enhancement. The online attachment style dimension is represented by the X-axis (secure; FoMO; avoidant). Each segment is attained from the interaction between the Y axis and X axis. For example, segment one is attained from the intersection between the Y-axis (online behaviours) and X-axis (inline attachment style) and provides the first archetype (segment one).

6.3.3   THIRD PHASE: CREATING A BEHAVIOURAL ARCHETYPE FOR EACH SEGMENT

In general, behavioural patterns, skills and attitudes towards certain software packages, as well as fictional demographic or personal details, are intended to add depth to characters and make them seem more realistic. However, in the field of computations such as HCI, there is insufficient consensus on the specific information required to establish a persona, including the presentation of information and the usage impacting on the software design process. Goodwin (Goodwin, K., 2001) suggested that a researcher should, during the creation of such a persona, prioritise specifying important information pertinent to the design, i.e. the persona's behaviour, workflow, goals and attitudes and then add demographic and personal information. Such information is usually based on the assumptions of the designers and behaviour support systems specialists (Nielsen, L. and Storgaard Hansen, K., 2014).

This research refines these components and proposes the building of constructs pertaining to the generation of behavioural archetypes obtained from the process of segmentation. These components provide additional details on the characteristics of users commonalities, as outlined in Figure 22. These commonalities include online profile identification, e.g. name and profile picture, online behaviours, e.g. role and motivation and feelings (emotional and psychological states). Behavioural archetypes do not include personal or demographic information; as such variables are not always related to behavioural patterns or the ways in which individuals interact with social media. The use of behavioural archetypes could assist in eliminating the gap between designers and behaviour analysts on one hand, and users on the others, through an

appropriate consideration of the behavioural models of different groups of users, including how the design team can expect them to interact with the system. Furthermore, there should not be artificial restrictions on the content of behavioural archetypes; designers can enrich them with additional components, i.e. demographic information.

The segmentation process led to the identification of five major behavioural archetypes in relation to problematic use of social media: (1) the Secure behavioural archetype; (2) the Intimate behavioural archetype; (3) the Escapist behavioural archetype; (4) the Narcissist behavioural archetype; and (5) the Discrepancy behavioural archetype (see Table 13).

TABLE 13: FIVE USERS' BEHAVIOURAL ARCHETYPES: INITIAL SEGMENTATION

Online behaviours				
Mood modification				Escapism archetype
Irresistible urge and self-disclosure			Narcissism archetype	
Categories themselves				Discrepancy archetype
Tracking information	Secure archetype			
Kindness and self-presentation			Intimacy archetype	

Online attachment style

6.3.4 FOURTH PHASE: DEVELOPING AND VALIDATING BEHAVIOURAL ARCHETYPES

The findings resulting from previous phases and our earlier studies of behaviours associated with problematic attachment to social media (Altuwairiqi, Majid et al., 2019; Altuwairiqi, Majid et al., 2019b) enabled the researchers to assess, validate and refine the five main behavioural archetypes i.e. the Secure user, the Intimate user, the Escapist, the Narcissist and the Discrepancy user based on analysis of data from a sample of 50 participants, as explained below. This process could lead to a final version of such behavioural archetypes being developed on the basis of qualitative analyses of the responses made by the participants which supported by quantitative analysis to reflect reality in mathematical means and provide a detailed description of these archetypes. Furthermore, these behavioural archetypes can be enriched with information relevant to

internal characteristics for each archetype, emotions and psychological states, as discussed in phase three.

In the purpose of confirming that the behavioural archetypes were inferred from the analysis and whether there were seen helpful for people to recognise their problematic attachment style, a second diary study was carried out with 50 participants. In addition, it was to confirm that the behavioural archetypes constitute a meaningful way of categorising social media users and can be used to generate new interventions and initiate discussions.

Convenience and snowball sampling techniques were used to recruit participants. The same eligibility criteria and self-assessment were applied as in the first phase when recruiting participants. About 80 people responded to our call for participants, through email or by telephone. 11participants were excluded because their responses to the screening questionnaire suggested that their use of social media was not problematic. Eighteen of the remaining 69 participants dropped out during the study, leaving a final sample of 51 participants who completed the study procedure in full.

The participants were given instructions on how to complete diary entries and a printed diary notebook (see Appendix C1). The diary notebook was designed to last for five days and everyday participants required to complete three entries a day and were identified as "morning" "afternoon" and "evening". The recording times were selected in order to demarcate the reporting periods equally distributed over the course of the five days for the effective observation time series present in the analysis without overloading the participants with a more recording schedule, which may be inconvenient. Participants were asked to spend two to three minutes completing each diary entry. Participants were instructed to leave an entry blank if they missed a recording time, rather than complete it by recalling.

Before the participants began to report, they were asked to spend some time reading the descriptions of the five archetypes and work out which archetype or archetypes fitted them best. Having decided this, they were expected to follow the colour code for the entire reporting (there is a distinctive colour code for every archetypes and day numbered from one to five, (see Appendix C1). The five behavioural archetypes

describe the predominant relationship styles people display with social media. However, it is quite important to be vigilant on some participants who may find it difficult to align to one of such archetypes since they are non-compatible with their corresponding online style. In such cases, it is important that they complete the template based on their interaction style. Participants were sent a daily reminder email to prompt them to record an entry in their notebook. To ensure confidentiality, each participant was assigned a unique code.

Upon the completion of the validating study, the participants were requested to provide clarification of some of their experiences with the five behavioural archetypes. The author concluded that these archetypes are a useful way of categorising people with a problematic attachment to social media because all of the participants identified with at least one of the archetypes and two participants identified with two archetypes. In addition, participants' feedback on the archetypes clearly indicated that they found them helpful in categorising their behaviour and recognising problematic online behaviours. This feedback strongly suggests that the five behavioural archetypes are valid. The data also validated segmentation dimensions.

After confirming the five behavioural archetypes, we enriched them on the basis of participants' feedback. The Findings section summarises the behavioural archetypes and the main differences between the archetypes. The qualitative feedback in section 6.5 summarises the feedback from participants on the five behavioural archetypes and Chapter 7 illustrates the quantitative validation data.

6.4 PROBLEMATIC ATTACHMENTS TO SOCIAL MEDIA: FIVE BEHAVIOURAL ARCHETYPES

Based on the four phases, five behavioural archetypes were developed for problematic attachment to social media. Each archetype contained the following information:

- Description: a brief overview of the behaviour archetype.
- Internal characteristics: attachment style, identity disclosure, social activeness, online behaviours and personal attributes.
- Emotional states and examples: common user experiences and examples of associated emotions. Users' experiences and associated emotions are split into

positive and negative emotions. Parrott's framework (Parrott, W. G., 2001) was utilised to differentiate between primary, secondary and tertiary emotions. See chapter 5 for more details (Altuwairiqi, Majid et al., 2019b).

- Psychological states and examples: common user experiences and examples of associated psychological states. See chapter 4 for more details (Altuwairiqi, Majid et al., 2019).

The behavioural archetypes that were developed for people with problematic attachment to social media are described (see Table 14), and the key differences between archetypes are presented (see Table 15).

TABLE 14: DESCRIPTION OF THE BEHAVIOURAL ARCHETYPES

No #	Archetype name	Description
1	Secure archetype	This archetype likes to feel assured. Social media helps them to maintain this feeling by building successful relationships that increase their connectedness and presence. Despite this, they can occasionally lose their sense of security, i.e. when unable to access social media, interact with peers or express themselves and receive the responses they feel they need to maintain their desired level of social presence and connectedness.
2	Intimate archetype	These individuals become closely attached to their social media and their online friends. This commitment to their friends manifests as a keen interest in their activities and (when appropriate) empathetic responses. They know what they like and refuse to engage with the material of which they disapprove. Their natural curiosity and vulnerability to the fear of missing out can lead them to become anxious if they are unable to maintain an online presence.
3	Escapist archetype	These users employ social media to avoid the reality of their own lives. They may engage in anonymously or create fictitious online personalities. They have little desire to form real relationships offline and use social media for entertainment. Their behaviour could easily exacerbate their true loneliness.
4	Narcissist archetype	These individuals pay excessive attention to the thoughts and opinions of others about them on social media and they often seek approval from others. They lack the confidence to use their real identity on social media but have an urge to respond as soon as possible to updates. Social media are used as a way of competing with others, but there is potential for discontent or jealousy if they feel their contacts are experiencing more enjoyment or achieving more than they are.
5	Discrepancy archetype	This archetype spends a considerable amount of time attempting to boost his or her self-esteem on social media, but this frequently leads to feelings of regret, including the feeling of having wasted time that could have been spent doing other things. Even when

engaged in other offline activities, these users are likely to think about social media, which can have an adverse influence on their daily lives. In addition, they may feel excluded and alone if social media contacts do not live up to their high expectations.

TABLE 15: KEY INTERNAL CHARACTERISTICS DIFFERENCES FOR THE FIVE BEHAVIORAL ARCHETYPES

Internal characteristics → Online behavioral archetypes	SM boosts the feeling of being secure	SM boosts perceived security and fear of missing out	Avoidant online attachment style	Committed to online group	Socially active	Tracking information	Self-presentation	Kindness role	Trust and positive expectation	Self-enhancement	Procrastination	Self-discrepancy	Vulnerable to peer pressure	Irresistible urge	Disturbance and loss of concentration	Categories themselves	Detached from reality
Secure archetype	O			×	×	×											
Intimate archetype		×					O	×	×								
Escapist archetype			O							×	×	×					
Narcissist archetype	O						O						×	×			
Discrepancy archetype			O												×	×	×

The following subsections describe each behavioural archetype in more detail.

6.4.1   SECURE BEHAVIOURAL ARCHETYPE

Users with a Secure behavioural archetype have several means of interacting on social media that allow them to feel safe and confident, which is a strong reason for their online attachment. This was found to be the most common behavioural archetype amongst our participants, who also had several online behaviours in common, as discussed below in detail (see Table 16).

- Identity: Their online identities usually reflect their real offline identity through the use of their real name and image. People of this archetype possess self-confidence. Revealing their true personality online is their effective means of

ensuring popularity and forming friendships. This may directly affect their behaviour on social media, including their attachment: *"I suppose my online identity while I am active online on Facebook and WhatsApp is a secure identity, which reflects my real character and personality as well helping to build trust in social media"*. The core characteristics of this archetype are the ability to trust in others and positive expectations of both self and others: "I feel happy and secure when people are there when I need them".

- Common features of this archetype include a desire to search for information through social media, due to its accessibility, which can promote joy, particularly if the information is positive. By contrast, a lack of information leads to feelings of fear and loss.

- This archetype is also socially active, sharing information online and forming friendships within closed groups. This is due to being deterministic, which increases their social capital and social ties (Jenkins-Guarnieri, M. A. et al., 2012), prompting feelings of security, which influence their use of social media as an essential aspect of their daily life. However, this may also result in feelings of isolation when faced with any decrease in interaction within these groups or when subjected to discrimination or exclusion from these groups. Exclusion from online social groups may result in negative emotions, including nervousness, anger or a lack of happiness: *"the Internet connection in my residence is so weak that I could not interact online with my friends, which made me feel isolated from the world"*.

- There are a number of emotions and psychological states that are prominent in the previous contexts (i.e. the positive interaction with social media profiles through comments or positive feedback) which revolve around a sense of liking and satisfaction. These can improve people's self-perception, leading to higher levels of self-esteem (Forest, A. L. and Wood, J. V., 2012), and are thus capable of triggering the evolution of an online presence. Hence easy online communication with relatives and friends (including sharing of news) has a positive impact on the emotions of Secure users: *"I feel really happy because I had a great chat with my family and friends and found lots of things online that made me joyous"*.

Despite these positive emotions, Secure individuals may feel regret or anger when they spend a great deal of time using social media as a result of their attachment. Anxiety arises when the content of social media is unpleasant, boring and repetitive, or results in negative thoughts due to the voyeuristic use of profile functions: *"there was not anything else to see on Instagram or Snapchat; I felt bored"*.

TABLE 16: OVERVIEW OF THE SECURE BEHAVIORAL ARCHETYPE

Secure Behavioural Archetype		
Internal characteristics	**Description**	
Identity	Feels confident using information that identifies him/her in interactions online, e.g. real (or close to real) name, real (or close to real) picture, along with location, place of work and email address	
Social media boosts the feeling of being secure	Interacting online contributes to a feeling of safety and confidence, perceived peer support and continual presence	
Tracking information	Considers it important and worthwhile to search for events, feed requests and news on social media. Keeps up to date with information and has a reasonable response time	
Socially active	Is active on social media (i.e. posting and commenting) and enjoys being involved in groups and establishing new connections	
Committed to their online group	Likes to maintain relationships with others and tolerates situations in which this may require acceptance of different attitudes and styles of interactions	
Examples of usage and associated emotions (positive and negative)		**Emotion example**
Positive usage experience	Social media used as a medium for reciprocal messaging, posting and commenting, i.e. interactive social communication	Satisfaction, liking, joy
	Social media as an accessible facilitator of activities related to pleasure and entertainment	Joy
	Social media are helpful for communicating with relatives and friends, as well as sharing information and contributes to a sustainable sense of connectedness and presence	Happiness, joy, astonishment
	Using social media for longer than required	Regret, anger
	Limited or no access to social media due to connectivity problems or restrictions imposed	Nervous, anger, fury,

Negative usage experiences	by the social context	unhappiness
	Not receiving sufficient or timely responses from peers when looking for support or socialisation	Anger, sadness
	Fear of missing out on certain events, news, opportunities and timely interactions	Worry, fear, jitteriness

Psychological States	Usage experiences
Loss of interest	When information content, interactions and contacts do not change and when they become repetitive
Anxiety	When spending too much time on social media or when dissatisfied with the content and interaction and unable to do much to change it
Boredom	When there is nothing new on one's social media which make them scrolling through content without conscious
Loneliness	Being unable to connect and interact or receive responses as desired
Craving	When there is a pressing need to shape and maintain one's online identity and self-concept which in turn increases their reputation

6.4.2 INTIMATE BEHAVIOURAL ARCHETYPE

The Intimate archetype is composed of a specific attitude, often characterised as a commitment to concrete attachments and relationships and development of ethical strength through fulfilling commitments, even when to do so demands significant sacrifices and compromises, e.g. spending more time online and responding fast to maintain peer trust and relatedness. The patterns and behaviours of this archetype's interactions with social media are discussed in detail below (see Table 17).

- The Intimate user's online identity is real and his or her real name and a genuine self-image are used in profiles, i.e. self-disclosure (Sprecher, S. and Hendrick, S. S., 2004). In addition, Intimate users frequently update their profile image because they want o to show their friends and social media contacts their appearance. This helps them to make new friends and they like to diversify their friends from different cultures and geographical areas and this makes them feel happy and joyous: *I took some pictures of myself and decided to use a new one for my profile to share with my family and friends"*.

- The core of the Intimate archetype is kindness in online interactions. The Intimate user feels confident and trustworthy and pays attention to others, helping them to address their difficulties: *"I am always a good listener and my friends and relatives like talking to me about their feelings and problems"*. Furthermore, the Intimate user's emotions are explicit throughout his or her online interactions.

- Very active in terms of appearance and participation with others on social media. This helps Intimate users to gain a reputation and form friendships which may facilitate the evolution of problematic attachment. Friendships are satisfying but comparisons with social media peers may provoke jealousy or envy: *"I was jealous when I saw my friend's posts and I compare them with my day; I wish I could be like him"*. Intimate users also experience anxiety and a loss of interest if faced with disagreeable friends or uncomfortable online content. This result in feelings of dislike and neglect: *"I did a favour to someone who just knows me from Facebook. Later on, he started sending lots of messages which I disliked"*.

- Intimate users feel positive and satisfied as a result of their online interactions. This leads to a secure attachment to social media, particularly in the context of friendships. It enhances the evolution of their online presence and makes them feel safe. Curiosity is also important and their attachment to social media may result in fear of missing out. Intimate users are eager to know what is taking place around them in the online world, especially their close circle.

- Intimate users may feel a kind of depression if one of their online friends is no longer available or when they engage in downward social comparison with others; this leaves a feeling of lack of social support. They may enjoy new friendships yet also feel regret or anger about the amount of time they spend on social media: *"I feel regret; I have lost precious time on social media"* or consider that they spend too much time posting and disclosing details of their personal life.

TABLE 17: OVERVIEW OF THE INTIMATE BEHAVIORAL ARCHETYPE

Intimate Behavioural Archetype	
Internal characteristics	**Description**

Identity	Feels confident and need to use their real name and image for online profiles; update his or her profile picture on a regular basis
Kindness role	Has an inner confidence and is eager to help others by listening to their problems and offering help
social media boosts the feeling of being secure and FoMO	Comfortable when engaging online, but natural curiosity means that any interruption to online activities can result in fear of missing out
Self-presentation	Confident about personal appearance and regularly changes his or her profile picture in order as a reminder of his/her presence and current status. This may also result in a tendency to compare their life with the perceived lives of others
Trust and positive expectation	Believes that his or her online friends can be relied on and is therefore keen to interact with them

Examples of usage and associated emotions (positive and negative)		**Emotion example**
Positive usage experiences	Social media are a tool for communicating with friends and family	Happiness, joy, astonishment
	Social media are useful for reciprocal messaging, posting and commenting, i.e. interactive social communication	Satisfaction, liking, joy
	Social media as a source of fun and entertainment	Pleasure, joy
	The Intimate user is well-liked and social media are a useful way of making many friends from various locations and backgrounds	Happiness, enjoyment, satisfaction
Negative usage experiences	Using social media for longer than required	Regret, anger
	Unwelcome communications received online, including disagreeable messages from friends, inappropriate subject matter, or comments with which one disagree	Dislike, neglect
	Use of social media to compare one's own life with those of one's contacts	Jealousy, unhappiness
	Limited or no access to social media due to connectivity problems or restrictions imposed by a specific social context	Nervousness, anger, fury, unhappiness
	A continual need to know about contacts' activities, resulting in fear of missing out	Worry, fear, jitteriness
Psychological	**Usage experiences**	

States	
Loss of interest	This occurs when there is little change of content, interaction and contacts, resulting in the experience becoming repetitive
Boredom	Arises when they loss of popularity due to inactive profile and the same content keeps being posted
Anxiety	This could result from spending too much time on social media, being unable to access social media. The belief that contacts expect a quick response to posts or online activity may also provoke anxiety
Loneliness	Arises if, over time, the Intimate user comes to rely on social media in daily life and any inability to communicate leaves him or her feeling excluded
Craving	This can arise in the face of routine. They are using social media on a daily basis which then turns into a daily habit
Depression	This can occur when they engage in downward social comparison with others in order to meet self-evaluation needs

6.4.3   ESCAPIST BEHAVIOURAL ARCHETYPE

The Escapist archetype represents a personality that is dependent on social media as a means of escaping real-life problems, anxiety and expectations (Griffiths, M., 2000). Social media then become an essential gateway to the online world. The Escapist uses social media as a temporary escape from real life problems and stress: *"sometimes you experience difficult circumstances. Using social media and interacting with friends are crucial to getting through such periods"*. Escapists' use of social media has a number of common characteristics, including the following:

- The Escapist is often anonymous online, due to an unwillingness to form friendships that are more than temporary and because the practices of their real life is aimed at adjusting their mood and obtaining some kind of entertainment. This gives the Escapist positive emotions, such as joy and pleasure, but they may feel regret if these positive emotions are delayed for a long period of time. The Escapist tends to be unconscious of their online interaction, leading to ignoring friends communication on social media or to procrastination and hence to negative emotions, such as sadness: *"Sometimes I use social media unconsciously, by which I mean that I see some friends texting, but I am in the*

kind of mood where I'll open and read their messages but not respond and then feel sad".

- The Escapist may also have some kind of self-discrepancy (Higgins, E. T., 1987). The Escapist's online personality may differ considerably from their real personality; they may pretend to be happier or younger online: *"Online interaction sometimes forces me to respond to people I do not really want to talk to"*. Escapists may play a role and act in order to garner sympathy and boost their self-confidence.

- Escapists have an avoidant attachment to social media. They wish to be self-reliant and so do not aspire to form deep friendships with others through social media, choosing instead to entertain themselves in their way (Hart, J. et al., 2015).

- Some of their patterns of use may cause side effects resulting in negative emotions. For example, Escapists may categorise themselves according to factors such as interests, age, gender or membership of an occupational group: *"I am trying to contact journalists who with a similar background"*. This approach may lead to loneliness and isolation, accompanied by other negative emotions such as sadness, anger and regret, with significant negative consequences for their self-conception. The following table illustrates the Escapist behavioural archetype (see Table 18).

TABLE 18: OVERVIEW OF THE ESCAPIST BEHAVIORAL ARCHETYPE

Escapist Behavioural Archetype	
Internal characteristics	**Description**
Identity	Escapists prefer to remain anonymous during online interactions
Procrastination	They may postpone responses to their online friends and, unconsciously, leave their messages and interactions unanswered
Self-enhancement motive	Social media offer an escape from real life, allowing the Escapist to create an imaginary persona that boosts his or her self-image and allows him or her to be viewed positively
Self-discrepancy	Escapists' unhappiness with their real-life situation causes them to make false claims about themselves when online, for example giving a false age or pretending to be happier than they really are
Avoidant online	Escapists are unwilling to form close friendships online, which

attachment style	may reflect an underlying lack of trust in those with whom they engage	
Examples of usage and associated emotions (positive and negative)		**Emotion example**
Positive usage experiences	Social media are helpful for communicating with relatives, friends and sharing information	Happiness, joy, astonishment
	Social media are used for activities resulting in pleasure and entertainment	Joy
Negative usage experiences	Fear of missing out on certain events, news, opportunities and timely interactions	Worry, fear, jitteriness
	Unconsciously spending longer online than one intended; avoiding communicating with others	Regret, anger, sadness
	Limited or no access to social media due to connectivity problems or restrictions imposed by the social context	Nervous, anger, fury, unhappiness
	Content or interactions do not suit one's mood	Anger
Psychological States	**Usage experiences**	
Anxiety	Occurs due to excessive usage of social media or due to displeasing content	
Boredom	Arises when the individual may engage in passive interaction such as viewing and scrolling in unconscious mood	
Loss of interest	This arises when the same content is repeatedly posted on social media	
Loneliness	Arises if social media are crucial to social interaction and one is unable to engage and feels excluded	

6.4.4   NARCISSIST BEHAVIOURAL ARCHETYPE

The Narcissist archetype often wishes to share their successes, dreams, ambitions and achievements with their social media friends, firstly, because they believe that their friends are eager to hear about their activities and secondly, to elicit positive emotions and comments (Carpenter, C. J., 2012). This archetype is therefore closely tied to social media. Narcissists feel safe when they are online and are made anxious by any loss of online activity (see Table 19). The Narcissist archetype is associated with positive self-views and self-concepts, resulting in a relatively high number of friendships, fairly heavy self-promotion and self-presentation. The characteristics of social media-related behaviours of Narcissists include the following:

- Narcissists struggle to resist using social media and respond promptly to messages, taking part in conversations, comments or the exchange of information. They tend to manipulate and update their profile content, including posting and changing their profile status: *"I shared something via Facebook and I saw that everybody liked it; that made me happy"*; *"As soon as I woke up I used my social network and shared a lot of pictures and videos. I felt amazing today"*. This interaction pattern may result in an evolution of their online presence and anxiety may arise from concerns about the expectations of others, perhaps leading to negative emotions such as nervousness, worry and shame.

- Narcissists use their real identity for their online profile. This is a self-presentational choice and brings joy and satisfaction. Narcissists use a genuine self-image on their online profile, because they typically believe themselves to be attractive, both as appearance and lifestyle, and so they think that this will help them to be noticed and so achieve their social identity goals: *"I have changed the profile picture I use on Facebook for family, relatives and friends, because I took a new picture of myself"*.

- Narcissists are influenced by their peers, leading to a form of competition in the use of social media, i.e. they are easily manipulated and feel they are at the centre of any interaction. Their self-categorisation is predictable, which results in them comparing themselves with others and may lead to negative emotions such as envy and jealousy. The following Table 19, illustrates the Narcissist behavioural archetype.

TABLE 19: OVERVIEW OF THE NARCISSIST BEHAVIORAL ARCHETYPE

Narcissist Behavioural Archetype	
Internal characteristics	**Description**
Identity	Narcissists are sufficiently confident in their online interactions to use one or more items of information that identify them, e.g. real name, picture, location data, workplace and email
Self-presentation	Narcissists have a high opinion of themselves and use social media to show off their good qualities, including their physical appearance, personality and achievements, e.g. they frequently update their profile content in order to attract the attention of others. However, this leaves them vulnerable to comparisons with others that they may find it difficult to avoid

Peer pressure	They are keen to impress their contacts and so may experience competitive pressures. They desire to be the centre of attention, and remaining thus requires considerable effort.	
Irresistible urge	They have an urge to respond to new posts and conversations and exchange information and content as soon as possible	
Secure and fear of missing out online attachment	Engaging with others via social media makes them feel secure and confident. If they cannot access social media, they may become uneasy and experience fear of missing out	

Examples of usage and associated emotions (positive and negative)		**Emotion example**
Positive usage experiences	Social media are helpful for communicating with relatives and friends, sharing information and experiencing a sense of ongoing connection	Happiness, joy, astonishment
	Social media are used for reciprocal messaging, posting and commenting, i.e. interactive social communication	Satisfaction, liking, joy
	Narcissists are well-liked and social media help them to make many friends from many different countries and cultures	Enjoyment, satisfaction
Negative usage experiences	Social media-motivated comparisons between one's own life and the lives of contacts, often in terms of their activities	Jealousy, unhappiness
	Curiosity about their contacts' activities can lead to fear of missing out in the event that one is unable to access social media	Worry, fear, jitteriness
	Limited or no access to social media due to connectivity problems or restrictions imposed by the social context	Nervous, anger, fury, unhappiness
	Undesirable social media content and comments are posted by contacts they consider disagreeable	Dislike, neglect

Psychological States	**Usage experiences**
Boredom	Arises when there is no new social media content or content is repetitive
Loss of interest	Arises when social media contacts have failed to add any new content, or when one lacks time to access social media
Loneliness	Social media are a key part of one's social life and one's group memberships reflect one's personal preferences
Anxiety	Evoked by difficulty in accessing one's profile or being unhappy with social media content. Anxiety may also result

		from feeling of commitment to be highly responsive and unconscious quick response
	Craving	In the form of a pressing need to shape and maintain one's online identity, self-concept and reputation

6.4.5   DISCREPANCY BEHAVIOURAL ARCHETYPE

This is one of the minority archetypes discovered in our study. It represents individuals who are characterised by a sense of being different from others in terms of social media habits. There are a number of notable patterns in Discrepancy users' social media interactions:

- Discrepancy users' profiles are frequently linked to their real identity because they see themselves as different from others and tend to classify themselves according to their feelings of self-worth and their self-perception: *"I am trying to be myself. Also, I like to share posts with my friends who have the same interests"*. Their attachment to social media takes an avoidant style, due to their focus on creating and maintaining self-esteem, in a number of different ways and to different levels, using the features and functions of social media. They may experience regret or anger as a result of the amount of time they spend online, on such activities.

- They also feel disturbed and lose concentration when their thinking is dominated by online activities to the extent that they are unable to focus on anything else. This leads them to lose interest in using social media, giving rise to negative emotions, such as nervousness and anger: *"When I was checking my message I lost my concentration and I missed important task which makes me feel anger"*.

- Their interactions are unlike those of other behavioural archetypes, in that they are discriminating and selective when it comes to content posted to their accounts (including posts or comments) because they suffer from social anxiety: *"I care about my appearance. I want people to see me as good looking and happy, even if that is far from the reality"*. In addition, they expect a lot from their online friends, which makes them feel anxious and lonely and may lead to other negative emotions, such as fear and nervousness: *"I was expecting a message and I felt lonely while I was waiting"*. The following table illustrates the Discrepancy behavioural archetype (see Table 20).

Discrepancy Behavioural Archetype	
Internal characteristics	**Description**
Identity	Discrepancy users use one or more items of information that identify them, e.g. real name, picture, location data, workplace and email, in online interactions
Avoidant online attachment style	Discrepancy users are unwilling to form close bonds with people they engage with on social media and find it difficult to trust those they meet online
Categorise themselves	Discrepancy users believe that they are special and contrast their own situation with their contacts' situations by comparing profiles and activities
Disturbance and lost concentration	The Discrepancy user finds that handling numerous interactions online simultaneously leads to a loss of concentration and so prefers to focus one interaction at a time
Different from reality	The Discrepancy user behaves very differently online and in the real world

Examples of usage and associated emotions (positive and negative)		Emotion example
Positive usage experiences	Social media are an accessible facilitator of pleasure and entertainment activities	Joy
	Social media are helpful for communicating with relatives and friends, including sharing information, resulting in a sustained feeling of connectedness and presence	Happiness, joy
Negative usage experiences	Frequent online engagement, accompanied by a lack of self-awareness and concentration	Regret, anger
	The fear of missing out on certain events, news, opportunities or interactions	Worry, fear, nervousness
	Failing to receive sufficient or timely responses from peers	Sadness

Psychological States	Usage experiences
Boredom	Arises when their interaction is passive and unconscious
Anxiety	Provoked by spending longer than intended on social media or being unable to check one's profile
Loss of interest	Caused by the disapproval of others' content and interactions, or because the content remains unchanged or becomes repetitive
Loneliness	They categorise themselves, which can result in feelings of isolation, mainly if contacts have not been active online

6.5 EVALUATION OF THE BEHAVIOURAL ARCHETYPES: ANALYSING PARTICIPANTS FEEDBACK'S

As previously stated, the diary study design covered how people aligned and reacted to the five behavioural archetypes and, additionally, how these behavioural archetypes influence users with regard to their problematic online attachment. In this section, several points were extracted through the analysis of the interviews we conducted with 18 participants who completed the second diary studies. The participants were chosen to cover the different behavioural archetypes and also considering the qualitative comments they gave when they completed the diary notebook. The interview asked the main question around how they found the description of the archetype and whether they have any suggestion to improve it. Their views are summarised in the following points:

- **Representative nature:** Participants believed that these behavioural archetypes were able to capture the main problematic online attachment style, making it easy for them to liaise to one of these archetypes. In addition, they began to understand and predict patterns of interaction of people around them. This can be attributed to the nature of the building components of the developed archetypes, which make them more close to reflecting reality. Examples of the comments received included *"I definitely can find one more characteristic that I have it myself in behavioural archetype number four"* and *"I found that easy to put myself in one of these behavioural archetypes, which is good to see my usage in front of me"*, and *"The five behavioural archetypes are well-structured and put together. I found it relatively easy to link to one of them and populate my daily diary"*. The representation nature of our five archetypes is also supported by the fact that each of the recruited participants, the 51 participants of the second diary study, found themselves in one of the archetypes.

- **Raising awareness towards the interaction style:** Participants agreed that the diary study and their completion of the sheets on a daily basis made them more conscious about their online behaviours and their problematic online attachment. They started to think of managing it during the diary study period. Examples of the comments received on this aspect include *"To be honest, these behavioural archetypes prompted me to think about how to use social networking sites"* and *"I would like to thank you because I started thinking about social media*

effects", and *"I realised my patterns from behavioural archetype one which exactly reflects my interaction"*.

- **Terminology awareness:** Some participants thought that there was an overlap between emotions and psychological states in each of the five behavioural archetypes, some of which are difficult to distinguish and they needed further clarification. For example, participants mentioned they tended to see negative emotions and some psychological states as a similar thing, occasionally. They also found the subtle differences between emotions hard to recognise and some could not differentiate between certain similar-nature emotions such as anxiety and regret and sadness. This suggests that an induction around emotions and the psychological states would be needed when behavioural archetypes are used for user modelling and behaviour awareness.

- **Engaging presentation:** At the start of the diary study (phase four), participants were presented with a summary description of each of the personas written in a simple and concise format. They were asked to liaise themselves with one or more of the behavioural archetypes. Based on their choice, participants were then given a diary book including entries tailored to the detailed description of that archetype. While participants found that detailed form helpful to self-diagnose their actual experience, they also expressed that the questions were of a *"dry nature"* and *"heavy at times"*. Hence, a more user-friendly and lively format of the behavioural archetypes would need to be presented to people if the intention is to use the behavioural archetypes for design or diagnosis purposes to avoid causing a tiring and less engaging experience.

- **Behavioural archetypes live presentation and representation:** A set of live behavioural archetypes were created in response to the previous point around the need for an engaging presentation. The behavioural archetypes were presented in the follow-up interviews. However, some participants expressed concerns about the names of the behavioural archetypes, especially the Narcissist and the Paranoid. The author stress here that these names were hidden from the actual studies and only used at that phase for consultation. Still, the author replaced the Paranoid with Discrepancy. Participants also felt that demographic data added to each behavioural archetype could be seen as a stereotyping. The archetypes

names used in this paper are meant for the practitioners and researchers and would need a more user-friendly terminology and presentation if used for other purposes such as validating a design or eliciting user requirements. In addition, it appeared that assigning gender and age to a behavioural archetype may deter some from choosing it or liaising themselves naturally to it.

- **Objectivity and influence:** Participants noted that they could be biased in filling the diary and recognising their behavioural archetypes altogether. For example, one participant mentioned that emotion could be volatile depending on the different interactions they have on their different social media accounts, and at times, they may feel *"different emotions simultaneously"* according to the various messages and content received. They also noted that *"being in a negative mood due to a real-world event can expand to the low mood in using social media and vice versa"*. Hence, the emotions and psychological states associated with the use of social media should not be attributed to that use entirely. A more objective measure of that relation, other than the self-report, would be then needed.

6.6 CHAPTER SUMMARY

In this chapter, the author reports a four-phase study for understanding the problematic attachment to social media by capturing users' live experiences based on the diary studies. The author also develops a set of five behavioural archetypes to represent users with problematic attachment to social media. These archetypes are: Secure, Intimate, Escapist, Narcissist, and Discrepancy. This set of archetypes is the first empirically based study in clustering users with problematic attachment to social media. These archetypes can be used to not only better understand and segment users with problematic attachment to social media but can also be used as a tool for facilitating effective communication between different teams and designing tailored interventions to address problematic attachment to social media in a Human Centred Design (HCD) approach.

7 CHAPTER SEVEN: QUANTITATIVE VALIDATION ON BEHAVIOURAL ARCHETYPES

This chapter undertakes statistical analysis on data collected as part of the research looking at validating the behavioural archetypes. Indeed, to help validate the five behavioural archetypes and to make the definitions of the behavioural archetypes more rigorous and scientific.

7.1 INTRODUCTION

Quantitative data provide more insight into behavioural archetypes diary notes. It seems common to add numerical results to qualitative research, and the use of numbers by itself does not make the research mixed methods (Maxwell, J. A., 2010).

The statistical analysis is broken down into three main parts: Introduction, Data Cleaning and Discriptive Data Analysis. The Introduction includes a summary of the aims and a description of the methodology. The Data Cleaning and Preparation section summarises the processes by which a final data set was obtained and the descriptive statistics of that final data set.

7.2 RESEARCH METHOD

Two raw datasets were provided, regular diary study for five days undertaken in an earlier phase of research with 51 participants, as explained in Chapter 6. Personality Trait test was followed up the diary study. Both had the same participants.

Each participant was asked to undertake a diary three times a day (morning, afternoon and evening) for five days-providing a more ecologically valid sample comprising 15 separate responses for each question on the diary. All questions were transferred to binary (see Table 21):

TABLE 21: CONVERSION OF QUESTION RESPONSE INTO DIGITAL RESPONSE

Digital Response Equivalent	Questionnaire Response Data
0	Not Felt
1	Felt
99	No Response

Questions were designed to elicit attributes according to the self-assigned behavioural archetype. Hence each different archetype had a different number of questions. All questions within each Behavioural Archetype were based on themes highlighted by preliminary research (Altuwairiqi, Majid et al., 2019; Altuwairiqi, Majid et al., 2019a; Altuwairiqi, Majid et al., 2019b). The differing number of questions related to how relevant each theme was within each behavioural archetype (see Table 22). For each participant, three independent variables were recorded: behavioural archetype, Gender and Age group.

TABLE 22: DESCRIPTIVE OF THE DIARY NOTE QUESTIONS

Behavioural Archetype	Archetype #	Total Diary Questions	Internal Validity Questions	Positive Emotions Questions	Negative Emotions Questions	Psychological states Questions
Secure	1	17	5	3	4	5
Intimacy	2	20	5	4	5	6
Escapism	3	15	5	2	4	4
Narcissism	4	17	5	3	4	5
Discrepancy	5	14	5	2	3	4

7.2.1 ANALYSIS METHOD

Descriptive statistics allow the researcher to get a feel for the data, explore variability and remove any outliers.

7.3 DESCRIPTIVE PHASE: DATA CLEANING AND PREPARATION

The raw dataset was developed using the understanding provided by Descriptive Statistics. Overall, the number of participants was reduced from 51 to 45. It then remained to code the data in a way as to facilitate data analysis. The questions on each survey were partitioned to create five dependent variables, and an effective response rate was created for each Participant on each Dependent Variable (necessary due to the varying number of questions). Subsequently, this would allow the participants to be grouped to analyse any of the three independent variables. The following section provides a summary of the outlier removal process, describes how the variables were coded and includes the descriptive statistics for the final data set.

7.3.1 OUTLIER REMOVAL

Data points came to the attention of the analyst under the following three categories; response rate, response variability and response stability.

7.3.1.1 RESPONSE RATE

The most apparent loss of data validity was when a respondent did not complete the questions. Although it is possible to use predictive statistics to fill in gaps in data, this is less reliable. To assess data validity, a simple response/non-response marker variable was created, which counted the number of non-responses and responses respectively. A fully completed questionnaire would have between 210 and 300 responses, depending on the number of questions within their chosen behavioural archetype.

There were three participants each had a response rate of less than 50%. These three participants were removed from the data set, reducing the sample size to 48. All others had a 100% response rate. Data may also be considered unreliable if they exhibit neither variability nor temporal stability.

7.3.1.2 RESPONSE STABILITY

Daily response totals were created for each participant. It was noticed that one participant had an average response of 9-10 for the first three days. For the last two days of the study, the questionnaire comprised entirely of 0's. Such a marked contrast to the responses on the first three days was considered highly abnormal, and the participant was removed from the study as an outlier.

7.3.1.3 RESPONSE VARIABILITY

Although responses were binary, we would still expect some variability over the course of 5 days. To that extent, a variable was created to count the "felt response" and then divided by the possible response count to create a response rate for each participant for each question. Taken together, this provided a snapshot of each participant and how they responded to each question.

While there may be cause or reason to interpret a particular question as correctly having a 100% response rate, such an extension to all emotional responses is unlikely. Therefore, if a participant answered all questions in the same way, it seems reasonable

to believe that the participant may not have taken the questionnaire seriously and was just "filling the form". Thus, those participants who exhibited a 100% response rate to all questions were removed.

Specifically, there were two participants who responded as "felt" in each of 225 and 210 responses respectively (i.e.100%" felt"). Two others that had some variation of response were not deemed to be outliers, leaving a final data set comprising 45 participants.

7.3.2   DATA CODING

The response rate variables used to identify outliers were then aggregated to create four independent variables; each corresponding to a section of the diary. For example, the first five questions on each survey measure the internal characteristics of the chosen archetype. A mean response rate for these five questions creates the Internal Validity variable. In a similar manner, the questions corresponding to positive emotion, negative emotion and psychological states were also aggregated. For more details (Table 21 above).

7.3.3   DESCRIPTIVE STATISTICS FOR EACH BEHAVIOURAL ARCHETYPE

Having verified the entity of the Behaviour Archetype, a quantitative analysis of the composite features for each behavioural archetype was undertaken. Necessarily, the starting point for this analysis is the descriptive statistics for each behavioural archetype. Due to the varying number of questions on each dependent variable, a statistic was created for each individual, representing the proportion of responses that were felt essentially a mean response value. These were subsequently used as the basis for the descriptive statistics outlined (see Table 23). The proportions of felt responses for each individual were represented by dependent variables: The Internal characteristics variable (PIVPERC), Positive emotions variable (PPOSPERC), Negative emotions variable (PNEGPERC), and Psychological states variable (PPSYPERC).

TABLE 23: BEHAVIOURAL ARCHETYPE DESCRIPTIONS

Behavioural Archetype (*n*)	Descriptive Statistic	Internal Characteristics Variable	Positive Emotions Variable	Negative Emotions Variable	Psychological States Variable
Secure (18)	Mean	0.65	0.62	0.36	0.34
	N	18	18	18	18

	Standard Deviation	0.17	0.27	0.24	0.23
	Median	0.7	0.63	0.33	0.29
	Minimum	0.33	0.18	0.03	0.07
	Maximum	0.84	1.00	1.00	1.00
	Range	0.51	0.82	0.97	0.93
Intimacy (11)	Mean	0.65	0.70	0.37	0.47
	N	11	11	11	11
	Standard Deviation	0.27	0.27	0.16	0.25
	Median	0.69	0.67	0.33	0.33
	Minimum	0.19	0.33	0.08	0.12
	Maximum	1.00	1.00	0.67	0.83
	Range	0.81	0.67	0.59	0.71
Escapism (4)	Mean	0.68	0.89	0.67	0.68
	N	4	4	4	4
	Standard Deviation	0.063	0.11	0.26	0.11
	Median	0.66	0.92	0.63	0.68
	Minimum	0.64	0.73	0.40	0.55
	Maximum	0.77	1.00	1.00	0.80
	Range	0.13	0.27	0.60	0.25
Narcissism (6)	Mean	0.67	0.71	0.34	0.38
	N	6	6	6	6
	Standard Deviation	0.24	0.23	0.15	0.10
	Median	0.61	0.74	0.33	0.37
	Minimum	0.33	0.42	0.18	0.23
	Maximum	1.00	1.00	0.50	0.53
	Range	0.67	0.58	0.32	0.31
Discrepancy (6)	Mean	0.58	0.92	0.51	0.51
	N	6	6	6	6
	Standard Deviation	0.28	0.17	0.23	0.28
	Median	0.53	1.00	0.59	0.42
	Minimum	0.25	0.57	0.20	0.25
	Maximum	1.00	1.00	0.73	0.95
	Range	0.75	0.43	0.53	0.70
Total (45)	Mean	0.64	0.72	0.41	0.43
	N	45	45	45	45
	Standard Deviation	0.26	0.27	0.23	0.24
	Median	0.64	0.71	0.35	0.33
	Minimum	0.19	0.18	0.03	0.07
	Maximum	1.00	1.00	1.00	1.00
	Range	0.81	0.82	0.97	0.93

The internal characteristics variable was proportional of response to the first five questions on the diary study questions. These first five questions were selected by the author for each behavioural archetype. These questions were chosen to reflect the

internal characteristics of the chosen behavioural archetype. A positive response indicated conformity with that behavioural archetype.

7.3.4 *DESCRIPTIVE* STATISTICS FOR INDEPENDENT VARIABLES

The three independent variables: age group, gender and behavioural archetype; have three, two and five classifications respectively. With the final data set comprising 45 participants, it is self-evident that the sample size will be of insufficient magnitude to allow testing to have statistical power for any interaction other than the age group by gender interaction and the three-way interaction will be impossible to establish as there are 30 distinct groups and only 45 participants.

TABLE 24: PARTICIPANT SPLIT BY GENDER AND PERSONA

		Secure archetype	Intimacy archetype	Escapism archetype	Narcissism archetype	Discrepancy archetype	total
Gender	**Male**	13	3	2	5	3	26
	Female	5	8	2	1	3	19
	Total	18	11	4	6	6	45

As mentioned previously, all participants were asked to select one of five behavioural archetypes proposed by the qualitative analysis and diary study research- which best reflected their online behaviours. An ideal study for statistical comparison would be equally balanced across categories. However, this may not be reflective of the reality in an actual population. Although not the main focus of this study, it is still of moderate interest to observe the distribution of behavioural archetype's chosen by participants. The Secure archetype was the most popular archetype comprising 40% of respondents. Intimacy archetype was the second most chosen (25% of respondents) and the remaining three archetypes comprised roughly 10% each out of the final sample of the respondents, (see Table 24).

Although the gender of participants was fairly balanced overall; 26 males and 20 females, this gender balance did not appear to extend to individual archetypes. Secure archetype and narcissism archetype appeared to be pre-disposed to males and intimacy archetype appeared more likely to be chosen by females.

Neither the age groups well balanced concerning gender (see Table 25). In each of the age groups, the lesser represented gender is outnumbered by a ratio of more than 2:1. This greatly complicates the ability to analyse gender and to a slighter extent age-group and gender interactions. It is, therefore, difficult to conclude which behavioural archetype may be more likely to be chosen by a particular age-group and to confirm that the gender differences in behavioural archetypes were simply not the function of age.

TABLE 25: PARTICIPANT SPLIT BY AGE GROUP AND GENDER

| | | Gender | | Total |
		Male	Female	
	18-24	3	10	13
Age group	25-34	16	7	23
	35-44	7	2	9
Total		26	19	45

Certainly, the secure archetype has most participants from the 25-34 age groups. This could explain why secure archetype appeared to be predisposed to male participants (see Table 26). Escapism archetype, narcissism archetype and discrepancy archetype all look balanced, but the numbers are too small to make any meaningful analysis of gender likelihood effect on the archetype type.

TABLE 26: PARTICIPANT SPLIT BY AGE AND BEHAVIOURAL ARCHETYPE

Age Group	Secure archetype	Intimacy archetype	Escapism archetype	Narcissism archetype	Discrepancy archetype	Total
18-24	5	3	1	1	3	13
25-34	9	7	2	3	2	23
35-44	4	1	1	2	1	9
Total	18	11	4	6	6	45

7.3.4.1 MODIFYING THE DEPENDENT VARIABLE FOR ANALYSIS

To assess each dependent variable, a new variable was created, which added each binary response together for each participant giving an overall score between 0-15. From this data, the mean number of times the emotion was felt in association for each question for each participant was calculated. Subsequently, these individual question means were combined into a mean score for each of the dependent variable measures. For descriptive statistics for the Dependent Variables, (see Appendix D1).

7.3.4.1.1 *DESCRIPTIVE STATISTICS OF QUANTITATIVE MEASURES*

The overall percentage of emotions felt is presented in the following tables. Based on mean, the result suggested escapism archetype was a higher emotional response (mean and median = 0.71) than the other behavioural archetypes although it should be noted that it had only 4 participants. The intimacy and discrepancy archetypes came second and third (see Table 27).

TABLE 27: DESCRIPTIVE STATISTICS OF QUANTITATIVE MEASURE BY BEHAVIOURAL ARCHETYPE

Persona (n)	Mean (SD)	Median	Minimum	Maximum
Secure archetype (18)	0.48 (0.19)	0.48	0.20	0.94
Intimacy archetype (11)	0.57 (0.23)	0.55	0.16	0.95
Escapism archetype (4)	0.71 (0.10)	0.71	0.60	0.83
Narcissism archetype (6)	0.51 (0.11)	0.51	0.34	0.63
Discrepancy archetype (6)	0.59 (0.22)	0.53	0.30	0.86
Total (45)	0.54 (0.20)	0.54	0.16	0.95

Comparing the mean percentage felt by gender, there was a higher overall emotional response by females (mean=.60) than by males (mean=0.50) across all behavioural archetypes (see Table 28).

TABLE 28: DESCRIPTIVE STATISTICS OF QUANTITATIVE MEASURE BY GENDER

Gender (n)	Mean (SD)	Median	Minimum	Maximum
Male (26)	0.50 (0.19)	0.51	0.16	0.86
Female (19)	0.60 (0.19)	0.56	0.35	0.95
Total (45)	0.54 (0.20)	0.54	0.16	0.95

7.3.4.1.2 *DESCRIPTIVE STATISTICS FOR POSITIVE EMOTIONS MEASURE*

The positive emotional response had a mean of 0.72 (to 2DP), (see Table 29). Although it is understood that emotions exist on a continuum, it is notable that the overall positivity towards social media is on average, 31% higher than the negative emotions. In terms of likelihood, a participant is on average, almost twice as likely to be positive than negative.

TABLE 29: POSITIVE EMOTIONS MEASURE SCORE BY GENDER

Gender (n)	Mean (SD)	Median	Minimum	Maximum
Male **(26)**	0.64 (0.25)	0.67	0.18	1
Female **(19)**	0.82 (0.24)	0.97	0.33	1
Total **(45)**	0.72 (0.26)	0.71	0.18	1

Comparing the mean percentage felt by gender, it would appear from Table 26 that females are far more positive than males. The females' positive emotional measure is 16% higher than for males. Standard deviations are similar for both groups ensuring homogeneity of variance is satisfied.

Escapism and discrepancy archetypes had means of 0.89 and 0.92 compared to 0.62 for secure archetype (see Table 30). Escapism and discrepancy archetypes appear more positive and secure archetype appears less. These mean values will be tested for significance later, although it should be noted that the number of participants in Escapism and discrepancy archetypes is low. The standard deviation for Escapism and discrepancy archetypes appear lower than other archetypes. This is likely due to the maximum score being 1-scores closer to the maximum value exhibit less variation.

TABLE 30: POSITIVE EMOTIONS MEASURE SCORE BY BEHAVIOURAL ARCHETYPE

Behavioural archetype (n)	Mean (SD)	Median	Minimum	Maximum
Secure archetype **(18)**	0.62 (0.27)	0.63	0.18	1
Intimacy archetype	0.70	0.67	0.33	1

(11)	(0.27)			
Escapism archetype	0.89	0.92	0.73	1
(4)	(0.11)			
Narcissism archetype	0.71	0.74	0.42	1
(6)	(0.23)			
Discrepancy archetype	0.92	1.00	0.57	1
(6)	(0.17)			
Total	0.72	0.71	0.18	1
(45)	(0.26)			

Age groups appeared to be broadly similar regarding the positive emotions (see Table 31). However, it is noticeable that the middle age-group which appeared more negatively disposed of is indeed less positive than other age groups. The youngest age-group is most positive towards social media and it is surprising to note that the 35-44 age-groups appear more positive than the 25-34 age-groups.

TABLE 31: POSITIVE EMOTIONS MEASURE SCORE BY AGE-GROUPS

Age Group (n)	Mean	Median	Minimum	Maximum
18-24	0.78	0.80	0.36	1
(13)	(0.23)			
25-34	0.68	0.67	0.18	1
(23)	(0.29)			
35-44	0.71	0.71	0.33	1
(9)	(0.22)			
Total	0.72	0.71	0.18	1
(45)	(0.26)			

As can be seen from Table 31 the standard deviations are roughly the same for all age groups. Seeing as positive and negative are diametrically opposed concepts an overall net Positive-Negative Score was created by subtracting the negative mean from the positive mean.

7.3.4.1.3 *DESCRIPTIVE STATISTICS FOR NEGATIVE EMOTION MEASURE*

The overall mean for the negative measure was 0.40(13) meaning that on average participants had negative emotions towards social media 40% of the time (see Table 32). At first glance, it appears that females are more negative than males; 0.48 compared to 0.36. Additionally, females also appear to have more significant variation

in negative emotional response as their standard deviation is 0.24 in contrast to 0.20 (see Table 32).

TABLE 32: NEGATIVE EMOTIONS MEASURE SCORE BY GENDER

Gender (n)	Mean (SD)	Median	Minimum	Maximum
Male (26)	0.36 (0.20)	0.34	0.03	0.73
Female (19)	0.48 (0.24)	0.35	0.18	1.00
Total (45)	0.41 (0.22)	0.35	0.03	1.00

Analysing the negative emotional response for each archetype revealed sharp differences between the archetypes, (see Table 33). Escapism archetype was much more negative with a mean of 0.67 compared to the behavioural archetype average of 0.40. Discrepancy archetype was also markedly higher-around 51%. The other three archetypes (secure, intimacy and narcissism) had a broadly similar level of negative emotion; between 34 and 36%.

However, escapism archetype had just 4 participants and discrepancy archetype only had 6 participants. Small sample sizes may hinder the detection of significant differences. The standard deviations also appear quite different across respective archetype; Escapism archetype is highest with 0.26 and narcissism archetype is lowest with 0.15.

TABLE 33: NEGATIVE EMOTIONS MEASURE SCORE BY BEHAVIOURAL ARCHETYPE

Persona (n)	Mean (SD)	Median	Minimum	Maximum
Secure archetype (18)	0.36 (0.24)	0.33	0.03	1.00
Intimacy archetype (11)	0.37 (0.16)	0.33	0.08	0.67
Escapism archetype (4)	0.67 (0.26)	0.63	0.40	1.00
Narcissism archetype (6)	0.34 (0.15)	0.33	0.18	0.50
Discrepancy archetype	0.51	0.58	0.20	0.73

(6)	(0.21)			
Total	0.41	0.35	0.03	1.00
(45)	(0.22)			

There is a bit of an oddity in the degree of negative emotions felt by respective age groups (see Table 34). It might be expected that any negative emotion would have a relationship with age; i.e. the younger someone is the less negative they were (or vice versa).

TABLE 34: NEGATIVE EMOTIONS MEASURE SCORE BY AGE-GROUPS

Age Group (n)	Mean	Median	Minimum	Maximum
18-24	0.41	0.35	0.18	0.73
(13)	(0.18)			
25-34	0.44	0.42	0.03	1.00
(23)	(0.27)			
35-44	0.30	0.30	0.18	0.42
(9)	(0.08)			
Total	0.41	0.35	0.03	1.00
(45)	(0.22)			

However, the mean negative emotion was lowest in the oldest age group (35-44), highest in the middle age-group (25-34) and fairly high in the 18-24 age group, (see Table 34). The variation across these age-groups also appeared to differ. It was highest in the 25-34 age-group, lowest in the 35-44 age-group and half-way between for the youngest 18-24 age-group. The numbers in each age-group are 14, 23 and nine which does not immediately invalidate this observation. The lowest variation was for the smallest sample (9 people for the 35-44 age-group) a suggestion that extreme values are not unduly influencing the data.

7.3.4.1.4 _DESCRIPTIVE STATISTICS OF PSYCHOLOGICAL STATES MEASURE_

The proportion of psychological states felt across behavioural archetypes ranged from 0.34 to 0.68 (see Table 35). However, females showed higher mean (.51) compared to males (.37), (see Table 36). Thus, the mean measure of psychological states for females

was 13% higher than for males. Age groups had slightly similar means, which was ranging from 0.39 to 0.45 (see Table 37).

TABLE 35: PSYCHOLOGICAL STATES MEASURE SCORE BY BEHAVIOURAL ARCHETYPE

Persona (n)	Mean (SD)	Median	Minimum	Maximum
Secure archetype (18)	0.34 (0.23)	0.29	0.07	1.00
Intimacy archetype (11)	0.47 (0.25)	0.33	0.12	0.83
Escapism archetype (4)	0.68 (0.11)	0.68	0.55	0.80
Narcissism archetype (6)	0.38 (0.10)	0.37	0.23	0.53
Discrepancy archetype (6)	0.51 (0.28)	0.42	0.25	0.95
Total (45)	0.43 (0.24)	0.33	0.07	1.00

TABLE 36: PSYCHOLOGICAL STATES MEASURE SCORE BY GENDER

Gender (n)	Mean (SD)	Median	Minimum	Maximum
Male (26)	0.37 (0.20)	0.33	0.07	0.83
Female (19)	0.51 (0.26)	0.46	0.09	1.00
Total (45)	0.43 (0.24)	0.33	0.07	1.00

TABLE 37: PSYCHOLOGICAL STATES MEASURE SCORE BY AGE-GROUPS

Age Group in years (n)	Mean	Median	Minimum	Maximum
18-24 (13)	0.41 (0.17)	0.43	0.09	0.73
25-34 (23)	0.45 (0.29)	0.33	0.07	1.00
35-44 (9)	0.39 (0.9)	0.33	0.20	0.77
Total (45)	0.43 (0.24)	0.33	0.07	1.00

7.3.5   STABILITY OF THE BEHAVIOURAL ARCHETYPE

An additional requirement for each behavioural archetype to be valid is that it must be stable. For the data for the daily mean of all diary questions felt for each behavioural archetype (see Table 38). These have been plotted on a line graph, and they appear to be fairly stable (see Figure 23).

TABLE 38: MEAN SCORES BY DAY AND BEHAVIOURAL ARCHETYPE

5 Study Days	Secure	Intimacy	Escapism	Narcissism	Discrepancy
D1 MEAN	24.5	29	34.25	24.33	24.4
D2 MEAN	25.5	28.5	30.5	27.17	25.6
D3 MEAN	22.44	28.13	31.5	27.5	26.6
D4 MEAN	21.75	23.5	30.75	27.17	24.6
D5 MEAN	20.63	25.88	32.75	24.17	27.4
Overall Mean	22.964	27.002	31.95	26.068	25.72
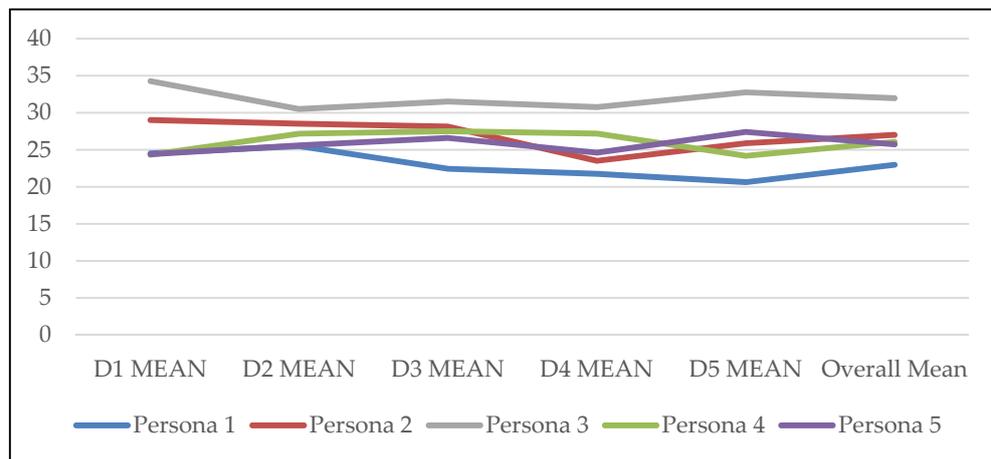
FIGURE 23: TEMPORAL STABILITY OF BEHAVIOURAL ARCHETYPES

7.3.6   DISTRIBUTION OF BEHAVIOURAL ARCHETYPE AMONGST SAMPLE

It seems reasonable to consider that if the Behavioural Archetypes are not a valid concept, then it follows that each of the five Behavioural Archetypes would be equally likely to be chosen when selected by participants- in effect selecting a Behavioural Archetype would be purely down to chance.

The Chi-Square test provides a way of assessing the "goodness of fit" for our sample under a theoretical distribution where each behavioural archetype had an equal chance of being selected.

There was good evidence (p=0.018) against the null hypothesis that Behavioural Archetypes were equally likely to be chosen (see Table 39). Therefore, accept the alternative hypothesis that all Behavioural Archetypes are not selected with equal probability. This quantitatively validates a perceived difference in Behavioural Archetypes on behalf of the participants.

TABLE 39: CHI-SQUARE VALUE FOR EQUAL PROPORTIONS OF PARTICIPANTS BY BEHAVIOURAL ARCHETYPE AND GENDER

	Archetype Number	Participants Gender
Chi-squared	11.897a	.641b
Df	4	1
Asymp. Sig.	.018	.423

A Chi-Square test was also used to assess the gender balance of the study. This is pertinent to the desire for the Behavioural Archetype concept to be adaptable and applicable to a large population. Any significant findings could be limited if the sample is not gender balanced and so it is important to establish whether the sample was prone to gender bias in participation. There was no evidence to reject the null hypothesis (p=0.423) that the probability of the gender of a participant is equally likely. Thus, observe that the overall study is gender-balanced.

7.4   PERSONALITY TRAITS

This section aimed to find the link between the behavioural archetypes which have been chosen by the participants and their personality traits. To achieve this aim, the researcher utilised the Big Five personality traits, which also known as the Big Five Inventory (BFF). It is a well-known theory in psychology and social science that explains the different factors of personality traits into five dimensions of personality. These dimensions are Extraversion, Openness, Conscientiousness, Neuroticism, and Agreeableness. Each of these dimensions is then further divided into personality facets, e.g. extraversion vs introversion (Goldberg, L. R., 1993; John, O. P. and Srivastava, S., 1999).

Each participant in the validation study of behavioural archetypes had completed the 44-item inventory measures (44-BFI) (John, O. P. and Srivastava, S., 1999). The scores of these five Personality Traits were between 1 and 5 with 1 suggesting the weakest presentation of the given trait and 5 the strongest presentation of that trait (see

Appendix D2). A mean score for each Personality Trait was produced for each Participant. Similarly, each participant had undertaken other characteristic measures; internal validity, overall emotions, positive emotion, negative emotion and psychological states.

The Personality Trait variable and each characteristic measures variable were then plotted and analysed for correlation using Archetype's Correlation Coefficient to investigate which personality trait is more correlated with the emotional characteristics. Significantly (p-Value<.01), The emotional characteristics were highly positively correlated with each other suggestion that if one personality trait is correlated with one, it is more likely to be correlated with the others (see Table 40).

TABLE 40: ARCHETYPE'S CORRELATION COEFFICIENTS OF THE CHARACTERISTICS MEASURES WITH EACH OTHER'S.

	Internal validity	Overall emotion	Positive emotion	Negative emotion
Psychological states	0.521^{**}	0.814^{**}	0.594^{**}	0.771^{**}
Internal validity		0.512^{**}	0.488^{**}	0.402^{**}
Overall emotion			0.852^{**}	0.882^{**}
Positive emotion				0.595^{**}

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

It was only the neurotic personality trait that is strongly correlated with four of the five characteristic measures and weakly correlated with the other. All of these correlations are positive; suggesting that neuroticism increases with respective increases of psychological states, internal validity, overall emotion and positive emotions. It is also positively weakly correlated with negative emotions. All other personality traits were not correlated with any of the characteristics measures (see Table 41).

TABLE 41: ARCHETYPE'S CORRELATION COEFFICIENTS OF THE PERSONALITY TRAITS WITH THE CHARACTERISTICS MEASURES

	Psychological states	Internal validity	Overall emotion	Positive emotion	Negative emotion
Extraversion	-0.125	0.088	0.054	0.119	-0.084
Agreeableness	0.074	0.046	0.083	0.091	0.057
Conscientiousness	0.105	-0.016	0.098	0.036	0.150
Neuroticism	0.374^{*}	0.516^{**}	0.429^{**}	0.487^{**}	0.266

Openness	-0.127	0.028	-0.143	-0.168	-0.142

7.4.1 PERSONALITY TRAITS AND BEHAVIOURAL ARCHETYPE

To establish whether these Personality Traits were linked to behavioural archetypes, descriptive statistics were calculated (see Appendix D3). All behavioural archetypes showed higher mean agreeableness and openness compared to the other traits. There seemed a slight difference between the five behavioural archetypes in terms of most personality traits. The following subsections will describe each behavioural archetype based on the mean of its dependent variables and its personality traits.

7.4.1.1 SECURE BEHAVIOURAL ARCHETYPE

Secure archetype accounted for 40% of the participants within the study. Of the 18 participants identifying as Secure archetype, 13 were male and five female. Half of the participants were part of the 25-34 age-group, four were in the 35-44 age-group, and five were in the 18-24 age-group. Secure archetype had the lowest level of psychological states with a mean of 0.34 compared with 0.43 across all behavioural archetypes. The Internal Validity of Secure archetype measured 0.65, and this was broadly the same as across all archetypes (0.64). The overall emotional response for Secure archetype was 0.47 compared with 0.56 across all archetypes, and this suggesting Secure archetype was slightly less emotional than average. The positive emotional response was 0.62 compared with an average of 0.72 across all archetypes suggesting that Secure archetype was less positive towards social media than average. Secure archetype was also slightly less negative than the average archetypes with 0.36 compared with 0.41. The negative emotion for Secure archetype is 0.26 compared with 0.31 across all archetypes. Overall it seems like Secure archetype is less positively disposed towards social media than other behavioural archetypes. The average agreeableness score for Secure archetype is 3.79 compared with 3.81 across all behavioural archetypes. Secure archetype seems about average in terms of agreeableness. In terms of neuroticism, Secure archetype is less neurotic than other behavioural archetypes 2.82 compared with 2.93, and it seems it is if anything slightly more open than other behavioural archetypes-scoring 3.56 in contrast to the overall

archetypes average of 3.49. It also appears slightly more extraverted than other archetypes; scoring 3.38 compared with 3.29.

7.4.1.2 INTIMACY BEHAVIOURAL ARCHETYPE

Intimacy archetype was the second most numerous archetype within the study, with 11 of 45 participants identifying. This amounted to just under a quarter of the sample group. Eight of the 11 participants in Intimacy archetype were females and three were males. Of these 11, seven were in the 25-34 age-group, 3 in the 18-24 age-group and one participant in the 35-44 age-group. The small numbers make within Intimacy archetype comparisons across age-group difficult. The overall emotional measure for Intimacy archetype of 0.58 is just above the archetypes average of 0.56, suggesting the overall emotional response for Intimacy archetype was average. In terms of positivity, Intimacy archetype was 0.70 compared with 0.72 across all archetypes. The mean negative emotional response for Intimacy archetype was 0.37 compared with 0.41suggesting broad similarity with other archetypes. Both were reflected in the Net Positive-Negative Emotional Response of 0.33 which was 2% higher than the average for all archetypes of 0.31. Intimacy archetype had mean psychological states of 0.47 compared with 0.43-indicating broadly similar psychological states with other archetypes. The Internal Validity of Intimacy archetype was in line with other archetypes; 0.65 compared with 0.64 across all archetypes.

In terms of the Personality Traits, on the Agreeableness Trait, Intimacy archetype was 3.83 compared with 3.81, it was broadly similar to other archetypes in terms of Agreeableness. Intimacy archetype was noticeably higher on the Neuroticism Trait, scoring 3.15 compared with 2.93 for all other archetypes. In terms of Openness, Intimacy archetype measured 3.55 compared with 3.49-a mild indication of being more open than other archetypes. Intimacy archetype is of average extraversion, scoring 3.27 compared with 3.29 for all archetype.

7.4.1.3 ESCAPISM BEHAVIOURAL ARCHETYPE

Escapism archetype had the fewest participants in the sample-just 4; two males and two females. Two were in the 25-34 age-group and one each in the 18-24 and 35-44 age-groups respectively. As this sample group has the fewest participants, it will be the most

difficult archetype about which to make inferences. This should be borne in mind while discussing descriptive statistics. The overall emotional measure for Escapism archetype is 0.76 compared with a 0.56 average across all other archetypes. This suggests that Escapism archetype may be more emotional than other archetypes. The positive emotional measure for Escapism archetype is 0.89 in contrast to 0.72 for all archetype, which indicated that Escapism archetype might be more positive towards social media than other archetypes. In addition, the negative measure for Escapism archetype 3 is 0.67 compared with 0.41 suggesting Escapism archetype is more negative than other archetypes. The net positivity towards Escapism archetype was lowest for Escapism archetype; 0.23 compared with 0.31 on average for all archetype. The psychological state's score for Escapism archetype appeared markedly higher than for other archetypes; 0.68 compared to 0.43. Escapism archetype scored 3.22 v 3.29 across other archetype and seemed less extroverts than other archetypes. Escapism archetype was least agreeable (3.56 v 3.81) of the archetypes and average neuroticism (2.94 v 2.93). Escapism archetype appeared more open than other archetypes (3.65v 3.490).

7.4.1.4 NARCISSISM BEHAVIOURAL ARCHETYPE

There were 6 participants identified as Narcissism archetype, comprising one from the 18-24 age-group, three from the 25-34 age-group and two from the 35-44 age-group. Narcissism archetype had a slightly below average overall emotion score of 0.50 compared with a mean of 0.56 for all archetype. The positivity of Narcissism archetype was no different from other archetypes, which indicated by a score of 0.70 compared with 0.71. In addition, the negative measure for Narcissism archetype is 0.34 compared with 0.41 across all archetype. The deficit across both positive and negative attributes suggests that Narcissism archetype may be less emotional than another archetype. The net positivity towards Narcissism archetype was higher for 0.37 compared with 0.31 on average for all archetype. Psychological states for Narcissism archetype appeared lower than for another archetype; the mean of 0.38 was below the average for all archetype of 0.43. Narcissism archetype scored 3.21 v 3.29 across other archetypes and seemed less extroverts than other archetypes. Narcissism archetype was less agreeable (3.69 v 3.81) than other archetypes and of less neuroticism (2.77 v 2.93). It also appeared as though Narcissism archetype were less open than other archetypes (3.45v 3.49).

7.4.1.5 DISCREPANCY BEHAVIOURAL ARCHETYPE

Discrepancy archetype had just 6 participants, three from the 18-24 age-group, two from the 25-34 age-group and one participant aged between 35 and 44. Discrepancy archetype was equally balanced by gender with three males and three females. Discrepancy archetype appeared more emotional than other archetypes, scoring 0.68 compared with 0.56. Discrepancy archetype also appeared more positive towards social media, with 0.92 against 0.72 across all archetypes. However, Discrepancy archetype was also more negative than other archetypes scoring 0.51 compared with 0.41 for all archetypes. However, Discrepancy archetype was the most overall positive towards social media scoring 0.41 compared to 0.21 across all archetypes. Discrepancy archetype also scored highest on the psychological states with 0.51 against 0.43 for all archetypes. Discrepancy archetype scored lowest on the Extraversion scale with 3.15 against 3.29. Discrepancy archetype was the most agreeable with 4.11 against 3.81 and also the most neurotic scoring 3.06 v 2.93. Discrepancy archetype also appeared to be the least open of all archetypes; scoring 3.07 v 3.49 across all archetypes.

7.5 CHAPTER SUMMARY

In this chapter, descriptive analyses was conducted on the data obtained through diary studies. The results of the statistical analysis indicated that there was significant evidence that the prevalence of each behavioural archetype was not likely to be equally spread throughout the population. (Some archetypes were more likely to be chosen than others). This could be important in planning sample sizes which would provide more robust data in future research. Moreover, there was no significant evidence to suggest behavioural archetypes were unreliable over time.

8 CHAPTER EIGHT: VALIDATION OF BEHAVIOURAL ARCHETYPES UTILISATION

This chapter will shed light on the validation of usefulness and effectiveness of the five using behavioural archetypes as a design tool in the design process of software-assisted solutions to keep a healthy relationship with social media. Indeed, a case study design will be adopted to perform validation procedures and stages.

8.1 INTRODUCTION

The focus of this chapter is on user behavioural archetypes, built on the concept of user classes which are similar to personas. Behavioural archetypes are meant to extract qualitative data down into types of users. In addition, they may also include a description of the user, goal, behaviours, characteristics and feelings (Adlin, T. et al., 2006). Thus, behavioural archetypes and personas concept will be used interchangeably in this chapter.

User research has evolved over the years and has become a constant part of the development process of many design projects. User participation tends to acquire knowledge about user behaviour, needs, and contexts in order to develop a system or service that is used by people. User experiences can be obtained in several ways and will always provide useful information. User research is meant to understand user behaviours, needs, and motivations in a particular context. Understanding the users and getting more insight into their experiences is required to know their needs and objectives for the project. This leads to a deeper understanding of user requirements before starting the development process. The user's search can be obtained through different methods, such as observation or interviews. Sanders claims that the type of user experience that can be obtained from user participation relies on what the user says, does or creates (Sanders, E. B.-N., 2002).

Observing what people do in a particular system, and how they use it, provides the researcher and developer with knowledge of the user's needs. For example, when people interact with the system, the designer acquires insight into implicit and explicit experiences, including their feelings, thoughts and behaviours about the system. This thesis focuses specifically on user experience in relation to their problematic attachment

to social media. Thus, it is important to explore user requirements and needs in order to facilitate better the software design meant for behaviour change and ultimately reform their problematic attachment. However, methodologies such as participatory design, usability evaluation, and contextual design have been recognised as enhancing user experience in software design. Although these techniques focus on different stages of the software development process, designers are still unable to fully understand the user's perspective while making their own design decisions. Recently, persona, a concept proposed by Alan Cooper, has achieved importance as a design tool (Cooper, A., 1999). Persona is a fictitious user developed by design team members based on user data.

The persona works as a role model for user categories, helping designers make difficult decisions from the user's point of view during the design process. The presence of fictitious users on the design team increases the designer's insight and focus towards certain users (Sinha, R., 2003). However, having a real user in the design team, as in participatory design, introduces a range of its own limitations, including the problem of recruiting users throughout the development process. The literature presents several examples of the benefit of using the personas method in design development. For example, the persona method was promoted as a powerful tool to provide developers with a better understanding of potential users. Many papers concluded that the use of personas was successful.

However, introducing behavioural archetypes as design tools for behavioural change software have rarely been investigated in academia. Also, there has been no empirical research to validate the usefulness of them as a design tool. Thus, to address this need, the objective of this chapter was to validate the usefulness of behavioural archetypes as tools for designing/developing behavioural change software, particularly, for people with problematic online attachment. This based on qualitative methods presents a case study where the design team utilise the behavioural archetypes to validate the usefulness and effectiveness of them as a design tool by conducting focus group sessions using the Digital Diet ABC application interface to negotiate design ideas and decisions.

8.2   SOFTWARE ENGINEERING METHODS EVALUATION

A classic topic in software engineering is software method evaluation. From a review of the literature, it is apparent that software engineering tools, methods and techniques monopolise the literature, while minimal research has been done on the evaluation and validation of these methods as identified by (Arthur, J. D. et al., 1986). Software engineering investigation was classified based on (Basili, V. R. et al., 1986) as follows:

- Single-project studies, which study objects in a single team and a single project.
- Multi-project studies, which study objects in a single team and a set of projects.
- Replicated-project studies, which study objects across a set of teams and a single project.
- Blocked subject-project studies, which study objects across a set of teams and a set of projects.

This classification is widely referenced in many published software-engineering experiments or studies, helping to evaluate how these experiments or studies were undertaken and conducted. Nevertheless, Kitchenham and Pickard proposed the advancement and extension of this classification to incorporate the formality of the experimental design (Kitchenham, B. et al., 1995), as follows:

- Where the investigation considers a single project, it can be classified as a case study, since it is not possible to have a formal experiment without replication.
- Where the investigation considers many projects or a single type of replicable project, it can be classified as a case study or a formal experiment. To be labelled as a formal experiment, a suitable number of replicable subjects and objects randomised within the constraints of experimental design is required.
- If the investigation examines a wide number of teams and projects, it can be classified as a formal experiment or a survey, according to whether the team and project selection is planned or ad- hoc.

They suggest that any software-engineering experimentation can be considered as a case study, a formal experiment, or a survey.

The differences between these methods are reflected in their scale. Formal experiments are carefully controlled and usually small in scale, whereas case studies frequently look at what is happening on a typical project on a much larger scale. The small scale of

formal experiments could result in some issues as the investigator or researcher tries to increase the scale from the laboratory to a real project. Therefore, case studies are highly important for the industrial evaluation of software engineering methods and tools since they can minimise scale-up issues. By contrast, surveys try to investigate what is happening over a large number of projects on a broader scale. The selection of any of the previous methods is highly important because the design, analysis techniques and conclusions they yield differ.

Case studies cannot achieve the scientific rigour of formal experiments, but they can provide sufficient information to help investigators judge if a specific method will benefit their organisation or project. Therefore, it is often used in software engineering research.

8.3   THE RATIONALE FOR UTILISING THE CASE STUDY DESIGN

The thesis will conduct a case study to validate the effectiveness and usefulness of behavioural archetypes in the design process for software meant to change behaviour. The case study approach provides an opportunity for the design team to investigate the benefits and problems of behavioural archetypes as a design tool for behaviour change software and enables them to offer their subjective feedback. As a new method, the case study strategy helps to gain a rich understanding of the context of the design process and various aspects that could hinder or facilitate applying the method activities to the given case. The case study offers a flexible approach which does not need a strict boundary between the studied object and its environment and context. Enlightened by the previous benefits of case study design, the available resources, time and nature of research, this thesis has adopted the case study as a method to evaluate and validate the usefulness of behavioural archetypes as a design tool for behaviour change software.

8.4   CHARACTERISTICS OF PROBLEMATIC ONLINE ATTACHMENT USERS AND BEHAVIOUR CHANGE SOFTWARE

Users with problematic attachment are characterised by a denial of their online behaviour, they react when they feel their freedom to continue using social media is controlled by some measures like reminders and timers, and relapse when they try to regulate that relationship both in terms of usage style and preoccupation around it (Ann Stoddard Dare, P. and Derigne, L., 2010; Kandell, J. J., 1998; Littrell, J., 2011). Thus,

the design of social media needs to consider the differences that users may have in their characteristics on different configurations of software-based intervention to meet the social and wellbeing needs of users (Shahri, A. et al., 2016). This includes individuals with problematic behaviour in the design of interventions and ensures that such interventions provide an appropriate message to the target population. For example, such individuals may be in denial regarding the extent of their issues. They may, therefore, trivialise the seriousness of the problem, suggesting that unusually high levels of social media usage are normal. Setting standards that are too easy, so users receive high levels of positive feedback may lead to some individuals believing they are cured whilst their usage is still problematic. On the other hand, setting unrealistic goals that individuals find difficult to adhere to may lead to reductions in self-esteem and consequently increases in depression. Such conflicting requirements need to be managed carefully.

On the other hand, designing and developing software for behavioural change is a complex task, particularly for people with problematic online attachment. Thus, Software design can be used to aid people with tools that include persuasive and gamification techniques to reform their problematic attachment with social media. However, ad hoc empowering of social media design by these tools may itself result in side effects such as anxiety and stress on users, this may lead to loss of interest to engage in the behaviour change process (Drosatos, G. et al., 2018). Table 42 presents some of these challenges.

TABLE 42: INNOVATIVE DESIGN AND THEIR CONSIDERATIONS

Innovative design	Considerations
Reminder to decrease the use	Preoccupations, cravings
Push notification off	Anxiety
Reducing access	Loneliness

It is also important that design to target problematic attachment to social media does not lead to other issues. Individuals with problematic attachment to social media tend to be anxious (Choi, S.-W. et al., 2015) and may report that, e.g., checking notifications reduces their anxiety. Identifying designs of social media platforms that simultaneously facilitate improved wellbeing and reduced problematic social media usage is a challenge

to be addressed. For example, a design that provided individuals with fewer notifications, while reducing triggered checking, might increase anxiety in individuals who are used to checking social media excessively.

However, segmenting people who have experienced problematic attachment to social media into behavioural archetypes (Altuwairiqi, Majid et al., 2019a) will help a better understanding of the target audience. These behavioural archetypes can be utilised as a design tool to facilitate system analysis, design, development and implementation.

8.5 TRADITIONAL SOFTWARE DESIGN AND DEVELOPMENT

The traditional software design and development process depend on a systematic methodology for analysis, design and testing, without using a particular user model such as Agile. Actual users are important sources of design requirements and may be involved in the design process to test the usefulness and usability of the design (Weatherall, J. W., Ann, 2000). A characteristic of traditional software design methodology is that it typically limits user involvement in the design process, where the majority of design decisions are produced by designers and developers (Magnusson, L. et al., 2004). Additionally, requirement elicitation was problematic in traditional design methodologies, as it did not appear to have reached the level of individual communication needed to capture the core of user groups. Previous studies indicate that a lack of communication and understanding the end-user groups is one of the main problems of the requirements elicitation process (Helsper, E., 2009). Freeman highlighted the importance of shared understanding between users and software designers and developers towards designing and developing useful software. This is because each one is coming from different experiences, backgrounds, thoughts and behaviours.

8.6 OVERVIEW OF THE SOFTWARE HOSTED IN THE CASE STUDY

The hosted application is a personalised behaviour change program designed to help people think about how their phone is used and how it affects their life. The application has been developed with the participation of some leading thinkers in the field of digital addiction, digital behaviour change and wellness. The application focuses on managing the time when people use their digital devices. However, getting out of any negative

habits is challenging and takes time and effort. The app development team is trying to help people discover the balance between digital device and life through:

- Helping users to understand the emotional motivations of their current habits;
- Selecting a persona for each user, helping them to feel part of a community that is facing similar difficulties. The personas are Boredom Battlers, Social Sticky Mitts, Rabbit Hole Wanderer and Busy Bee;
- Setting goals for new behaviours and then tracking progress against these goals over time (see Figure 24);
- Providing tools, such as blocking notifications and screen dimming to control usage, while at the same time sending interrupts to stimulate behaviour change;
- Enabling association with friends, to promote new habits through reciprocity;
- Comparing achievement against other Digital Diet ABC users;
- Providing information and inspiration about digital balance.
- Facilitating a conversation about digital habits.
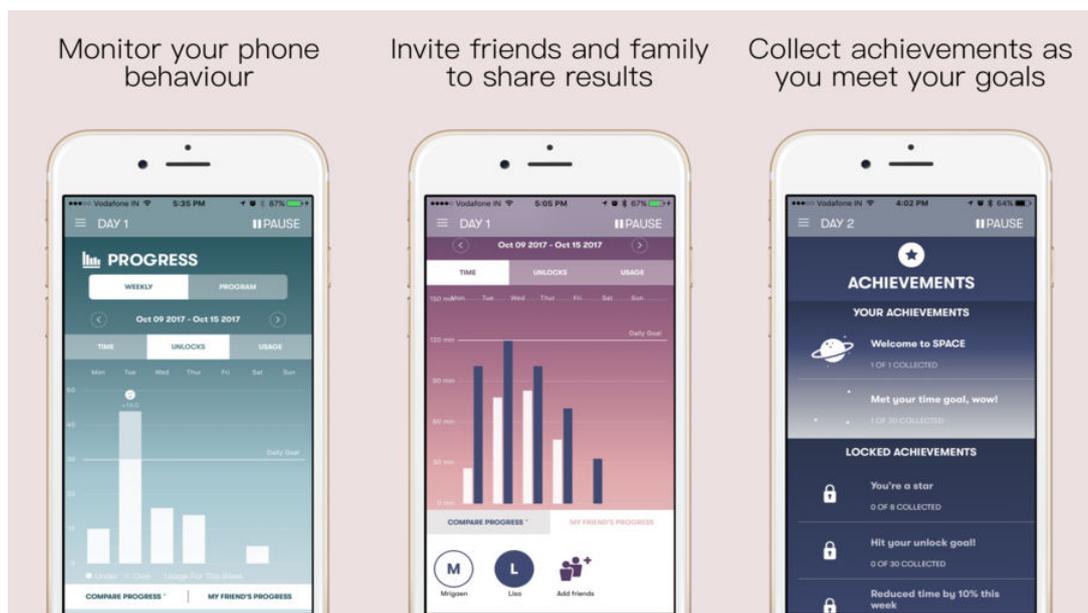
FIGURE 24: SNAPSHOT FROM DIGITAL DIET ABC APPLICATION

8.7 VALIDATION CASE STUDY: DIGITAL DIET ABC APPLICATION

The design of case studies is the same as for any other type of empirical studies, such as the designs proposed by (Kitchenham, B. A. et al., 2002). However, as this case study has a more flexible design strategy, it may result in more redundancy. For example, if

insufficient data are collected for analysis, further data collection may need to be planned. The main limitation for its flexibility is that the case study should have a specific goal from the outset.

8.7.1   STUDY AIM

The aim of this study is to validate the usefulness and effectiveness of utilising the behavioural archetypes as a design tool for behaviour change. In particular, this validation is meant to find out how behavioural archetypes are useful and effective in the way they help the design team identify and cater for users' different requirements and to develop the Digital Diet ABC app toward reforming their problematic attachment to social media. Benefits of using personas in the software design suggested by literature (Miaskiewicz, T. and Kozar, K. A., 2011), will be adopted as a baseline for this validation study. These benefits include:

1. Effective communication tools and increased engagement among the design team;
2. Increased focus on the users and their diverse contexts and needs;
3. Increased empathy for users;
4. Better design of the product;
5. Stable design;
6. Marketing and Introduction of Technology

8.7.2   DATA COLLECTION METHODS

To achieve the aim of the study, qualitative data collection instruments will be adopted, which involve interviews, focus groups, observation and survey. Each of these instruments will be elaborated in the following:

- **The interview method:** Will be used with hosted application designers to gather knowledge in relation to their app development process, known as Digital Diet ABC. Additionally, it will assess the usefulness of our behavioural archetypes as a design tool for the app development process towards people with problematic online attachment. After focus groups sessions, a follow-up interview will be conducted with Digital Diet ABC designers to discuss the development concepts proposed from the focus group sessions, and this refers to benchmarking the

usefulness and effectiveness of the five behavioural archetypes in the design process for that type of application.

- **Focus group method:** Will be conducted with the multidisciplinary design team to familiarise the design team with the five behavioural archetypes. In the meantime, the design team will utilise the five behavioural archetypes to develop the design of the Digital Diet ABC app and to make sure the data capture and validation are accurate.

- **Observation method:** Will be adopted as a data collection method in this study. Observation is a qualitative research method in academic disciplines such as anthropology, sociology, education, development studies and psychology. It provides a powerful way to capture and understand people's behaviour and attitudes towards particular goals by observing and recording their activities from a distance that does not affect their behaviour (Kothari, C. R., 2004). As this study follows the case study approach, the observation method will be beneficial in the evaluation process of the usefulness of the behavioural archetypes in the design process. It is possible to observe and think about how design team members are using the archetypes in many aspects such as where they find it useful, where they find it challenging, where they find it understandable. It also provides more freedom for both observer and design team members to study, ask and answer questions during the evaluation process. This indeed consolidates the evaluation process. There are four types of observational roles based on the distinctions made by the sociologist (Gold Raymond, L., 1958), which can be applied to any field of research.

    1. **Complete Observer**

This is a detached observer where the researcher is neither seen nor noticed by participants. It is one way of minimising the observer effect as participants are more likely to act naturally when they do not know they are being observed.

    2. **Observer as Participant**

The researcher is known and recognised by the participants and in many cases, the participants also know the research goals of the observer. There is some interaction with the participants but the interaction is limited. The researcher aims to play as neutral a role as possible.

In this study, the observer as participant allows for effective engagement with participants, e.g. asking or answering questions. Additionally, this role minimises bias by restricting the observer to a certain limit of involvement as discussed above, which offers participants more freedom in using the behavioural archetypes.

3. Participant as Observer

The researcher is fully engaged with the participants and more of a friend or colleague. There is full interaction with participants, but they still know that this is a researcher. This method is often used when studying remote native populations or inner-city cultures.

4. Complete Participant

The researcher is fully embedded, practically like a detective. The observer fully engages with the participants and partakes in their activities. Participants are not aware that they are being observed, however, or that research is being conducted, even though they fully interact with the researcher. It is often thought that the best way to understand a type of role, people, or culture is to experience it first-hand.

- **Group Administrated Questionnaire (GAQ):** Will be adopted to assess the evaluation and get more insight into the design team's experiences about using the five behavioural archetypes in the design process. GAQ is an alternative to individual interview (Yerushalmi, E. et al., 2012), each member is asked to complete the questionnaire that is meant for evaluation at the end of the second focus group session. Respondents enter their responses independently without interacting with each other. This format is convenient for the researcher and secures a high response rate. If respondents do not understand any specific question, they can ask for clarification.

The GAQ in this study contained open-ended questions and builds on the benefits of personas used which were discussed earlier in this chapter (see Table 45 above). The open-ended questions will be used to evaluate the usefulness of using the behavioural archetypes from the design team's perspective and is based on their experiences of utilising them during the session.

In addition, the aim of the validation study is to validate the usefulness and effectiveness of utilising the behavioural archetypes as a design tool in the design process for software-assisted solutions to regulate social media usage. In particular, this validation is meant to find out how behavioural archetypes are useful and effective in the way they help the design team identify and cater for users' different requirements and to develop the Digital Diet ABC app toward reforming their problematic attachment to social media. Benefits of using personas in the software design suggested by literature (Miaskiewicz, T. and Kozar, K. A., 2011), will be adopted as a baseline for this validation study and the group administrated questionnaire (GAQ) was designed based on these benefits, (see appendix E). these benefits include:

- Effective communication tools and increased engagement among the design team;
- Increased focus on the users and their diverse contexts and needs;
- Increased empathy for users;
- Better design of the product;
- Stable design;
- Marketing and Introduction of Technology

8.7.3 STUDY MATERIAL: BEHAVIOURAL ARCHETYPE TEMPLATE

This study is based on validating the usefulness and effectiveness of the five behavioural archetypes in the design process. To achieve this objective, the researcher develops five behavioural archetype templates to be used during the study.

Behavioural archetype templates are needed in order to implement them in the focus groups sessions and use them as a tool to generate design team insight. Thus, five templates for the behavioural archetypes were created.

The templates provide a visual representation of the behavioural archetypes with clear headlines and minimal text. They are brought to life by being given a real name and personality as well as a portrait avatar. The author prefers to use a portrait avatar to sustain the use of behavioural archetypes because the use of a real picture may result in a feeling of dislike or hostility toward behavioural archetypes. Additionally, the portrait avatar may fit this type of study; especially the archetypes consisting of emotions and

psychological states. Each archetype was given a descriptive name to help the team to differentiate between them and to create awareness about the target groups. Each descriptive name has been chosen carefully through a literature review to give a self-explanatory description for each archetype (see Figure 25). For all five behavioural archetypes templates (see Appendix E2).
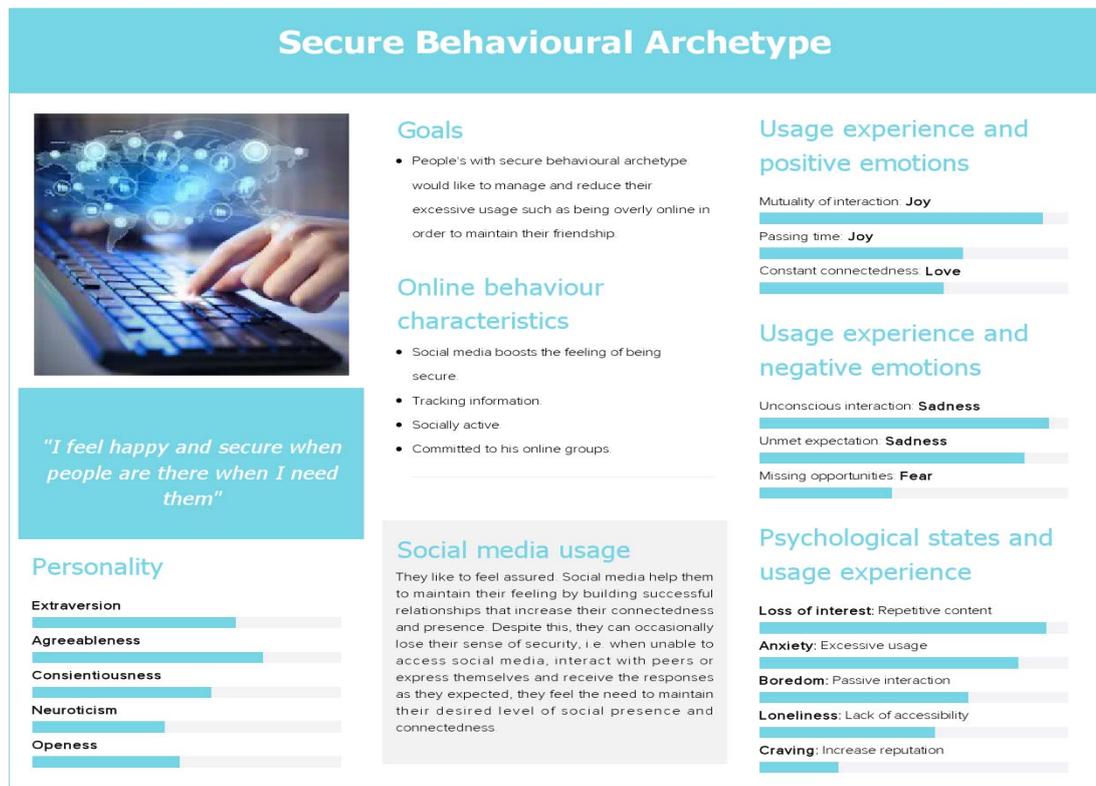
FIGURE 25: SECURE BEHAVIOURAL ARCHETYPE TEMPLATE

8.7.4 PARTICIPANT'S RECRUITMENT

The study required selection of the design team, including designers and psychologists. Convenience sample techniques based on a pre-selection questionnaire will be adopted and allocated to each member (see Appendix E3). The pre-selection questionnaire is to ensure that all participants have a similar level of experience and design background.

8.7.5 STUDY PROCEDURES

The validation process consists of the following stages: an interview with current practice, familiarisation session, utilising the behavioural archetypes, and evaluation and

follow up interview with current practice (see Figure 26). The following will explain the procedure in more detail:

For the interviews, A 90 minute semi-structured interview will be conducted with the hosted app developers via Skype. The developers will be emailed the five behavioural archetypes. A list of questions will be asked in relation to their app development process, and the usefulness of utilising the five behavioural archetypes for their app development process. For anonymity purpose, their application will be re-named to Digital Diet ABC.

For the focus group session, the researcher will conduct two focus group sessions. The first session is a familiarisation session designed to introduce the five behavioural archetypes and enable the participants to perceive them as real users. During the session, each behavioural archetype will be presented by the researcher; for each archetype, the researcher will start with the following question in order to generate a discussion: What sort of information is the behavioural archetype likely to produce about people with problematic online attachment? The familiarisation session has two objectives:

1. The team members need to view the behavioural archetypes as real users they can communicate with;
2. The team members need to understand the template of each behavioural archetype in order to identify online behaviours and usage style for each and any other characteristics that may influence the design.

At the end of the session, the participants will be split into two groups; each group will nominate one behavioural archetype and write a scenario to demonstrate how the archetype would use the social media in a problematic way. This task aims to enhance the self-awareness of the participants towards behavioural archetypes and to validate their acceptance of them as a real user. Then, the participants will be asked to upload and use the Digital Diet ABC app for one week in order to be ready for the next session.

The second session is the utilising behavioural archetype session, which is designed to validate the usefulness and effectiveness of the behavioural archetypes as a design tool. The researcher will first present to each participant a sample of the familiarisation

session findings with the scenarios created by them. The session will start by projecting the Digital Diet ABC app on the screen. Then, to warm up the team, they will critique the design of the app against the five behavioural archetypes. After that, the researcher will trigger archetype utilisation by asking "*what are the possible ideas that may help to develop and personalise the app design based on the five archetypes?*" As part of their ideation activity, the team are free to suggest any aspect of design. The participants will be able to sketch or write their ideas on the papers; each participant is expected to propose design recommendations or ideas that would help in the app development process.

In the meantime, the researcher observes how the behavioural archetypes are utilised during the session and their impact on the design team and design process. In order to evaluate the impact that behavioural archetypes may or may not have on the session, the researcher observes how the behavioural archetypes are used in terms of;

1. How much impact they have on team communication?
2. What are their impacts in terms of redesign and innovation?

At the end of the session, the participants will complete a validation GAQ to evaluate the usefulness and effectiveness of utilising the behavioural archetypes in the design process.

8.7.6 STUDY PROTOCOL

The validation study will be conducted as follow:

1. A pilot study will be conducted in order to evaluate the study design;
2. Recruiting the design team based on the pre-selection questionnaires;
3. The participants will be emailed a consent form, together with a participant information sheet verifying the purpose of the study, and the expectations of their involvement, (see Appendices E4 and E5);
4. A semi-structured interview will be conducted with Digital Diet ABC app developers. The interview aims to investigate their app development process and the usefulness of the five behavioural archetypes as a design tool for the potential development process. The interview will be started with the following questions:

- How did you design the Digital Diet ABC application?

- How did you prioritise the features such as goal setting?

- Have you involved end users to take part in the design? If yes, how?

- How did you create the personas for your app?

- What do you think about the five behavioural archetypes?

- Would they give you a better idea about the user base?

- Would the behavioural archetypes be a replacement for actual users?

- As a design team, would the use of behavioural archetypes help you to communicate?

- Do the behavioural archetypes inform the design?

5. Then, invite the multidisciplinary design team, which consists of eight participants to attend two focus group sessions. The first session is familiarisation, and the second session is brainstorming;

6. During the first session, 'familiarisation', the researcher will commence by welcoming the participants, then providing an introduction outlining the theme of the research, and the purpose of the study. Then, the behavioural archetypes will be projected on to the screen with a brief introduction and explanation for each of them. The design team will be split into two groups; each group will choose one behavioural archetype and write a scenario about it. The sessions are scheduled to run for between 60 and 90 minutes;

7. The second focus group session will be held in the week after with the same participants. Ideation and brainstorming techniques will be used to enable the team to utilise the five behavioural archetypes in the app development process. The researcher will trigger archetype utilisation by two activities as follows:

- Ideation activity in order to utilise the archetypes and come up with ideas for app development to explore the effectiveness of the five behavioural archetypes for the design process. The team will provide a list of concept ideas that can be used for the app development process;

- Brainstorming activity to elaborate more on the design ideas and to enable the participants to act in a natural style. Also, to examine the effectiveness of the five behavioural archetypes on the team interaction

through discussing with them the benefits they experienced during the session;

8. At the end of the session, GAQ will be handed to each participant to evaluate the use of behavioural archetypes as a design tool for the software designing process toward people with a problematic attachment to social media.

9. In addition, observation will be conducted at stage two (familiarisation) and stage three (utilising behavioural archetypes).

10. Follow up interview with developers of Digital Diet ABC to assess the development ideas proposed from stage three activities regarding their app development.

8.7.7   ANALYSIS

Qualitative analysis will be applied to the qualitative data collected from an interview with observation and open-ended questions through GAQ. The findings from each stage in the underneath figure will be interpreted separately due to the aim of each stage. The interview with current practice in stage one was aimed to get more insight into the Digital Diet ABC app development process and to get their impressions about the usefulness of using the five behavioural archetypes in their app development process. In stage two and stage three, the aim was to familiarise the participants with the five behavioural archetypes and the Digital Diet ABC app, to propose ideas for app development based on the archetypes and observe the effectiveness and usefulness of utilising the behavioural archetypes in the design process. In stage four, the aim was to evaluate the usefulness and effectiveness of using the five archetypes in the design process. Finally, the follow-up interview with current practice in stage five aimed to validate the design ideas with the application designers. The conclusion of the analysis will be reported with the findings of each stage in conjunction with each other in the discussion section.
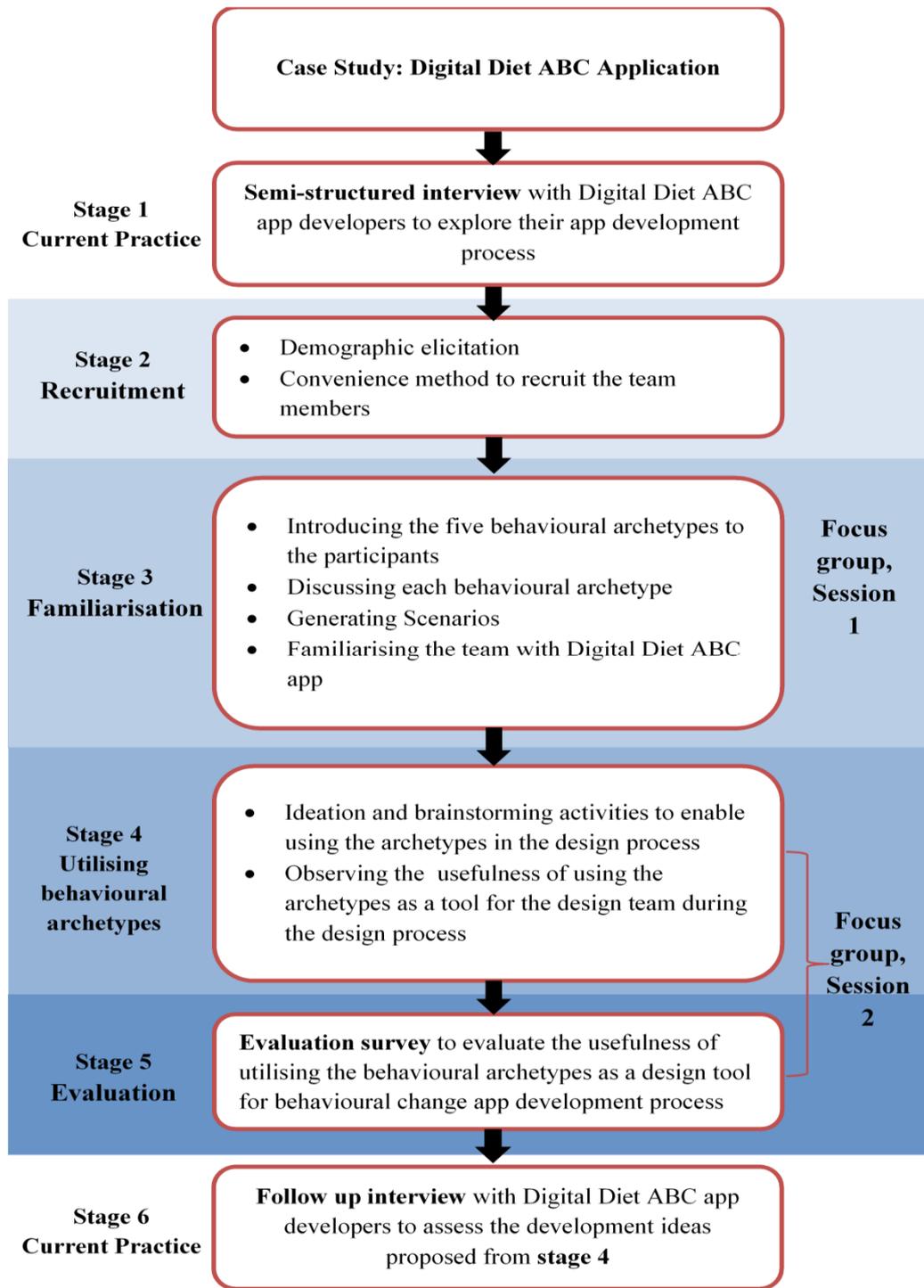
FIGURE 26: VALIDATION STAGES OVERVIEW

8.7.7.1 FINDINGS FROM STAGE ONE: CURRENT PRACTICE INTERVIEW

This section will draw a description of the key findings obtained from the interview with current practice. The interview participants were two industrial designers who

developed the Digital Diet ABC app. The session duration was 90 minute, conducted through Skype.

Overall, the participants felt that the five behavioural archetypes ~~are~~ were beneficial for their app development process and they had an overall positive impression of the tool.

- **Digital Diet ABC App Development Process**

The app developers commented that their app development process was based on two iterations, each iteration consisting of a number of methods. The first iteration relied on gathering requirements for the app development process through open source dataset such as Google Analytics. Then the designers created four personas based on a mixture of domain expertise and the data obtained from Google analytics. This process helped make the initial decision in terms of what features need to be included in the design, e.g. notifications and pop-ups. Then the design team conducted two workshops with the leading Design Company towards designing the application interface. For the second iteration, the design team developed the principles of application design based on research on the principles of behaviour change. After that, the design team adopted the Minimum Viable Product (MVP) process to build the minimum most important features that cater to the needs of the user. At the final process, the design team validate and de-prioritise the design features through Google Analytics and review their feedback to measure and generate assumption in relation to design features satisfaction and effectiveness.

8.7.7.1.1 *BENEFITS OF USING THE ARCHETYPES FROM THE PERSPECTIVE OF CURRENT PRACTICE*

Throughout the interview, the designers illustrated many benefits of using the five archetypes in their app development process as following:

1. **Comprehensive:** The personas created by the app designers to segment their app users were created based on a mixture of domain experts and the Google analytics database. The five behavioural archetypes were created based on research consisting of four phases to segment people with problematic online attachment, as explained in chapter six. The component constructs for all archetype templates include goal, behavioural characteristics, emotions,

psychological states and personality traits. The app designers have seen our archetype templates which provided to them more depth than what they had: *"these archetypes are really interesting and comprehensive as they have behavioural characteristics and feelings"*.

2. **Support App Personalisation:** The archetype templates encapsulate different information in relation to people with problematic online attachment. This information is helpful as it explains the key online behaviours and the user experiences that may trigger feelings. Thus, the design for behaviour change can be personalised to provide different types of messaging and support to different groups of people based on these archetypes. For example, the pop-up could be customised based on the archetypes.

3. **Helping to Reduce Cost and Time Elements:** The five behavioural archetypes emerged from real data collected through research in relation to people with problematic attachment to social media. Thus, the designers claim that these archetypes will lower the design cost and time, especially when the design is meant for behaviour change because these archetypes help to understand the problems existing. Therefore, they will help the designers in recognising what the problems are to be solved in the design toward people with problematic attachment to social media. Whereas, the traditional style required an effort to understand the end user behaviours and patterns of their problematic online interaction: *"If you have an unlimited budget and you have this kind of information, it would be extremely helpful to use them instead of spending money on intensive studies and recruiting people"*.

4. **Enhancing the Focus on a Specific Audience:** In fact, the five behavioural archetypes are segmenting and describing people who have a problematic attachment to social media. Therefore, these archetypes help to specify who is and who is not being designed for. For example one of the designers' commented that they are planning to develop the Digital Diet ABC app toward people who have a problematic online engagement, and these archetypes would be complete enough for them to build the app development process of it to target these groups of users.

8.7.7.2 IDENTIFYING SCENARIOS FROM ARCHETYPES TEMPLATES: FAMILIARISATION

Focus group session was conducted with a multidisciplinary team consisting of eight participants, an equal number of male and female. Half the participants were from a software engineering discipline (n=4), human-computer interaction (n=2) and psychology discipline (n=2). The session lasted 80 minutes and produced a vital discussion in which more than half of the participants participated. Each behavioural archetype was introduced and discussed toward familiarising the participants with them. The archetype templates were projected on to the screen and discussed in the following order: Secure behavioural archetype, Intimacy behavioural archetype, Escapist behavioural archetype, Narcissist behavioural archetype and Discrepancy behavioural archetype. Hard copies of behavioural archetypes were provided to the participants and they wrote notes on each archetype during the discussion (see Appendix E6)

Based on the session analysis, the observer found that the participants were more familiar with the five behavioural archetypes by the end of the discussion. The general issues raised during the discussion are listed below:

- The use of the avatar picture was leading the participants to the fact that the archetype, such as Intimacy archetype, represented only women users. The observer explained to them that there is mixed gender in each archetype and the reason behind representing each archetype with a male or female avatar was based on the majority of participants who had aligned themselves to one archetype in the confirmatory study in earlier studies, see chapter six.
- Some participants found the personality trait chart hard to draw information out of as it needs more explanation. The presence of some psychology participants during the session helped to explain the meaning of each trait dimension and the related facets.

However, the participants appreciated the use of the description name as it helped them to refer to each archetype and recall a general overview of each archetype in an easy manner. Moreover, they commented that the presentation of the data was effective and concise as the strength of emotions and psychological states being triggered by online behaviours demonstrated.

After the five behaviour archetypes were presented and discussed, the team was split into two groups, each group was asked to nominate one archetype and then write a scenario about it. The aim was to examine their understanding and to raise their self-awareness about problematic behaviours and the archetypes. Also, to examine to what extent the archetypes template is useful to generate a scenario. The groups nominate Intimacy archetype (see Figure 27) and Narcissist archetype (see Figure 28). The following is the scenarios generated by the groups.

- **Intimacy Archetype Scenario:**

Cara is a social media user who spends most of her time in online activities such as chatting with friends and families. She sees social media as a valuable tool for making and developing friendships and she feels a craving to expand her friend's list. She likes to take photographs of herself on a regular basis and uses these to update her profile picture, which may attract new friends. Cara is kind and pays attention to what is happening in the lives of others, commenting on their posts, pushing likes and offering encouragement to them. These in returns enhance her popularity, but she feels sad and regrets about the time she has spent online. Cara has high expectations of her online friends as she always expects them to interact with her in the same manner. She feels anxious when her contacts do not reply to her quickly; at the same time, she feels fearful that she may have missed an important activity. Because of these negative feelings, she would like to control her commitment to online friends and being preoccupied about her popularity.

Intimacy Behavioural Archetype

Goals
- People's with intimacy archetype would like to combat being preoccupied about their commitment to their online friends

Online behaviour characteristics
- Social media boosts the feeling of being secure and fear of missing out
- Kindness role
- Self-presentation
- Trust and positive expectation

"I am always a good listener and my friends and relatives like talking to me about their feelings and problems"

Personality
Extraversion
Agreeableness
Consientiousness
Neuroticism
Openess

Social media usage
They become closely attached to their social media and their online friends. This commitment to their friends manifests as a keen interest in their activities and (when appropriate) empathetic responses. They know what they like and refuses to engage with the material of which they disapprove. Their natural curiosity and vulnerability to the fear of missing out can lead them to become anxious if they are unable to maintain their online presence

Usage experience and positive emotions
Constant connectedness: **Love**
Mutuality of interaction: **Joy**
Passing time (source of entertainment): **Joy**
Seeking popularity: **Joy, Love**

Usage experience and negative emotions
Losing track of time: **Sadness**
Unpleasant online interaction: **Anger**
Social comparison: **Anger**
Unable to interact online: **Anger**
Missing opportunities: **Fear**

Psychological states and usage experience
Loss of interest: Repetitive content
Boredom: Loss of popularity due to inactive profile
Anxiety: Excessive usage, commitment to being highly responsive
Loneliness: Lack of accessibility
Craving: Daily routine
Depression: Downward social comparison

FIGURE 27: INTIMACY BEHAVIOURAL ARCHETYPE TEMPLATE

- **Narcissist Archetype Scenario:**

David likes to use social network sites such as Instagram to express his opinions, describe what he has been doing and tell people what he hopes to do in future. He has a good opinion of himself, is confident and posts his real photo. This is because he considers himself to be attractive and believes that people are more likely to notice his posts because of this. Whilst at work, many notifications come up on his mobile and he is not permitted to use social network sites, but the inability to engage online makes him feel anxious and angry. He wonders what his friends are doing and checks his account in a hasty manner. He has recently returned from holiday and is keen to know if people liked the photos he posted. He knows that some of his friends have had luxurious holidays recently and wants to show that his holiday was just as special and he is sure that they will be interested to know what he has been doing. Thus, these kinds of social comparison via social media make him feel anger especially when his friends did not interact as he expected. Therefore, David would like to stop being preoccupied about his image to his peers.

Narcissist Behavioural Archetype

"I shared something via Facebook and I saw that everybody liked it; that made me happy"

Personality

Extraversion
Agreeableness
Consientiousness
Neuroticism
Openess

Goals

- People's with narcissist archetype would like to stop being preoccupied about their image to peers.

Online behaviour characteristics

- Secure and fear of missing out online attachment.
- Self-presentation.
- Peer pressure.
- Irresistible urge.

Social media usage

They pay excessive attention to the thoughts and opinions of others about them on social media and they often seek approval from others. They have the confidence to use their real identity on social media and have an urge to respond as soon as possible to updates. Social media are used as a way of competing with others, but there is potential for discontent or jealousy if they feel their contacts are experiencing more enjoyment or achieving more than they are.

Usage experience and positive emotions

Sense of belonging: **Love**

Matuality of interaction: **Joy**

Seeking popularity: **Love, Joy**

Usage experience and negative emotions

Social comparisons: **Anger**

Curiosity: **Fear**

Unable to interact online: **Anger**

Unmet expectation: **Sadness**

Psychological states and usage experience

Boredom: Loss of popularity due to inactive profile

Loss of interest: Repetitive content, lack of online interaction

Loneliness: Online interaction is essential activity

Anxiety: Excessive usage, commitment to be highly responsive

Craving: Increase reputation, acuire intrinsic rewards

FIGURE 28: NARCISSIST BEHAVIOURAL ARCHETYPE TEMPLATE

As noted from the generating scenarios task, the behavioural archetype templates include goal, online behaviour characteristics, emotions, psychological states and traits. Therefore, the template content is useful and enables the designers to generate several scenarios in order to define the problem and specify the behaviour change software requirements. At the end of the session, the participants were asked to upload the Digital Diet ABC app in their phone and prepare themselves for the next session.

8.7.7.3 FINDINGS FROM STAGE FOUR: UTILISING THE BEHAVIOURAL ARCHETYPES

In this section, the author interprets the findings that emerged from analysing stage four, which was aimed to utilising the five behavioural archetypes in developing the Digital Diet ABC app. One week following the familiarisation session, the participants were familiar with the five behavioural archetypes and the Digital Diet ABC app functionality. The session started with criticising the app and the participants agreed that the app needed to be developed in order to motivate the users and therefore prompt a behaviour change. The focus of the application is to motivate those people with

problematic attachment to become more controlled with their social media usage and thus less attached. The participants recommended that interactive technology and personalisation needed to be implemented in order to motivate the users, where motivation is vital for allowing effective behaviour change (Miller, W. R. and Rollnick, S., 2012).

The participants utilised the five behavioural archetypes to evaluate the Digital Diet ABC application and performed ideation and brainstorming in order to develop the application. The participants proposed concepts ideas and recommendations for developing the application from the point of view of the behavioural archetypes. Firstly, the participants recommended implementing the five behavioural archetypes in the application instead of the generic personas there. The following points summarise these concept ideas and recommendations proposed regarding the application development.

- Empower the application with the five behavioural archetypes. It is very useful and will help to warn the users about their current usage and related consequences such as negative emotions.

- Tailor motivations, educational messages and helpful feedback to help achieve individual goals using the concept of behavioural archetypes.

- Add an alternative progress bar to show the level of improvements in conjunction with the user's goal (current archetype and ideal archetype).

- Add gamification tools to the toolkit list with emphasising the right to choose. This will help to encourage users as well as to avoid their reactance.

- Create peer groups for each behavioural archetype.

- Set collective and individual goals for each peer group.

- Replace the comparison through gender and age with more creative social comparison tools such as comparison in term of usage and progress. Comparison through gender and age could demotivate the users.

- Allow provisional support and follow up through implementing Chatbot technology.

8.7.7.4 FINDINGS FROM STAGE FIVE: EVALUATE THE BEHAVIOURAL ARCHETYPES USEFULNESS AS A DESIGN TOOL IN THE DESIGN PROCESS

The participants completed GAQ consisting of two sections, the first section related to evaluating the usefulness and effectiveness of using the five behavioural archetypes as design tools for the design process based on the sessions conducted. While the second section related to potential improvements that can be performed to the archetype templates. Thematic analysis was applied to the GAQ and the observations. In general, all participants emphasised that the five behavioural archetypes were useful and effective in the design process. The following information shows the benefits and risks of using behavioural archetype in the design process that emerged from the analysis process.

8.7.7.4.1 *BENEFITS OF BEHAVIOURAL ARCHETYPES IN THE DESIGN PROCESS*

- **Effective Communication and Increased Engagement**

Behavioural archetypes are meant to facilitate effective communication amongst the design and development team and increase their engagement in the process. Design and development team members such as psychologists, engineers and designers provide important contributions to the design process but often lack common experiences, concepts and perspectives. In reality, they lack a common ground on which to communicate. Therefore, this can lead to ambiguity and debates within a design team. The observer indicates the behavioural archetypes helped to create a concrete ground where the design team could discuss from the behavioural archetype's perspective instead of their individual perspective. Using the behavioural archetypes in the sessions has been effective to engage all team members and provide a useful communication. Most responses in the GAQ expressed that the behavioural archetypes were effective communication tools, e.g. *"to a large extent, the archetypes contributed to making effective communication amongst participants as well as to open more discussion"*.

- **Increased Focus on the Users and their Diverse Context and Needs**

Behavioural archetypes are meant to increase the focus on the users and their diverse needs and contexts. They are meant to help the design and development team in having a shared understanding of the users and to make assumptions about them explicit. Without a clear understanding of the target audience, it is difficult to predict their problematic attachment and related behaviours. The observer indicates that the

behavioural archetypes help designers understand a problem from actual context rather than their own assumptions. These behavioural archetypes have well defined behaviours, goals and feelings and can assist as a reference point for all of the designers involved in the process. Behavioural archetypes are specifically created to focus the attention on a specific target audience, i.e. people with problematic attachment to social media. Thus, the designers will ignore the behaviours and needs of every potential user. However, focusing on specific audience and their behaviours defined in each archetype, designers are likely to satisfy a large scale of users who have similar problematic attachment style. Most responses in the GAQ expressed that the behavioural archetypes were useful in removing focus from individual perspective and increasing focus on the targeted audience, e.g. *"the archetype reflects reality of online social media usage and have a link to a number of personality types and audience which validates its use in giving designers precise information and focus"*.

- **Increased Empathy for Users**

Behavioural archetypes are meant to help the design and development team to build empathy towards the users and appreciate their situations, needs and context from a caregiving point of view. The term empathy means understanding and predicting people behaviours, emotions and psychological states. The observer indicates that using behavioural archetype templates to study online behaviour characteristics, emotions, personality traits and psychological states allows the design and development team to identify and feel empathy for the audience they reflect. With these behavioural archetypes in mind, creative design ideas were proposed that fit the goals of the targeted audience. Most responses in the GAQ expressed that the behavioural archetypes were useful and effective to react to and empathise with targeted groups, e.g. *"the archetypes templates enabled the design team to closely understand the user feelings and behaviours which triggered the designers to set solutions fitting each archetype. I found these archetypes shorten the distance between designers and real users"*.

- **Better Software Product Design**

Behavioural archetypes are meant to help produce better designs with a richer set of design features and make design decisions more informed. Understanding the targeted audience can facilitate new ideas and features which in turn inform better design. For

example, in this particular case study, the observer indicates that the designers were focusing on a small sample of people who have problematic attachment to social media through the five behavioural archetypes. This helped the designers to make better decisions by focusing on the provided archetypes and referring to them to support their design ideas. Most responses in the GAQ expressed that the behavioural archetypes were useful and effective for better software design, e.g. *"using these archetypes help designers to set the right features for the right users. However, most the software products do not consider user differences in terms of behaviours and feelings"*.

- **Stable Design**

Behavioural archetypes are meant to help produce a design which is likely to be inclusive and sustainable and would require less frequent changes in users' lifestyles. The sustainable design aims to eliminate negative impacts through sensible designs, especially in the case of problematic attachment to social media. Indeed, people who have problematic online attachment are characterised by denial and reactance which may lead to negative effects on their wellbeing. Thus, it is important to understand user behaviours and needs in order to propose a sustainable design. The observer indicates that the five behavioural archetypes have been useful for the design team in terms of raising their awareness of the target audience's behaviours, feelings and goals. The design team, therefore, suggests a better design that can be tailored to the user's requirements and help them to take advantages of the Digital Diet ABC application's benefits. Most responses in the GAQ expressed that the behavioural archetypes were useful and effective in terms of promoting sustainable design, e.g. *"having the behavioural archetypes during the session helped in developing sustainable designs that worked for different users"*.

- **Marketing and Introduction of Technology**

Behavioural archetypes are also meant to inform the design and development team as to how to introduce the final product to the different user groups. Indeed, the five behavioural archetype templates provide a concise description of the behaviours, emotions, psychological states and personality traits of people with a problematic attachment to social media. This ultimately enables the design team to develop the application such as Digital Diet ABC for its target audience, which is a principal

success factor in delivering technology to the market. The observer indicates that the archetype templates have helped the design team empathise with and gain depth understanding of the Digital Diet ABC application users. Most responses in the GAQ expressed that the behavioural archetypes were a useful and effective tool to design or develop a better model which reflects the market requirements, e.g. *"having archetype templates that categorise users based on their differences such as goals, feeling and behaviours were helpful in presenting a software product that is acceptable to the end users"*.

8.7.7.4.2 *RISKS OF USING THE BEHAVIOURAL ARCHETYPE IN THE DESIGN PROCESS*

- There was insufficient information provided by behavioural archetype template that allowed designers to understand the users from the marketing or business perspective. Thus because the context of the target audience is different, e.g. *"the archetypes do not give information on how the product should be introduced from the business perspective"*.

- Using picture or avatar were distracting, the designers believed that the presented male avatar in the template, which leads them to assume that the audience for this behavioural archetype was only male or vice versa.

- Each behavioural archetype has a goal, online behavioural characteristics, negative and positive emotions, psychological states and personality traits. This information enables the designers to make assumptions about end users and they may generalise these assumptions over the people around them.

8.7.7.5 *STAGE SIX: CURRENT PRACTICE REFLECTION ON PROPOSED DESIGN CONCEPTS*

A follow-up interview was conducted with Digital Diet ABC designers. The aim was to reflect on the conceptual ideas proposed by participants during Stage four in the validation study. The designers endorsed the proposed ideas. In particular, developing their application based on the five behavioural archetypes because they will help the end user realised their problematic attachment and the related side effects. Thus, this will raise their awareness and motivate them to promote behaviour change. Moreover, they considered the importance of tailoring motivations and intervention strategies based on

individual needs. Thus, empowering their application with persuasive tools will be beneficial for assisting behaviour change, especially in the case of problematic attachment, as the user may need regular motivation to maintain progress. The interview lasted for 45 minutes and ended with the recognition of the effectiveness of conceptual ideas for their application and eventually the use of behavioural archetypes as a design tool in the design process for software-assisted solutions to regulate social media usage.

8.7.7.6 *BEHAVIOURAL ARCHETYPES USED AS A USEFUL AND EFFECTIVE DESIGN TOOL*

The validation sessions conclude that the use of behavioural archetypes have been useful and effective in the design process. This is compatible with the opinion of case study participants which consist of the Digital Diet ABC designers and the multidisciplinary team who used the five behavioural archetypes. The tool was described as effective and useful to help the design and development team understand the problem to be solved, the audience and their behaviours, especially if the application was meant to promote behaviour change and needs to be accessed to different types of users. For benchmarking, it was important to criticise the current Digital Diet ABC application from the archetypes perspective. Additionally, the usefulness and effectiveness of the five behavioural archetypes were evaluated through GAQ. Then, a follow up interview was conducted with the application designers to assess the proposed design ideas.

All the above activities resulted in the fact that the five behavioural archetypes were effective and useful design tools in the design process. Moreover, the archetypes were effective in the Digital Diet ABC application requirements specifications and potential design.

8.8 RECAP OF THE VALIDATION FINDINGS

Findings that emerged from the analysis process of GAQ as follow:

- Effective Communication and Increased Engagement
- Increased Focus on the Users and their Diverse Context and Needs
- Increased Empathy for Users
- Better Software Product Design
- Stable Design
- Marketing and Introduction of Technology

Please refer to the above section 8.8.7.4.1 for more details.

Designers workshops in stage four were meant to utilising the five behavioural archetypes in developing the Digital Diet ABC app. The participants proposed concepts ideas and recommendations for developing the application from the point of view of the behavioural archetypes. Please refer to the section 8.8.7.3 for more details which contribute to developing the Digital Diet ABC app.

8.9   CHAPTER SUMMARY

This chapter presented the case study design utilised to validate the effectiveness and usefulness of using the behavioural archetypes as tools in the design process of software-assisted solutions to keep a healthy relationship with social media. The validation process consisted of the following stages: an interview with current practice, a familiarisation session, utilising the behavioural archetypes and an evaluation and follow up interview with current practice. The study concludes that the behavioural archetype is an effective design tool in the design process of software-assisted solutions to help keep a healthy relationship with social media such as the Digital Diet ABC application. However, there are some risks that might be triggered by using the behavioural archetype as a design tool during the design process such as gender bias due to using representative pictures or avatars.

9 CHAPTER NINE: CONCLUSION CHAPTER

In this thesis, problematic attachment on social media was is defined as an over-reliance on its applications to satisfy social and personal requirements, which can eventually harm personal and social wellbeing. People rely on social media to enhance their self-esteem and maximise social capital. This reliance can be problematic and cause impaired decision making, poor impulse control and anxiety, leading to excessive social media usage. Such problematic attachment to social media could meet another type of behavioural addiction (Kuss, D. J. et al., 2013; Ross, M. W. et al., 2012). Hence, this will raise new challenges and ethical considerations in the design of behaviour change tools. Fortunately, software as a means of such problematic attachment use can be a means for promoting behaviour change and prevention strategy.

The main aim of this thesis is to explore the live experience of problematic attachment to social media presented by users in relation to the design features of social media platforms. It appears that people experience psychological states including anxiety, depression and lower wellbeing in combination with their social media usage. While we are not advocating a causal relationship between social media usage and such states, one of the possible triggers could be related to the design features. Social media was originally meant to provide social support, return a sense of connectedness among users and promote social capital and self-esteem. Some design features seem to rely on gratification through positive expectations, social recognition, feedback and rewards to persuade online interaction and increase usage.

Despite the positive outcomes of online interaction, it may also be linked to negative impacts on well-being (Huang, C., 2017). Ultimately, a design that promotes positive wellbeing can support user values, e.g. social satisfaction and system trustworthiness. The positive attachment design could play an essential role in promoting and helping healthy online interaction. For example, current social media design allows users to accept or reject friend requests and set up privacy settings which enhance trust in the system.

Users with problematic attachment are characterised by a denial of their online behaviour; resistance, when they feel their freedom to use social media, is controlled by measures like reminders and timers, and relapse when they try to regulate that

relationship both in terms of usage style and preoccupation (Littrell, J., 2011). Thus, social media design needs to consider differences between users in configurations of software-based intervention to meet the social and wellbeing needs of users (Shahri, A. et al., 2016). Also, users showing problematic attachment may yearn to increase their reputation or feel anxious when unable to interact as they wished. The thesis findings identified negative psychological states that are facilitated by social media design, suggesting that the current design adopted by social media may impact negatively on users' wellbeing in the absence of any countermeasures to help self-regulation and mindfulness. People with poorer wellbeing may be more likely to use social media to alleviate loneliness.

Software is usually designed in line with user requirements. However, in this case, user requirements regarding social connectivity may contribute to problematic attachment to social media. Changes to software design to meet care needs are therefore needed. Software design with persuasive and gamification techniques can be used to reform people's problematic attachment to social media. However, ad hoc empowering of social media design by these tools may result in user side effects such as stress; leading to loss of engagement in the behaviour change process (Drosatos, G. et al., 2018). Co-creation methods integrate user perspectives with expert opinion and scientific evidence to develop interventions (Sackett, D. L. et al., 1996). Participatory design has been used successfully to improve the dynamics and challenges of serious games for health promotion (Desmet, A. et al., 2016). Participatory design methods may, therefore, help reduce this conflict by developing platforms acceptable to users, in terms of ease of use and need satisfaction, and developers, in terms of promoting wellbeing, in line with corporate responsibility.

It is also important that designs to target problematic attachment to social media do not lead to other issues. Individuals with problematic attachment tend to be anxious and may report that, e.g., checking notifications reduces their anxiety. Identifying designs of social media platforms that both improve wellbeing and reduce problematic usage is a challenge to be addressed. For example, decreasing notifications to individuals, while reducing checking, might increase anxiety in those who excessively checked social media. Also, limiting groups to certain times, while reducing the pressure to reply to messages at all hours, might lead to increased loneliness in users who have come to rely

on the group for 24-7 support. A socio-technical approach could be needed, where human care combines with machine intelligence and software tools.

9.1 OBJECTIVES REVISITED

Objective 1: Conducting a literature review on social media addiction and related topics

The author reviewed the literature from different areas to get more insight and understanding. Subjects such as social media addiction phenomenon, behaviour change, online attachment, dependency, and withdrawal symptoms were reviewed from both psychological and software perspectives. Moreover, it served to find different types and patterns of interaction styles and attachment in social media. This includes types of people concerning their attachment style, their perceptions of problematic usage, the relations between social media design features and the requirements of the user. The literature review concluded with comprehensive understanding to inform the subsequent exploratory studies.

Objective 2: Exploring the problematic attachment to social media and the contribution of the design features in triggering it

This was achieved through conducting empirical studies to understand the various styles of online attachment and problematic engagement. In addition, these were meant to explore people's feelings and behaviour patterns associated with their problematic attachment to social media. Additionally, to explore the social media features that might facilitate problematic attachment.

The successful exploratory study that has been conducted involved activities such as a pre-selection survey. This helped in the compilation of an effective sample and establishing its demographic data. Information was collected on two focus groups and this has aided in engaging the participants with the research problem. Another activity on the exploratory study involved conducting diary studies to achieve the aim of this objective and to enhance the ecological validity of the study (see Chapter 3). This activity was carried out in fourteen days and it helped in identifying the real-time usage. The data collected from the interview and the diary studies were analysed using thematic analysis. The findings were also validated and confirmed through the card sorting in the confirmatory study. The findings reveal depth understanding in people

real-time experience in relation to problematic attachment to social media. Chapter 4 and Chapter 5 were the main findings achieved by objective 2.

Objective 3: Segmenting users with a problematic attachment to social media into behavioural archetypes

This was achieved through developing five behavioural archetypes that represented how social media users differed in their problematic attachments to them. The author conducted a four-phase qualitative study where the diary study method was considered at the initial stage, and also the refinement and confirmation stage, to enhance ecological validity. Indeed, these archetypes are meant to facilitate effective ideation, creativity, and communication during the design process. They also helped in the elicitation and customisation of the variability in the requirements and design of behaviour change tools for combatting problematic usage of social media. Chapter 6 was the main finding achieved by objective 3.

Objective 4: Validating the usefulness and effectiveness of the behavioural archetype as a design tool in the design process of a software-assisted solution to regulate social media usage

A case study was conducted to validate the usefulness and effectiveness of the user behavioural archetypes as a design tool in the design process of a software-assisted solution to regulate social media usage. In particular, this validation was meant to find out how behavioural archetypes are useful and effective in the way they helped the design team to identify and cater for users' different requirements and to develop the Digital Diet ABC app toward reforming their problematic attachment to social media. Chapter 8 was the main finding achieved by objective 4.

9.2   CONTRIBUTION TO KNOWLEDGE

This thesis contributes to the growing field of research in the area of problematic attachment to social media. It also contributes to the design of tools that assist the change of problematic behaviour through developing five behavioural archetypes that determined how social media users differ in their problematic attachments to social media. The archetypes are meant to facilitate effective ideation, creativity, and communication during the design process and help the elicitation and customisation of

the variability in the requirements and design of behaviour change tools for combatting problematic usage of social media. The following points highlight the main contributions:

- **First Contribution:** Exploring the real world experience of people who have problematic attachment to social media and understanding the phenomena in a naturalistic or close to naturalistic setting. This was achieved through utilising diary study design as a data collection method in the exploration phase, 18 participants took part in the study over a period of 14 days and for each there were three diary entries every day. In the past, the majority of the empirical literature concerning social media addiction has relied on retrospective data collection methods. This introduces limitations because of the potential for recall bias and questions regarding ecological validity.

- **Second Contribution:** An ecological exploration of psychological states associated with problematic attachment to social media. This was achieved through adopting a multi-stage qualitative research method employing diary studies designed as a primary data collection technique in the exploration phase to enhance the ecological validity of the study. The findings empower software engineers with a deep understanding of designing tools that are meant to enable self-regulated and a managed reform of problematic attachment to social media.

- **Third Contribution:** An ecological exploration of problematic attachment to social media as presented by users in relation to design features of social media platforms. This was built upon an ecological exploration through the use of diary entries for data collection. Identification of relations between design features and psychological states associated with people's online interaction were helpful as a first step in thinking that social media can be equipped with tools to help manage such a problematic attachment. As well as help users to reform their online interaction, expectations and online identity in a healthy manner.

- **Fourth Contribution:** An ecological exploration of emotional states associated with problematic attachment to social media. This was achieved through adopting a multi-stage qualitative research method employing diary studies designed as a primary data collection technique in the exploration phase to enhance the ecological validity of the study. These findings provide software

developers with insights and challenges to be considered toward building tools to enable a self-regulated and a managed reform of problematic attachment to social media.

- **Fifth Contribution:** An ecological exploration of the problematic attachment to social media presented by the users regarding the design features of social media platforms. This was based on an ecological study using a diary study for data collection. Recognising the relationships between design features and emotional states in connection with problematic online interaction has been helpful in considering that social media can be equipped with tools that can handle such problematic engagement and help users to reform their online interaction in a healthy way.

- **Sixth Contribution:** Developing a set of five behavioural archetypes to represent users with problematic attachment to social media. These archetypes will pave the way for software designers and serve as a guide for them on how behaviour change tools can help to reform the behaviour of problematic attachment to social media. These should be designed to meet individual needs. This was achieved by using a four-phase qualitative study where the diary study method was considered at the initial stage, and also the refinement and confirmation stage, to enhance ecological validity.

- **Last Contribution:** Bridging between software designers and users with problematic attachment to social media through utilising the five behavioural archetypes in the design process. This in relation to the behavioural archetype proved to be a useful and effective design tools instead of the real user designing software to promote behavioural change.

9.3   THESIS LIMITATIONS

The research utilised convenience sampling and all participants were volunteers, which may have biased the sample. It would also provide more validity if the sample size was higher. However, the initial version of the archetypes was, itself, based on a substantial qualitative study. In addition, the set is supported by previous studies, so their creation was both empirical and literature-based. The results of the study are not meant to be a generalisation of the typical patterns of problematic attachment to social media. Instead,

the author advocates their usage as a starting point for a variety of processes, such as the requirements of elicitation, personalisation, tailoring, and self-diagnosis, both for the behavioural change processes and the tools supporting these processes. The study looked at participants self-declared to have a problematic attachment to social media. This is another bias in the sample. Having people who may exhibit symptoms of problematic attachment but are in denial of it may have revealed other kinds of attachment and, hence, archetypes.

The findings covered a range of user experiences and accompanying emotional states and psychological states. This shed the light on another bias that indicates that there are still missing additional experiences and emotions due to the difficulty of the participants recognise what makes part of their problematic attachment despite their declaration of having it. However, there is a need for different research method designs to deal with such a user group, as a diary study is based on self-reporting and user cooperation. The diary study design was used to collect data three times a day and used reminders. While this process helps to minimise recall bias and increase ecological validity, there could be still a degree of imprecision, especially because some may encounter conflicting feelings during the same period of the day.

9.4   RECOMMENDATIONS FOR FUTURE WORK

The findings of this thesis have significant implications. However, more research is needed to draw more consistent conclusions about the different factors involved in designing and proposing the tools meant to manage and regulate problematic attachment to social media.

Based on the findings of this thesis data collection methods were used. Future research needs to consider using other methods and data sources perhaps based on objective measures and more in real-time. For example, smart watches and wrestle sensors could be used to collect biological, physical, behavioural or environmental data which may be correlated with actions on social media for a better understanding of the user experience and emotions. Additionally, in this thesis, the five behavioural archetypes were confirmed and validated with 51 participants. The author recommends similar studies for future work conducted with large representative samples to enable generalisation of

the findings from that sample for an entire population. Moreover, future work may investigate more into the role of gender differences in problematic attachment to social media and how this will contribute to the design of behavioural change tools.

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11 APPENDICES

APPENDIX A: EXPLORATORY STUDY

A1: Exploratory study-Pre-selection survey

Please provide a response for each of the following questions:

1- What is your age?

○ 18-24

○ 25-34

○ 35-44

○ 45 or older

○ I prefer not to answer

2- What is your gender?

○ Male   ○ Female   ○ I prefer not to answer

3- What is your marital status?

○ Single   ○ In a relationship

4- What is your current level of education?

○ High School

○ Diploma's degree

○ Bachelor's degree

○ Master's degree

○ Professional degree

○ Doctorate degree

5- What is your usage experience of social network sites?

○ Under 3 months

○ Between 3 and 6 months

○ Between 6 and 9 months

○ Between 9 and 12 months

○ More than 12 months

6- What is your motivation for using social network sites? (One or more)

☐ Keep in touch with others
☐ Rise visibility of interesting things
☐ Gather useful information
☐ Release emotional stress

☐ Keep track your friend activities

Others _____

7- Explain briefly your usage style of social network sites:
……………………………………………………………………….………………………
……………………………………………………………………….………………………

8- What time do you prefer to receive daily reminder message for diary notes? (One or more)

☐ Morning   ☐ Afternoon   ☐ Evening   ☐ Night

9- Please provide your Email address

……………………………………………………………………….………………………

10- Choose one or more from the following statements that match with your experience in the social network sites (SNS), e.g. Facebook, Twitter, etc.

☐ I use SNS to talk with others when I feel isolated

☐ I use SNS to make myself feel better when I am down

☐ I go on SNS to make myself feel better when I am anxious

☐ I have lost track of time when I am on SNS

☐ I have used SNS for longer time than I had expected to

☐ I have spent a good deal of time on SNS

☐ I have gone on SNS for longer time than I had intended

☐ I am treated better on SNS than in face-to-face relationships

☐ I feel safer relating to others on SNS rather than face-to-face

☐ I am more confident socializing on SNS than offline

☐ I am more comfortable with people on SNS than people in face to-face relationships

☐ I am treated better on SNS than offline

☐ When I am not on Facebook, I wonder what is happening on SNS

☐ I feel lost if I cannot go on SNS

☐ It is hard to stop thinking about what is waiting for me on SNS

☐ I have gotten into trouble at work or school because of being on SNS

☐ I have missed class or work because I was on SNS

☐ I feel worthless offline, but I am someone on SNS

☐ I have missed social event because of being on SNS

☐ When I am on SNS, I socialize with other people without worrying about how I look.

☐ When I am on SNS, I socialize with other people without worrying about the relationship commitment

☐ I have control over how others perceive me on SNS

☐ I am unable to reduce time on SNS

☐ I feel guilty about the amount of time I spend on SNS

☐ I have tried to stop using SNS for long periods of time

☐ I have made unsuccessful attempts to control my use of SNS

Section I: Please read the following scenarios and answer the questions for each scenario

Scenario 1

Steve is a daily user of Facebook which helped him to make a lot of friends and share his special moments with them. He has a different character completely from his real-life character in the social reality. He totally depends on his account status to expresses truthfully whether he is pleased or sad. He gains strength and support from the positive comments posted by his friends. These comments reflect well on his real character which consequently affects his work and relationships in reality. One day, the developers of Facebook made some changes in the design of the interactive page between users. One of these changes was deleting the status feature because they see that this feature should be embedded in another feature. Then Steve felt anxious and upset because he lost the feature that meant a lot to him and helped him to reflect his self-image and at the same time improve his self-confidence.

Please answer the following questions based on the scenario 1:

Q1: What are the actions that annoy the person in this scenario?

……………………………………………………………………………………………

Q2: To what extent do you think this action affect person's mood and feeling?

……………………………………………………………………………………………

Q3: What is the motivation behind the person usage of social network sites?

……………………………………………………………………………………………

Q4: Could you describe the user identity/character in this scenario?

……………………………………………………………………………………………

** If you have any information or feedback you would like to add please write it down

……………………………………………………………………………………………

Scenario 2

Some users of Facebook may like to belong to certain groups. These groups express their opinions and share the same thoughts i.e. fans of a particular football team. Sarah

was a member of one of these groups and she feels that this group gives her a sense of belonging to the social world. A group member sense of who they are based on their group membership. In order to increase their self-image, they may discriminate themselves from other groups and biased for their group. Sarah feels a sense of belonging and loyalty to the group. Sarah was a kind of person who is less active in the group. The group leader excluded Sarah because of her low interaction and engagement in the group discussion. He state that the members number in the group is limited and he decided to exclude all inactive members to give a chance to other active member to join the group. What happen made Sarah feel anxious and low self-image. It also caused psychological damage and reflected negatively on her outlook in real life.

Please answer the following questions based on the scenario 2:

Q1: What are the actions that annoy the person in this scenario?

……………………………………………………………………………………………

Q2: To what extent do you think this action affect person's mood and feeling?

……………………………………………………………………………………………

Q3: What is the motivation behind the person usage of social network sites?

……………………………………………………………………………………………

Q4: Could you describe the user identity/character in this scenario?

……………………………………………………………………………………………

** If you have any information or feedback you would like to add please write it down**

……………………………………………………………………………………………

Scenario 3

The Human Resources Department of an organisation has recently seen an increase in stress-related leave in part because of the increased number of emails and peer pressure online. Alexander is one of these cases. He often feels pressured to give responses upon receiving an urgent and highly important email. He thinks that quick responses will increase his popularity and enhance his image amongst his colleagues. He then does so in a hasty and erratic style and feels bad afterwards. He sometimes uses his SNSart phone to reply and feels unable to resist the urge to wait until he has access to a PC

when he could write a proper reply. This led Alexander to feel a sense of dependence and has made him attached to his email.

Please answer the following questions based on the scenario 3:

Q1: What are the actions that annoy the person in this scenario?

………………………………………………………………………………………………

Q2: To what extent do you think this action affect person's mood and feeling?

………………………………………………………………………………………………

Q3: What is the motivation behind the person usage of social network sites?

………………………………………………………………………………………………

Q4: Could you describe the user identity/character in this scenario?

………………………………………………….……………………………………………

** If you have any information or feedback you would like to add please write it down

………………………………………………………………………………………………

Section II: Please answer the following questions

Q1: Which of these scenarios match your usage style of social network sites?

………………………………………………………………………………………………

Q2: What do you think about your social network sites identity/character?

………………………………………………………………………………………………

Q3: What features are more important for you when you creating online account on social network site? For example, profile picture, age…etc.

………………………………………………………………………………………………

Q4: What do you think of having multiple accounts which may mean multiple identities? Do you think you will behave differently in each one?

………………………………………………………………………………………………

Q5: What would you think from the social network sites design to do if you decided to detach yourself from certain online identities/character?

………………………………………………………………………………………………

A3: Exploratory study-Diary study Questions (Example 1)

Q1) Tick one or more from the boxes based on your feelings and emotions due to your usage of the social network site from this morning:

A) Abnormal behaviour (Explain why next to your choice):

Ex: ☑ Anxiety [I felt anxious because I lost the internet connection]

☐ Anxiety   …………………………………………

☐ Loneliness   …………………………………………

☐ Loss of interest   …………………………………………

☐ Irritability   …………………………………………

☐ Boredom   …………………………………………

☐ Craving

Other [write down in the box]

………………………………………………………………………………………………

B) Emotional State (Explain why next to your choice):

☐ Love   ……………………………………………….

☐ Joy   …………………………………………….

☐ Surprise   …………………………………………….

☐ Anger   …………………………………………….

☐ Sadness   …………………………………………….

☐ Fear   …………………………………………….

Other [write down in the box]

………………………………………………………………………………………………

C) From the list, choose the most important profiling features based in your social network accounts (Explain why next to your choice):

☐ User name   ………………………………………..

☐ Profile picture …..…………………………………...

☐ Status …………………………………….

☐ Location …………………………………….

☐ Bio …………………………………...

☐ Interest …………….……………………

☐ Background ………………..…………………

☐ Privacy settings ………………………………….

☐ Number of followers or fans …………...………….

Others you can mention [write down in the box]

………………………………………………………………………………………

Q2) Which one of these social network sites you check excessively today:

☐ Facebook   ☐ Twitter

☐ SnapChat   ☐ WhatsApp

☐ Email   ☐ Instagram

☐ Skype   ☐ LinkedIn

☐ WeChat

☐ Other [write down in the box]

………………………………………………………………………………………

Q3) Write a story that can help to explain how was your usage of social network today?
Please write in details and give examples

………………………………………………………………………………………
………………………………………………………………………………………

A3: Exploratory study-Diary study Questions (Example 2)

At this moment, **you have been detached for about 6 hours**, please answer the following questions:

Q1) Do you feel excessive motivated to check your accounts? Explain what motivate your desire and Why?

…………………………………………………………………………………………

Q2) Tick one or more from the boxes based on your feelings and emotions due to your detachment from the social network sites:

A) Emotional State (Explain why next to your choice):

☐ Love   …………………………………………

☐ Joy   …………………………………..

☐ Surprise   ………………………………….

☐ Anger   ………………………………….

☐ Sadness   …………………………………..

☐ Fear   ………………………………….

Other [write down in the box]

…………………………………………………………………………………………

B) Abnormal behaviour (Explain why next to your choice):

☐ Anxiety   ………….…………………………..

☐ Loneliness   ………………………………….

☐ Loss of interest   ………………………………….

☐ Depression   …………………………………

☐ Boredom   …………………………………

☐ Craving   ………………………………….

☐ Low self-esteem …………………………………….

☐ Isolation   …………………………………….

Other [write down in the box]

……………………………………………………………………………………………

C) You may feel that you need to check or update some features on your accounts, from the list, choose the most important profiling features that you wish to check it: (Explain why next to your choice):

☐ Profile picture   ………..…………………………

☐ Status   …………………………………...

☐ Location   …………………………………

☐ Bio   …………………………………..

☐ Interest   …………………………………..

☐ Background   …………………………………..

☐ Privacy settings   ………..…………………………

☐ Number of your followers, fans or friends   ……………………………..

☐ Number of your activities e.g. posts, tweets, etc. ……………………..…………

Others you can mention [write down in the box]

……………………………………………………………………………………………

Q3) When you detach yourself from social network sites, Have you tried alternative things to avoid negative side effects? If yes, what was it and why you used it?

……………………………………………………………………………………………

Q4) Write a story that can help to explain how was your detachment from the social network sites? Please write in details and give examples including your symptoms, emotions, feelings and consequences related to your detachment?

……………………………………………………………………………………………

Note: If you have any other comments you would like to add please write it here:

……………………………………………………………………………………………

A3: Exploratory study-Diary entry (Real Example)

Participant ID: M7

Q1) Tick one or more from the boxes based on your feelings and emotions due to your usage of the social network site from this morning:

A) Abnormal behaviour (Explain why next to your choice):

Ex: ☑ Anxiety   [I felt anxious because I lost the internet connection]

☐ Anxiety   ………………………………

☑ Loneliness   [*I felt that I'm in need to talk to someone who could change my mood and aid me to forget my loneliness and escape from stressful thoughts*]

☐ Loss of interest ………………………………

☐ Irritability   ………………………………

☐ Boredom   ………………………………

☐ Craving   ………………………………

Other [write down in the box]

………………………………………………………………………………………………..

B) Emotional State (Explain why next to your choice):

☐ Interest   ………………………………

☐ Joy   ………………………………

☐ Love   ………………………………

☐ Happy   ………………………………

☐ Anger   ………………………………

☐ Hate   ………………………………

☐ Regret   ………………………………

☑ Sadness [*Sometimes when I experience difficult circumstances and all what you could do is being patient and controlling your reactions. Thus, using social media, talking with close friends are crucial to pass this situation*]

C) From the list, choose the most important profiling features based in your social network accounts (Explain why next to your choice):

☐ Your user name   ……………………………

☐ Profile picture   ……………………………

☐ Your status   ……………………………

☐ Your location   ……………………………

☐ Your Bio   ……………………………

☐ You interest   ……………………………

☐ Your background   ……………………………

☑ Your privacy settings [*It's the most significant feature to me as it allow me to control my communication with some users via blocking and being able to accept or reject friendship requests*]

Others you can mention [write down in the box]

…………………………………………………………………………………..

Q2) Which one of these social network sites you check excessively today:

☐ Facebook

☐ Twitter

☑ SnapChat

☐ WhatsApp

☐ Email

☐ Instagram

☐ Skype

☐ LinkedIn

☐ WeChat

☐ Other [write down in the box]

……………………………………………………………………………………..

Q3) Write a story that can help to explain how was your usage of social network today? Please write in details and give examples

Firstly, I used Snapchat in the early morning to see videos of some social media influencers. Then, I used Twitter to respond to an old friend messages. Here, just I want to thank social media for giving us the right to be selective who we should and shouldn't contact, in comparison with the real life where we find ourselves sometimes in force to deal with some silly people.

A4: Exploratory study- Participant's Consent Form

Study Title: Problematic Attachment to Social Media: Lived Experience and Behavioural Archetypes

Researcher Information

Majid Altuwairiqi, PhD researcher
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Bournemouth University

Supervisor Information

Dr. Raian Ali
rali@bournemouth.ac.uk
Faculty of Science & Technology
Bournemouth University

Please initial here

I have read and understood the participant information sheet for the above research project.	
I confirm that I have had the opportunity to ask questions.	
I understand that my participation is voluntary.	
I understand that I am free to withdraw up to the point where the data are processed and become anonymous, so my identity cannot be determined.	
During the tasks of the study, I am free to withdraw without giving a reason and without there being any negative consequences.	
Should I not wish to answer any particular question(s), complete a test, I am free to decline.	
I give permission for members of the research team to have access to my anonymised responses. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the outputs that result from the research.	
I understand taking part in the research may include being recorded (audio) but that these recordings will be deleted once transcribed and anonymised.	
I agree to take part in the above research project.	

Name or Initials of the Participant   Date   Signature

_____   _____   _____

Name or Initials of the Researcher   Date   Signature
    Majid Altuwairiqi
                                      _____   _____

A5: Exploratory study- Participant's Information Sheet

The title of the research project: Problematic Attachment to Social Media: Lived Experience and Behavioural Archetypes

Invitation

You are being invited to take part in this research project conducted by Majid Altuwairiqi, a postgraduate researcher, in the Department of Computing and Informatics, Faculty of Science & Technology, Bournemouth University, UK. This study is part of his PhD thesis and is supervised by Dr. Raian Ali. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

What is the purpose of the study?

The aim of this research is to understand the problematic attachment to Social Network Sites, e.g. Facebook and Twitter. This is fundamental to provide software solutions that can help dependent users to manage their online identity evolution.

Why have I been invited to take part?

You have been invited because of your background and experience in relation to problematic online behaviour. This research will involve experts in areas related to the problem space and also individuals who have problematic experience with online identity.

Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a participant agreement form. You can withdraw at any time, up to the point where the data are processed and become anonymous, so your identity cannot be determined, without it affecting any benefits that you are entitled to in any way. You do not have to give a reason. Deciding to take part or not will not adversely affect you.

What would taking part involve?

Depending on your role, you will be asked to participate in one or more of these activities:

- Interview sessions: in which the researcher will discuss with you individually about various aspects of the problem and potential solution. Your personal experience and opinion will be needed.

- Focus groups: in which the researcher will invite you and a number of individuals to discuss a topic in relation to the problem. The session could be also held as design sessions where you and other participants contribute to design templates and solution with the help of the facilitator.

- A diary study where you record your daily tasks in relation to the problematic behaviour and the suggested solutions. The diary study may take around 2 weeks and it may be followed by a brief interviews.

What is Evernote SNS art phone app and why do I need to use it?

Evernote is an app for phones and computers. It is used to allow people taking electronic notes such as voice, pictures or text and possible sharing with others. You will be asked to download the Evernote app from Apple Store or Play Store depending on the type of your phone or through the following link: https://evernote.com/download/ and keep it active for a certain period of time. You will sign up by your email account. The researcher will use the Evernote to send you questions during the day about attachment to SNS and you are expected to answer and send it back as text, picture or voice. Once this phase is finished, you may be invited to an interview about your experience with the software and messages.

Note: you might be asked for short term detach from your profile identity on social network site.

What are the possible benefits and risks of taking part?

Whilst there are no immediate benefits for those people participating in the project, it is hoped that this work will improve our understanding of withdrawal symptoms that relate to the attachment to the SNS and how we design a new technology that can help people managing their withdrawal. There are not speculated risks of taking part of this study.

Will my taking part in this study be kept confidential?

All the information that we collect about you during the course of the research will be kept strictly confidential. You will not be able to be identified in any reports or publications. All data relating to this study will be kept for 5 years on a BU password protected secure network.

Will I be recorded, and how will the recorded media be used?

Yes, if you take part in the focus group and interview stages. The recording will help the research team to capture the information that will be sought from you during the focus group and interviews. However, you will be given the right to accept or reject recording. No other use will be made of the recording without your written permission, and no one outside the research team will be allowed access to the original recordings.

The audio recordings made during this research will be deleted once transcribed and anonymised. The transcription of the focus groups and interviews will not include your name or any identifiable information. Instead, each person will be identified by their code (i.e. #id112345, #id122345, etc).

Who should I contact for further information?

If you have any questions or require more information about this project, please contact me using the following contact details:

Majid Altuwairiqi, E-mail: Maltuwairiqi@bournemouth.ac.uk

Faculty of Science and Technology, Bournemouth University, BH12 5BB

What if something goes wrong?

If you have any complaints about this project please contact Professor Tiantian Zhang, Deputy Dean for Research and Professional Practice of the Faculty of Science and Technology at Bournemouth University at the following address:

Professor Tiantian Zhang, E-mail: researchgovernance@bournemouth.ac.uk

Talbot Campus, Fern Barrow, Poole, BH12 5BB, Tel: 01202 965721

Thank you for reading this information sheet and for considering taking part in this research.

A6: Exploratory study-Example from thematic analysis

Screenshot from coding by using MAXQDA software

A	B	C	D	E	F	G	H	I
●	M7-note1111	Social Network Site	32	33	SnapChat	7	0.02	Majid
●	M7-note1111	Drive	41	42	Snapchat is my recent addiction these days, as it a mirror that reflects optimism, happeness, motivation towards working hard, being patient with life challenges by seeing daily short videos of some social media influencers	223	0.69	Majid
●	M7-note1111	Features\Presence	42	42	it sometimes forcing me to respond to others who I don't want to talk with , as a result of seeing me online	109	0.34	Majid
●	M7-note1111	Abnormal Behaviour\Loneliness	48	48	Loneliness	0	0.00	Majid
●	M7-note1111	Motivation\Self-promotion	48	49	I felt that I'm in need to talk to someone who could change my mood and aid me to forget my loneliness and escape from stressful thoughts	127	0.39	Majid
●	M7-note1111	Emotional State\Negative	61	61	Sadness	0	0.00	Majid
●	M7-note1111	Context\Personal	62	63	ometimes you experience difficult circumstances and all what you could do is being patient and controlling your reactions. Thus, using social media, talking with close friends are crucial to pass this situation	210	0.65	Majid
●	M7-note1111	Role\Conservative	72	73	its the most significant feature to me as it allow me to contoral my communication with some users via blocking and being able to accept or reject friendship requests	167	0.51	Majid
●	M7-note1111	Social Network Site	75	75	SnapChat	8	0.02	Majid
●	M7-note1111	Motivation\Habit	86	87	I used Snapchat in the early morning to see videos of some social media influencers	83	0.26	Majid
●	M7-note1111	Context\Personal	101	101	ometimes I used social media unconsciously, which means that I see some firends texting but I become in a such mood the lead me to open, read and not responding	160	0.49	Majid
●	M7-note1111	Abnormal Behaviour\Anxiety	106	106	Anxiety	7	0.02	Majid
●	M7-note1111	Technical issues	107	107	I lost internet connection when I was in the Uni where no strong signal	70	0.22	Majid
●	M7-note1111	Emotional State\Negative	116	116	Anger	6	0.02	Majid
●	M7-note1111	Motivation\Self-promotion	116	118	I was a bit stress with study pressure which made me angry then I talked with friends /family	67	0.21	Majid
●	M7-note1111	Features\Identity	122	122	Profile picture	15	0.05	Majid
●	M7-note1111	Online Identity Formation	124	124	Ptofile pic feature in WhatsApp has an important role to express my mood. Also, it replaces the removing of status which helped me to see some people situations via their pictures	180	0.55	Majid
●	M7-note1111	Online Profile Identification\Pseudonymit	124	124	Ptofile pic feature in WhatsApp has an important role to express my mood	72	0.22	Majid
●	M7-note1111	Context\Task	145	145	Today, I did not use social media extensively as I was having tasks that I aimed to finish	90	0.28	Majid

One-Case Model

Code-Subcode-Segments Model

unable to relax or jittery or felt fear sometimes, because I couldn't know what is going on there. No active in the family group in whatsapp. (Curiosity)

Enjoyment [I enjoyed using my social network this mornig because i entertained myself

Surprise [because I received annoying messages from my best friend and I did not expected that from her]

Sadness [Sometimes you experience difficult circumstances and all what you could do is being patient and controlling your reactions. Thus, using social media, talking with close friends are crucial to pass this situation

Jealousy [because I saw my friend posts and I compare it with my day, I wished If I be like him and having his life]

Joy [I enjoyed when i spen the time with my social networking , for instance, i shared a new recording video

Love [I also felt happy because my birthday is after two days and my friends in Facebook surprise me with some nice birthday comments]

I had a problem with my internet connection today. I could not look at a social account for more than a photo. Normally this makes me a little nervous

My usage of network was as usual but I noticed that once my phone switched off or the battery being low I get nervous I think only how I can charge it

fantastic because the internet connection was great and I kept constantly to my accounts which made me felt overjoyed and interested in use it

Anger [in terms of conversation to improve my speaking on the skype i couldnt speak with my friend due to internet axcess problem

Desire [I had something to discuss with a friend, so I desired to use facebook, other than this, I was not interested in checking posts, likes etc

Anger [I was a bit stress with study pressure which made me angry then I talked with friends /family]

Joy [because today I found to many interesting things in Facebook and the people upload a really beautiful pictures in Instagram and in Snapchat]

I was very busy and couldnt find enough time to check them more.so, i felt a bit strange and everythink looked a bit out of control

Anger [I was thinking that can you guys please do not send me any message today]

Joy [i was feeling depressed on account of exam which is caming soon and its the best way to avoid all these stressful levels , i spoke with my close Friend on the Skype

the internet connection in my residence was so weak so this made me feeling furious and isolated from the world

My usage of social network today was really positive because the internet connection was great and I found lots of an excellent news on social network regarding the situation in my country and I had a great chat with my family and friends as well

Negative Emotional State Positive

B1: Confirmatory study-Participant's consent form

Study Title: Problematic Attachment to Social Media: Lived Experience and Behavioural Archetypes

Researcher Information
Majid Altuwairiqi, PhD researcher
maltuwairiqi@bournemouth.ac.uk
Faculty of Science & Technology
Bournemouth University

Supervisor Information
Dr. Raian Ali
rali@bournemouth.ac.uk
Faculty of Science & Technology
Bournemouth University

Please initial here

I have read and understood the participant information sheet for the above research project.	
I confirm that I have had the opportunity to ask questions.	
I understand that my participation is voluntary.	
I understand that I am free to withdraw up to the point where the data are processed and become anonymous, so my identity cannot be determined.	
During the tasks of the study, I am free to withdraw without giving a reason and without there being any negative consequences.	
Should I not wish to answer any particular question(s), complete a test, I am free to decline.	
I give permission for members of the research team to have access to my anonymised responses. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the outputs that result from the research.	
I understand taking part in the research may include being recorded (audio) but that these recordings will be deleted once transcribed and anonymised.	
I agree to take part in the above research project.	

Name or Initials of the Participant   Date   Signature

_____   _____   _____

Name or Initials of the Researcher   Date   Signature
    Majid Altuwairiqi
                         _____   _____

The title of the research project: Problematic Attachment to Social Media: Lived Experience and Behavioural Archetypes

Invitation

You are invited to take part in this research project conducted by Majid Altuwairiqi, a postgraduate researcher in the Department of Computing and Informatics, Faculty of Science & Technology at Bournemouth University (BU). This study is part of his PhD thesis and is supervised by Dr Raian Ali. Before you decide whether or not to participate, it is important for you to understand why the research is being conducted and what it will involve. Please take the time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is unclear or if you would like more information. Take your time deciding whether or not you wish to take part.

What is the purpose of the study?

The purpose of this research is to develop an engineering method equipped with tools and mechanisms to generate a software assistant to manage the evolution of the online presence in order to minimise the side-effects of "withdrawal symptoms" that may result within the managing process.

Why have I been invited to take part?

You have been invited because of your background and experience in relation to the problematic use of social network sites. You have been invited because we think that you can comment and give feedback on the problem space of the research topic and also the possible solutions to manage online identity and its evolution and minimising the associated side-effects.

Do I have to take part?

It is up to you whether or not to take part. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a participant agreement form. Also, you may need to provide your email address to allow the researcher to contact you for any further clarifications regarding the study if necessary. You will not be identified or identifiable in the outputs that result from the research and the email address will be removed after the data are collected and transcribed so that the data will become totally anonymous. You can withdraw at any time up to the point where the data are processed and become anonymous (so that your identity cannot be determined) without it affecting any benefits that you are entitled to in any way. You do not have to give a reason for withdrawing. Deciding to take part or not will not adversely affect you.

What would taking part involve?

Depending on your role, you will be asked to participate in one or more of these activities:

- Interview sessions: in which the researcher will discuss with you individually about various aspects of the problem and potential solutions. Your personal experience and opinion will be sought.

- Focus groups: in which the researcher will invite you and a number of individuals to discuss a topic in relation to the problem. The sessions could also be held as design sessions in which you and other participants contribute to design templates and solutions with the help of the facilitator.

- A diary study in which you record your daily tasks in relation to problematic behaviour and the suggested solutions. The diary study may take around two weeks to complete and may be followed by brief interviews.

What is the Evernote smart phone app and why do I need to use it?

Evernote is an app for smart phones and computers. It is used to allow people to taking electronic notes such as voice, pictures or text and possibly share these with others. If you participate in a diary study, you may be asked to download the Evernote app from the Apple Store or Play Store depending on the type of Smart phone that you use or through the following link: https://evernote.com/download/ and keep it active for a certain period of time. You will sign up by your email account. The researcher will use Evernote to send you questions during the day about attachments to SNS and you are expected to answer in the form of text, pictures or voice. Once this phase is complete, you may be invited to an interview to find out about your experience with the software and messages.

Note: you may be asked to stop updating your profile content or from replying to your online messages on social network sites for a short period of time.

What are the possible benefits and risks of taking part?

While there are no immediate benefits for those who participate in the project, it is hoped that this work will improve our understanding of the evolution of online identity and how we design new technologies that can help people to manage their online identity evolution. There are no anticipated risks associated with taking part in this study.

Will my taking part in this study be kept confidential?

All of the information that we collect about you during the course of the research will remain strictly confidential. You will not be able to be identified in any of the reports or publications. All data relating to this study will be kept for up to five years on a BU password-protected secure network.

Will I be recorded and how will the recorded media be used?

Yes, you will be recorded if you take part in the focus group and interview stages. The recordings will help the research team to capture the information that will be sought from you during the focus group and interviews. However, you will be given the right to accept or reject being recorded. No other use will be made of the recording without your written permission and nobody outside of the research team will be allowed access to the original recordings. The audio recordings made during this research will be deleted once transcribed and anonymised. Transcription of the focus groups and interviews will not include your name or any identifiable information. Instead, each person will be identified by their code (i.e. #id112345, #id122345, etc.).

Who should I contact for further information?
If you have any questions or require more information about this project, please contact me using the following contact details:

Majid Altuwairiqi, E-mail: Maltuwairiqi@bournemouth.ac.uk

Faculty of Science and Technology, Bournemouth University, BH12 5BB
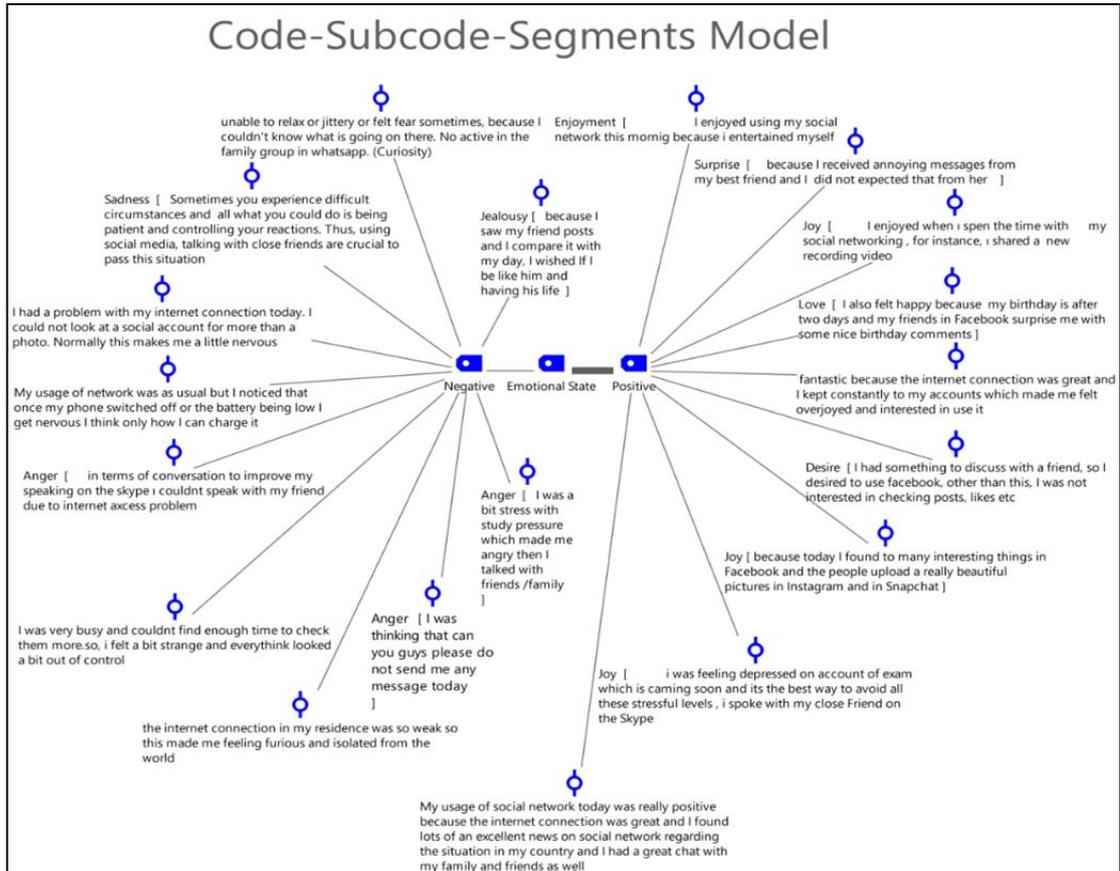
What if something goes wrong?
If you have any complaints about this project please contact Professor Tiantian Zhang, Deputy Dean for Research and Professional Practice of the Faculty of Science and Technology at Bournemouth University at the following address:

Professor Tiantian Zhang, E-mail: researchgovernance@bournemouth.ac.uk

Talbot Campus, Fern Barrow, Poole, BH12 5BB, Tel: 01202 965721

Thank you for reading this information sheet and for considering taking part in this research.

Psychological States (M)

Loss of Interest

M1

Less Friend Interaction

M1A

Lack of Availability time

M1B

Distracted interaction

M1C

Repeated Content

M1D

Craving

M2

Enhance Self Esteem

M2.1

B4: Confirmatory study-Closed card sorting example

Please write your comments in the table using the code for each themes and subthemes

(Closed-Card Sorting Comments & Notes-V70)

Theme		Theme Code	Comments
Emotions	Positive	E9A E9B E11 E13	With E11 I think that could fall under Universal Friends categories. E9A and E9B, would be either love or happy. E13 I would put with Pleasure Source and stick with satisfaction or love.
	Negative		I have no suggestions for this section.
Psychological states		M41 M3 M1A	I would maybe combine depression and anxiety, and then add Self categorization M41 and Less friend interaction M1A to M3.
SNS Features		F7	Peer pressure could also be down to popularity and social status. F1 is categorized perfectly.

Question about your experiences in closed card sorting exercise:

1. Where any of the categories difficult to understand?

I found the categories to be laid out clearly and were relevant to each theme.

2. Where any of the index difficult to group it? If so why?

No I found the index easy to group.
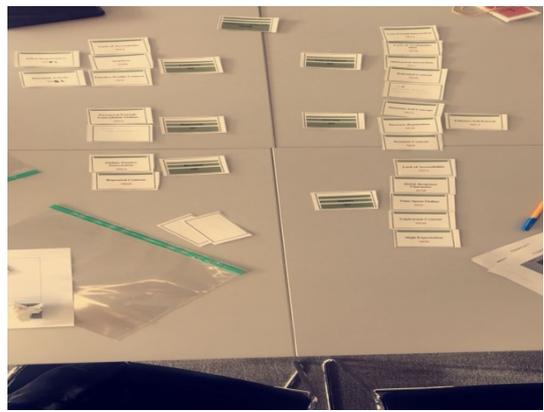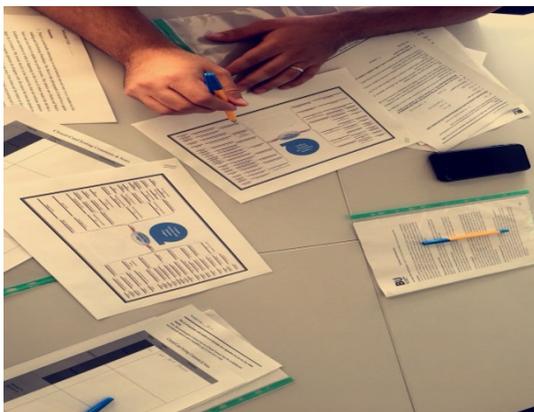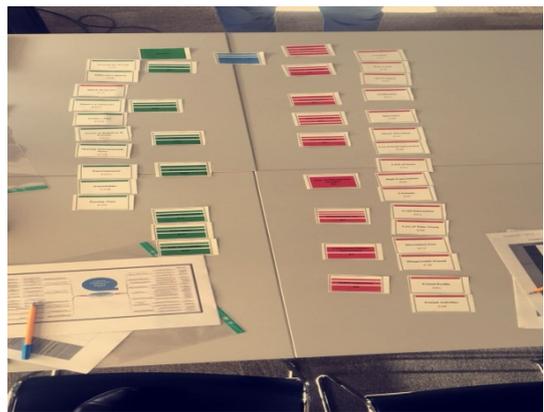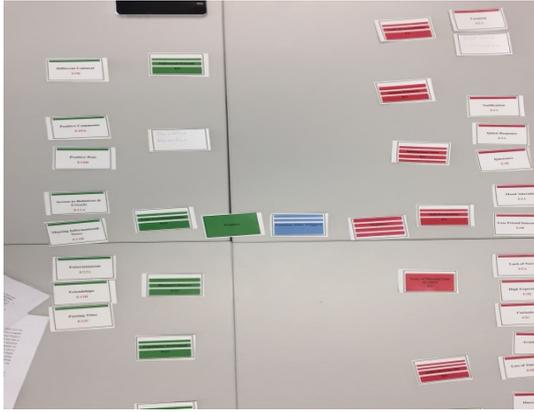
B5: Confirmatory study-Closed card analysis spreadsheet

Categories Info Which Each Team and Participant Sorted and Agreeing Each Card towards Finding

🟩 Main themes in each category   🟦 Emotions   🟩 Psychological States   🟥 Social Network Site Features

Category	Card No	Card name	Sort Team1	Sort Team2	Sort P1	Sort P2	Sort P3	Sort P4	Sort P5	Amendment
Negative Emotions	NE1	Notification	✓	✓	✓	✓	✓	✓	Connection	✓
	NE2	Unconscious interaction	✓	✓	✓	✓	✓	✓	✓	✓
	NE3	Self-Promotion	✓	✓	✓	✓	Unsuccessful selfpromotion ✓	✓	✓	Unsuccessful self-promotion
	NE4	Fear of missing out	Missing opportunities	✓	✓	✓	✓	✓	✓	Missing opportunities
	NE5	Hasty and unconsciously prolonged usage	✓	✓	✓	✓	✓	✓	✓	✓
	NE6	Unmet expectation	✓	✓	✓	✓	✓	✓	✓	✓
	NE7	Social-comparison	✓	✓	✓	✓	✓	✓	✓	✓
	NE8	Unconscious disregard								
	NE1A	Act impulsivity	✓	✓	✓	✓	✓	✓	✓	✓
	NE2A	Loss of reputation	✓	✓	✓	✓	✓	✓	✓	✓
	NE2B	Loosing time	✓	Loosing track of time	✓	✓	✓	✓	✓	Loosing track of time
	NE2C	Relapse to usual engagement style	✓	✓	✓	✓	✓	✓	✓	✓
	NE3A	Unable to interact online	✓	✓	✓	✓	✓	✓	✓	✓
	NE3B	Lack of response to self-promotion	✓	✓	✓	✓	✓	✓	✓	✓
	NE4A	Scarcity of information	✓	✓	✓	✓	✓	✓	✓	✓
	NE4B	Curiosity	✓	✓	✓	✓	✓	✓	✓	✓
	NE5A	Quick response	✓	✓	✓	✓	✓	✓	✓	✓
	NE5B	Overly online	✓	✓	✓	✓	✓	✓	✓	✓
	NE6A	Failure in meeting positive expectation	✓	✓	✓	✓	✓	✓	✓	✓
	NE7A	Negative comparisons	✓	✓	✓	X Unfavourable interaction	✓	✓	✓	Unfavourable interaction
	NE8A	Missing essential announcements	✓	✓	✓	✓	✓	✓	✓	✓
	NE8B	Ignored by others	✓	✓	✓	✓	✓	✓	✓	✓
Positive Emotions	PE1	Constant connectedness	✓	✓	✓	✓	✓	✓	✓	✓
	PE2	Interaction reciprocity	✓	✓	✓	✓	✓	✓	Interaction mutuality	Interaction mutuality
	PE3	Passing time	✓	✓	✓	✓	✓	✓	✓	✓
	PE4	Popularity increased	✓	✓	✓	✓	✓	Seeking popularity	✓	Seeking popularity
	PE1A	Sense of belonging	✓	✓	✓	✓	✓	✓	✓	✓
	PE1B	Real time accessibility	✓	✓	✓	✓	✓	✓	✓	✓
	PE2A	Positive comments	✓	Positive contribution	✓	✓	✓	✓	✓	Positive contribution

Category	Code	Description								
	PE3A	Re-establish friendships	✓	✓	✓	✓	✓	✓	✓	✓
	PE3B	Source of entertainment	✓	✓	✓	✓	✓	✓	✓	✓
	PE4A	Friends expand online	✓	✓	✓	✓	✓	✓	✓	✓
	PE4B	Divers cultural activities	✓	✓	✓	✓	✓	✓	✓	✓
Psychological States	M1	Loss of interest	✓	✓	✓	✓	✓	✓	✓	✓
	M2	Craving	✓	✓	✓	✓	✓	✓	✓	✓
	M3	Anxiety	✓	✓	✓	✓	✓	✓	✓	✓
	M4	Loneliness	✓	✓	✓	✓	✓	✓	✓	✓
	M5	Depression	✓	✓	✓	✓	✓	✓	✓	✓
	M6	Boredom	✓	✓	✓	✓	✓	✓	✓	✓
	M1A	Less friend interaction	✓	+M1E inactive profile content ✓	✓	✓	✓	✓	✓	M1A
	M1B	Lack of availability time	✓		✓	✓	✓	✓	✓	M1B
	M1C	Distracted interaction	✓		✓	✓	✓	✓	✓	M1C
	M1D	Repeated content	✓		✓	✓	✓	✓	Repetitive content	M1D
	M2A	Acquire intrinsic rewards	✓	✓	✓	✓	✓	✓	✓	✓
	M2B	Increase reputation	✓	✓	✓	✓	✓	✓	✓	✓
	M2C	Relapse to positive expectation style	✓	✓	✓	✓	✓	✓	✓	✓
	M2.1	Enhance self-esteem	✓	✓	X Daily routine	✓	✓	✓	✓	M2.1
	M3A	Constantly connected	✓	✓	✓	✓	✓	✓	✓	✓
	M3B	Unconscious quickly response	✓	✓	✓	✓	✓	✓	✓	✓
	M3C	Time spent online	✓	✓	✓	X Excessive usage	✓	✓	✓	M3C
	M3D	Displeases content	✓	✓	✓	✓	✓	✓	✓	✓
	M3E	High expectation	✓	X	Unmet expectation	✓	✓	✓	✓	✓
	M4A	Lack of accessibility	✓	✓	✓	✓	✓	✓	Connection	✓
	M4B	Social isolation	✓	✓	✓	✓	✓	✓	✓	✓
	M4C	Inactive profile content	✓	✓	✓	✓	✓	Move to M6	✓	M4C
	M41	Self-categorisation	✓	✓	✓	✓	✓	✓	✓	✓
	M42	Essential activity	✓	✓	✓	✓	✓	✓	✓	✓
	M5A	Negative social comparison	Downward social comparison	✓	✓	✓	✓	✓	Downward social comparison	M5A
	M5B	Unmet social support	✓	✓ ✓	✓	✓	✓	✓	✓	M5B
	M6A	Online passive interaction	✓	✓ +M4C	✓	✓	✓	✓	✓	M6A
Social Network Site Features	M6B	Repeated content	✓	X	✓	✓	✓	✓	✓	✓
	F1	Identity	✓	✓	✓	✓	✓	✓	✓	✓
	F2	Conversation	✓	✓	✓	✓	✓	✓	✓	✓
	F3	Reputation	✓	✓	✓	✓	✓	✓	✓	✓
	F4	Presence	✓	✓	✓	✓	✓	✓	✓	✓

		Col1	Col2	Col3	Col4	Col5	Col6	Col7	Col8
F5	Group	✓	✓	✓	✓	✓	✓	✓	✓
F6	Sharing	✓	✓	✓	✓	✓	✓	✓	✓
F7	Notifications	✓	Push notifications	✓	✓	✓	✓	✓	Push notifications
F8	Direct communications	✓	✓	✓	✓	✓	✓	✓	✓
9	Self-Presentation	Boos self-image	✓	✓	✓	✓	✓	✓	Boos self-image
10	Profile Info	X	X	✓	X	✓	✓	✓	X
11	Online popularity	✓	✓	✓	✓	✓	✓	✓	✓
12	Information sharing	✓	✓	+ Excessive	✓	✓	✓	✓	Excessive information sharing
13	Time consuming	✓	✓	✓	✓	✓	Time investment	✓	Time investment
14	Negative comparison to others ideal self	✓	Downward comparison to others	✓	✓	✓	✓	Downward comparison	Downward comparison to others
15	Unmet empathy interaction	✓	✓	✓	✓	✓	✓	✓	✓
16	Annoying distraction	✓	✓	✓	✓	✓	✓	✓	✓
17	Maintain belonging	✓	✓	✓	✓	✓	✓	✓	✓
18	Seeking acceptance from others	✓	✓	✓	✓	✓	✓	✓	✓
19	Maintain online presence	Preoccupation with online presence	✓	✓	✓	✓	✓	✓	Preoccupation with online presence
20	Lack of social support	✓	✓	✓	✓	✓	✓	✓	✓
21	Boost popularity	✓	✓	✓	✓	✓	✓	✓	✓
22	Promote quick responses	✓	✓	✓	✓	✓	✓	✓	✓
23	Self-categorisation	✓	✓	✓	✓	✓	✓	✓	✓
24	Self-Promotion	✓	✓	✓	✓	✓	✓	✓	✓
25	Peer Pressure	✓	✓	✓	✓	✓	+ Popularity	✓	+ Popularity
26	Self Enhancement	Enhance self-concept	✓	✓	✓	✓	✓	✓	Enhance self-concept

C1: Five behavioural archetypes diary notebook

Diary Notebook

Majid Altuwairiqi

Please read and understand the description of each persona and follow the persona code; i.e. **colour** based on the persona title to complete the diary **if you feel that one or more of these personas matches your online behaviour**. <u>**Please use the diary three times per day e.g. morning ▣ , afternoon 🕐 and evening/night time** 🌙</u>

Archetype Title	Archetype Description	Archetype Code
Online Archetype 1	I like to be self-assured and Social Network Sites (SNS) help me to maintain this feeling by building successful relationships that increase my connectedness and presence. Despite this, I might occasionally be subject to a loss of that perceived security in situations such as when I am unable to access SNS, interact with peers, express myself and receive responses that I perceive to be sufficient to maintain my desired level of social presence and connectedness.	
Online Archetype 2	I become closely attached to my SNS and my online friends. This commitment to my friends is demonstrated by showing a keen interest in what they are doing and being empathetic when appropriate. I know what they like and would not engage with material that I disapprove of. I can become anxious if I'm unable to maintain an online presence because I'm typically curious and vulnerable to the fear of missing out.	
Online Archetype 3	I use SNS as a means to avoid the reality of my own life. I may engage anonymously or create fictitious personalities to portray a person I would like to be. I have little desire to form real relationships offline and use SNS for the purpose of entertainment. This action could easily make my true loneliness even more pronounced.	
Online Archetype 4	I pay excessive attention to the thoughts and opinions of others on SNS. I'm also likely to seek approval from others. I'm sufficiently self-confident to use my real identity on SNS but have an urge to respond as soon as possible to new posts or information. SNSs are used as a way of competing with others but there is potential for discontent and jealousy if my contacts are having more experiencing enjoyable times or better achievements.	
Online Archetype 5	I spend a lot of time attempting to boost my self-esteem on SNS but this often causes regret that I have wasted time that I could have spent doing other things. Even when doing other activities, I'm likely to think about SNS and this can have an adverse influence on my daily life. If SNS contacts do not live up to my high expectations, I may feel persecuted and alone.	

<table>
<tr><td colspan="5" align="center">Online Archetype 1</td></tr>
<tr><td>Brief Description</td><td colspan="4">I like to be self-assured and Social Network Sites help me to maintain this feeling by building successful relationships that increase my connectedness and presence. Despite this, I might occasionally be subject to a loss of that perceived security in situations such as when I am unable to access SNS, interact with peers, express myself and receive responses that I perceive to be sufficient to maintain my desired level of social presence and connectedness.</td></tr>
<tr><td colspan="2">Archetype Characteristics</td><td colspan="3">Tick here please if this reflects you</td></tr>
<tr><td colspan="2"></td><td>🗓</td><td>🕐</td><td>🌙</td></tr>
<tr><td>1. SNS boosts the feeling of being secure</td><td colspan="1">Interacting online contributes to my feeling of safety and confidence. I feel peer support and continuous presence.</td><td></td><td></td><td></td></tr>
<tr><td>2. Committed to their online group</td><td colspan="1">I like to maintain relationships with others and tolerate situations where this may mean accepting different attitudes and interactions.</td><td></td><td></td><td></td></tr>
<tr><td>3. Socially active</td><td colspan="1">I am active on SNS e.g. posting and commenting and I like to become involved in groups and establish connections.</td><td></td><td></td><td></td></tr>
<tr><td>4. Tracking information</td><td colspan="1">I find it important and worthwhile searching for events, feeds, requests and news on SNS. I keep up to date and have a reasonable response time.</td><td></td><td></td><td></td></tr>
<tr><td>5. Identity</td><td colspan="1">In my interactions online, I feel confident to use various personally identifiable information, e.g. real or close to real name, real or close to real picture, location data, work place, email, etc.</td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Comments and other items you would like to add:</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td colspan="5">Common Situations and Emotions Examples</td></tr>
<tr><td></td><td>Situation</td><td>Example emotions</td><td>🗓</td><td>🕐</td><td>🌙</td></tr>
<tr><td rowspan="2">Situations and positive emotions that may</td><td>P1. SNS being an accessible and easy facilitator for pleasure and entertainment activities</td><td>Joy</td><td></td><td></td><td></td></tr>
<tr><td>P2. SNS being helpful to communicate with relatives, friends and share information and feel sustainable connectedness and</td><td>Happiness, joy, astonishm</td><td></td><td></td><td></td></tr>
</table>

			![calendar icon]	![clock icon]	![moon icon]
result and be triggered by these situations	presence	ent			
	P3. SNS being a medium for reciprocal interaction in messaging, posting and commenting, etc.; i.e. interactive social communication	Satisfactio n, liking, joy			

Comments and other items you would like to add:

Situations and negative **emotions** that may result or be triggered by these situations	**N1.** Using SNS more than needed	Regret, anger			
	N2. The fear of missing out on certain events, news, opportunities and timely interactions	Worry, fear, jitteriness			
	N3. Limited or no access to SNS due to issues with connectivity to the Internet or restrictions by the social context I am in	Nervous, anger, furious, unhappy			
	N4. Not receiving sufficient or timely responses and interactions from peers when looking for support and socialisation	Anger, sadness			

Comments and other items you would like to add:

Common psychological states			![calendar icon]	![clock icon]	![moon icon]
	Psychologica l state	**Situation**			
Psychologi cal states are actions or tendencies that do not allow an individual to change or cope well with certain situations	**M1.** Loneliness	Being unable to connect and interact or receive responses as desired			
	M2. Boredom	When there is nothing new on my SNS or when there is repetitive content			
	M3. Craving	When there is a pressing need to shape and maintain the online identity and self-concept			
	M4. Loss of interest	When the information content, interactions and contact are not changing and become repetitive			
	M5. Anxiety	When spending too much time on SNS or when dissatisfied with the content, interaction, etc. and being unable to do much to change it			

Comments and other items you would like to add:

Online Archetype 2				
Brief Description	I become closely attached to my SNS and my online friends. This commitment to my friends is demonstrated by showing a keen interest in what they are doing and being empathetic when appropriate. I know what they like and would not engage with material that I disapprove of. I can become anxious if I'm unable to maintain an online presence because I'm typically curious and vulnerable to the fear of missing out.			

Archetype Characteristics		**Tick here please if this reflects you**		
		⬛am	🕐	🌙
1. SNS boosts the feeling of being secure and fear of missing out	I'm comfortable when engaging online but my natural curiosity means that any interruption to my online activities could result in fear of missing out.			
2. Identity	I feel confident using my real name and details for my online profile, including a picture of myself that I update frequently.			
3. Self-presentation	I'm confident about my appearance and regularly change my profile picture in order to keep in people's minds. Because of this, I may have a tendency to compare my own life with those of others.			
4. Kindness role	I have an inner confidence and I am keen to help others by listening to their problems and doing what I can.			
5. Trust and positive expectation	I believe that I can rely on the friends that I make online and I am therefore keen to interact with them.			

Comments and other items you would like to add:

Common Situations and Emotions Examples			⬛am	🕐	🌙
	Situation	**Example emotion**			
	P1. SNS being a medium for reciprocal interaction in	Satisfaction, liking, joy			

				![am]	![clock]	![moon]
***Situations and positive emotions** that may result and be triggered by these situations*	messaging, posting and commenting, etc.; i.e. interactive social communication.					
	P2. SNS being a useful tool for communicating with friends and family.	Happiness, joy, astonishment				
	P3. I am well-liked and SNS help me to have many friends in various locations and from different backgrounds.	Happiness, enjoyment, satisfaction				
	P4. SNS being a medium for fun and entertainment.	Pleasure, joy				

Comments and other items you would like to add:

***Situations and negative emotions** that may result or be triggered by these situations*	**N1.** Unwelcome communications received online including disagreeable friends, inappropriate subject matters or comments that you disagree with.	Dislike, neglect				
	N2. Using SNS for longer than I initially intended.	Regret, anger				
	N3. I experience a continual need to know what my contacts are doing and this can result in fear of missing out.	Worry, fear, jitteriness				
	N4. SNS allow me to compare my own life with those of my contacts.	Jealousy, unhappiness				
	N5. Limited or no accessibility to SNS due to issues with connectivity to the Internet or restrictions by the social context I'm in.	Nervousness, anger, furious, unhappiness				

Comments and other items you would like to add:

Common psychological states			![am]	![clock]	![moon]
	psychological state	**Situation**			
	M1. Loneliness	Over time, I come to rely on SNS in my daily life and any inability to communicate will leave me feeling excluded.			
	M2. Boredom	Results when the content of SNS has already been read,			

		there is no new content or the same content keeps being posted.			
Psychological states are actions or tendencies that do not allow an individual to change or cope well with certain situations	**M3.** Craving	When there is a pressuring need to shape and maintain the online identity and self-concept.			
	M4. Loss of interest	When the information content, interactions and contact are not changing and becoming repetitive.			
	M5. Anxiety	Could result from spending too much time on SNS, being unable to access SNS, or if the content of SNS is not interesting. I may also feel anxious because I believe my contacts expect a quick response to their posts or online activity.			
	M6. Depression	Could happen when my close friends are unavailable online for a long time or terminate their profiles.			
Comments and other items you would like to add:					

Online Archetype 3					
Brief Description	I use SNS as a means to avoid the reality of my own life. I may engage anonymously or create fictitious personalities to portray a person I would like to be. I have little desire to form real relationships offline and use SNS for the purpose of entertainment. This action could easily make my true loneliness even more pronounced.				
Archetype Characteristics			**Tick here please if this reflects you**		
			⏺ am	🕐	🌙
Identity	In my interaction online, I prefer to remain anonymous.				
Avoidant online attachment style	Unwilling to form close friendships online and this may reflect an underlying lack of trust in those I engage with.				
Self-enhancement	SNS offer a form of escapism from my real life, allowing me to create imaginary personas that reinforce my self-image.				
Procrastination	When I delay and postpone responding to my online friends				
Self-discrepancy	Unhappiness with my real-life situation causes me to make imaginary claims about myself when online; e.g. giving a false age or making out that I'm happier than I really am.				
Comments and other items you would like to add:					

Common Situations and Emotions Examples			⏺ am	🕐	🌙
	Situation	**Example emotion**			
Situations and positive emotions that may result and be triggered by these situations	**P1.** SNS being helpful to communicate with relatives, friends and share information	Happiness, joy, astonishment			
	P2. SNS being a medium for pleasure and entertainment activities	Joy			
Comments and other items you would like to add:					
Situations and	**N1.** When the information content, interaction and content of the SNS may not suit my mood.	Anger			

	N2. I unconsciously spend longer online than I intended to and may try to avoid communicating with others.	Regret, anger, sadness			
negative **emotions** that may result or be triggered by these situations	N3. Limited or no access to SNS due to issues with connectivity to the Internet or restrictions due to the social context I'm in.	Nervous, anger, furious, unhappy			
	N4. The fear of missing out on certain events, news, opportunities and timely interactions	Worry, fear, jitteriness			

Comments and other items you would like to add:

Common psychological states			am	⏰	🌙
	psychological state	**Situation**			
Psychological states are actions or tendencies that do not allow an individual to change or cope well with certain situations	**M1.** Loneliness	SNS form a key part of my social interaction and if I'm unable to engage I may feel excluded.			
	M2. Boredom	Results when the content of SNS has already been read, there is no new content or the same content keeps being posted.			
	M3. Loss of interest	This arises when the same content is repeatedly posted on SNS.			
	M4. Anxiety	When I spend too much time on SNS or when I face difficulty accessing my profile.			

Comments and other items you would like to add:

Online Archetype 4				
Brief Description	I pay excessive attention to the thoughts and opinions of others on SNS. I'm also likely to seek approval from others. I'm sufficiently self-confident to use my real identity on SNS but have an urge to respond as soon as possible to new posts or information. SNSs are used as a way of competing with others but there is potential for discontent and jealousy if my contacts are having more experiencing enjoyable times or better achievements.			
Archetype Characteristics		**Tick here please if this reflects you**		
		🔆	🕐	🌙
1. Identity	In my interactions online, I'm sufficiently confident to use one or more aspects of my personally identifiable information, e.g. real name, real picture, location data, work place, email, etc.			
2. Irresistible urge	I struggle to use SNS and I have an urge to respond to new posts and conversations and exchange information and content as soon as possible.			
3. Secure & fear of missing out online attachment	Engaging with others via SNS makes me feel secure and confident. If I cannot access SNS, I may become uneasy and experience fear of missing out.			
4. Self-presentation	I have a good impression of myself and use SNS as a way of showing off my good qualities, whether that is my physical appearance, personality or achievements. This is demonstrated by continually updating my profile content in order to attract the attention of others. This also leaves me vulnerable to comparisons with others that I may difficult to avoid.			
5. Peer pressure	I'm keen to impress my contacts and this can result in competitive pressures. There is a desire to be the centre of attention and this requires effort to maintain.			
Comments and other items you would like to add:				
Common Situations and Emotions Examples		🔆	🕐	🌙
	Situation	**Example emotion**		
	P1. SNS being a medium for reciprocal interaction in	Satisfaction, liking,		

			☐ am	⏱	☾
Situations and positive emotions that may result and be triggered by these situations	messaging, posting and commenting, etc.; i.e. interactive social communication.	joy			
	P2. I'm well-liked and SNS help me to have many friends of various cultures and in different countries.	Enjoyment, satisfaction			
	P3. SNS is helpful to communicate with relatives and friends, to share information and feel sustainable connectedness and presence.	Happiness, joy, astonishment			
Comments and other items you would like to add:					
Situations and negative emotions that may result or be triggered by these situations	**N1.** Curiosity about what my contacts are doing causes a fear of missing out if I'm unable to access SNS.	Worry, fear, jitteriness			
	N2. SNS is a medium that motivates me to compare my own life with those of my contacts and this is often measured in terms of the activities I engage in.	Jealousy, unhappiness			
	N3. When undesirable SNS content and comments are posted by contacts that are considered to be disagreeable.	Dislike, neglect			
	N4. Limited or no access to SNS due to issues with connectivity to the Internet or restrictions due to the social context I'm in.	Nervous, anger, furious, unhappy			
Comments and other items you would like to add:					

Common psychological state			☐ am	⏱	☾
	psychological state	**Situation**			
Psychological states are actions or	**M1.** Loneliness	SNS being a key part of my social life and my form groups relate to my personal likes.			
	M2. Boredom	When there is nothing new on my SNS and the content is repetitive.			
	M3.	When there is a pressing need			

tendencies that do not allow an individual to change or cope well with certain situations	Craving	to shape and maintain my online identity and self-concept.			
	M4. Loss of interest	When SNS contacts have not added any new content or when I have a lack of time to access SNS.			
	M5. Anxiety	I may be experiencing difficulties accessing my profile or be unhappy with the SNS content. Anxiety may also result from an expectation that I must respond quickly to the online interactions of others.			
Comments and other items you would like to add:					

Online Archetype 5					
Brief Description	I spend a lot of time attempting to boost my self-esteem on SNS but this often causes regret that I have wasted time that I could have spent doing other things. Even when doing other activities, I'm likely to think about SNS and this can have an adverse influence on my daily life. If SNS contacts do not live up to my high expectations, I may feel persecuted and alone.				

Archetype Characteristics		**Tick here please if this reflects you**			
		🔲 am	🕐	🌙	
1. Identity	In my online interactions, I use one or more pieces of personally identifiable information, e.g. real name, real picture, location data, work place, email, etc.				
2. Avoidant online attachment style	Unwilling to form close bonds with those I engage with on SNS and I find it difficult to trust the people I meet online.				
3. Disturbance and lost concentration	Handling numerous interactions online at the same time will cause me to lose concentration. Therefore, I prefer to handle one situation at a time.				
4. Categorise themselves	I believe I'm special and weigh up my own situation against those of my contacts by comparing profiles and what I have been doing in my life.				
5. Different from reality	I behave in a way that is very different to how I behave in the real world.				
Comments and other items you would like to add:					

Common Situations and Emotions Examples		🔲 am	🕐	🌙	
	Situation	**Example emotion**			
Situations and positive emotions that may result and be triggered by these situations	**P1.** SNS is helpful to communicate with relatives, friends and share information and feel a sustained connectedness and presence	Happiness, joy			
	P2. SNS is an accessible and easy facilitator for pleasure and entertainment activities	Joy			
Comments and other items you would like to add:					

			am	🕐	🌙
Situations and negative emotions that may result or be triggered by these situations	**N1.** Not receiving sufficient or timely responses and interactions from peers as desired	Sadness			
	N2. The fear of missing out on certain events, news, opportunities or timely interactions	Worry, fear, nervous			
	N3. Frequently engage online in a state of apparent unconsciousness	Regret, anger			

Comments and other items you would like to add:

Common psychological states			am	🕐	🌙
	psychological states	**Situation**			
Psychological states are actions or tendencies that do not allow an individual to change or cope well with certain situations	**M1.** Loneliness	I categorise myself which makes me feel isolated from others or because my contacts have not been active online.			
	M2. Boredom	When there is nothing new on my SNS or when the content is repetitive.			
	M3. Loss of interest	When I disapprove of others' information content and interactions or it does not change or becomes repetitive.			
	M4. Anxiety	If I spend longer on SNS than I initially intended or I am unable to check my own profile for some reason.			

Comments and other items you would like to add:

Online Archetype ……….		
Brief Description		
Archetype Characteristics		
Common Situations and Emotions Examples		
	Situation	**Example emotion**
Situations and positive emotions that may result and be triggered by these situations		
Situations and negative emotions that may result or be triggered by these situations		
Common psychological states		
	psychological states	**Situation**
Psychological states are actions or tendencies that do not allow an individual to change or cope well with certain situations	Loneliness	
	Boredom	
	Craving	
	Loss of interest	
	Anxiety	

D1: Descriptive Statistics for Dependent Variables

			Statistic	Std. Error
PERCENTFELT	Mean		.5418	.02924
	95% Confidence Interval for Mean	Lower Bound	.4829	
		Upper Bound	.6008	
	Median		.5433	
	Variance		.038	
	Std. Deviation		.19612	
	Minimum		.16	
	Maximum		.95	
	Range		.79	
	Interquartile Range		.27	
	Skewness		.153	.354
	Kurtosis		-.377	.695
PIVPERC	Mean		.6433	.03060
	95% Confidence Interval for Mean	Lower Bound	.5816	
		Upper Bound	.7049	
	Median		.6400	
	Variance		.042	
	Std. Deviation		.20529	
	Minimum		.19	
	Maximum		1.00	
	Range		.81	
	Interquartile Range		.31	
	Skewness		-.194	.354
	Kurtosis		-.537	.695
PPOSPERC	Mean		.7163	.03859
	95% Confidence Interval for Mean	Lower Bound	.6385	
		Upper Bound	.7941	
	Median		.7111	
	Variance		.067	
	Std. Deviation		.25888	
	Minimum		.18	
	Maximum		1.00	
	Range		.82	
	Interquartile Range		.51	
	Skewness		-.405	.354
	Kurtosis		-1.120	.695
PNEGPERC	Mean		.4060	.03349
	95% Confidence Interval for Mean	Lower Bound	.3386	
		Upper Bound	.4735	

	Median		.3500	
	Variance		.050	
	Std. Deviation		.22467	
	Minimum		.03	
	Maximum		1.00	
	Range		.97	
	Interquartile Range		.30	
	Skewness		.732	.354
	Kurtosis		.524	.695
PMALPERC	Mean		.4282	.03536
	95% Confidence Interval for Mean	Lower Bound	.3570	
		Upper Bound	.4995	
	Median		.3333	
	Variance		.056	
	Std. Deviation		.23721	
	Minimum		.07	
	Maximum		1.00	
	Range		.93	
	Interquartile Range		.30	
	Skewness		.665	.354
	Kurtosis		-.234	.695
NETP_NPERC	Mean		.3102	.03274
	95% Confidence Interval for Mean	Lower Bound	.2443	
		Upper Bound	.3762	
	Median		.3333	
	Variance		.048	
	Std. Deviation		.21961	
	Minimum		-.06	
	Maximum		.75	
	Range		.81	
	Interquartile Range		.34	
	Skewness		.074	.354
	Kurtosis		-.694	.695

D2: 44-Big Five Inventory (BFI)

Here are in the next page a number of characteristics that may or may not apply to you. Please circle the number from 1 to 5 next to each statement to indicate the extent to which you agree or disagree with that statement.

	Rate
Strongly disagree	1
Disagree a little	2
Neither agree nor disagree	3
Agree a little	4
Strongly agree	5
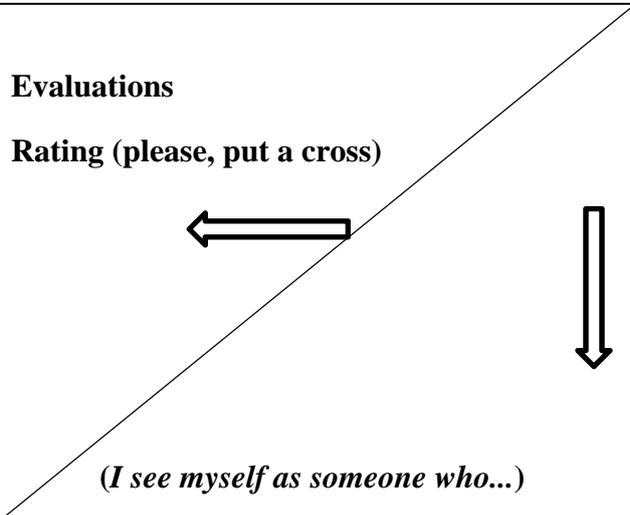
Strongly disagree	Disagree a little	Neither agree nor disagree	Agree a little	Strongly agree	Evaluations Rating (please, put a cross) (*I see myself as someone who...*)
1	2	3	4	5	1. Is talkative
1	2	3	4	5	2. Tends to find fault with others
1	2	3	4	5	3. Does a thorough job
1	2	3	4	5	4. Is depressed, blue
1	2	3	4	5	5. Is original, comes up with new ideas
1	2	3	4	5	6. Is reserved
1	2	3	4	5	7. Is helpful and unselfish with others
1	2	3	4	5	8. Can be somewhat careless
1	2	3	4	5	9. Is relaxed, handles stress well

1	2	3	4	5	10. Is curious about many different things
1	2	3	4	5	11. Is full of energy
1	2	3	4	5	12. Starts quarrels with others
1	2	3	4	5	13. Is a reliable worker
1	2	3	4	5	14. Can be tense
1	2	3	4	5	15. Is ingenious, a deep thinker
1	2	3	4	5	16. Generates a lot of enthusiasm
1	2	3	4	5	17. Has a forgiving nature
1	2	3	4	5	18. Tends to be disorganized
1	2	3	4	5	19. Worries a lot
1	2	3	4	5	20. Has an active imagination
1	2	3	4	5	21. Tends to be quiet
1	2	3	4	5	22. Is generally trusting

Strongly disagree	Disagree a little	Neither agree nor disagree	Agree a little	Strongly agree	**Evaluations** **Rating (please, put a cross)** (*I see myself as someone who...*)
1	2	3	4	5	23. Tends to be lazy
1	2	3	4	5	24. Is emotionally stable, not easily upset
1	2	3	4	5	25. Is inventive
1	2	3	4	5	26. Has an assertive personality

1	2	3	4	5	27. Can be cold and aloof
1	2	3	4	5	28. Perseveres until the task is finished
1	2	3	4	5	29. Can be moody
1	2	3	4	5	30. Values artistic, aesthetic experiences
1	2	3	4	5	31. Is sometimes shy, inhibited
1	2	3	4	5	32. Is considerate and kind to almost everyone
1	2	3	4	5	33. Does things efficiently
1	2	3	4	5	34. Remains calm in tense situations
1	2	3	4	5	35. Prefers work that is routine
1	2	3	4	5	36. Is outgoing, sociable
1	2	3	4	5	37. Is sometimes rude to others
1	2	3	4	5	38. Makes plans and follows through with them
1	2	3	4	5	39. Gets nervous easily
1	2	3	4	5	40. Likes to reflect, play with ideas
1	2	3	4	5	41. Has few artistic interests
1	2	3	4	5	42. Likes to cooperate with others
1	2	3	4	5	43. Is easily distracted
1	2	3	4	5	44. Is sophisticated in art, music, or literature

Source: John, Oliver P., and Sanjay Srivastava. "The Big Five trait taxonomy: History, measurement, and theoretical perspectives." Handbook of personality: Theory and research 2 (1999): 102-138.

D3: Personality Traits and the five behavioural archetypes
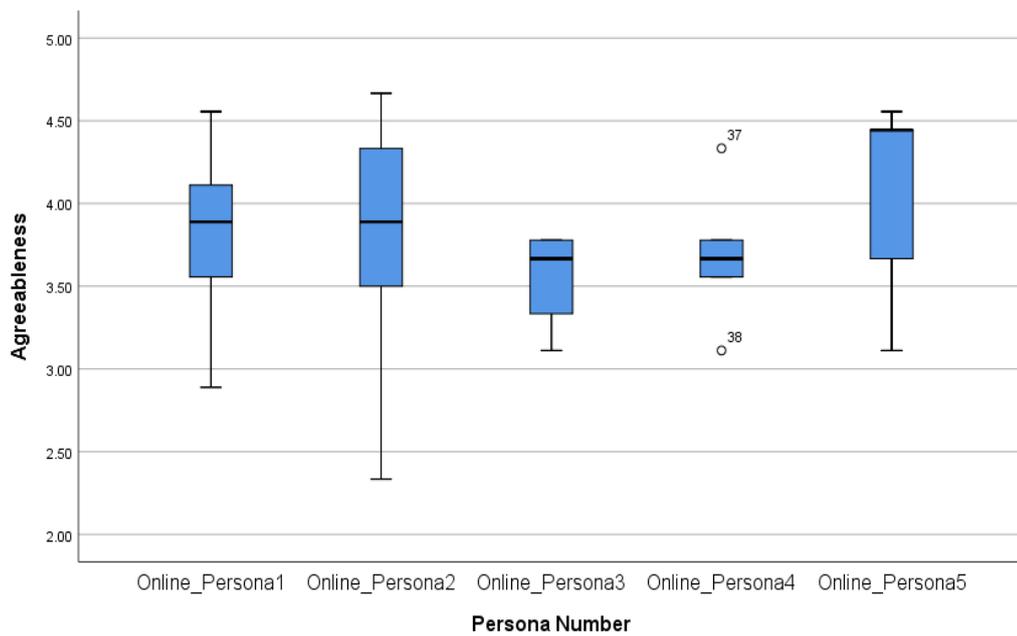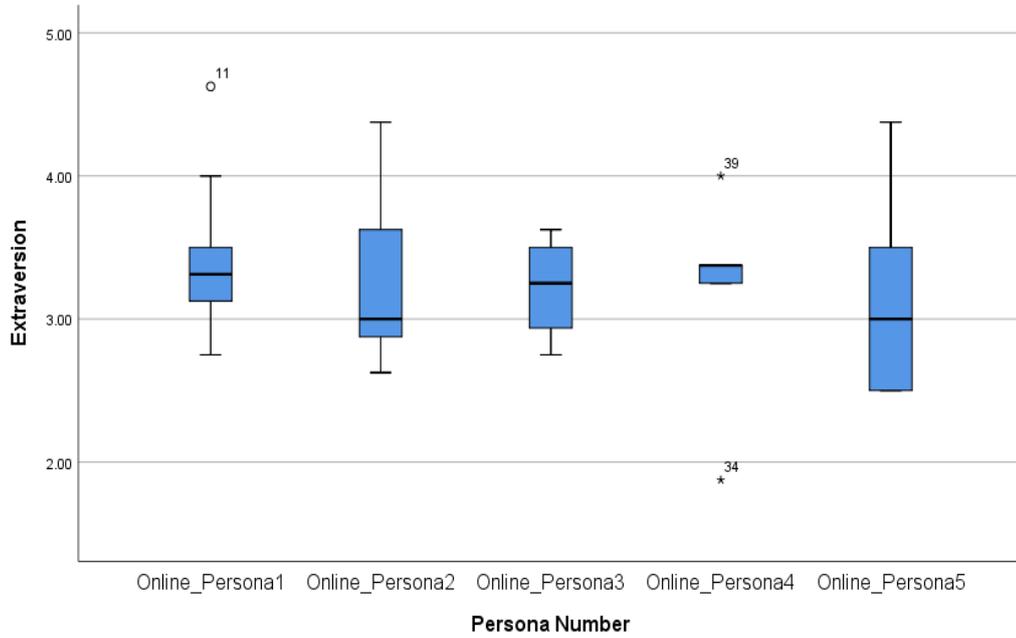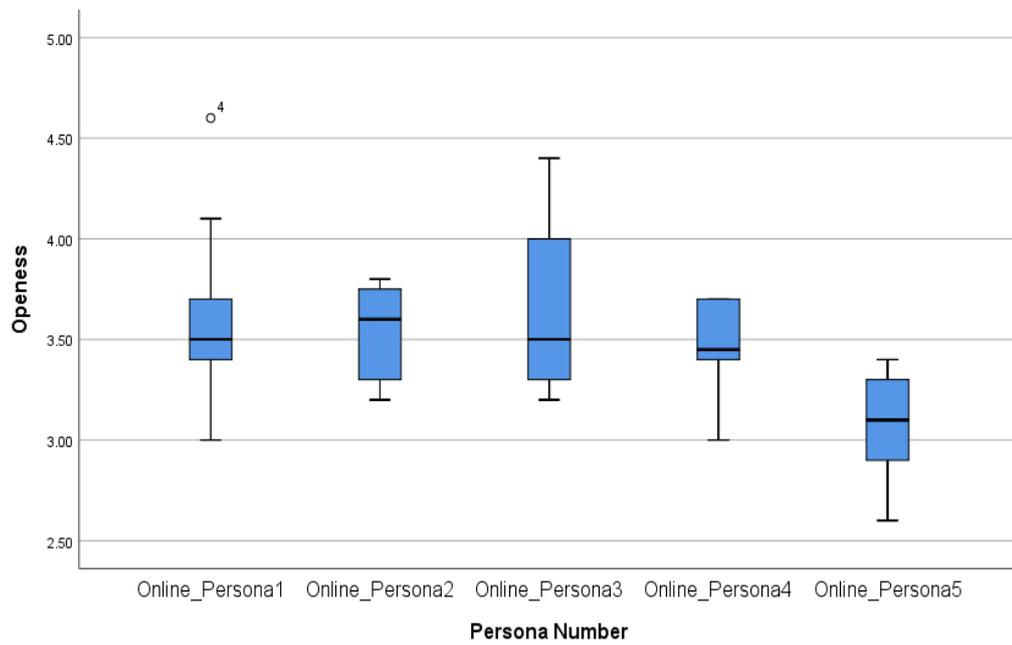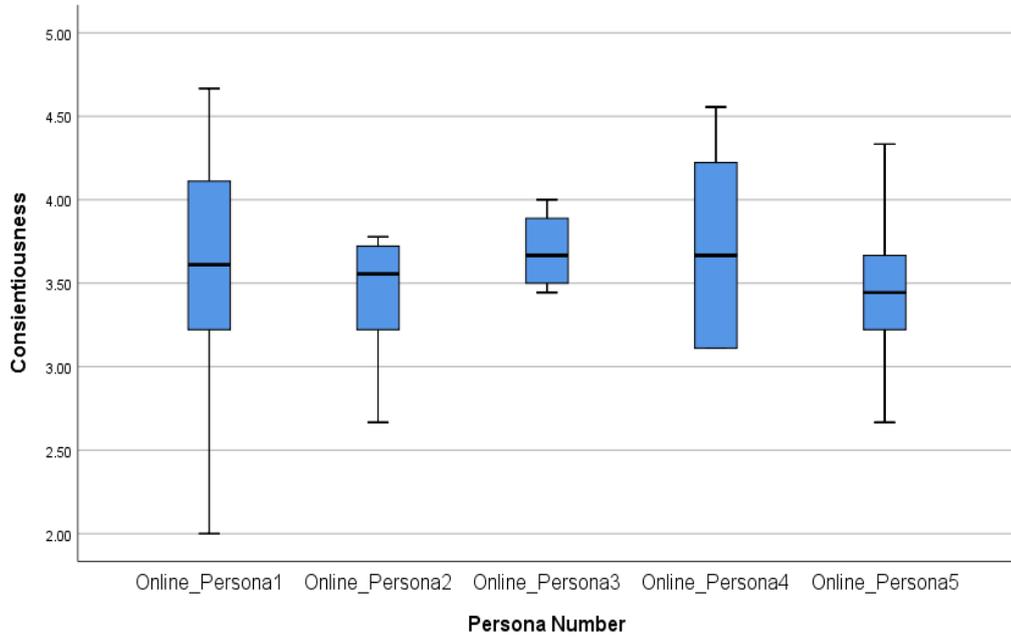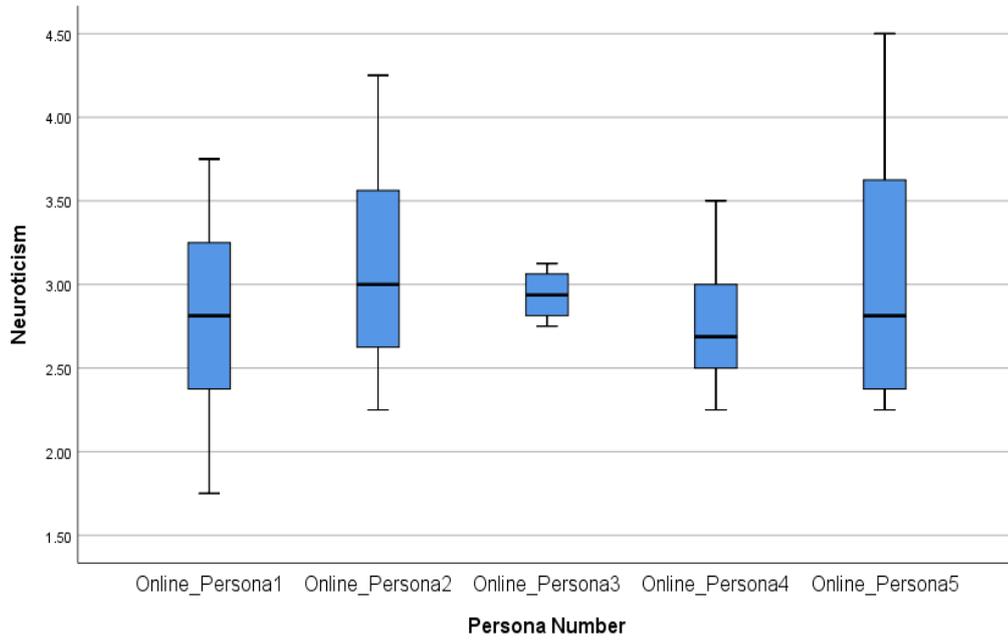
E1: Group Administration Questionnaires (GAQ) for Evaluation the Usefulness of Behavioural Archetypes as a Design Tools in the Design Process

Please give your response to the following questions and explain your responses in order to evaluate the **usefulness** and **effectiveness** of the five behavioural archetypes as a design tool for designing or developing software meant to change the behaviour towards people with a problematic attachment to social media:

Section I: Validation questions

[A: Effective Communication and increased Engagement]. Behavioural archetypes are meant to facilitate effective communication amongst the design and development team and increase their engagement in the process. How do you evaluate our archetypes from this perspective?

…………………………………………………………………………………………………

……………………………………………………………………………………….............

[B: Increased focus on the users and their diverse contexts and needs]. Behavioural archetypes are meant to increase the focus on the users and their diverse needs and contexts. They are meant to help the design and development team in having a shared understanding of the users and to make assumptions about them explicit. How do you evaluate our archetypes from this perspective?

…………………………………………………………………………………………………

……………………………………………………………………………………….............

[C: Increased Empathy to users]. Behavioural archetypes are meant to help the design and development team to build empathy towards the users and appreciate their situation, needs and context from a caregiving point of view. How do you evaluate our archetypes from this perspective?

…………………………………………………………………………………………………

……………………………………………………………………………………….............

[D: Better software product design]. Behavioural archetypes are meant to help produce better designs with a richer set of design features and make design decisions more informed. How do you evaluate our archetypes from this perspective?

……

……

[E: Stable design]. Behavioural archetypes are meant to help produce a design which is likely to be inclusive and sustainable and would require less frequent changes in users' lifestyle. How do you evaluate our archetypes from this perspective?

………

………..............

[F: Marketing and Introduction of Technology]. Behavioural archetypes are also meant to inform the design and development team as to how to introduce the final product to the different user groups. How do you evaluate the usefulness of our archetypes from that perspective?

………

………..............

Section II: Potential improvement

A: What information would you suggest adding to the template? Please provide specific details and explain your reasons?

………

………..............

B: To what extent were you satisfied with using the five behavioural archetypes for the

design process? Please specify how.

………

………..............

Thank you for your participation

E2: Behavioural Archetypes Templates

Secure Behavioural Archetype

Goals
- People's with secure behavioural archetype would like to manage and reduce their excessive usage such as being overly online in order to maintain their friendship

Online behaviour characteristics
- Social media boosts the feeling of being secure.
- Tracking information
- Socially active
- Committed to his online groups

"I feel happy and secure when people are there when I need them"

Personality

Extraversion
Agreeableness
Consientiousness
Neuroticism
Openess

Social media usage

They like to feel assured. Social media help them to maintain their feeling by building successful relationships that increase their connectedness and presence. Despite this, they can occasionally lose their sense of security, i.e. when unable to access social media, interact with peers or express themselves and receive the responses as they expected, they feel the need to maintain their desired level of social presence and connectedness.

Usage experience and positive emotions

Mutuality of interaction: **Joy**
Passing time: **Joy**
Constant connectedness: **Love**

Usage experience and negative emotions

Unconscious interaction: **Sadness**
Unmet expectation: **Sadness**
Missing opportunities: **Fear**

Psychological states and usage experience

Loss of interest: Repetitive content
Anxiety: Excessive usage
Boredom: Passive interaction
Loneliness: Lack of accessibility
Craving: Increase reputation

Intimacy Behavioural Archetype

Goals
- People's with intimacy archetype would like to combat being preoccupied about their commitment to their online friends

Online behaviour characteristics
- Social media boosts the feeling of being secure and fear of missing out
- Kindness role
- Self-presentation
- Trust and positive expectation

"I am always a good listener and my friends and relatives like talking to me about their feelings and problems"

Personality

Extraversion
Agreeableness
Consientiousness
Neuroticism
Openess

Social media usage

They become closely attached to their social media and their online friends. This commitment to their friends manifests as a keen interest in their activities and (when appropriate) empathetic responses. They know what they like and refuses to engage with the material of which they disapprove. Their natural curiosity and vulnerability to the fear of missing out can lead them to become anxious if they are unable to maintain their online presence.

Usage experience and positive emotions

Constant connectedness: **Love**
Mutuality of interaction: **Joy**
Passing time (source of entertainment): **Joy**
Seeking popularity: **Joy, Love**

Usage experience and negative emotions

Losing track of time: **Sadness**
Unpleasant online interaction: **Anger**
Social comparison: **Anger**
Unable to interact online: **Anger**
Missing opportunities: **Fear**

Psychological states and usage experience

Loss of interest: Repetitive content
Boredom: Loss of popularity due to inactive profile
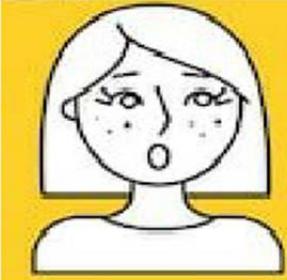**Anxiety**: Excessive usage, commitment to being highly responsive
Loneliness: Lack of accessibility
Craving: Daily routine
Depression: Downward social comparison

Escapist Behavioural Archetype

Goals
- People's with escapist archetype would like to manage being felt anxious provoked by their online procrastination

Online behaviour characteristics
- Avoidant attachment style
- Procrastination
- Self-enhancement motive
- Self-discrepancy

"Sometimes I use social media unconsciously, by which I mean that I see some friends texting, but I am in the kind of mood where I'll open and read their messages but not respond and then feel sad"

Social media usage
They employ social media to avoid the reality of their own lives. They may engage in anonymously or create fictitious online personalities. They have little desire to form real relationships offline and use social media for entertainment. Their behaviour could easily exacerbate their true loneliness.

Usage experience and positive emotions
Constant connectedness: **Love**
Passing time (source of entertainment): **Joy**

Usage experience and negative emotions
Missing essential announcements: **Sadness, Fear**
Losing track of time: **Sadness**
Unable to interact online: **Anger**
Unmet expectation: **Sadness**

Psychological states and usage experience
Anxiety: Excessive usage
Boredom: Passive interaction
Loss of interest: Repetitive content
Loneliness: Unable to engage online and feel excluded

Personality
Extraversion
Agreeableness
Consientiousness
Neuroticism
Openess

Narcissist Behavioural Archetype

Goals
- People's with narcissist archetype would like to stop being preoccupied about their image to peers

Online behaviour characteristics
- Secure and fear of missing out online attachment
- Self-presentation
- Peer pressure
- Irresistible urge

"I shared something via Facebook and I saw that everybody liked it; that made me happy"

Social media usage
They pay excessive attention to the thoughts and opinions of others about them on social media and they often seek approval from others. They have the confidence to use their real identity on social media and have an urge to respond as soon as possible to updates. Social media are used as a way of competing with others, but there is potential for discontent or jealousy if they feel their contacts are experiencing more enjoyment or achieving more than they are.

Usage experience and positive emotions
Sense of belonging: **Love**
Mutuality of interaction: **Joy**
Seeking popularity: **Love, Joy**

Usage experience and negative emotions
Social comparisons: **Anger**
Curiosity: **Fear**
Unable to interact online: **Anger**
Unmet expectation: **Sadness**

Psychological states and usage experience
Boredom: Loss of popularity due to inactive profile
Loss of interest: Repetitive content, lack of online interaction
Loneliness: Online interaction is essential activity
Anxiety: Excessive usage, commitment to be highly responsive
Craving: Increase reputation, acure intrinsic rewards

Personality
Extraversion
Agreeableness
Consientiousness
Neuroticism
Openess

Discrepancy Behavioural Archetype

Goals
- People's with discrepancy archetype would like to manage their hasty and unconsciously usage of social media

Online behaviour characteristics
- Avoidant online attachment style
- Categorise herself
- Disturbance and lost concentration
- Different from reality

"I'm trying to be myself. Also, I like to share posts with my friends who have the same interests"

Personality

Extraversion

Agreeableness

Consientiousness

Neuroticism

Openess

Social media usage
They spend a considerable amount of time attempting to boost their self-esteem on social media, but this frequently leads to feelings of regret, including the feeling of having wasted time that could have been spent doing other things. Even when engaged in other offline activities, They are likely to think about social media, which can have an adverse influence on their daily lives. In addition, they may feel excluded and alone if social media contacts do not live up to their high expectations

Usage experience and positive emotions

Source of entertainment: **Joy**

Constant conectedness: **Love**

Usage experience and negative emotions

Hasty and unconsciously prolonged usage: **Anger**

Missing opportunities: **Fear**

Ignored by others: **Fear, sadness**

Psychological states and usage experience

Boredom: Passive interaction

Anxiety: Excessive usage or being unable to check their profile

Loss of interest: Repetitive content

Loneliness: Self categorisation or social isolation

Participants ID: ………………..   **Date: ……………...…**

Section I: Demographics Information

Q1) What is your gender?

O   Male   O   Female   O   I prefer not to say

Q2) What is your field of specialisation?

☐   Psychology   ☐   Software Engineering

☐   Product Design/Development   ☐   HCI

☐   Other, please specify ……..................

Q3) Please specify you education level

O   Bachelor degree   O   Master degree   O   Doctoral degree

O   Other, please specify ……..................

Section II: Expertise

Q4) Have you been engaged in any software products design? Please specify how.

…………………………………………………………………………………………………

………………………………………………..………………………….…………………

Q5) Have you used personas on the design process? Please specify how.

….......………………………………………………....…………………………………………

…………………………………………..……………………………………………..……

E4: Participants Consent Form for Validation Study

Study Title: Problematic Attachment to Social Media: Lived Experience and Behavioural Archetypes

Researcher Information
Majid Altuwairiqi, PhD researcher
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Faculty of Science & Technology
Bournemouth University

Supervisor Information
Dr. Raian Ali
rali@bournemouth.ac.uk
Faculty of Science & Technology
Bournemouth University

Please initial here

I have read and understood the participant information sheet for the above research project.	
I confirm that I have had the opportunity to ask questions.	
I understand that my participation is voluntary.	
I understand that I am free to withdraw up to the point where the data are processed and become anonymous, so my identity cannot be determined.	
During the tasks of the study, I am free to withdraw without giving a reason and without there being any negative consequences.	
Should I not wish to answer any particular question(s), complete a test, I am free to decline.	
I give permission for members of the research team to have access to my anonymised responses. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the outputs that result from the research.	
I understand taking part in the research may include being recorded (audio) but that these recordings will be deleted once transcribed and anonymised.	
I agree to take part in the above research project.	

Name or Initials of the Participant   Date   Signature

_____   _____   _____

Name or Initials of the Researcher   Date   Signature
    Majid Altuwairiqi
                                                        _____   _____

Participant Information Sheet

The title of the research project: Problematic Attachment to Social Media: Lived Experience and Behavioural Archetypes

Invitation

You are invited to take part in this study conducted by Majid Altuwairiqi, a postgraduate researcher in the Department of Computing and Informatics, Faculty of Science & Technology at Bournemouth University. This study is part of his PhD thesis and is supervised by Dr Raian Ali. Before you decide whether or not to participate, it is important for you to understand why the research is being conducted and what it will involve. Please take the time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is unclear or if you would like more information. Take your time deciding whether or not you wish to take part.

What is the purpose of the study?

The aim of this study is to validate the usefulness and effectiveness of utilising the behavioural archetypes as a design tool in the design process. In particular, this validation is meant to find out how behavioural archetypes are useful and effective in the way they help the design team identify and cater for users' different requirements to develop Digital Diet ABC app toward reforming their problematic attachment to social media. A multidisciplinary team and industry professional designers will be included in this study.

Why have I been invited to take part?

You have been invited because of your background and experience in relation to the problematic attachment to social media in terms of behaviour change and software design. The research team believe that your feedback will be beneficial to consolidate the approach and mechanisms proposed in this research.

Do I have to take part?

It is up to you whether or not to take part. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a participant agreement form. Also, you may need to provide your email address to allow the researcher to contact you for any further clarification regarding the study if necessary. You will not be identified or identifiable in the output that results from the research and the email address will be removed after the data are collected and transcribed so that the data will become totally anonymous. You can withdraw at any time up to the point where the data are processed and become anonymous (so that your identity cannot be determined) without it affecting any benefits that you are entitled to in any way. You do not have to give a reason for withdrawing. Deciding to take part or not will not adversely affect you.

What would taking part involve?

Depending on your role, the application developers will be taking part in the interview. Whereas, a multidisciplinary team will take part in two focus group sessions. To nominate the members of the multidisciplinary team, each participant will complete a pre-selection survey in order to elicit their demographic information and their experience in terms of behaviour change and software design.

- Semi-structured interview sessions: In which the researcher will interview and discuss various aspects with application developers. The interview aims to further investigate their app development process and the usefulness of the five behavioural archetypes as a design tool for their app development process.
- Focus group sessions: In which the researcher will invite a multidisciplinary team to attend two focus group sessions. The first session is familiarisation, and the second session is brainstorming. The familiarisation session aims to familiarise the participants with the five behavioural archetypes. Then the team will be split into two groups; each group will choose one behavioural archetype and write a scenario about it. The scenarios are meant particularly to help participants to immerse their focus on the five behavioural archetypes. However, the brainstorming session is designed to validate the usefulness and effectiveness of the behavioural archetypes as a design tool. The researcher observes how the behavioural archetypes are utilised during the session and their impact on the design team and design decisions. At the end of the session, the participants will answer a validation survey to evaluate the usefulness of utilising the behavioural archetypes as a design tool for the development process of the Digital Diet ABC app.

What are the possible benefits and risks of taking part?

While there are no immediate benefits for those who participate in the project, it is hoped that this work will improve our understanding of the evolution of online identity and how we design new technologies that can help people to manage their online identity evolution. There are no anticipated risks associated with taking part in this study.

Will my taking part in this study be kept confidential?

All of the information that we collect about you during the course of the research will remain strictly confidential. You will not be identifiable in any of the reports or publications. All data relating to this study will be kept for up to five years on a BU password-protected secure network.

Will I be recorded and how will the recorded media be used?

Yes, you will be recorded if you take part in the focus group and interview stages. The recordings will help the research team to capture the information that will be sought from you during the focus group and interviews. However, you will be given the right to accept or reject being recorded. No other use will be made of the recording without your written permission and nobody outside of the research team will be allowed access to the original recordings. The audio recordings made during this research will be deleted

once transcribed and anonymised. Transcription of the focus groups and interviews will not include your name or any identifiable information. Instead, each person will be identified by their code (i.e. #id112345, #id122345).

Who should I contact for further information?

If you have any questions or require more information about this project, please contact me using the following contact details:

Majid Altuwairiqi, E-mail: Maltuwairiqi@bournemouth.ac.uk

Bournemouth University, Faculty of Science and Technology

Talbot Campus, Fern Barrow, Poole, BH12 5BB, Tel: 01202 968140

What if something goes wrong?

If you have any complaints about this project please contact Professor Tiantian Zhang, Deputy Dean for Research and Professional Practice of the Faculty of Science and Technology at Bournemouth University at the following address:

Professor Tiantian Zhang, E-mail: researchgovernance@bournemouth.ac.uk

Bournemouth University, Faculty of Science and Technology

Talbot Campus, Fern Barrow, Poole, BH12 5BB, Tel: 01202 965721

Thank you for reading this information sheet and for considering taking part in this research.

E6: Photos for the Participants during Focus Groups Sessions (Familiarisation and utilising Behavioural Archetypes Stages)
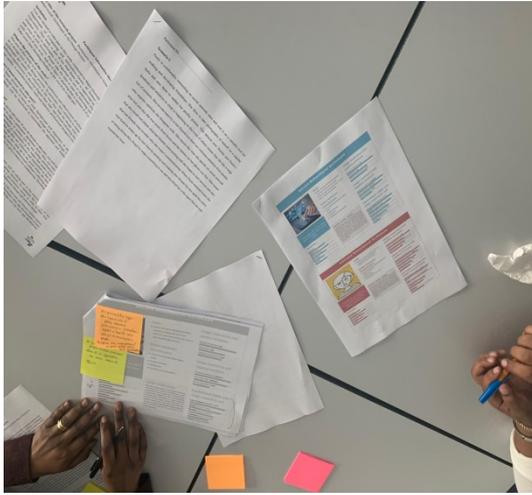
**Appendix F1: Ethical Approval from the Ethics Committee of the Authors'
Institution**

Research Ethics Checklist

Bournemouth University

Reference Id	15286
Status	Approved
Date Approved	07/03/2017

Researcher Details

Name	Majid Altuwairiqi
School	Faculty of Science & Technology
Status	Postgraduate Research (MRes, MPhil, PhD, DProf, DEng)
Course	Postgraduate Research
Have you received external funding to support this research project?	No

Project Details

Title	Withdrawal Symptoms and Correlated Features of Social Network Sites
Proposed Start Date of Data Collection	06/03/2017
Proposed End Date of Project	22/12/2017
Supervisor	Raian Ali
Approver	Hongnian Yu

Summary - no more than 500 words (including detail on background methodology, sample, outcomes, etc.)

Research Ethics Checklist

Bournemouth University

Reference Id	19047
Status	Approved
Date Approved	31/01/2018

Researcher Details

Name	Majid Altuwairiqi
Faculty	Faculty of Science & Technology
Status	Postgraduate Research (MRes, MPhil, PhD, DProf, DEng)
Course	Postgraduate Research - FST
Have you received external funding to support this research project?	No

Project Details

Title	Tools for Evolving Online Identity on Social Networking Sites
Proposed Start Date of Data Collection	23/01/2018
Proposed End Date of Project	30/09/2019
Supervisor	Raian Ali
Approver	Hongnian Yu

Summary - no more than 500 words (including detail on background methodology, sample, outcomes, etc.)