Social network fatigue : antecedents, effects and characteristics

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SOCIAL NETWORK FATIGUE - ANTECEDENTS, EFFECTS AND CHARACTERISTICS

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Table of Contents

CHAPTER 1 INTRODUCTION.....	1
1.1. Background.....	1
1.2. Research Gaps and Justifications for Research.....	2
1.3. Conceptualizing Social Network Fatigue - Formulation of Research Questions	10
1.3.1. RQ1 - Investigating Antecedents.....	11
1.3.2. RQ2 - Investigating Effects.....	13
1.3.3. RQ3 – Enumerating Characteristics.....	16
1.4. Aim and Objective of Research.....	18
1.5. Methodology	21
1.6. Contributions of Research	22
1.7. Structure of the Report.....	23
CHAPTER 2 LITERATURE REVIEW.....	25
2.1 Fatigue	25
2.1.1 Definitions.....	27
2.1.2 Classification of Fatigue	29
2.1.3 Fatigue-Related Factors and Consequences.....	31
2.1.4 Characteristics of Fatigue.....	33
2.2 Fatigue Themes in Technology Mediated Environments	38
2.2.1 Information Fatigue and Related Research.....	38
2.2.2 Technostress.....	41
2.2.3 Addiction Related Research.....	44
2.3 Virtual Communities	45
2.3.1 Definition of Virtual Communities	45
2.3.2 Research on Growth of Virtual Communities and Participation within	47
2.3.3 Decline, Disengagement and Related Research.....	50
2.3.4 Research within Gaming Communities	53
2.3.5 Problems with Fatigue Related Research within Virtual Communities.....	54
2.4 Social Networks	56
2.4.1 Definition and Characteristics.....	56
2.4.2 Social Network Goals, Motivations, Uses and Gratifications.....	58
2.4.3 Social Networking Applications	61

2.4.4	Generic Uses of Social Networking Applications.....	66
2.4.5.	Use – Diffusion Theory.....	68
2.5	<i>Theoretical Frame Guiding Data Collection and Analysis</i>	68
CHAPTER 3	METHODOLOGY.....	73
3.1.	<i>Research Design</i>	73
3.2.	<i>Choice of Mixed Methods</i>	77
3.3.	<i>Choice of Environment for Research</i>	79
3.4.	<i>Recruitment and Sampling of Participants</i>	80
3.5.	<i>Activity Collection and Analysis</i>	84
3.5.1.	Activity Logs and Activity-Related Indicators	84
3.5.2.	Activity Analysis.....	88
3.6.	<i>Interview Design and Analysis</i>	93
3.6.1.	Choice of the Medium.....	93
3.6.2.	Design of the Interview Questions.....	95
3.6.3.	Interview Analysis	98
3.6.3.1.	Integrating Activity and Interview Analysis - Use of Probes	110
3.6.3.2.	Ensuring Consistency of Interview Analysis	111
3.7.	<i>Ethical Considerations</i>	112
3.7.1.	Use of Informed Consent for Full Disclosure	113
3.7.2.	Ensuring Participant Privacy and Confidentiality.....	114
CHAPTER 4	ANALYSIS & DISCUSSION.....	116
4.1	<i>Participant Demographics</i>	116
4.2	<i>Not Fatigued</i>	118
4.2.1	Not Fatigued Vs. Fatigued – Summary of Experiences and Emotional Attachment	118
4.2.2	Fatigued Vs. Not Fatigued - Demographic Comparison.....	121
4.3	<i>Antecedents of Social Network Fatigue</i>	123
4.3.1	Social Dynamics Related (SD).....	123
4.3.1.1	SD Fatigue Experiences	123
4.3.1.2	SD Demographics and Usage Levels.....	133
4.3.2	<i>Content Related (C)</i>	135
4.3.2.1	<i>C Fatigue Experiences</i>	135
4.3.2.2	<i>C Demographics and Usage Levels</i>	141

4.3.3	<i>Immersion Related (I)</i>	143
4.3.3.1	<i>I Fatigue Experiences</i>	143
4.3.3.2	<i>I Demographics and Usage Levels</i>	148
4.3.4	<i>Platform Related (P)</i>	150
4.3.4.1	<i>P Fatigue Experiences</i>	150
4.3.4.2	<i>P Demographics and Usage Levels</i>	153
4.3.5	<i>External Demands Related (ED)</i>	154
4.3.5.1	<i>ED Fatigue Experiences</i>	154
4.3.5.2	<i>ED Demographics and Usage Levels</i>	158
4.3.6	<i>Community Life Cycle Related (LC)</i>	159
4.3.6.1	<i>LC Fatigue Experiences</i>	159
4.3.6.2	<i>LC Demographics and Usage Levels</i>	164
4.3.7	<i>Multiple Antecedents and Account Deactivation</i>	165
4.4	<i>Discussion</i>	169
4.4.1	<i>Antecedents of Social Network Fatigue</i>	169
4.4.1.1	<i>Handling of Antecedents - Individual Differences</i>	169
4.4.1.2	<i>Antecedents that Induce Physiological Fatigue</i>	172
4.4.1.3	<i>Antecedents that Affect Uses and Gratifications of SN</i>	173
4.4.1.4	<i>Controllability and Dynamism of the Antecedents</i>	175
4.4.2	<i>Effects of Social Network Fatigue</i>	176
4.4.2.1	<i>Short Breaks in Activity</i>	178
4.4.2.2	<i>Controlled Activity</i>	180
4.4.2.3	<i>Suspended Activity</i>	182
4.4.3	<i>Characteristics of Social Network Fatigue</i>	185
4.4.4	<i>Social Network Fatigue – A Working definition</i>	190
CHAPTER 5	CONCLUSION	192
5.1	<i>Summary of Findings</i>	192
5.2	<i>Implications</i>	205
5.3	<i>Contributions</i>	211
5.4	<i>Limitations</i>	212
5.5	<i>Suggestions for Future Research</i>	218

REFERENCES 223

<i>Appendix A: General Solicitation</i>	<i>248</i>
<i>Appendix B: Informed Consent</i>	<i>249</i>
<i>Appendix C: Participant Information Sheet.....</i>	<i>251</i>
<i>Appendix D: Template for Activity Log</i>	<i>254</i>
<i>Appendix E: Interview.....</i>	<i>255</i>
<i>Appendix F: IRB Approval Letter</i>	<i>262</i>
<i>Appendix G: Parent/Guardian Informed Consent Agreement.....</i>	<i>264</i>
<i>Appendix H: Conferences and Publications</i>	<i>267</i>

List of Figures

Figure 1-1 Research Gap, Objective and Questions	20
Figure 2-1 Mapping of Literature Reviewed to Research Questions.....	72
Figure 3-1 Research Design.....	76
Figure 3-2 Facebook Activity Log.....	86
Figure 3-3 Activity Trace with Trend Line.....	88
Figure 4-1 Rest-break after Hectic Interaction.....	179
Figure 4-2 Steady Levels of Activity in Platform- related Fatigue.....	180
Figure 4-3 Antecedents and Effects of Social Network Fatigue.....	184

List of Tables

Table 2-1 Characteristics of Fatigue	36
Table 2-2 Generic Uses of Popular Social Networking Applications.....	67
Table 3-1 Distribution of Users Based on Frequency and Variety of Use.....	91
Table 3-2 Classification of Users based on the Slope of Activity Trend.....	92
Table 3-3 Fatigue Indicators/Emotions Mapped to Causes/Sources.....	104
Table 3-4 Aggregated Stressors - Labels and Description.....	108
Table 3-5 Inter-coder Reliability.....	112
Table 4-1 Participants – Demographic Classification.....	117
Table 4-2 User Demographics and Average Indicators - Fatigued Vs. Not-Fatigued.....	122
Table 4-3 User Demographics and Average Indicators - SD vs. Not SD Fatigued.....	133
Table 4-4 User Demographics and Average Indicators - C vs. Not C Fatigued.....	142
Table 4-5 User Demographics and Average Indicators - I vs. Not I Fatigued.....	149
Table 4-6 User Demographics and Average Indicators - P vs. Not P Fatigued.....	153
Table 4-7 User Demographics and Average Indicators - ED vs. Not ED Fatigued.....	158
Table 4-8 User Demographics and Average Indicators - P vs. Not P Fatigued.....	164
Table 5-1 Antecedents of Social Network Fatigue.....	195
Table 5-2 Reflection of Fatigue on User Activity.....	197
Table 5-3 Characteristics of Social Network Fatigue.....	202

ABSTRACT

In the context of social network use, the term social network fatigue has been used loosely in media and academic publications to denote a sense of weariness associated with use of social networks. In view of the recent proliferation of social networking applications and the academic interest surrounding widespread use and adoption of these, a conceptual clarification of the term becomes important. However, a conceptualization of social network fatigue has not been attempted so far. This research therefore, addresses this primary gap and aims to clarify the concept of social network fatigue, guided by literature on fatigue available from within the clinical domain as well as societal and work settings. With the help of a mixed methods approach towards investigating user experiences that result in negative emotions or affect activity levels adversely, the research identifies antecedents of fatigue as well as the specific effects these have on user activity, so as to enumerate the unique characteristics of the phenomenon. A high level model of social network fatigue and a working definition of the phenomenon are derived based on the findings.

Qualitative data in the form of an e-mail interview covering user experiences within the social network environment as well as quantitative data in the form of activity logs gathered over a six month period from 158 Facebook users have been used to identify the antecedents and effects of social network fatigue. A qualitative content analysis of the interview transcripts combined with a quantitative analysis of user activities reveals six distinct groups of antecedents and three distinct effects of fatigue on user activity. Independent T-tests for differences in demographic and activity profiles of users

indicating fatigue related to each antecedent, as compared to those who do not report the fatigue, indicate significant variations of selected factors across the various groups.

Thus, social network fatigue has been found to be preceded by factors related to the social dynamics occurring within the network, content made available there, self-detected immersive tendencies of the user, design issues of the platform, maturing of the life-cycle of the community to which the user is attached or factors that are external to the social network environment such as work, family or studies related demands faced by the user. The effects of fatigue on social network activity include short rest breaks, a relatively longer term downward moderation of activities or a suspension of user activities through a deactivation of his or her account. Unique characteristics of social network fatigue specific to the context of social network use were enumerated. For instance, the restorative nature of effects of fatigue that may help to maintain a healthy pattern of social network use was identified.

Furthermore, demographic factors such as age and gender were found to vary significantly between users indicating specific fatigue antecedents. The number of social networking applications used was significantly higher in the case of fatigued users as compared to those who did not indicate any fatigue. The average frequency of use of Facebook recorded by fatigued users was also significantly higher than that of those with no indication of fatigue. Additionally, the overall trend depicted by the activity trace indicated a steeper falling pattern for fatigued users as opposed to those who were not fatigued.

CHAPTER 1 INTRODUCTION

1.1. Background

‘Social networks’ have been described as structures of relationships made of friends and relatives within which sharing of information and favours takes place on a regular basis (Jackson, 2005). Although conventionally defined as a network made of people, such networks may also incorporate a technology component which facilitates new ways of linking, such as connecting while a user is on the move. As Wellman (1996) puts it, “*when a computer connects people, it is a social network*” (p.197). In the recent years, aided by innovative technological developments in the field of telecommunications, novel yet meaningful linkages are made possible amongst the constituent entities of social networks with unprecedented ease and efficiency. For instance, geographical boundaries which were once barriers to the development of social and professional ties are no longer impediments when networks are able to facilitate instantaneous exchanges and sharing of rich multi-media information with ease and efficiency. Thus, social networks have come to play a key role in the social and professional lives of users as important conduits of information and trivia even when they may be geographically dispersed.

Social networks are used for ‘networking’ which implies an initiation of social relationships (boyd & Ellison, 2008), or to ‘network’ which suggests maintenance of existing social links. These activities are supported by features and functionalities embedded into specially designed applications called social networking applications that afford uses such as searching and adding friends, sharing content through external links and status updates, engaging in interactive social games, as well as interacting on a one-

to-one basis or within groups. Consequently, applications in the genre such as Facebook, Twitter and LinkedIn have enjoyed widespread adoption in the recent years.

The last decade saw a roll-out of the mobile version of these social networking applications which further fuelled their proliferation and widespread use, resulting in an exponential growth in their user base (Brenner & Smith, 2013). Additionally, the newer features and functionalities offered by them, supported by advanced networking and multimedia capabilities have become increasingly immersive, which further enhanced the lure of these applications. While on one hand, this paints a rosy picture of the perceived entertainment and social benefits of such applications, there is an inevitable downside to it. For one, an immediate result of these trends is an entwining and inseparability of the online and offline lives of users (boyd & Ellison, 2008), who seemingly stay engaged with these applications constantly. This in turn has led to a host of concerns over whether such pervasive and immersive engagement with social networking applications may have resulted in the users suffering from the inevitable after-effects, in the form of a phenomenon commonly referred to in popular media as ‘social network fatigue’ (Bernstein, 2009; Cherubini, Gutierrez, Oliveira & Oliver, 2010; Joinson, 2008; Snow, 2011; Weinstein, 2013).

1.2. Research Gaps and Justifications for Research

Bernstein (2009) uses the term ‘fatigue’ to indicate a tired state of use of Facebook. Snow (2011) cites the term ‘Facebook fatigue’ in the course of explaining why an increasing number of Facebook users in North America, may be ‘shunning’ the site. A more recent study reports that 61% of the American Facebook users have voluntarily

taken a break from using Facebook for a period of several weeks or more and 20% of those who once used the site no longer do so (Lee, Smith & Duggan, 2013). Facebook fatigue has been highlighted as a phenomenon of interest in several media articles that discussed social network use patterns (Van Grove, 2013; Weinstein, 2013). Thus, of late, ample evidence has been presented to the effect that segments of social network users may be tiring of and from the use of the platform, in what appears to be a case of fatigue. However, the factors associated with this phenomenon and its effects, as well as its exact nature remain elusive. As Cherubini et al. (2010, p.1) observe, “*most of the users of social networks are overloaded by constantly changing feeds and they struggle to keep up with the content*”. They acknowledge the significance of the phenomenon, at the same time highlighting the fact that it has not been investigated extensively within the scientific community (Cherubini et al., 2010).

Several research gaps can be identified which necessitate an investigation into social network fatigue as a phenomenon. First, the term itself has been used loosely to refer to a sense of weariness related to the use of social networking applications. In the context of social networks, usage of the term alludes to different shades of meaning in different published sources. For instance, social network fatigue has been associated with a decline in social network activity (Hampton, Goulet, Marlow & Rainie, 2012), and with users taking a ‘hiatus’ from use (Ortutay, 2013). This poses a fundamental problem of conceptual clarification of a phenomenon of interest in a thriving domain, that of social media.

Second, studies that specifically attempted a conceptualisation of social network fatigue have not been made available till date, although the theme may have been implicit

in studies on use and behavioural dynamics within virtual communities. For instance, studies within virtual communities that probe negative user response such as non participation or decline in participation (Birnholtz, 2010; Brandtzaeg, 2012; Brandtzaeg & Heim, 2007; Iriberry & Leroy, 2009; Kazmar, 2004; Komito, 2011; Wang & Chen, 2012) may point to possible user fatigue, although the term as such has not been cited in these papers. Research within gaming communities, (Debeauvais, Schiano & Ducheneaut, 2011; Ducheneaut, Yee, Nickell & Moore, 2007) has investigated negative user emotions as well as factors that prompt users to continue use. However, fatigue does not feature as a theme in these studies. In the domain of social media, research that investigated use patterns and the underlying reasons have been reported (Cheshire, Antin & Churchill, 2010; Kwak, Chun & Moon, 2011; Lampe, Ellison & Steinfield, 2008; Moore & McElroy, 2012; Nov, Naaman & Ye, 2010; Racke & Bonds-Racke, 2008; Thelwall, 2008; Wilkinson & Thelwall, 2010). Once again, fatigue has not been identified or investigated as a possible reason for a decline in activity or discontinued use in any of these studies.

Third, fatigue related studies in the context of technology use have traditionally taken the form of investigations on physical fatigue from prolonged, repetitive use (Hamam, Georgenas, AlSulaiman & El-Saddik, 2010; Matsushita, Shiba & Nagashima, 2006). However, the scope of such studies excludes the emotional and experiential dimensions of fatigue. Given that fatigue has been defined as a subjective, individual feeling involving psychological, cognitive and emotional dimensions (Piper, Lindsey & Dodd, 1987) this appears to be a major limitation. Additionally, since emotional and experiential dimensions of use are important considerations in design (Norman, 2002;

Picard, 2010), a broader focus on fatigue in the context of social network use appears to be a necessity from a design perspective.

Even when emotion and experience related studies have been initiated within the domain, there has been lesser emphasis on negative user experiences and emotions as compared to the positive ones. Consequently, studies that directly investigated negative emotions and behaviours in the context of virtual communities have been fewer in number. For instance, studies on user dissatisfaction or discomfort as evidenced by non participation or decline of virtual communities (Kazmer, 2004; Brandtzaeg & Heim, 2008; Birnholtz, 2010) have been reported. However, specifically, in the domain of social media, research on negative user response in general, and fatigue in particular, are not available to date. The closest such effort is a study which investigated the reasons why Korean Twitter users ‘unfollowed’ subscriptions (Kwak, Chun & Moon, 2011). A reference to negative response can also be seen in studies on the growth and life cycle changes of virtual communities such as the one that addresses their ‘death’ or decline of communities (Iriberry & Leroy, 2009), although the focus of the study is not primarily on the negative emotions of the users. Yet, an exploration of negative experiences is important, as this provides valuable insights into design elements that may impact on usability negatively (Norman 2002; Picard 2000) and would throw light on design features that may be ineffective. Thus, a significant gap exists within the domain which can only be addressed through an investigation specially focussed on negative user experiences in the context of social network use. Such a study, therefore, would enable an identification of the specific antecedents that precede stress inducing events leading to fatigue and would offer useful pointers to designers of social networking applications.

Stress-related studies in the context of use of information communication technologies (ICTs) in general, (Ayyagari, Grover & Purvis, 2011; Davis, 2002; Ragu-Nathan, Tarafdar, Ragu-Nathan & Tu, 2008; Tarafdar, Qiang, Ragu-Nathan & Ragu-Nathan, 2007; Tu, Wang & Shu, 2005), and of information in particular (Edmunds & Morris, 2000; Simpson & Prusak, 1995), have been reported. The former refers to ‘technostress’ or stress experienced by end-users as a result of use of Information and Communication Technologies (ICTs) (Coklar & Sahin, 2011; Ragu-Nathan et al., 2008; Sahin & Coklar, 2009). The latter report a phenomenon called ‘information fatigue’ described as “*an experience arising from having too much information which uses too much of the users’ time, causing them to feel stressed*” (Edmunds & Morris, 2000, p.19). Both sets of research cover the central fatigue related factor namely stress. However, the contexts of use in these studies are generic in that they cover a broad spectrum of technologies that support user tasks or provide information in an organizational or personal context of use.

Therefore, even though the above cited studies focus broadly on a fatigue related theme, they are inadequate in answering questions pertaining to the specific context of social network use. Studies on technostress have reported stress causing factors in the context of technology use; yet these are unable to throw light on the specific factors that may cause fatigue when users connect socially and share information using a social network. Thus, while technostress may be a generic ailment affecting users of any form of technology, social network fatigue is a phenomenon experienced exclusively by users of social network applications and cannot be understood comprehensively from technostress studies. The reason being that social network fatigue may be influenced by characteristics

specific to the uses of social networks for the establishment and maintenance of social connections and as a conduit of a wide range of information shared amongst socially connected members (Wellman, 1996). Since social networks support ‘networking’ or relationship initiation and have been used to ‘network’ or maintain existing links (boyd & Ellison, 2008) through the various functions and features incorporated into them, there may be antecedents that are peculiar to these uses that may induce fatigue which need to be uncovered.

Studies on the other related terminology called ‘information overload’ focus on stress arising out of being exposed to what is perceived as ‘too much’ information in an organizational or personal context (Eppler & Mengis, 2004). In such situations, fatigue sets in, causing feelings of stress, confusion, pressure and anxiety (Edmunds & Morris, 2000) and resulting in low motivation to continue the use of the resource. The major causes of fatigue in the context are factors pertaining to information itself, the person receiving, processing or communicating the information, the tasks or processes, the organizational design, and the supporting information technology (Eppler & Mengis, 2004). Hence, in such studies, the emphasis is predominantly on the information aspect of use of modern ICTs, even though stress is a factor shared in common with fatigue.

Although it is reasonable to assume that any aspect of information provided by social networks could be a source of stress in the context, it would be worthwhile to investigate what specific elements related to information and its use bring about fatigue, especially since the networks themselves serve as important sources of information for users (Wellman, 2006). Additionally, given the range of uses afforded by these networks other than sharing, it is imperative that there may be factors other than information that

may result in fatigue. As such, a gap evidently exists which can only be addressed by a study of ‘social network fatigue’ as a distinct phenomenon of interest in the context of use of social networks to stay socially connected.

Addictive or excessive use patterns have also been investigated in the context of Internet and mobile phones as well as online games. (Charlton & Danforth, 2007; Liu & Peng, 2009; Nazir, 2012; Park, 2005; Ng & Wiemer-Hastings, 2005; Rice 2000; Salehan & Negahban, 2013; Wan & Chiou 2006). On the surface, there appears to be a link between the themes of addictive behaviour and fatigue. This link exists in the form of excessive use which has been cited as a factor leading to addictive behaviour (Ng & Wiemer-Hastings, 2005) as also to fatigue (Potempa et al., 1986; Shen et al., 2006; Tiesinga et al., 1996). Thus, while findings of addiction research may be helpful in explaining some of the factors leading to social network fatigue, these by themselves are not sufficient to present a detailed understanding of the phenomenon. This is primarily so, once again, due to the contextual differences that exist between the two, which present the possibility of a multitude of other important fatigue inducing factors that need to be unearthed if the phenomenon is to be conceptually clarified.

Given that the euphoria surrounding social media may have reached its peak (Cherubini et al., 2010; Snow, 2011) following a phase of increased experimentation, this may be an appropriate time to address the issue of conceptual fuzziness surrounding the term. This is especially significant as social network related theories are applicable to fields as diverse as business, marketing, education, organizational behaviour, medicine, clinical psychology and social welfare (Jackson, 2005). In the developed countries for instance, at a societal level, norms of social interaction are being redefined with the

increased reliance on social networks for personal projection, mundane social exchanges, social support, social and political activism and news dissemination as well as for harnessing communal support on various issues that concern the society. As such, rules of interaction in such a networked community are fuzzy, arbitrary or even undeterminable in many instances which make social adaptations at an individual level difficult (Keller, 2013). This in turn may manifest as communal, social and political issues that may be difficult to understand, anticipate and address. An understanding of user experiences within social networks is therefore a necessity not only for individuals but also for the society as a whole.

Additionally, corporations have in the recent years invested heavily in social networks in the hope of building a stronger social presence so as to reach out to a geographically dispersed group of customers and stakeholders at a fraction of time and cost as compared to the pre-social network era. This is due to the immediacy and cost efficiencies that social networks offer when it comes to reach, customer feedback and market research and the competitive advantage it offers (Chandler, 2013). Once again, as corporate spending on social network based initiatives are increasing on one hand, very little is known about the factors that would bring about a decline in the enthusiasm surrounding participation and active sharing within such networks. This in turn, increases the stakes in such initiatives and drives risks upwards unless concerted efforts at identifying the factors that would bring about a decline in social network participation are made.

This research therefore, aims to develop a conceptual understanding of the phenomenon of social network fatigue in the context of use of social networks to stay

socially connected. This is achieved through an identification of the antecedents or factors that precede social network fatigue as well as its effects on user activity. In the course of understanding the interplay of the antecedents that lead to fatigue and the effects of these on user activity, the unique characteristics of the phenomenon as it manifests in the context are enumerated.

1.3. Conceptualizing Social Network Fatigue - Formulation of Research Questions

Fatigue has been studied extensively within the clinical domain, where researchers investigated the phenomenon amongst patients suffering from different types of ailments such as cancer, multiple sclerosis, rheumatoid arthritis, Parkinson's disease, diabetes mellitus, hypertension, asthma, AIDS and depression, to cite a few (Baumann, Zopf & Bloch, 2012; Maes, Twisk & Johnson, 2012; Sharpe & Wilks, 2002; Small & Lamb, 2000; Strober & Arnett, 2005) .

With industrialization and post industrial societal changes as well as computerization and growth of the Internet, fatigue and related concepts came to be explored in non-medical domains such as the work place and society at large (Ayyagiri, et al., 2011; Brod, 1984; Coklar & Sahin, 2011; Eppler & Mengis, 2004; Hamam et al., 2006; Hardy, Shapiro & Borrill, 1997; Pawlikowska, Chalder, Hirsch, Wallace, Wright & Wessely, 1994; Ragu-Nathan et al., 2008; Sahin & Coklar, 2009). Nevertheless, specifically in the context of social network use, research on 'fatigue' has not yet been made available, and hence till date, the concept has remained fuzzy. As such, the overarching research question has been set as: How could social network fatigue be conceptualized?

1.3.1. RQ1 - Investigating Antecedents

A clinical definition of fatigue describes it as a “*subjective, unpleasant feeling of tiredness that has multiple dimensions and is influenced by circadian rhythm and other factors which varies in duration, unpleasantness and intensity*” (Piper et al., 1987, p. 19).

Amongst the antecedents or factors that precede fatigue reported within clinical and work domains are, increased energy requirements or an overwhelming amount of psychological, social or role demands (Tiesinga, Dassen, Theo & Ruud, 1996), an imbalance between increasing role demands (Viner & Christie, 2005) and work demands (Hardy et al., 1997).

Additionally, cognitive anxiety (Potempa, Lopez, Reid & Lawson, 1986) as well as lifestyle factors, physical inactivity and increased role expectations (Yu, Lee & Man, 2010) have been reported to induce fatigue clinically. Fatigue is also related to the perceived difficulty or projected length of time for a task, self-efficacy (Potempa et al., 1986) and boredom (Barofsky & Legro, 1991). Personal and psychological factors such as ‘evaluative concerns’ or concerns over mistakes and doubts about actions (Brooks, Rimes & Chalder, 2011) as well as neuroticism and introversion (Prins, van der Meer & Bleijenbergh, 2006) have also been cited as fatigue antecedents. Unfavourable environments such as those recording high temperatures and humidity (Anonymous, 1952) are said to induce clinical fatigue. Ill-health, over-work or shift work, emotional problems such as stress, tension and depression or family related issues have also been cited as antecedents of fatigue in both clinical as well as societal and work related research (David, Pelosi, McDonald, Stephens, Ledger, Rathbone & Mann, 1990; Ridsdale,

Alison, Jerrett, Mandalia, Osler & Vora, 1993; Hardy et al., 1997) where the phenomenon of fatigue has been extensively studied.

Thus, across this range of studies the antecedents of fatigue could be seen to be embedded in what people are required to do within a given context such as work, or expected to perform in the form of functions, whether social or personal. Some of these antecedents have also been found to be embedded within the individual user who is placed within the context, while yet others have been found to originate from within the immediate environment in which the users acts. Still others can be seen to originate from factors external to the immediate context where fatigue is observed; for instance, family in the case of work related fatigue, and work in the case of clinical fatigue. Furthermore, in the clinical context, physiological and psychological varieties of fatigue have been identified based on the type of stressors that cause the fatigue, for instance, say, physical or emotional exhaustion (Anonymous, 1952; Shen, Barbera & Shapiro, 2006). Likewise depending on the duration for which the experience is felt, fatigue has also been classified as acute and chronic (Shen et al., 2006).

It follows therefore that a detailed knowledge of the antecedents of stress causing events in any context, whether clinical, work, organizational or societal may be valuable. For one, it enhances the understanding of stressful experiences resulting in negative emotions through a revelation of the specific origins of the factors that precede it. Through this, it prepares stakeholders within the context to pre-empt the onset of stress and manage the resulting consequences on the expected output, be it productivity, performance, quality of life or the overall general health of the users. However, as a result of the larger problem of conceptual fuzziness surrounding social network fatigue

highlighted in 1.2, any information on the specific factors that lead to fatigue or the antecedents of fatigue in the context of social network use to stay socially connected is not available as of now.

Since physiological and psychological fatigue forms have been identified clinically (Shen et al., 2006), either of these forms would be of interest to the research even though psychological stressors are expected to feature in the context of social network use predominantly. This is particularly so, given the pioneering and exploratory nature of the work which necessitates that signs of any form of fatigue be identified and presented as ignoring any aspect would render the findings incomplete. Thus, besides psychological stressors, physiological ones, wherever identified, would also be presented as part of the findings. Consequently, the need to identify the specific antecedents of social network fatigue in any form would be addressed in the first research question.

RQ1: What are the antecedents of fatigue in the context of use of social networks to stay socially connected?

1.3.2. RQ2 - Investigating Effects

Given the proven links between fatigue experiences and activity, the next logical question that would follow is: What effects would these antecedents have on user activity within the context of social network use. The basic theoretical support for the relation shared between fatigue and activity has been recorded in one of the earliest reports on fatigue where the term was used to explain determinable changes in activity attributable to continued activity (Anonymous, 1952). This is an interesting description which brings out the unique cyclical relationship of fatigue with activity, where activity could be a

possible antecedent as well as an effect of fatigue. In other words, continued activity may lead to fatigue which in turn may result in further changes to the activity patterns.

Additionally, fatigue is said to present the sufferer with lower physical capacity, and lower energy levels (Potempa et al., 1986), which in turn suggests that fatigue would result in lower levels of activity. Furthermore, fatigue is also said to lower the motivation to work, which once again may lead to reduced output. Other effects of fatigue which may have direct or indirect impact on activity include reduced memory, decreased attention and concentration, impaired thought processes, poorer coping ability, increased irritability and loss of interest in most activities (Ream & Richardson, 1996; Yu et al., 2010). Fatigue may also be characterized by behaviours such as complaining and being inactive and withdrawing (Potempa et al., 1986), all of which points to a negative effect on activity.

These links between fatigue experiences and activity, performance or productivity have held true across the various contexts where related research has been reported. Thus, technostress and information fatigue related studies report the negative effects of these experiences on usage of technology or systems. For instance, technostress is reported to have a negative impact on attitudes, thoughts and behaviours of users (Weil & Rosen, 1997). It has also been reported to impact on productivity inversely (Tarafdar et al., 2007). Furthermore, technology overload which is a dimension of technostress is also found to *“crowd out productivity instead of enhancing it”* (Karr-Wisniewski & Lu, 2010, p. 1061). Likewise, information fatigue has been reported to result in low motivation to continue the use of the resource (Edmunds & Morris, 2000). Lower job satisfaction, analysis paralysis, lower accuracy and speed of performance have also been reported as effects of information fatigue (Eppler & Mengis, 2004).

Across all the domains where fatigue or related phenomena have been studied, fatigue has led to a negative outcome leading to decline in the productivity or use (Eppler & Mengis, 2004; Tarafdar et al., 2007) which ties in with the reported effect of stress and fatigue in clinical studies. However, in the context of social network use, given the unique social and hedonic gratifications met by these applications (Lampe et al., 2007; Park, Kee & Valenzuela, 2009), it is important to identify the specific effects such experiences may have on individual user activity so as to reveal the characteristics of the phenomenon.

Another related dimension which would enhance our understanding of the fatigue-activity links is the activity profile of the fatigued users and how this may differ from those that do not indicate any fatigue in the context. Activity profile in the context could be defined as a set of activity related factors consisting of the frequency or a count of activity and variety or the number of different types of use both of which point to two major dimensions of use (Shih & Venkatesh, 2004) along with the general trend traced by the activity over a period of time. These measures, when taken together, are expected to reveal a unique activity profile of fatigued users and throw further light on the phenomenon. Likewise, it would also help to verify if the activity profiles of the fatigued users exposed to each of the identified antecedents show any peculiarities as opposed to that of those who do not indicate any fatigue signs. Furthermore, it would be important to understand if fatigue would inevitably lead to a negative effect on user activity as has been reported in prior research. Given the peculiarities of the uses afforded by social networking applications and the fact that their use is voluntary to a large extent, these questions need to be investigated within the context. Answers to the above questions would help address the fuzziness surrounding the concept of social network fatigue and

aid a deeper understanding of the phenomenon which leads to the second research question and its sub questions.

RQ2: How does individual user activity within social networks reflect fatigue experiences in the context?

RQ2a: What is the typical activity profile of the fatigued user?

RQ2b: How is this different from that of a user who is not fatigued?

RQ2c: What are the specific effects of fatigue on user activity patterns?

1.3.3. RQ3 – Enumerating Characteristics

The characteristics of clinical fatigue as revealed from an analysis of the various available definitions and studies of the phenomenon (Walker & Avant, 1995) would serve to guide the identification of the unique antecedents and effects of social network fatigue, and through these, its characteristics. Clinically, fatigue is complex, subjective and experiential in nature (Hardy et al., 1997, Tiesinga et al., 1996; Yu et al., 2010). In terms of dimensionality, fatigue experience is multidimensional consisting of emotional, physiological, physical, behavioural as well as cognitive dimensions (Lewis & Wesley, 1992).

Additionally, temporal and severity elements of fatigue have been reported (Small & Lambe, 2000). Thus, the intensity of fatigue experiences varies along a continuum starting with a mild feeling of tiredness at one end, and progressing to a more persistent experience and a state of exhaustion or ‘burnout’ at the other, at which point the user withdraws from the stress causing environment (Walker, 1986). Fatigue is also known to

exist in many forms. Thus, physiological and psychological fatigue forms have been identified. Physiological fatigue is defined clinically as a “*loss of maximal force generating capacity during muscular activity*” (Lewis & Haller, 1991, p. S98).

Psychological fatigue has been defined as a state of weariness associated with stress and other intense emotional experiences (Shen et al., 2006). Fatigue is also classified as acute or chronic based on the duration for which the experience persists (Shen et al., 2006).

Specific indicators of fatigue have been reported as well as its prevalence amongst certain demographic groups such as women and service staff (Sharpe & Wilkis, 2002).

However, the subjectivity and experiential nature of the phenomenon need to be verified to see if it holds true in the context of social network use to stay socially connected. Questions such as whether these experiences manifest in multiple dimensions involving cognitive, psychological and emotional aspects as in the case of clinical and occupational fatigue, also need to be addressed. Additionally, it would be worthwhile to see if various fatigue forms emerge in the context, and if so, identify suitable bases for the classification of these forms. Besides, the question of whether fatigue experiences vary in intensity as does clinical fatigue needs to be investigated. Thus, in the context of social network use, an examination of how the various identified stressors impact on user activity will bring to light other aspects of this phenomenon that characterise it such as its general nature, dimensionality, variability of intensity, forms, prevalence, and indicators, all of which will enhance the conceptual understanding of the phenomenon. In other words, identification of the antecedents and the effects as well as an understanding of the interplay of these two factors across all user experiences and activity data gathered would

enable the characterisation of social network fatigue in general. The last of the research questions originates from this opportunity.

RQ3: What are the characteristics of ‘social network fatigue’?

1.4. Aim and Objective of Research

To summarize, the aim of the proposed research can be stated as: To understand fatigue in the context of social network use to stay socially connected (Figure 1-1). The objective is to conceptualize social network fatigue and thus the overarching research question would be:

How could social network fatigue be conceptualized?

The research objective is achieved through an identification of the unique factors that precede fatigue as well as the corresponding effects on user activity, an understanding of which would lead to an enumeration of the distinct characteristics of the phenomenon in the context. With the above aim, and guided by a cross disciplinary review of ‘fatigue’ related literature, this research seeks to answer the following research questions using an exploratory mixed methods study and aided by a quantitative analysis of user activities as well as qualitative analyses of in-depth interviews conducted amongst Facebook users:

RQ1: What are the antecedents of fatigue in the context of use of social networks to stay socially connected?

This question would investigate into the specific factors that precede fatigue in the context so as to provide conceptual clarity to the term ‘social network fatigue’.

RQ2: How does individual user activity within social networks reflect fatigue experiences in the context?

RQ2a: What is the typical activity profile of the fatigued user?

RQ2b: How is this different from that of a user who is not fatigued?

RQ2c: What are the specific effects of fatigue on user activity patterns?

The specific nature of the effect of fatigue on user activity within the social network environment would be addressed by these questions which would further improve the conceptual understanding of the term.

RQ3: What are the characteristics of 'social network fatigue'?

Thus, other aspects of the phenomenon that characterise social network fatigue besides the antecedents and effects unearthed, including its nature, dimensionality, variability, forms, prevalence and indicators would be enumerated from an examination of the interplay between the two factors with the help of the third research question.

Figure 1-1 Research Gap, Objective and Questions

1.5. Methodology

The study was done within the Facebook environment primarily due to its popularity as the leading social networking platform as well as its reach across a wide cross section of the global population of social network users (Brenner, 2013). According to available statistics, more than 60% of the social network market is owned by Facebook with its 1.5 billion user base (Kallas, 2013). Additionally, Facebook has been cited as a leading application used to stay socially connected with higher trust and closer relationships recorded amongst its network of users (Brenner, 2013).

A mixed methods approach was used for the research overall. Quantitative data were gathered primarily from user-submitted activity logs and demographic information of 158 Facebook users recruited through solicitations sent out using a purposive snow ball sampling approach. Qualitative data were gathered from email interviews conducted amongst the same sample simultaneously. The interview probed user experiences and emotions associated with Facebook usage that may have led to an alteration in the respondents' activities. These interview transcripts were analyzed qualitatively to verify if the user indicated fatigue at some stage of use and also to identify, aggregate and label the common antecedents of fatigue that emerged. Additionally, activity logs were quantitatively analyzed both individually and collectively with a view to generating and comparing summary statistics of frequency of use, variety of use, as well as the general trend traced over a six-month period. Individual activity traces were also generated for each participant to reveal any peculiar pattern that may be of interest. The demographic data as well as the activity related data were quantitatively analysed and independent T tests were used to test for differences in this data between fatigued users and those with no

indication of fatigue. Thus, a qualitative content analysis of user experiences was used in conjunction with the quantitative analyses done on activity and demographic data to address each of the research questions.

1.6. Contributions of Research

The major contribution of this research is towards the clarification of what has been a conceptually fuzzy term until now. This presents numerous benefits to all stakeholders within the domain of social networks including the users, developers and researchers of the domain. The findings are expected to result in both theoretical as well as practical contributions which will have an impact on the field of social network as a whole.

First, a conceptualisation of social network fatigue would enable the phenomenon to be better understood and this would present a significant, much needed pioneering step towards organized future research within the domain. This is particularly significant, since conceptual clarification is a pre-requisite of knowledge creation (Argyris, 1975) as well as the basis of academic discourse in any given domain. This in turn would guide the development and iterative refinement of appropriate scales that would enable an empirical assessment of the antecedents of social network fatigue as well as the severity of fatigue experiences felt by users, in the course of engaging with social networks.

Furthermore, conceptual distinctions between social network fatigue and other oft-reported stress related phenomena such as technostress and information fatigue could also be drawn. Thus, researchers would be able to gain a clearer understanding of the phenomenon and be able to distinguish it from other related terminologies such as

technostress and information overload at a conceptual level. This in turn would help them to investigate the behavioural dynamics of users within social networks and the resulting experiences more effectively. Conceptual clarification of the term would also encourage and facilitate academic discourse within the domain which would further enhance and improve the quality of research within the domain.

From a practical point of view, an understanding of the antecedents and effects of social network fatigue would aid the identification, assessment and management of these experiences where necessary and possible. Administrators and developers of social networking applications would be able to use the knowledge to anticipate and pre-empt the onset of fatigue or to introduce design features that could ease or manage the condition as and when it crops up. Industry watchers, businesses, management practitioners and media professionals would be presented with a systematic, testable means to analyse traffic and activity within such environments, and draw more meaningful inferences on usage trends. Social network users may be presented with strategies to better manage their social network related activities which in turn would ensure a more enjoyable experience within the environment.

1.7. Structure of the Report

The report is organized into five chapters. Chapter 1 outlines the background, scope and justification of the proposed research, the objectives of the research and the research questions, and provides an overview of the report organization. Chapter 2 covers the literature review, presenting a survey of fatigue literature from within the clinical as well as the domain of societal studies where fatigue as a phenomenon has been investigated

thoroughly so as to understand its characteristics. Fatigue and related research in the domain of computer mediated communication are also reviewed to identify related terminologies as well as the issues surrounding such research. Additionally social networking applications are reviewed with the intention of positioning this genre within the larger set of social media and identifying the generic uses afforded by them.

Chapter 3 details the overall approach to the proposed research describing the methodology adopted, the tools used for data collection and analysis, as well as the ethical considerations. Chapter 4 presents the analysis of the data collected as well as a discussion based on the findings, to arrive at an initial conceptual framework for ‘social network fatigue’. The various antecedents of social network fatigue are identified, and the effects on user activity discussed. Based on these, a high level model of social network fatigue as well as the characteristics of the phenomenon is derived and a working definition of the term presented. Chapter 5 presents a summary of the findings, highlights the implications of the results to stakeholders within the domain, enumerates limitations of the work, as well as outlines the broad objectives for proposed future work.

CHAPTER 2 LITERATURE REVIEW

This chapter is organized into four major sections. The first section reviews definitions, antecedents, effects and forms of fatigue so as to identify the characteristics of the phenomenon as it is described within the domains of nursing, clinical psychology, medicine, general health and psychosomatic research as well as in organizational and societal studies. This is followed by a discussion of research on fatigue and related themes outside of the clinical domain, specifically in technology mediated environments. The third section presents definitions and characteristics of social networks as well as related theories such as uses and gratifications derived from social network use. The section concludes with a survey of the top five social networking applications from within the domain with a view to identifying their generic uses as illustrated by the features and functionalities offered by each. A summary of the chapter is presented to conclude how the literature reviewed in each of the sections would be used to guide the research design and data analysis presented in Chapters 3 and 4 respectively.

2.1 Fatigue

Fatigue has remained an elusive concept (Chalder, Berelowitz, Pawlikowska, Watts, Wessley & Wright, 1993) even within the clinical domain where it has been studied extensively in the fields of medicine, nursing, psychosomatic research and psychology (Potempa et al., 1986) and outside of it (Hardy et al., 1997; Williamson & Friswell, 2013). Some of the ambiguity surrounding the concept has been attributed to its derivation from common colloquial language. In the context of nursing, the use of the term reflects and sometimes conflicts with colloquial usages. Thus, while effects such as

physical or mental weariness, unpleasant sensations and reduction in the individual's ability to function, are commonly shared in the nursing and colloquial uses; the latter views the concept as a transient experience, whereas the former takes the view that the condition may be more persistent or chronic. Additionally, the subjectivity of the experience attributed to individual of the term (Ream & Richardson, 1996).

In sum, the definition and measurement of fatigue have been surrounded by confusion, mystery and controversy for many years (Barofsky & Legro, 1991; Chalder et al., 1993; Christley, Duffy & Martin, 2012; Dittner, Wessley & Brown, 2004; David, Wessley, & Pelosi, 1988; Muscio, 1921; Ream & Richardson, 1996; Tiesinga, Theo, Dassen, Ruud, vanden Heuvel & Wim, 1999; Small & Lamb, 2000; Whitehead, 2009). Nevertheless, over the years, there have been several efforts at defining the term clinically, with some arguing that it is a symptom (Chalder et al., 1993; Ream & Richardson, 1996), while others maintaining that it may be a condition in itself (Sharpe, 2004) and a third group suggesting that it could be viewed as either (Dittner et al., 2004; Lewis & Wessley, 1992; Ridsdale et al., 1993). The difficulties in defining the concept (Shen et al., 2006) due to it being a 'subjective experience' (Dittner et al., 2004) and a 'complex phenomenon' (Shen et al., 2006) have also been cited. Additionally, fatigue has been defined in physiological and psychological terms, described as part of both somatic and psychiatric disorders, considered an outcome measure, or an intervening variable, and classified as an acute or chronic phenomenon (Barofsky & Legro, 1991). The challenges surrounding efforts at defining the concept are thus evident.

2.1.1 Definitions

According to the Oxford Dictionary of English Etymology (1966), the Latin word ‘fatigare’ from which the word ‘fatigue’ is derived means to “*exhaust as with riding or working to weary or harass*” or to tire. These origins support the current predominant description of the term as being related to exertion, which is reflected in several of the early dictionary definitions of the term.

Researchers within the clinical domains such as nursing and medicine have attempted to define fatigue as early as mid 1900’s. Thus, one of the earliest descriptions of fatigue appeared in the 1952 edition of the British Journal of Medicine, where the term has been used to indicate determinable changes in activity, attributed to continued activity (Anonymous, 1952). According to this definition, fatigue may be caused by activity and results in its deterioration or an alteration of its character (Anonymous, 1952). An allusion to a negative effect of fatigue experience on activity performed can be seen in this early description.

Over the years, there have been efforts at analysing the concept aimed at introducing some form of structure and rigour into the use of the term, a necessity within scientific disciplines. For instance, in the domain of nursing, concept analyses have been used to derive appropriate definitions of clinical fatigue that would aid diagnosis, treatment and care of fatigue (Potempa, et al., 1986; Ream & Richardson, 1996; Tiesinga et al., 1996). Thus, a widely used definition of fatigue comes from within the nursing domain where it has been defined as a “*subjective, unpleasant feeling of tiredness that has*

multiple dimensions and is influenced by circadian rhythm and other factors: It varies in duration, unpleasantness and intensity” (Piper et al., 1987, p. 19).

Many other researchers also acknowledge that a ‘feeling of tiredness’ or ‘exhaustion’ is the most predominant characteristic of fatigue (Dittner et al., 2004; Lewis & Wessley, 1992; Small & Lamb, 2000; Sharpe, 2004; Watanabe, Stewart, Jenkins, Bhugra & Furukawa, 2008). From a physiological point of view, fatigue is a “*loss of maximal force-generating capacity*” (Lewis & Haller, 1991, p. 99), which points to a decline in physical capabilities as fatigue sets in. The link between fatigue and drop in physical performance or activity has also been acknowledged by others (Ream & Richardson, 1996; Small & Lamb, 2000; Shen et al., 2006; Yu, et al., 2010). Fatigue is also reported to have a negative impact on social functioning as well as on the motivation to perform social and leisure activities (Small & Lamb, 2000; Yu, et al., 2010). In the context of occupational mental health, fatigue may be viewed as a response of vulnerable individuals to adverse job factors such as high demands or workload, and an inability to meet goals (Hardy et al., 1997).

Fatigue is also described as a subjective sensation varying along a continuum comprising emotional, behavioural and cognitive components (Hardy et al., 1997). Tiesinga et al. (1996) have similarly acknowledged the complex, multi-causal, multidimensional, non-specific and subjective nature of fatigue in nursing. The view has been shared by several other researchers within the domain (Ridsdale et al., 1993; Sharpe & Wilks, 2002; Yu, et al., 2010). Thus, the definition proposed by Ream and Richardson (1996) comes across as more comprehensive than that offered by Piper et al., (1987) in that it encompasses all of these elements: “*Fatigue is a subjective, unpleasant symptom*

which incorporates total body feelings ranging from tiredness to exhaustion creating an unrelenting overall condition which interferes with the individuals' ability to function to their normal capacity" (Ream & Richardson, 1996, p. 527). Potempa et al. (1986) also suggest that fatigue may be a perception resulting from a complex interplay of physical and psychological factors, which alludes to its subjective nature. The holistic nature of fatigue has also been highlighted by researchers in the domains of medicine (Anonymous, 1952; Tiesinga et al., 1996). Consequently, efforts at alleviating fatigue have been reportedly influenced by the individual's present condition, past history as well as by what he or she anticipates for the future (Anonymous, 1952).

2.1.2 Classification of Fatigue

Various approaches to classifying fatigue forms have been reported, of which, the most common ones are based on the dimensionality of the symptoms, or the duration for which the experience persists (Goetz, Koch, Hahr, Beer, Minder & Adler, 2005). Thus, physiological and psychological fatigue has been identified. Physiological fatigue is defined as a *"loss of maximal force generating capacity during muscular activity or a failure of the functional organ"* (Lewis & Haller, 1991, p. 99). Psychological fatigue, in contrast, has been defined as a state of weariness related to reduced motivation, and is reported to be associated with stress and other intense emotional experiences (Shen et al., 2006), such as depression (Potempa et al., 1986).

Based on the duration of experience reported, fatigue has been classified as 'acute' and 'chronic'. Although this classification has been widely used, the duration used as the basis for differentiating the latter from the former, remains non-standard. Thus, the

duration for which fatigue should persist before it can be classified as chronic can fall anywhere from three to six months or more (Brooks, et al., 2011; Sharpe; 2004; Tanaka & Watanabe, 2010; Watanabe et al., 2008). The other, less persistent variety of fatigue, or ‘acute’ fatigue, is caused by an identifiable insult or exertion and is relieved by appropriate rest. Acute fatigue generally affects otherwise healthy individuals and is perceived to be a normal protective function of the body (Shen et al., 2006). It has a rapid onset, is of short duration, and is usually linked with a single cause. After a rest, exercise or stress management, acute fatigue is usually alleviated. Overall, it has minor or minimal effects on daily activities or quality of life (Shen et al., 2006).

Chronic fatigue is a persistent, relapsing and longer lasting fatigue, typically not related to exertion (Watanabe et al., 2008). It primarily affects the clinically disordered population and is perceived as abnormal, unusual or excessive. Chronic fatigue is reportedly severe and brought on by acute physical or psychological stress such as serious injuries, surgery, pregnancy and labour, or even serious life events such as the loss of a loved one or a job (Prins, et al., 2006). It is said to be insidious or gradual and cumulative in onset (Shen et al., 2006), not relieved by usual restorative techniques such as rest (Watanabe et al., 2008), and having a significant negative effect on daily activities and quality of life (Shen et al., 2006). Thus, when acute, fatigue serves a protective function; when it is excessive or chronic, its function is said to be unknown (Piper et al., 1987). In sum, acute fatigue is a common, rather harmless and restorative phenomenon, whereas chronic fatigue results in personal and societal costs (Michielsen, Willemsen, Croon, De Vries & Van Heck, 2004).

In its extreme form, fatigue could result in ‘burnout’, characterized by increased feelings of emotional exhaustion leading to an eventual decision to quit the environment causing stress (Maslach & Jackson, 1981). Thus, burnout can be viewed as the extreme end of the ‘*burnout- engagement*’ continuum (Maslach & Leiter, 2005, p. 498), where according to Schaufeli et al., engagement can be defined as a “*positive fulfilling, work related state of mind characterized by vigour, dedication, and absorption* (as in Crawford, LePine & Rich, 2010, p. 834). Besides stress, the absence of positive motivators such as autonomy, variety and significance of tasks assigned, commitment, and moral purpose in work as well as inadequate support, may also bring about burnout (Friesen & Sarros, 1989). Absence of rewards and lack of autonomy have also been cited as factors inducing burnout (Jackson, Turner & Brief, 1987).

2.1.3 Fatigue-Related Factors and Consequences

The onset of fatigue is said to be detectable by certain signs such as alterations in the pattern of doing work or other signs not directly concerned with work, followed by a deterioration of performance (Anonymous, 1952). Additionally, increased energy requirements or an overwhelming amount of psychological, social or role demands have been cited as predominant factors related to fatigue (Tiesinga et al., 1999). For instance, fatigue symptoms have been said to reflect an imbalance amongst increasing educational, social and sports demands faced by adolescents (Viner & Christie, 2005). Work demands have been found to predict fatigue amongst National Health Service workers (Hardy et al., 1997). Cognitive anxiety (Potempa et al., 1986) as well as lifestyle factors, physical inactivity, and role expectations (Yu, et al., 2010) have been reported to induce fatigue amongst older patients. Ill-health, over-work or shift work, emotional problems such as

stress, tension and depression or family related issues have been cited as antecedents of fatigue (David et al., 1997; Ridsdale et al., 1993).

Fatigue is also related to the perceived difficulty or length of time expended on a task, self-efficacy or the conviction that one can successfully produce rewarding outcomes for oneself (Potempa et al., 1986) as well as boredom (Barofsky & Legro, 1991). Personal and psychological factors have been found to be associated with fatigue. 'Evaluative concerns' or concerns over mistakes and doubts about actions (Brooks et al., 2005) as well as neuroticism and introversion (Prins et al., 2006) have been associated with fatigue. Environment has been reported to influence fatigue experiences: For instance the, stress imposed by the physical context in the form of temperature and humidity (Anonymous, 1952) is said to have an effect on fatigue.

The multidimensionality of fatigue suggests that it may be made of several elements: Lewis and Wessley (1992) identify emotional, behavioural and cognitive dimensions of fatigue. Small and Lamb (2000) add temporal and severity elements to these dimensions. Fatigue has been found to vary along a continuum starting with a general feeling of tiredness at one end and progressing to a state of exhaustion (Lewis & Wessley, 1992). A severe state of fatigue called 'burnout' can be positioned at the extreme end of the spectrum. Burnout as a concept describes a condition of cynicism, depletion and withdrawal (Walker, 1986).

Consequently, fatigued individuals may be presented with lower physical capacity and energy levels (Potempa et al., 1986), poorer motivation to work, reduced memory, decreased attention and concentration, impaired thought processes, poorer coping ability,

increased irritability and diminished social functioning (Yu et al., 2010) at varying levels of intensity. Fatigue precipitates affective, behavioural and cognitive responses including irritability, inability to make decisions, inability to concentrate on daily tasks and forgetfulness (Ream & Richardson, 1996) as well as loss of interest in most activities (Potempa et al., 1986). Fatigue may also be characterized by behaviours such as complaining, being inactive and withdrawing (Potempa et al., 1986). Additionally, fatigue occurrence is reportedly higher amongst women than in men (David et al., 1990; Lewis & Wessley, 1992; Hardy et al., 1997; Pawlikowska et al., 1994; Patel, Kirkwood, Weiss, Pednekar, Fernandes, Pereira & Mabey, 2005; Sharpe & Wilks, 2002; Tiesinga et al., 1999). The higher fatigue incidence amongst women has been attributed to the higher psychological morbidity in women in the context of community related studies (Pawlikowska et al., 1994) and reported to be difficult to specify within the clinical context (David et al., 1990). Fatigue has also been reported to be higher amongst the older population (Eldadah, 2010).

2.1.4 Characteristics of Fatigue

A framework recommended by researchers to analyse abstract concepts, comprising of an exploration of origins, definitions and classification as well as other relevant attributes such as related factors and consequences (Paley, 1996; Walker & Avant, 1995) reviewed in the earlier sections has been used as a guide to understand the concept of fatigue as it is used in clinical and societal domains in the previous sections. Based on this approach, the following aspects that characterise fatigue have been identified (Table 2-1).

Thus, fatigue has been found to be used commonly in the colloquial *context* and in the domains of clinical studies as well as studies on the general population and organizational and work settings. The *nature* of the phenomenon such as its complexity makes it difficult to diagnose in several cases. Additionally, fatigue has been reported to be experiential and subjective and as following a certain biological cycle or a circadian rhythm in its occurrence.

There are multiple *dimensions* to fatigue involving physical, emotional, cognitive, behavioural, temporal and severity elements. Thus, fatigue could manifest and differentiate itself along one or more of these dimensions. The *intensity* of fatigue experiences has been found to vary along a continuum starting with a mild sensation of weariness and progressing to an extreme state of exhaustion when the user decides to quit the environment causing fatigue.

Several fatigue *forms* have been identified. Fatigue may be physiological when it manifests in the form of aches and pains or tiredness of a specific part of the body or psychological if it manifests in the form of a negative emotion such as disinterest. Based on duration for which the experience lasts, fatigue may be acute or short lived or chronic or relatively long lasting.

Antecedents of fatigue include a variety of factors consisting of pathological, physical or psychological conditions, neuroticism, introversion, monotony, boredom, mental work requiring close attention, increased energy requirements, high levels of exertion, cognitive anxiety, lack of support of individual goals, absence of rewards,

imbalance between multiple demands, overwhelming psychological, social and role demands, physical inactivity, self-efficacy as well as task difficulty and task duration.

The *prevalence* of fatigue is reported to be higher among women and the older population as also amongst those employed in the services and health sectors.

Consequently, several *indicators* of fatigue can be identified including, tiredness, exhaustion, discomfort, loss of interest, energy or enjoyment, inability to make decisions, reduced motivation, decreased attention and concentration, reduced memory, impaired thought processes, poor coping ability, irritability, withdrawal and complaining. The *effects* of fatigue include low performance and activity, low social functioning and quality of life, conflicts, reduced output and frequent mistakes.

Table 2-1 Characteristics of Fatigue

Aspect	Characteristic	Sources
Context	Colloquial; clinical; general population; work or organizational	Michelsen et al., 2004; Ream & Richardson, 1996
Nature	Complex; subjective; experiential; following circadian rhythms; negative; difficult to diagnose	Anonymous, 1952; Dittner et al., 2004; Piper, Lindsey & Dodd (1987); Ream & Richardson, 1996; Tiesinga et al., 1996; Yu et al., 2010
Dimensionality	Multiple: involving physical, emotional, cognitive, behavioural, temporal and severity elements	Hardy et al., 1997; Lewis & Wessley, 1992; Piper et al., 1987; Small & Lamb, 2000; Tiesinga et al., 1996
Intensity	Variable along a continuum between mild weariness and advancing to a state of extreme exhaustion.	Hardy et al., 1997; Lewis & Wessley, 2002; Piper et al., 1987; Ream & Richardson, 1996; Tiesinga et al., 1996; Yu, Lee & Man, 2010
Forms	Based on manifestation: physiological Vs. psychological; Based on duration: Chronic where experience lasts for 3-6 months or more and not relieved by rest Vs. Acute where the experience is shorter and relieved by rest; Burnout and quitting in an extreme form	Ream & Richardson, 1996; Shen et al; 2006; Watanabe et al, 2008

	Characteristic	Sources
Antecedents	Pathological, physical or psychological condition; neuroticism, introversion; monotony; boredom; mental work requiring close attention; increased energy requirements; high levels of exertion; cognitive anxiety; lack of support of individual goals; absence of rewards; imbalance between multiple demands; overwhelming psychological, social and role demands; physical inactivity; self-efficacy; task difficulty; task duration	Anonymous, 1952; David et al., 1990; Hardy et al., 1997; Potempa et al., 1986; Prins et al., 2006; Ream & Richardson, 1996; Shen et al., 2006; Tiesinga et al., 1996; Tiesinga et al., 1999, Viner & Christie, 2005; Yu, et al., 2010;
Prevalence	Higher amongst women and the older population; High among services and health care professionals	David et al., 1990; Eldadah, 2010; Hardy et al., 1997; Pawlikowska et al., 1994; Patel et al., 2005; Sharpe & Wilks, 2002; Tiesinga et al., 1999; Yu et al., 2010
Indicators	Tiredness, exhaustion, discomfort; loss of interest, energy or enjoyment; inability to make decisions; reduced motivation; decreased attention and concentration; reduced memory; impaired thought processes; poor coping ability; irritability; withdrawal; complaining	Anonymous, 1952; Dittney, Wessley & Brown, 2004; Hardy et al., 1997; Lewis & Wessley, 1992; Potempa et al., 1986; Sharpe 2004; Small & Lamb, 2000; Viner & Christie, 2005; Watanabe et al., 2008; Yu et al., 2010
Effects	Low performance; low activity; low social functioning; low quality of life; conflict; reduced output; frequent mistakes	Ream & Richardson, 1996; Shen et al., 2006; Small & Lamb, 2000

2.2 Fatigue Themes in Technology Mediated Environments

The portability of the concept of fatigue to contexts outside of the home domains where it has been extensively investigated is evidenced in its use in the field of computer mediated environments, especially in studies focussed on information related fatigue (Edmunds & Morris, 2000; Oppenheim, 1997), and technostress (Ayyagiri et al., 2011; Brod, 1984; Champion, 1988; Coklar & Sahin, 2011). In addition, research delving into negative user emotions and behaviours such as those that look into technology addiction, decline and disengagement within online communities (Beenen, Ling, Wang, Chang, Frankowski, Resnick & Kraut, 2004; Hew 2009; Iriberry & Leroy, 2009), and within massively multiplayer gaming communities (Ducheneaut, Yee, Nickell & Moore, 2007; Smith, Sharma & Hooper, 2006) have been reported. Research on physical fatigue or the tiring of specific organs such as the eyes or limbs through repeated use in the context of use of Information Technology and Systems, from a user interface design perspective has also been reported (Matsushita et al., 2006; Hamam et al., 2010). However, given the experiential nature of the concept of clinical fatigue, which is the main focus of this research, such literature is not reviewed.

The following sections review work done within technology mediated environments that may be related to negative emotions or user behaviours within, with a view to identifying the limitations of such studies.

2.2.1 Information Fatigue and Related Research

In the late 1990s, with the proliferation of the Internet and Internet based systems, professionals were faced with the problem of ‘information overload’ which described a

situation where the subject was overwhelmed by too much information: This in turn led to the user feeling stressed and resulting in ‘information fatigue’. The problem was further amplified with the rapid growth and improved accessibility of web based information (Ho & Tang, 2001). From the above definitions it is apparent that there are features of information fatigue that may be shared in common with social network fatigue as these networks primarily serve as conduits of information. As such, the findings of research in this area are relevant to the understanding of the phenomenon.

One of the earliest researches in the area was commissioned by Reuters in 1996 when they launched an international survey focused on this problem faced by executives (Oppenheim, 1997). The coinage of the term “*Information Fatigue Syndrome*” (IFS) was credited to this pioneering work (Oppenheim, 1997). The features of this syndrome were feelings of stress arising out of information systems use and a pessimistic outlook towards the information situation brought about by the receiving of enormous amounts of unsolicited information. Additionally, users felt stressed as a result of a perception that large amounts of information may be needed to make timely decisions and to perform effectively. The pervasive and ubiquitous connectivity offered by the Internet was the major cause of the problem. The consequences included distraction from the main purpose of work, delay or stoppage of effective decision making, tension between colleagues, loss of job satisfaction, ill health, cancelation of social activities or feeling too tired for leisure activities, and damages to personal relationships (Oppenheim, 1997).

Edmunds and Morris (2000) acknowledge the inconsistency in the available definitions of the term ‘information overload’. For instance, one available definition describes the problem as occurring when large amounts and high rates of information

begin to act like noise. The rate of receiving of information was too high for the receiver to process it efficiently without distraction and stress. According to Klapp, this increased errors and other costs, rendering the information ineffective (as cited in Edmunds & Morris, 2000). A second one describes it as the point where there is so much information that it is no longer possible to effectively use it (Edmunds & Morris, 2000). Edmunds and Morris (2000) describe information fatigue as “*an experience arising from having too much information which uses too much of the users’ time, causing them to feel stressed which in turn affects their decision making: Concurrent with the phenomena, is the anxiety generated by worrying whether an important piece of information has been missed in the volume of material that is being processed*” (p. 19).

Several terms which describe or focus on the various aspects of the problem could be gathered from the literature: For instance the use of the terms ‘infoglut’ (Koski, 2001), ‘communication overload’ (Eppler & Mengis, 2004) and ‘data smog’ (Edmunds & Morris, 2000) appears to focus on the content related aspects such as its volume and quality. The terms ‘cognitive overload’, ‘sensory overload’, ‘knowledge overload’ and ‘information fatigue’ (Eppler & Mengis, 2004) as well as ‘analysis paralysis’ appear to focus on the experiential aspect of the phenomena from the perspective of the user. The term ‘information fatigue syndrome’ (Oppenheim, 1997), views the concept as a diagnosable condition. Although the terms ‘information overload’ and ‘information fatigue’ are used interchangeably, conceptually, the former could be viewed as a problem leading to the latter, based on the characteristics of fatigue reviewed in Section 2.1.

In this context, however, causes of fatigue are focused around information and its use. Fatigue sets in due to the exposure to too much information, causing feelings of

stress, confusion, pressure and anxiety (Edmunds & Morris, 2000) and resulting in low motivation to continue the use of the resource. The major causes of fatigue can be found in factors pertaining to: Information itself, the person receiving, processing or communicating the information, the tasks or processes involved, the organizational design and the supporting information technology (Eppler & Mengis, 2004). Consequently, at an individual level, a lack of perspective, cognitive strain or stress, lower job satisfaction and analysis paralysis may result: Performance may be affected in terms of the accuracy and speed (Eppler & Mengis, 2004).

2.2.2 *Technostress*

Technostress has been defined as the “inability to cope with new computer technologies in a healthy manner” (Brod, 1984, p. 16). It is used to describe the stress experienced by end-users as a result of use of ICTs (Coklar & Sahin, 2011; Ragu-Nathan et al., 2008; Sahin & Coklar, 2009; Salanova & Schaufeli, 2008) or a “sub dimension of stress and the direct or indirect effect of technology use on human behaviour” (Coklar & Sahin, 2001, p. 172). As such, stress is a factor shared in common with clinical fatigue and possibly with social network fatigue although in this instance the stress has been defined as arising out of technology use.

Weil and Rosen (1995) define the term in a much broader way so as to include “any negative impact on attitudes, thoughts, behaviours or psychology caused directly or indirectly by technology” (p. 96). Thus, other related terms such as computer anxiety, techno-anxiety, technophobia, cyberphobia, computerphobia, computer stress, technology overload, and any other negative attitudes towards any aspect of technology can be

considered technostress (Wang, Shu & Tu, 2008) although each of these terms has also been used independently and conceptually differentiated from one another (Champion, 1988; Powell, 2013).

For instance, the term techno-anxiety has been used to indicate an ailment caused by technostress (Coklar & Sahin, 2011) or as one of its symptoms and has been distinguished from the latter conceptually (Champion, 1988). Technology overload has been defined as “additional technology tools crowding out productivity instead of enhancing it”, of which information overload has been identified as a component (Karr-Wisniewski & Lu, 2010, p. 1061). Information overload has also been reported to be a stressor or stress causing factor inducing technostress (Thomée, Eklöf, Gustafsson, Nilsson & Hagberg, 2007) much the same way as it brings about information fatigue (Oppenheim, 1997). Computer anxiety is termed a negative emotional state experienced by an individual when he or she is using a computer or computer equipment (Bozionelos, 2001) and is characterised by feelings of fear, stress, resistance to learning and a perceived lack of control over one’s work life (Korobili, Togia & Malliari, 2010). The term computerphobia characterised by a fear of technology also has been used to refer to negative attitudes towards computers (Jay, 1981). Although a closely related term, technophobia, appears to suggest a broader application of the concept to technology other than computers, the two are often used interchangeably (Anthony, Clarke & Anderson, 2000).

Panic, anxiety, resistance, mental fatigue, intolerance and perfectionism have been cited as symptoms of technostress as with technophobia (Tu et al., 2005). Besides the above psychological symptoms, physiological and physical symptoms of technostress

such as headaches as well as hand and back aches have been identified (Tu et al., 2005). A feeling of lack of control over work or personal lives has also been reported as a cognitive symptom of technostress (Korobili et al., 2010). Thus, as in the case of clinical fatigue, technostress also appears to have psychological, physical, physiological and cognitive manifestations. Thus, given that social networks in this context are technology mediated and fatigue has been reported to be a result of technostress, factors relating to the phenomenon may be useful in explaining and understanding social network fatigue.

Five components of technostress have been identified namely: (1) Techno-overload, or the perceived increased demands made by technology to work faster and more (2) Techno-invasion, or the perception that technology forces user to change work and life habits and that it invades into personal life (3) Techno-complexity or the perception that technology is difficult to understand and use and can be threatening to job security (4) Techno-insecurity or the perception that technological knowledge sharing is hindered due to the fear of being replaced and (5) Techno-uncertainty (Tarafdar et al., 2007) or the perception that there are constant new developments and resulting changes to technology. The resulting ‘work overload’, perceived invasion of personal lives or ‘presenteeism’ as well as the dynamic characteristics of technologies such as their pace of change, have been found to induce stress in users (Ayyagiri, et al., 2011).

As such, in technostress, the primary factors inducing stress are centred on the technology itself. Additionally, other factors include: environmental factors such as inappropriate or inadequate working conditions, social factors such as conflicts and power struggles, and work and role changes as well as the anxiety arising out of these (Coklar & Sahin, 2011). Technostress has been found to impact on productivity inversely (Tarafdar

et al., 2007; Wang et al., 2008). Additionally, in an organizational context, technostress has been reported to adversely affect the individual's job satisfaction as well as commitment to the organization (Reghunathan et al., 2008).

2.2.3 *Addiction Related Research*

An extreme but related phenomenon termed addiction or excessive or problematic use has been identified in relation to the use of specific technologies such as the Internet and mobile phones. Similar use patterns have also been investigated in the context of engagement with media and online games (Charlton & Danforth, 2007; Khang, Kim & Kim, 2013; Liu & Peng, 2009; Nazir, 2012; Park, 2005; Ng & Wiemer-Hastings, 2005; Rice 2000; Salehan & Negahban, 2013; Wan & Chiou 2006). Given that excessive use (Ng & Wiemer-Hastings, 2005), a factor linked to fatigue (Potempa et al., 1986; Tiesinga et al., 1996; Shen et al., 2006), leads to addictive behaviour, an examination of this genre of research might be helpful in explaining certain types of user behaviours within social networks that could lead to fatigue.

Internet addiction has been described as a proclivity towards compulsive use of the Internet that interferes with one's ability to lead a normal life (Rice, 2000). Addiction is also explained as oddly high dependence (Park, 2005) on a particular technology or device and is characterised by repetitive acts with a total disregard for the consequences (Salehan & Negahban, 2013). Addictive behaviour in the context of technology use is often obsessive and compulsive and characterised by symptoms such as tolerance, withdrawal, craving, negative life consequences and escapism (Ng & Wiemer-Hastings, 2005) as reflected in a neglect of work, family and other commitments.

Shyness or the fear to meet people or a discomfort arising out of an anxiety of being evaluated by others and consequently being rejected has been associated with addictive tendencies on the Internet (Chak & Leung, 2004). Additionally, internal locus of control or the extent to which one believes that one has control over one's life or self-regulation or one's ability to direct his or her own behaviour has been found to be negatively associated with addiction in the context of Internet use (Chak & Leung, 2004), massively multiplayer online games (Liu & Peng, 2009) as well as media use (Khang et al., 2013).

Negative life consequences of addictive behaviour have been verified. In particular, addictive gaming has been found to induce fatigue amongst players (Liu & Peng, 2009). Other consequences such as time management problems as well as problems in school have been reported in the context of mobile addiction (Park, 2005). Interestingly, however, research in the context of massively multiplayer online role playing games (MMORPGs) report that even with heavy overuse, the players did not exhibit typical patterns of addiction such as feeling irritated when not given a chance to play (Ng & Wiemer-Hastings, 2005). This finding redefines addictive behaviour in the context of such games.

2.3 Virtual Communities

2.3.1 Definition of Virtual Communities

‘Virtual communities’ are communities formed through technology mediated communications, forged for exchange of ideas and information (Constant, Keisler & Sproull, 1994). These communities nurture ‘social capital’ which Cohen and Prusak

(2001, p. 4) define as “*consisting of the stock of active connections among people: the trust, mutual understanding and shared values and behaviours that bind the members of human networks and communities and make cooperative action possible.*” Other benefits of participation in virtual communities include information exchange, social support, social interaction or the opportunity to meet people and build friendships, and be entertained (Sutanto, Kankanhalli & Tan, 2008). Additionally, these communities provide users with a spatial and temporal independence through the time and location flexibility they offer. They also provide permanency through supporting editing and reflection on responses, storage and retrieval of messages, and through establishment of permanent social presence through photographs, profiles and archived messages (Iriberry & Leroy, 2009). Online communities serve various types of user needs categorized as: (1) Purposive or accomplishing a predetermined purpose, be it informational (need for information) or instrumental (task related), (2) Entertainment or fun and relaxation through interaction, (3) Self-discovery or understanding and deepening of one’s self through social interactions and (4) Social enhancement or gaining value through acceptance and recognition by peers (Sutanto et al., 2008, p. 14). As such, they could be considered a larger set to which social networks belong.

Virtual communities go through various stages of evolution over time (Iriberry & Leroy, 2009). Five stages of evolution of online communities have been identified, each of which representing the uniquely dynamic needs of the members and the community as a whole. The first stage or the *inception* stage is when the idea for the online community emerges along with a vision for the community and some rules for behaviour and participation. This is followed by the *creation* stage when the technological components

are put in place and the members begin to interact as well as encourage others to join in. The *growth* stage is characterized by the emergence of a common culture, vocabulary, etiquette and a group identity besides distinct member roles: In the *maturity* stage, more explicit formal regulations, rewards, subgroups and structured discussions become the norm; the strength of the community improves through trust and lasting relationships that emerge. *Death* is brought on when the community loses momentum and member interest, and faces poor participation, lack of quality content, unorganized contributions and transient membership (Iriberry & Leroy, 2009). This stage could thus be viewed as one where a number of members experience fatigue and burnout and eventually quit the environment. The peculiarity of the dynamic evolution of the community is that new members join in and old members whose needs are satisfied, or whose initial excitement over joining has worn down, leave the community from time to time: When this happens, the community evolves and the cycle of interaction repeats (Iriberry & Leroy, 2009).

2.3.2 Research on Growth of Virtual Communities and Participation within

Much of the research efforts in the field have focussed on factors that make online communities work, a contrarian view that would throw light on the potential detriments to their growth through a negation of the findings. A multi-dimensional view of the determinants of success of virtual communities has been made available: Thus, at a community level, effects of sense of purpose, etiquette and integrated rituals (Kim, Kim & Nam, 2010) in nurturing a respectful environment where members can express their ideas freely without fear of being harassed or criticised (Hew, 2009) have been reported. Rapid response to queries, high quality of content, diversity or heterogeneity of members, (Hew, 2009; Raban, Moldovan & Jones, 2010) as well as a ‘critical mass’ or a perceived

sufficiency of number of people and levels of activity that make it attractive or worthwhile for members (Raban et al., 2010; Zhang & Hiltz, 2003) were found to be factors that improve participation within online communities. Consequently, absence of any of these factors could lead to user fatigue and may result in a decline of the community.

Members are also reported to be satisfied and participate better in communities when their salient identities are confirmed by others within the community (Swann, Polzer, Seyle & Ko, 2004). Awareness of, or familiarization with, other participants in the community is also reported to be a determinant of engagement (O'Brien & Toms, 2008). A subjective feeling of closeness and belonging may be reported by engaged users within a thriving community (Rotman, Golbeck & Preece, 2009). Common ground formation with the help of shared history and shared interpretive framework is found to improve the meaning of interaction for members within virtual communities where user generated media are shared (Cook & Teasley, 2011). Once again, if these conditions are not met, a decline in user engagement may result, some of which may be attributable to fatigue.

At an individual level, motivations (Koh, Kim & Bock, 2007) including explicit acknowledgment of members' uniqueness of opinions (Beenen et al., 2004) and willingness to share (Hew, 2009) determine success of virtual communities. Social motivations such as social norms, ties and interpersonal trust also have a significant effect on commitment to a virtual community (Wang & Chen, 2012), which in turn, ensure its growth. It can be deduced therefore that absence of any of the above may lead to user fatigue and disengagement within the community. Additionally, extrinsic, rather than intrinsic motivation is reported to play a more important role in participant's satisfaction

in virtual communities which predicts their sustained involvement in the environment (Chou, Min, Chang & Lin, 2010).

At an infrastructure level, the importance of improving privacy protection to enable higher levels of trust and anonymity for increased engagement has been highlighted (Leimeister, Ebner & Krcmar, 2004). Anonymity for participants has been cited as a major determinant of success of online communities: It facilitates ‘*deindividuation*’ defined as a “*psychological state of decreased self-evaluation, leading to dis-inhibited and anti-normative behaviour and arousal when individuals join crowds or large groups: The resulting feeling of anonymity leads to diminished awareness of self and individuality which in turn reduces self-restraint and normative regulation of behaviour making them feel free to say what they want*” (Miura & Shinohara, 2005, pp. 95-96). Additionally, ease of use, reliability and accessibility of the platform (Hew, 2009) and opportunity for chance encounters between members online facilitated by technology (O’Brien & Toms, 2008) have also been cited as determinants of success of online communities. Once again through a negation of these findings it can be concluded that a lack in any of the above platform related factors would dissuade the users from engaging with the community.

The most commonly observed behaviour within virtual communities is a silent participation termed ‘lurking’. On the surface lurking appears to share characteristics with fatigued behaviour due to two reasons. First, the apparent manifestation of both is low level of visible activity. Second, both behaviours have negative connotations attached to them conventionally. Kollock and Smith (as cited in Nonnecke & Preece, 2000) describe lurkers as free-riders; ie. non-contributing resource taking members.

However, the ‘selfish’, ‘free-rider’ view of the lurker has subsequently been corrected (Preece, Nonnecke & Andrews, 2004). A more modern view of lurking takes the stance that it only becomes a problem when there is little or no posting within a community (Preece et al., 2004) and leads to the decline of the virtual community. A positive spin on the term has also been brought to light through the introduction of the concept of the ‘active lurker’ (Takahashi, Fujimoto & Yamasaki 2003). The term describes members who, although demonstrating lurking behaviour within the community in terms of levels of activity, have strong and wide influence outside of it, and actively engage in propagating ideas from within.

2.3.3 Decline, Disengagement and Related Research

While the studies cited above provide cues regarding the factors that might cause the decline of online communities brought about by member fatigue, direct investigative efforts into the phenomena that deal with the question of why people leave online communities or get fatigued in such environments, have been comparatively fewer or combined with studies that investigated success factors. For instance, Iriberry and Leroy (2009) cite factors that shortened the growth stage of a community as part of a larger study on determinants of success traced through the community life cycle.

Thus, undersupply of content, poor participation, unorganized contributions, transient membership, members with weak ties, unwillingness to share information, lack of anonymity concerns about privacy and safety, shyness about public posting and time limitations were found to shorten the life cycle of communities (Iriberry & Leroy, 2009). Similarly, inability to make time commitment to interact, technological difficulties or

overload experienced in other areas of lives have also been cited as factors leading to disengagement or members' lack of investment in activities within online communities (O'Brien & Toms, 2008). Additionally, scepticism towards the platform (Utz, 2000) as well as fear of criticism, lack of intrinsic motivation, feelings of inconvenience and lack of time (Iriberri, 2005) have been reported to inhibit participation.

In the context of communities engaged in instant messaging, Birnholtz (2010) reported a study on adoption, adaption and abandonment amongst young adults. The study reported that users felt that they left themselves too available and therefore vulnerable to interruption due to personal information shared widely. This resulted in the users finding it hard to end conversations that were started, which in turn interfered with their ability to get work done (Birnholtz, 2010). Kazmer (2004) investigated student's disengagement and departure from online learning communities after graduation and reported that the changes in location and time of online activity resulted in a change in the interaction habits.

In another study of detractors of engagement within chat groups, Miura and Shinohara (2005) reported the effect of conversation congestion or a situation where multiple overlapping threads run simultaneously on cognitive overload and fatigue experienced by members. Furthermore, excessively short intervals between remarks overloaded the participants; although congestion at moderate density had a positive effect (Miura & Shinohara, 2005). Brandtzaeg and Heim (2007) cite several reasons for members being less active or terminating online community memberships including lack of interesting people or friends attending, low content quality, low usability, harassment

and bullying, time consuming or isolating experiences, low trust and over commercialization.

More recently, in the context of social networks, recent research on the reasons and characteristics of ‘unfollow’ behaviour in Twitter (Kwak, Chun & Moon, 2011), was reported. The act of ‘unfollowing’ represents a broken relationship in Twitter. Thus, the behaviour is a strong manifestation of loss of interest in an entity that originally appealed to the user, which gives it a negative character. The following characteristics of ‘unfollow’ behaviour were cited: The frequency of occurrence was high, although mostly singular and often clustered; it was less likely to be with long standing followees, and was not related to the number of followees the user may have (Kwak et al., 2011).

Additionally a one-way relationship was most likely to be unfollowed than a reciprocal relationship; if a user retweets a followee’s tweet he or she was found to be less likely to unfollow the followee. Unfollow was also found to be more likely with followees who do not share common relationships and therefore have weak tie strengths with the follower (Kwak et al., 2011). The following motivations were reported for unfollow behaviour: (1) A feeling of being overwhelmed at the sheer volumes of bursts tweets which implied that too many tweets from a single followee arriving back-to-back close in time pushing other followee’s tweets out of the timeline, (2) tweeting of uninteresting topics although not necessarily of poor quality, (3) tweets covering mundane details of daily life, (4) re-tweeting or forwarding of random topics, advertisements and automated messages (Kwak et al., 2011).

2.3.4 *Research within Gaming Communities*

The social aspect of online gaming has been brought to limelight in the recent years with the emergence of complex online social communities where people could meet and play. The trend was led by multi-user dungeons (MUDs) and eventually taken to new heights by massively multiplayer online games or MMOGs (Ducheneaut et al., 2007). Thus, research that investigated interaction patterns and identified factors that make successful gaming environments that nurture social interactions have been undertaken (Ducheneaut & Moore, 2004; Ducheneaut, Yee, Nickell & Moore, 2006; Smith, et al., 2006).

Demands of complex social dynamics within MMOGs increases the amount of mental energy required to process a given amount of information: A cognitive overload problem results. The unwanted effects of the problem include repeated ‘death’ of the player in the gaming environment, resulting in an inability on the part of the player to attend to some actions and missing of important information (Ang, Zaphiris & Mahmood, 2007). Nevertheless, some amount of cognitive overload appeared to have brought in some challenge for the users and made the interactions more meaningful (Ang et al., 2007).

Factors that explain the success of gaming communities (Ducheneaut et al., 2007) or the retention within (Debeauvais, Schiano & Ducheneaut, 2011) have also been reported. This includes factors such as the ability of the platform to provide an “*audience*”, “*a sense of social presence*” and a “*spectacle*” (Ducheneaut et al., 2007, p.

413) to users. Debeauvais et al. (2011) also noted that the players' existing level of involvement in the platform defines their motivations for continuing there.

2.3.5 Problems with Fatigue Related Research within Virtual Communities

Unlike in the home domains comprising of clinical, organizational and societal studies, efforts at defining and conceptualizing fatigue and related concepts have not been recorded in contexts outside. Thus, while scales and inventory sets that could be used to empirically assess fatigue are used and widely tested in these home domains (Chalder et al., 1993; Dittner et al., 2004; Elliott, Shewchuk, Hagglund, Rybarczyk & Harkins, 1996; Leitner, 1991; Maslach & Jackson, 1981), such efforts have been non-standard within contexts where these concepts have been ported over to such as in information fatigue related (Edmunds & Morris, 2004; Koski, 2004; Eppler & Mengis, 2004) and technostress related research (Ayyagiri et al., 2011; Brod, 1984; Champion, 1988; Coklar & Sahin, 2011).

Specifically, in the context of virtual communities, fatigue as such has yet to be studied although the theme may be implicit in some of the causes cited for disengagement within. For instance, where fatigued behaviour is implied such as in decline and disengagement related research (Birnholtz, 2010; Brandtzaeg & Heim 2007; Iriberry & Leroy, 2009; Kazmer 2004; Kwak et al., 2010; Miura & Shinohara, 2005), there have been no efforts at conceptually defining the phenomenon as the theme itself was not the main focus in these studies. Thus numerous gaps in fatigue related research within virtual communities can be identified.

First, there has been a trend towards investigating positive experiences rather than deterrents that keep the members from getting involved within the community (Cook & Teasley, 2011; Hew, 2009; Swann et al., 2004; Zhang & Hiltz, 2003). The problem with such an approach is that often when studies fail to focus on the negative aspects of a given phenomenon and treat it as a side issue, valuable rich information may be overlooked or neglected.

Second, the experiential, subjective and holistic nature of fatigue as well as its multidimensionality, (Anonymous, 1952; Piper et al., 1987; Tiesinga et al., 1996) have often been found neglected in research that focused on causes that led to a decline in use or engagement within communities (Iriberry & Leroy, 2009). Once again, this results in important characteristics of fatigue such as the variable effects of possible fatigue antecedents on the individual experiences as well as the differences with which such experiences may impact user behaviour cannot be identified.

Third, in the context of virtual communities, research commonly takes on an empirical quantitative approach, attempting some form of aggregation, combining and quantifying user activities (Backstrom, Kumar, Marlow, Novak & Tomkins, 2008; Brandtzaeg & Heim, 2008; Beenen et al., 2003), on one hand and, attitudes, perceptions and other measurable parameters (Chou et al., 2009; Hew 2009; Wang & Chen, 2012) on the other so as to assess the effects of the latter on the former. Qualitative analyses at an individual unit level have been relatively fewer in number, with studies that assess individual user experiences restricted mostly to research within gaming communities (Ang et al., 2006). This highlights the significance of what appears to be an important missing link, the need to investigate negative experiences of individual users in the

context of use of virtual communities, so that negative behaviours within such communities may be better explained and understood.

2.4 Social Networks

2.4.1 *Definition and Characteristics*

‘Social Networks’ (SN) have been described as structures of “*relationships among friends and relatives with whom we share information and favours on a regular basis*” (Jackson, 2005). Wellman’s definition of social networks incorporates a technological dimension into the concept: “*When a computer connects people, it is a social network. Just as a computer network is a set of machines connected by a set of cables, a social network is a set of people, organizations or other social entities connected by a set of socially meaningful relationships*” (Wellman, 1997, p.197).

The characteristics of such networks include the meaningful connections amongst the constituent entities and its role as a conduit of information amongst the connected members. Although often used interchangeably, the terms “*social networking*” from “*social network*” have been differentiated: The former emphasizes relationship initiation, often between strangers (boyd & Ellison, 2008, p.2), whereas the latter implies maintenance of existing links. Social networks can be considered a special type of virtual communities where socialising activities are enabled by features and functionalities embedded into the platforms that support the structure. These include searching and adding friends that enable social networking, sharing content via links, pictures and videos and via status updates, besides playing social games and interacting on a one-to-one or one-to-many mode so as to allow maintenance of the network.

The basis of the community is the “*Gemeinschaft*” (Abfalter, Zaglia & Mueller, 2012) or a spontaneous organic social relationship characterized by strong reciprocal bonds of sentiment and kinship: Thus mutuality or reciprocity of bonds shared is an important basis of social networks. A sense of community in the context can be described as one of a sense of belonging experienced by the members, a feeling that members matter to one another and to the group, and a shared faith that members’ needs will be met through their commitment to be together (McMillan, 1986). This is characterised by four elements: (1) *Spirit* that alludes to a spark of friendship that becomes a spirit of sense of community and extends beyond a mere membership, (2) *Trust* that comes out of knowing what each member could expect from the others in the community and the norms, rules and laws that are in place, (3) *Trade* or the ways and means in which members derive benefits from one another and the community and, (4) *Art* or a shared history that becomes the community’s story in a symbolized form which is made of significant events that become part of its collective heritage (McMillan, 1996).

Thus, more than the capabilities offered by the technological components and the usability of such networks, social motives of the members have been reported to determine the level of participation as well as commitment towards the community in such networks (Wang & Chen, 2012). Additionally, network externalities or the increase in value of the network as the number of users increases as well as social norms or values and conventions facilitate member participation in community activities increasing interpersonal trust and commitment to the community (Wang & Chen, 2012).

As presented in Section 2.4.1, social networks may be physical (Jackson, 2005) or virtual or existing on a network (Wellman, 1997). Since both definitions focus on people

and their relationships, many of the theories reviewed may apply to both physical networks as well as virtual networks with differences peculiar to the channels used to establish the links. It should be noted that in the context of this thesis, any reference to the term ‘social network’ is taken as virtual social networks in line with the Wellman definition.

2.4.2 Social Network Goals, Motivations, Uses and Gratifications

A discussion of goals is important in the context of this research as fatigue has been known to have links with whether user goals are met within a given environment. Thus users who feel their goals are met within an environment may be less susceptible to fatigue than those who feel otherwise (Hardy et al., 1997). Consequently it is important to examine the uses and gratifications of social networks so that fatigue could be understood better in relation with these motivations for use.

Two types of user goals have been identified for social network use: (1) “*To promote the self*” goal characterised by a ‘broadcasting’ or a ‘one-to-many’ interaction where the flow is primarily outwards from one, and (2) a “*maintain relationships*” goal characterised by a responsive or communicating behaviour or one-to-few interaction with reciprocal exchanges (Underwood, Kerlin & Farrington-Flint, 2011, p. 663). Furthermore, users have been known to turn to social networks for enjoyment, maintaining and developing relationships, social and emotional support, and information seeking and sharing (Baek, Holton, Harp & Yaschur, 2011; Kim, Sohn & Choi, 2011; Lin & Lu, 2011).

Social network use has been explained with the help of the ‘uses and gratifications’ theory which refers to the how and why of the use of the platform (Lampe, Ellison & Steinfield, 2007) and links a specific use afforded by social networks to the satisfaction the users gain from such use. Two of the major social uses of such networks have been ‘social searching’ or searching for information about offline contacts, and ‘social browsing’ or the act of checking out the background of newly acquired online contacts possibly with the intention of developing them into offline contacts (Lampe et al., 2007). Additionally, a ‘surveillance’ function or “*tracking actions, beliefs and interests*” of contacts (Lampe et al., 2007, p. 167; Komito, 2011) has also been served by social networks.

In addition to the social gratifications above, cognitive and hedonic gratifications derived from social network use have been identified. For instance, content gratifications (Joinson, 2008) are met when social networks are perceived as valuable sources of information on a wide array of topics ranging from gossip and news to special interests including hobbies and product recommendations as well as perspectives and advice. Information seeking as well as entertainment gratifications of social networks has also been observed (Park et al., 2009). Specifically amongst young users, entertainment gratifications were found to be one of the most common motives for use (Special & Li-Barger, 2012) besides affection and pleasure gratifications (Auter, 2007). Users have also been known to turn to social networks for enjoyment, maintaining and developing relationships, social and emotional support and information seeking and sharing (Kim et al., 2011; Lin & Lu, 2011; Baek et al., 2011). The following motives were also reported for the use of social networks: To maintain existing relationships, to meet new people, to

project a fun cool image, to make oneself popular, to pass time, to express or present oneself, for learning, for task management and for activism (Hew, 2011). However, the level of satisfaction derived from use of social networks has been found to be related to levels of self disclosure (Special & Li-Barber, 2012). Amongst the younger users, the levels of control afforded have been reported to play an important role in determining engagement and use (Auter, 2007; Madell & Muncer, 2007).

Gratifications derived from social network use have also been grouped as content related gratifications and experience related or process gratifications (Joinson, 2008; Song, Larose, Eastin & Lin, 2004). According to Swanson, content gratifications are derived from the use of the content to gain knowledge or understanding, whereas process gratifications result from the experience of consuming the content rather than from the content itself (as cited in Song et al., 2004).

Thus, from a content perspective, social networks can be a valuable source of information and knowledge on a wide range of topics from news, product and service recommendations and advice, perspectives, feedback on available products and service and such. Nevertheless, the value comes from the participants' willingness to share within the community, which in turn is determined by effective social interaction which has been found to be an important determinant of knowledge contributing behaviour within communities (Chiu, Hsu & Wang, 2006; Lin & Bhattacharjee, 2009; Sussman & Siegal, 2003).

Additionally, social network use has been found to vary according to the stage of maturity of use (Lampe et al., 2008) as well as personality traits of the user including neuroticism, extraversion, openness and sociability (Hughes, Rowe, Batey & Lee, 2012).

2.4.3 Social Networking Applications

Social networking applications can be considered a subset of the larger domain of social media defined as “*a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of ‘user generated content’*” (Kaplan & Haenlein, 2010, p. 61). This suggests that a variety of applications other than social networking sites, including blogs, virtual social worlds, virtual game worlds, content communities and collaborative communities fall within the larger domain of social media. Blogs are mostly text based, web and date stamped sites, presented in reverse chronological order, content communities are formed to share media content such as books, videos or photos, virtual game worlds are platforms that replicate a three dimensional environment in which users can appear in the form of personalized avatars and interact with each other as they would in real life and virtual social worlds allow inhabitants to choose their behaviours more freely with the help of avatars (Kaplan & Haenlein, 2010).

Social networking applications, which provide the context for this research, emerge as a distinct subset of social media characterised by relatively high support for identity and presence needs of the user (Kietzmann, Hermkens, McCarthy & Silvestre, 2011). Thus social networks afford opportunities for users to interact socially with one another, while assuming a persona closest to their real self as opposed to virtual worlds. In

doing so, network members present or reveal themselves, communicate with others, exchange distribute and receive content, know about other accessible users, associate or relate themselves with others as well as identify the standing of self and others within the community as well as form communities and sub-communities. (Kietzmann et al., 2011).

Several social networking applications have been launched in the recent years, some of which are general interest such as Facebook, Twitter and Google Plus, whereas others can be considered special interest catering to groups of people who share a common interest or a purpose such as professional linking as in the case of LinkedIn. The top 5 social networking websites in the domain based on traffic consolidated by Alexa Global Traffic (“Top 15 Most Popular Social Networking Sites”, 2013) are as follows: Facebook, Twitter, LinkedIn, Google Plus and Pinterest. According to recent reports, Facebook enjoys 45% of the social network market share (Cohen, 2013).

Facebook is currently the world’s most trafficked social networking site with over 1.5 billion active users (“Facebook Fact Sheet”, 2013) currently. According to Alexa, it is the second most trafficked site after Google (“The Top 500 sites on the Web”, 2013) and the world’s top ranked social networking site. Facebook centres on friend related activity such as adding and searching for friends as well as sharing within a community: As such, the primary objective is to enable users to stay socially connected. The site currently enjoys 60% of the share of social network market (Kallas, 2013). With its emphasis on social linking, Facebook is credited with popularising the unconventional verb use of the word ‘friend’ to mean an activity of befriending. One of the popular features offered is the ‘status’ update that allows users to broadcast their current thoughts via a text box which appears on the users’ wall. The ‘wall’ also shows all links, photos or

videos and materials recently posted by other members of the user's network. The unique features of Facebook include the facility to broadcast thoughts via the status updates using a one-to-many communication as well as to share links to news, jokes, photos or videos through posts. The site also supports one-to-one communication via private messages and chats besides searching for friends, and classifying them under lists and groups. Friends are added through a reciprocal process: Once a user sends a friend request to another, the request has to be approved before the two can be made friends. A unidirectional 'following' enables users to subscribe to the public feeds of any user without being added in as a friend.

Twitter, founded in 2006, is a social networking and micro blogging service that enables users to broadcast and receive messages known as 'tweets' restricted to up to 140 characters. Friends in Twitter are called 'followers'. Twitter allows one way relationship without the need for a 'followee' to approve of the request for linking. The brevity of the messages sent out along with the ease of following as well as the ability to link to external sites and pictures make the site popular amongst users. Twitter is ranked the second most popular social networking site (Top 15 Most Popular Social Networking Sites", 2013) with over 218 million active users as of October 2013 (Edwards, 2013). Tweets can be broadcast and received via the Twitter website, text messages, RSS and third party applications such as Tweetie, Twitterific and such. A common use of Twitter is also to 'retweet' a tweet received that a user may find interesting so that it gets broadcast to users within his sub networks. Retweets is a form of sharing of propagation of interesting information or messages.

LinkedIn is a business-related social networking site mainly used for professional networking. At present, LinkedIn reports a user base of 259 million worldwide (Anders, 2013). The site is predominantly patronised by white collar workers who fall within the high income high educated demographics 64% of whom come from outside of the United States (Smith, 2013). The main aim of the site is to enable professionals, employers and agencies to link up with each other so that they may seek opportunities for employment, establish collaborations as well as exchange information. The site allows members to create and edit profiles from which they can create a 'snapshot' or a business card which includes basic information such as name, location, title, education, and links to the personal website, in the form of a virtual business card. Grouping functions are made available which allow the users to discuss things in the privacy of smaller groups as well as set permissions to restrict the actions allowed on the account. Additionally, the site allows members to follow companies which give them early access to updates, job openings, and announcements.

Google Plus was launched in September 2011 after a 12-week invitation- only trial period (Halliday, 2011) with the aim of addressing the design concerns of its most popular social networking site and competitor, Facebook. Google Plus attempts to overcome the limitations of the flat friends-list afforded by Facebook which makes segregation of social interactions difficult, thereby hoping to provide more private small group communications at various levels of connection. With its 'circles' that allow a clear segregation and grouping of the types of associates the users have, Google Plus hopes to appease a segment of the social network users who were unhappy with the one-dimensional way Facebook treated contacts which failed to afford any form of social compartmentalization.

One of the major features of the site are ‘circles’ which allow social compartmentalization more effectively than in the groups and lists features provided by Facebook. Circles enable users to organize network members into groups for sharing: Users may be able to view a list of people in a user's collection of circles, they cannot view the names of those circles. Thus feature allows a great amount of flexibility in the way the user chooses to organize his contacts and manage the privacy of his interactions.

Pinterest calls itself a “*virtual pinboard to organize and share the things you love*” and aims to “*connect everyone in the world through the 'things' they find interesting*” (About Pinterest, 2013). The latest user base of Pinterest stands at around 70 million users worldwide (Smith, 2013). Connecting people based on shared tastes and interests is the unique proposition of the application. Thus, browsing of pinboards created by other users is a major feature offered by the application. The key activity unique to the application is ‘pinning’ and ‘repinning’. The application is unique in that it is image based and works like a virtual scrap book of pictures, such as clothing, accessories, fashion, recipes, events and such that appeal to the masses.

Of the applications reviewed above, those emphasizing on the social links of the masses are of special interest in the context of this research. Due to their appeal to users of any demographic group, such applications also tend to have wider user bases. Thus, applications that cater to special interest groups such as LinkedIn that targets job seekers, Twitter that attracts news and information seekers and Pinterest that caters to special interest groups would not be the most appropriate platforms to launch the study.

On the other hand, Facebook due to its primary focus on social linking emerges as a suitable platform for investigation. Furthermore, Facebook has been identified as high in value in terms of its affordance of identity, presence, relationships and conversations (Kietzmann et al., 2011) all of which point to its higher affordance of social linking which appeals to masses and not just to any one group of users. As such, opportunities for fatigue arising out of social interactions would be higher for applications such as Facebook as compared to others in the genre which may be focused on specific groups of users such as professionals or enthusiasts of a particular hobby. In the recent years Facebook fatigue has been cited as a phenomenon of interest in media reports on social network use (Snow, 2011; Van Grove, 2013; Weinstein, 2013). All of the above pitches Facebook as an appropriate platform for the study of social network fatigue.

2.4.4 Generic Uses of Social Networking Applications

In view of the context within which ‘fatigue’ is to be conceptualized, namely social network use to stay socially connected, it is important to identify the generic uses of the major social networking applications reviewed above. Thus, although each of the applications has its unique identity in terms of addressing a niche need or a niche group of social network users, there are several generic uses that apply to most of the applications in the genre.

The following generic uses could be identified based on the features presented above and based on the reported uses of virtual communities presented by Lampe et al. (2007), Iriberry and Leroy (2009) and Sutanto et al. (2008): (1) Self presentation, or the building of a public persona projected through the profile or one’s personal space within

the network which presents a self-projected image of the user, (2) Broadcasting of personal updates such as one's thoughts or location to a wide audience such as ones' contacts or the general public, (3) Interacting on a one- to- one level through responding to individual posts or initiating exchanges with individual contacts, (4) Sharing, including posting general interest items such as videos, audio clips, jokes, news links and external links, (5) Networking, or extending contact lists through adding friends or creating and participating in sub-groups, and (6) Entertainment, including using of external links and applications designed to support individual interests such as social readers, social games and such social applications as shown in Table 2-2:

Table 2-2 Generic Uses of Popular Social Networking Applications

Use	Description	Affordance in SN applications
Self Presentation	Building a public persona projected through the profile which presents a self-projected image of the user.	Profiles, walls, snapshots and boards
Broadcast of updates	Public airing of one's thoughts or location to a wide audience such as ones' contacts or the general public	Status updates. Check-ins, tweets, streams, pins
Interacting	One- to- one exchanges through responding to individual posts or initiating exchanges with individual contacts	Likes, comments, chats, messages, hangouts
Sharing	Posting general interest items such as videos, audio clips, jokes, news links and external links with groups or the general public	Links, posts, retweets, repins
Networking	Extending contact lists through adding friends or creating and participating in sub-groups	Friends, groups, lists, events, circles, following
Entertainment	Use of external links and applications designed to support individual interests such as social readers, social games and social applications.	Games, social applications

2.4.5. *Use – Diffusion Theory*

Level of use of social networks is a parameter the research is interested in. The use-diffusion model proposed by Shih & Venkatesh (2000) provides a suitable framework that helps to assess these with the help of tangible parameters which would describe use or activity in the context. The two dimensions of use that feature in the model are: (1) rate or frequency of use which indicates how often the user uses a given system or product, as well as (2) variety of use which measures the different types of uses for which the given system or product (Shih & Venkatesh, 2000) is employed. The first dimension provides the extent of dependence the user has on the environment whereas the second factor is related to the user's familiarity and level of comfort with the features of the given system or product.

As such, the theory has been used to study diffusion and use in contexts such as marketing and systems, as it provides a meaningful frame for the assessment of extent of use. For instance, Ruiz-Mercado, Masera, Zamora & Smith (2011) have developed a model of adoption of cook stoves based on the use-diffusion theory. Choudrie and Dwivedi (2004) have used the theory to study consumer adoption of broadband technologies. Brown (2008) and Venkatesh (2006) have used the same to study the diffusion of household technologies.

2.5 Theoretical Frame Guiding Data Collection and Analysis

The review of fatigue literature covered in Section 2.1 especially Sections 2.1.1 thru 2.1.3 helped to provide a high level idea of what constitutes fatigue as well as to identify its multiple antecedents and effects. This was used in two ways: First, this

provided a theoretical base which was used to understand fatigue experiences and identify the stressors or factors that precede fatigue- antecedents – as well as the effect such experiences have on user activity. Thus, this section helped to directly address RQ1 that delve into the antecedents and RQ2 that investigated how user activity within social networks reflected fatigue experiences in part.

Section 2.1.4 which presents a summary and integration of fatigue literature to provide an overview in the form of the characteristics of fatigue in general provided a theoretical frame within which a similar generalization could be attempted for social network fatigue which addressed RQ3. Besides, the effects and indicators of fatigue as well as its forms and variability identified in this exercise also pointed to a need to investigate and assess how the users' activity profile would look like in support of RQ2a. It also provided the necessary pointers to test how the activity profiles of fatigued users would look like and how these varied from those that were not fatigued in support of RQ2b and RQ2c. The findings related to prevalence of fatigue amongst certain demographics such as women and the elderly (Eldadah, 2010; Pawlikowska et al., 1994) also helped to guide the tests on whether any such demographic differences could be significant in the case of social network fatigue. The problem was addressed by RQ2b and further strengthened RQ2 so as to provide deeper insights into the links of social network fatigue with user activity.

Additionally, Section 2.1 also provided useful pointers that helped with the design of an appropriate research methodology that would help to address the research objective of how social network fatigue could be conceptualized (covered in Chapter 3). For instance, one of the most significant findings of the review presented in Section 1, which

would guide the methodology outlined in the following chapter, is the close link between exertion or activity levels and fatigue experiences. High levels of exertion and activity have been cited as major antecedents of fatigue (Potempa et al., 1986; Tiesinga et al., 1996; Shen et al., 2006); additionally reduced activity levels have been found to be a consequence of fatigue (Ream & Richardson, 1996; Small & Lamb, 2000; Shen et al., 2006). Thus, a dip in activity levels may indicate fatigue; this may also be a result of fatigue. It follows therefore that an analysis of activity indicators such as the frequency of use, variety of use as well as the general trend traced over a period of time may be an ideal starting point and a mandatory component of an exploratory study of this nature. The demographic differences reported in fatigue experiences amongst women (David et al., 1999) and the elderly (Eldadah, 2010) also point to a possibility that such differences may exist amongst fatigued social network users as well. Thus, these findings inspired the incorporation of simple statistical tests to check for differences between fatigued and the not fatigued group of user as part of the research design. These also provided a frame for analysing the data gathered as detailed in Chapter 3.

Section 2.2 that reviews fatigue related themes in computer mediated environment establishes the theoretical frame within which social network fatigue can be examined as these terms appear to share commonalities or links with the central theme of this research namely social network fatigue. However, given the unique peculiarities of the context against which this research is set, namely use of social networks to stay socially connected, it was assumed that there would be distinct differences between these concepts as identified under the section.

Thus, for one, the review of these themes enables social network fatigue to be sufficiently distinguished from these concepts that are relatively well researched. This in turn, was expected to enhance the conceptual clarity of the term and provide a more detailed understanding of the phenomenon as a whole thus addressing the overall research objective of conceptualizing social network fatigue. Additionally, a review of fatigue related themes within computer mediated environments also provided useful theoretical bases for understanding some of the antecedents and effects identified in the course of data analysis and thus further aided in answering RQs 1 and 2.

Section 2.3 and 2.4 review theories that review the concepts related to of virtual communities in general and social networks in particular as well as the theories related to their use and dynamics, so as to cover the what, how and why of these topics that are contextual to the research. This was essential to generate a useful conceptual framework using which the relevant information regarding use patterns, user experiences as well as user activities could be gathered, analysed, understood and explained so as to answer RQs 1 and 2 more comprehensively.

For instance., the theories community growth and disengagement (Birnholtz, 2010; Brandtzaeg & Heim, 2007; Iriberry & Leroy, 2009; Kwak et al., 2011; Miura & Shinohara, 2005) as well as those that explain user goals, motivations, and uses and gratifications in the context of social networks (Baek et al., 2011; Kim et al., 2011; Lampe et al., 2007; Lampe et al., 2008; Sutanto et al., 2008; Underwood et al., 2011), have been covered in Sections 2.3.2, 2.3.3, 2.3.4 as well as 2.4.2 so as to establish theoretical bases for interpreting the experiences and behaviours of social network users gathered through

the interviews and activity traces. Thus, these theories would guide data analysis as well as help to explain some of the observations recorded.

The survey of social network applications in Section 2.4.3 helped in enumerating the generic uses supported by these as well as identify the specific focus of each which provides a meaningful frame of interpreting the user activities within, besides establishing the commonalities shared across the platforms. From a methodological stand point, this also helped in making an appropriate selection of a platform on which the research could be conducted which has been justified in Chapter 3. Like-wise the use –diffusion theory provides a frame to guide the assessment of the levels of use of social networks by the user. Thus, the literature review was mapped to the research questions as illustrated in Figure 2-1.

Figure 2-1 Mapping of Literature Reviewed to Research Questions

CHAPTER 3 METHODOLOGY

This chapter describes the overall research design adopted, before going on to present and justify the choice of the social network environment used for the study. Details of how the participants were sampled and recruited are outlined next. Additionally, the chapter presents the method used to recruit the participants and describes how each of the two major tools employed for data collection, namely email interview and activity logs, was used to address the research questions. This is followed by a description of how the quantitative data gathered using the user submitted activity logs were analysed so as to derive the activity related indicators. The steps used to analyse the qualitative data extracted from the interview transcripts in tandem with the individual activity traces and indicators derived are discussed next. Ethical considerations that guided the overall approach towards data collection and analyses are presented towards the end.

3.1. Research Design

A mixed methods design that combines the use of quantitative and qualitative data with quantitative and qualitative analyses was used for the research. The approach, thus, involved integration of quantitative and qualitative data in a single study (Creswell & Plano Clark, 2007). Individual day-to-day activity within the environment chosen for research, Facebook in this instance, gathered over a six-month period via individually solicited activity log files provided the required quantitative data. Usage patterns as well as experiences and emotions undergone by the user in the course of use, recorded in a qualitative email interview, captured the relevant qualitative data. Quantitative analyses

were performed on user activities involving the statistical averages of factors such as frequency or the count of user activity on a day-to-day basis, and variety or the types of activities performed by the user, as well as the general activity trend traced over a six-month period. This was integrated with a qualitative analysis of user experiences and emotions so as to derive comprehensive insight into fatigue experiences and behaviours. Although multi-methods research design as such is not entirely new, a methodology that combines a quantitative analysis of user activity with qualitative analysis of fatigue experiences in the context of social network use is unique and has not been used in any previously reported studies within the domain, to the best of the researcher's knowledge.

To begin with, the research leaned heavily on a multidisciplinary literature review leading to an identification of the characteristics of the concept of 'fatigue' as it has come to be used in clinical and occupational domains where it has been investigated extensively. From the review, the characteristics of clinical fatigue that may provide cues regarding identifiable features of social network fatigue such as antecedents and effects were distilled. The fatigue literature reviewed, thus, served to guide the selection and design of the two main data collection tools used, namely the activity logs that captured user activity on Facebook as well as the interview covering experiences and emotions associated with its use.

Additionally, the literature review also framed the qualitative analysis of the interview transcripts as well as the quantitative analysis of the activity data gathered through the logs. The analyses served to provide insights into fatigue experiences in the context of social network use to stay socially connected. A classification of the various factors that precede fatigue or the antecedents was done and the corresponding effects of

such experiences on user activity identified addressing RQs 1 and 2. An examination of the interplay of antecedents and effects of social network fatigue across all cases examined led to an enumeration of the characteristics of ‘social network fatigue’ thus addressing RQ3. Thus, the overall research design followed a sequence as shown in Figure 3-1:

Figure 3-1 Research Design

3.2. Choice of Mixed Methods

A mixed methods approach was employed in this instance with the use of two main data collection tools: An activity log which provided a chronological listing of user activity on Facebook over time as well as a qualitative interview. A mixed method research design is a procedure for collecting, analysing and mixing both quantitative and qualitative methods in a single study (Creswell & Plano Clark, 2007). The approach is used when the use of both quantitative and qualitative methods in combination provides a better understanding of the research problem than either method by itself. Hence, such an approach goes beyond collecting two distinct strands of research - quantitative and qualitative - to merging, integrating, linking or embedding the two strands (Creswell, 2008). It is especially effective when the researcher seeks to build on the strengths of both quantitative and qualitative data, or when one type of data alone is not sufficient to address the research questions (Creswell, 2008).

In this context, the research used a parallel mixed methods design (Figure 3-1), where qualitative and quantitative methods were carried out separately but concurrently (Hesse-Bieber, 2010). This was done because the unexplored and open nature of the overarching research objective - that of conceptualizing social network fatigue - warranted the use of both types of data in combination as well as in parallel, so that deeper insights into fatigue as it manifests in the context could be gained through addressing each of the set research questions. Thus, for instance, individual interview transcripts were used in combination with the corresponding activity trace for a deeper understanding of fatigue experiences and antecedents so as to address RQ1 across all 158 cases analysed.

In the case of the sub questions of RQ2 that investigated how individual user activity within the environment reflected fatigue, the two sets of data were used both in parallel or independently as well as in conjunction, where one set was used to derive a more comprehensive understanding of the other. Thus, in the case of RQ2a that investigated the typical activity profile of the fatigued user, such a profile was derived with the help of an independent quantitative analysis of user activity in terms of the frequency and variety of use as well as the overall trend traced over the six-month period.

For RQ2b, the consolidated profile of the fatigued group of users was compared against that of those users with no indication of fatigue as indicated in the interview transcripts and tested for any significant differences using independent T Tests. In the case of RQ2c, the effects of the antecedents on user activity were identified through an analysis of the interview alongside the activity trace and activity indicators. RQ3, which attempted to enumerate the general characteristics of social network fatigue, was addressed with the help of RQs 1 and 2 and as such, leaned on both sets of data used in conjunction.

Additionally, the individual activity traces and indicators also guided further probing into possible reasons why individual user experiences recorded in the interview transcripts, could or could not explain the peculiarities depicted in the activity trace or activity related indicators, as and when the need arose. This in turn provided valuable insights into the possible activity-fatigue links in the context, in order to address RQ2 more comprehensively. Thus, the mixing of the two methods allowed the researcher to incorporate a 'complementarity' (Hess-Bieber, 2010) which ensured a triangulation (Creswell 2008) of the findings. As a result, a more comprehensive picture of social

network fatigue emerged, supported not only by descriptions of user experiences and associated emotions, but also by individual activity patterns and indicators.

3.3. Choice of Environment for Research

The review of social networking applications in Section 2.6.3 presents the generic uses of all applications in the category besides highlighting the unique characteristics of each of the top five in the category. Thus, each of the platforms appears to have a niche even, when they enable linking of users through the affordances of the generic uses offered with the help of specific built-in features (Table 2-2). Consequently, Facebook and Google Plus emerge as platforms that focus on social links and interactions as opposed to LinkedIn which focuses on professional linking. Pinterest, the newer and the last of the list supports all the generic uses, yet has a focus on objects of interest and hence aims to link people who share common interests. Twitter, although only next to Facebook in terms of the current available rankings (Cohen, 2013), focuses on a broadcast form of sharing more than on one-to-one interactions. Additionally, the brevity of the tweets, the main means of sharing in Twitter, renders this a powerful yet restricted platform.

Thus amongst the fare, Facebook and Google Plus emerge as the better choice of environment due to their focus on social connections and given the emphasis of the research on fatigue in the context of use of social networks to stay socially connected. Of the two, Facebook becomes a clear choice for two reasons: First, as the leading social networking platform it claims almost 60% of the social networking market share (Kallas, 2013). This ensures that there is a considerable overlap between users of Facebook and those of the others in genre: As such a study amongst Facebook users may thus be easily

applicable to users of other applications in the genre. Additionally, Facebook has been in use since 2004 and has developed a mature user base as large as 1.5 billion globally (“Facebook Fact Sheet”, 2013), as opposed to Google Plus which has been added to this class of applications in 2010 (Rox, 2012).

3.4. Recruitment and Sampling of Participants

Facebook users who have been subscribed to the platform for a period of not less than one year were recruited through solicitations (Appendix A) distributed via notice boards and word of mouth reference, mailing lists and Facebook groups during the period December 2012 to November 2013. A period of minimum one year of Facebook use was set so as to ensure that all selected users are familiar with the use of the application. This was important as the users needed some time to get used to the features and functionalities afforded by the application and to have had the opportunity to be exposed to the various possible stressors within the environment. Since the interview focused on experiences with Facebook use, it was essential that a minimum time frame of use be set so as to ensure that the respondents had gained enough experiences that could be shared. This also preempted the problem of respondents not answering the open ended questions about experiences citing reasons of their inexperience with the application to a certain extent.

From each of the contact points obtained through these sources, additional referrals were sought through a purposive snowball sampling technique. Snowball sampling is defined as *“a non-probabilistic form of sampling in which persons initially chosen for the sample are used as informants to locate other persons having necessary characteristics making them eligible for the sample”* (Bailey, 1994, p. 438). The

conceptual basis of snowball sampling is that members of a special population, Facebook users in this instance, are familiar with others in that population (Penrod, Preston, Cain & Starks, 2003). The method entails identifying an initial number of subgroups from whom the requisite data are gathered and who then serve as ‘seeds’ to refer or identify other potential respondents (Magnani, Sabin, Saidel & Heckathorn, 2005). The seeds themselves may be chosen via convenience sampling (Magnani et al., 2005) or targeted sampling (Watters & Biernacki, 1989). As such, this sampling method is widely used in formative research such as the one reported (Magnani et al., 2005).

Although perceived as a traditional technique used for accessing hidden or hard to reach populations (Penrod et al., 2003), Biernacki & Waldorf (1981) assert that the method is applicable in sociological endeavours since it “*allows for sampling of natural interactional units*”. For example, Browne (2005) has used snowball sampling method on known user’s social networks to access hard to reach population of women. Such techniques are also reported to facilitate meeting the evaluative criteria of appropriateness and adequacy of sampling in a systematic and strategic manner.

Chain referral techniques are generally considered appropriate for studies that require the use of multiple sources of participants in order to maximize variation within social networks (Penrod et al., 2003). Thus, given the networked nature of Facebook, such a referral method was identified as the most effective means of reaching out to a large number of users belonging to different age groups effectively.

Alternate sampling methods such as cluster sampling as well quota sampling both of which establish parameters for the number of individuals of each group to be included

in the study were considered as possible methods to ensure a fair distribution of the sample amongst the different user groups. However, given the dynamism as well as the difficulty in obtaining a consistent set of user demographics of Facebook, this was difficult to apply. Additionally, considerable amount of apriori knowledge about the phenomenon under investigation (Watters & Biernacki, 1989) – fatigue in this context - would be required before these approaches can be applied which in this case was not available. Since the overall objective of the research was set as understanding fatigue experiences and given the fact that the primary approach to analysis was qualitative, the use of these methods was discounted.

Snowball sampling has been largely criticised for the shared similarities amongst referrals which in turn results in ‘isolates’ or unique cases being ignored (Atkinson & Flint, 2001) which brings in a certain amount of bias into the research. One way to ensure this concern is addressed is with the help of larger sample sizes (Pollok & Schlitz, 1988). However, the self-propelling nature of the snowball sampling method (Biernacki & Waldorf, 1981) was controlled to a large extent to ensure coverage of the various user groups according to available Facebook user demographics information. This was done with the help of multiple contact points or seeds to start the snowballing. This step also helped to reduce the problem of homogeneity of respondents (Atkinson & Flint, 2001) built into this approach to sampling (Biernacki & Waldorf, 1981). Thus, elements of targeted sampling (Watters & Biernacki, 1989) in which collected data are constantly analyzed to adjust the recruitment and sampling process so as to ensure a fair distribution amongst all age and gender groups were incorporated into the sampling process.

The sample size was determined on the basis of the methods used for data collection and analysis as well as the objectives set for research. Thus, for the qualitative component most studies are based on samples sizes of between 30 and 60 (Bernard, 2000; Morse, 1994), or under 50 (Ritchie, Lewis & Elam, 2003). The use of smaller samples especially for qualitative content analysis has been supported by the finding that after the first 20 interview transcripts are analyzed, little new information emerges out of any additional ones (Green & Thorogood, 2009) due to what is termed ‘theoretical saturation’ (Guest, Bunce & Johnson, 2006). However, in this instance, the use of quantitative analysis on the activity logs necessitated that the sample size is also adequate to support such an analysis (Gay, 1996). Thus, a target of 150 respondents was set so as to satisfy the requirements of both types of analyses that were to be performed on the data set. This sample size also addressed the concern of homogeneity of the participants brought about by the snowballing technique used (Pollok & Schlitz, 1988).

From amongst those contacted, those who expressed interest were emailed an Informed Consent (Appendix B) which detailed the terms and conditions of participation in accordance with the guidelines outlined by the Institutional Review Board at the researcher’s institution. The participants who consented via email were given a Participant Information Sheet (Appendix C) and were asked to submit their Facebook activity logs for the preceding six consecutive months. The logs, auto generated by Facebook, record user activity chronologically and are made available to all users upon clicking open a button labelled ‘activity log’, on his or her ‘timeline’.

Detailed instructions on how to compile the activity logs were sent along with a macro enabled excel template (Appendix D) into which the logs could be copied.

Additionally, they were to complete an email interview that covered the demographics and social network usage patterns besides experiences and emotions associated with Facebook use (Appendix E). A \$30 SGD incentive was offered as compensation to each participant who completed the requirements of the study, for the time and resource involved in formatting and preparing the activity log as well as completing the e-mail interview.

Particulars of those who responded to solicitations were logged in an excel sheet to enable tracking and follow-ups. The dates on which the users were contacted were recorded in the spreadsheet along with alternative contacts such as their alternate email ids and telephone numbers, where available. As and when the activity logs or the interview were returned, the spreadsheet was updated. Follow-up emails were sent out when the respondent failed to respond within two weeks. The monetary incentive was used to encourage participation and to acknowledge the time and effort that had to be invested in the completion of the tasks. A total of 253 Facebook users responded to solicitations from which 158 completed sets of data could be gathered. The completion rate thus stood at a comfortable 63%. One hundred and fifty eight Facebook users were thus recruited in this manner

3.5. Activity Collection and Analysis

3.5.1. Activity Logs and Activity-Related Indicators

Fatigue literature establishes the close link shared between fatigue experiences and activity levels (Table 2-1). Specifically, activity levels have been found to explain and indicate fatigue due to its relationship with exertion (Ream & Richardson, 1996; Small &

Lamb, 2000; Shen et al., 2006; Yu et al., 2010). In other words, a dip in activity levels is a major observable consequence of fatigue as well as its major indicator. Thus, a theoretically justifiable link exists between activity levels and fatigue experiences which remained to be verified in the context of social network use. This provided a theoretical basis for employing indicators related to user activity to assess manifestation of fatigue experiences.

User activity on Facebook is automatically logged and stored online and is available to each user on his or her timeline upon clicking open a button labelled ‘activity log’. Access to these logs is restricted to individual users, and as such, the only means of obtaining copies of the logs is through direct submissions from the users themselves. The log records individual user activity chronologically with the help of a brief label that describes the type of activity performed such as “X commented on a link” along with a description of the activity in the form of the actual content of the comment. A date stamp provides the exact date on which the activity was performed (Figure 3-2):

Figure 3-2 Facebook Activity Log

As such, various activity-related indicators can be derived from these logs when tracked and aggregated over a period of time. For instance, the log can be considered a reliable indicator of the participant's usage of Facebook since it provides information about how often the user engages in any activity within the environment, over a given period of time, or the frequency of use as well as what types of activity he or she engages in, or the variety (E.g.: like, comment, share). According to the use-diffusion theory these two parameters could be useful determinants of the 'level of use' of a product or system in any context (Shih & Venkatesh, 2000). As such, the use-diffusion model measures level of use with the help of two dimensions of use: (1) *frequency* or a count of how often the user uses a system or a product and (2), *variety* or the different types of uses for which the

user uses the same. In this instance, the frequency of use is determined by a day-to-day count of activities and the variety is determined by a count of the number of types of uses to which the user puts Facebook. The first dimension may be related to the extent of dependence the user has on the environment in terms of the time spent, whereas the second aspect may be linked to the depth of user's familiarity and comfort with the features embedded within the environment. Thus, use levels of individual participants within the Facebook environment were assessed using the frequency and variety of use.

Additionally, user activity when tracked over a six-month period allowed a trace to be generated (Figure 3-3) with the help of the visualization software Tableau Public 7.0 (<http://www.tableausoftware.com>), which depicted any unusual pattern such as a trough which may be indicative of a period of non-use, or a peak indicative of an unusual spurt of activity. A general trend in user activity over the period indicated the direction in which the user activity has been moving overall: Rising, falling or steady. The slope of the trend line provided a means to assess the extent to which a trend is being followed: For instance, the size of the slope would indicate how steeply the user's activity has been moving, whereas the sign of the slope – positive or negative - pointed to the direction of movement - i.e. rising or falling, during the six-month period. Thus, along with the frequency and variety indicators, the slope of the trend line was also used to create an activity profile of the user.

Figure 3-3 Activity Trace with Trend Line

At an individual user level, the aggregation and analysis of levels of use enabled a categorisation of the users based on frequency and variety of use, which in turn provided a frame within which individual interview transcripts could be analysed and understood. Additionally, the trend indicated by the trace also provided an additional activity related dimension for analysis. Besides, troughs or peaks indicated on an activity trace also served as useful guides for further probes and investigations during the follow-up stage of data collection.

3.5.2. Activity Analysis

Activity analysis can be viewed as a special instance of content analysis defined in its original form as an “*objective systematic and quantitative description of the manifest content of communication*” (Berelson, 1952, p.18) which in this instance, is a brief description of the activity performed by the Facebook user gathered from the user submitted activity logs. The analysis started with assigning numeric codes to individual

users followed by the coding of the day-to-day activities recorded in the submitted activity log using an axial coding scheme for each of the types of activities that appeared in the log such as ‘comment’, ‘like’, ‘update status’ and such. For instance, the description “X commented on a link” was coded with a ‘C’ and “X likes a photo” was coded with an ‘L’.

Since these labels were system generated, they were standardized across the logs and hence the subjectivity involved in the coding was minimal. Due to this, instead of a second coding, a visual verification of the data entered was done to ensure correctness and consistency in the coding. As an additional measure, the consolidated activity labels for all respondents were sorted using an Excel spreadsheet to further ensure that similar activities were coded the same way. Inconsistencies detected were negligible and attributable to data entry errors in most instances. The spotted errors were corrected before the data was consolidated, and visualizations and summary statistics were generated.

As a first step, the frequencies as well as the coded varieties of activities recorded over the six- month period were totalled for each individual user. Statistical averages for the two values were derived for all 158 participants. Thus, a total of 152,049 activities were logged by the 158 participants over the period. The range of activity of individual users varied between 0 and 6141. The average number of activities was 962.3 with a standard deviation of 870.6. The median activity was 666.

As for the variety, in all, the users were found to have engaged in 49 varieties of activities each of which could be categorized under one of the generic uses of social networks namely self presentation, broadcast, interacting, sharing, networking and

entertainment as discussed in Chapter 2 (Table 2-2). The mean variety of use was 12.1 with a standard deviation of 3.9. The median and mode of variety of use were also 12. Out of the 158 participants, three had no activity during the period. Thus, 155 activity logs were analysed in terms of the frequency of use which indicated how often the user engaged in an activity on Facebook, variety of use which indicated the familiarity of the user with various functions offered, as well as the general trend in activity traced over a six-month period.

The summary statistics allowed for a classification of all 158 participants into four quartiles for each of the two parameters, determining the level of use, namely the frequency (F) and variety (V). The grouping was based on quartiles in line with other research where such bases were used for the division of users based on similar characteristics (Bentson, Freeborn, Mullooly, & Pope, 1986; Mentzoni, Brunborg, Molde, Myrseth, Skouverøe, Hetland & Pallesen, 2011; Shanyang, 2006). This basis of classification has also been found to be suitable for data distributions that are not normal (Mentzoni et al., 2011) as was the case with the set of frequencies (Skewness = 2.07; Kurtosis = 5.97; S.E = 77.213). As for the variety, since the statistical averages were all found to be around 12, the choice of either the median or mean as the basis for grouping did not make any difference.

Thus, for frequency or count of activity (F), Q4 consisted of users who reported above 1246 activities during the six-month period under consideration (Very High - labelled VH). Q3 consisted of those who fell between the 662-1246 range (High - labelled H), Q2 consisted of users who reported 286-661 activities (Low - labelled L) and Q1 consisted of users who recorded 0-285 activities (Very Low- labelled VL). Likewise, for

the variety (V), Q1 consisted of users who recorded 0-10 types of use (labelled VL), Q2 consisted of those who recorded 11-12 types of use (labelled L), Q3 consisted of users with 13-15 types of use (labelled H) and Q4 consisted of those with 16-21 types of use (labelled VH). The 158 users, thus, were classified into a matrix comprising of these four classifications for the two parameters as shown in Table 3-1. The classification, however, due to its derivation from the statistical averages of the sample, may not be applicable to any group of users. Additionally, this segregation into the quartiles serves only as a means of grouping users based on the two indicators of interest. While the arbitrariness of the exercise is acknowledged, this is not expected to have an impact on the analysis as the purpose of this classification is only to offer a snapshot of the distribution of users in terms of their frequency and variety of use. From Table 3-1, it can be seen that there was a good spread of users belonging to all 24 use categories in the selected sample. The top three classes fell within the F-VL/V-VL, F-VH/V-VH and F-H/V-L groups with 24, 19 and 17 users respectively.

. Table 3-1 Distribution of Users Based on Frequency and Variety of Use

Frequency/Variety	V-VH	V-H	V-L	V-VL	Total
F-VH	19	9	8	4	40
F-H	13	6	17	3	39
F-L	6	8	16	9	39
F-VL	0	3	13	24	40
Total	38	26	54	40	158

Legend: VH – Very high; H – High; L - Low; VL – Very low

N=158

The trend line for the trace of individual activity over a six-month period was automatically generated by the visualization software Tableau Public 7.0. The slope of the trend line computed by Tableau was used as a basis to classify the trends. Thus, the following trend indicators were used: 0=Falling ($-1 < \text{Slope} < -0.5$); 1= Falling slightly ($0 > \text{Slope} > -0.5$); 2=Steady ($\text{Slope} = 0$); 3= Rising slightly ($0 < \text{Slope} < 0.5$); and 4=Rising ($1 > \text{Slope} > 0.5$). On average, the overall individual user activity over a six-month period traced a slightly positive trend at 2.10 ($S.D = 1.59$). The classification of activity trends of all 158 users based on the slopes is given in Table 3-2:

Table 3-2 Classification of Users based on the Slope of Activity Trend

Trend Category	0	1	2	3	4	*NA	Total
No of users	36	26	27	16	50	3	158

Legend: 0=Falling ($-1 < \text{Slope} < -0.5$); 1= Falling slightly ($0 > \text{Slope} > -0.5$); 2=Steady ($\text{Slope} = 0$); 3= Rising slightly ($0 < \text{Slope} < 0.5$); and 4=Rising ($1 > \text{Slope} > 0.5$)

N=158

*Not Applicable since no activity was recorded in the three cases

The indicators derived above enabled an activity profiling of the participants on the basis of which, fatigued users could be differentiated from those who did not indicate any fatigue so as to address the research questions RQ2 a and RQ2b using independent T tests. T tests were chosen as an inferential test most commonly used (O'Brien & Keith, 1993) instead of predictive tests such as correlation or regression analysis for the following reason. The phenomenon under investigation has not been previously defined or studied and is relatively unknown. As such, its characteristics have yet to be enumerated

and any conclusion regarding possible predictors could only be drawn after the phenomenon has been defined and the associated factors have been established. Under the circumstances, simple and frequently used T tests (Creswell, 2008) were expected to provide some initial insights into whether it would be worthwhile to carry out more powerful predictive tests in the context.

3.6. Interview Design and Analysis

3.6.1. *Choice of the Medium*

An in-depth probing email interview was used to collect the required qualitative data on possible fatigue experiences. An email in-depth interview is described as an asynchronous online interview which is semi-structured in nature, and involves multiple e-mail exchanges between the interviewer and interviewee over an extended period of time (Meho, 2005). This method, purely on its own and in combination with face-to-face interviews, has been increasingly used for qualitative data collection for over two decades (Foster, 1994; Hodgson, 2004; Karchmer, 2001; Kim, Brenner, Liang & Asay, 2003; Lehu, 2004).

In this instance, the choice of the medium was guided by the fact that face to face interviews were not feasible due to the respondents being geographically dispersed. Several advantages offered by the email channel also supported its use. For one, e-mail interviews have been found to facilitate greater disclosure of personal information, offering benefits to both the researcher and participants (Bowker & Tuffin, 2004). Given the personal nature of the questions which probed unobservable activities and negative experiences and emotions associated with social network use, this benefit offered by the

channel was valuable. Additionally, given the sensitive nature of the themes probed - negative experiences and emotions associated with Facebook use - this method was found to be effective in drawing forth responses which may have otherwise been difficult to elicit.

The e-mail mode also served as a safeguard against possible loss of face among some of the respondents when describing sensitive experiences, (Kim et al., 2003) thus making it easier for them to respond candidly to the questions. Additionally, email interviews have been found to reduce, or even eliminate, some of the problems associated with face-to-face interviews, such as interviewer-interviewee effects resulting from visual or nonverbal cues such as tone of voice, shyness or aggression and gestures. Besides, other factors that may cause an imbalance in a face to face interview such as differences of race, gender, age and verbal articulation skills will not have an adverse effect when e-mail is used as the medium (Bowker & Tuffin, 2004).

On the downside, a concern about lack of 'media richness' afforded by face to face interviews has been raised about email interviews. Media richness has been described as the ability of the medium to foster interaction and feedback that permit the people to communicate using different cues and multiple senses (Bowker & Tuffin, 2004). In this instance, this concern was addressed with the help of follow-ups and probes using other media of communication such as telephone calls, instant messaging or face- to-face communication where feasible. The choice of the channel for follow-ups and probes was left to the respondent and in most cases telephone calls or instant messaging or chats such as Facebook chats were chosen. In instances where the respondent was physically accessible, face-to-face sessions were used to follow up. Personalization of the e-mail as

well as the use of the above supplementary modes of communication addressed concerns about the lack of opportunities for interaction and instant feedback. This also helped to put the interviewee at ease and set up a certain level of comfort which enabled open communication and exchanges. Thus, the follow-ups with the help of alternate channels provided ample opportunities for closer interaction and feedback.

3.6.2. Design of the Interview Questions

The major aim of the interview was to gather information about stressors, irritants or any other causes that may have led to a change in the pattern of use in the course of the participant's engagement within the environment, during the period reflected in the activity log and outside of it. The interview therefore, covered questions on user activities and experiences falling outside of the six-month period tracked, so as to address concerns over the temporal limitation of the activity trace window. The interview also attempted to investigate any reasons other than stressors and irritants, for lower levels of recorded activity through a probe of lurking behaviours which constitutes activities that are not visible (Nonnecke & Preece, 2001; Preece et al., 2004). The interviews was thus designed to help gather insights into the theorized links between fatigue experiences and activity levels, while at the same time allowing the interviewer additional flexibility to probe whenever activity patterns failed to comply with the theorized links or when additional information was needed.

In order to design the specific interview questions, a basic checklist was prepared to make sure that all relevant themes such as demographic information, social network use and login patterns, unobservable activities, assessment of previous use not covered by the

activity log, negative experiences and emotions or other contributing factors associated with Facebook use could be covered and explored. Within each of the broader items, specific questions that would elicit required details were developed, keeping in mind opportunities for further probing. The questions themselves were crafted with the help of the information gathered from the literature on fatigue and its relationship with activity as well as social network use reviewed in Chapter 2. This allowed the researcher the freedom to explore where necessary while at the same time ensuring that the interview is bound within the parameters set by the main aim of the study.

Thus, a set of 28 questions were crafted to be included in the interview in total. The questions were organized into three major sections: A through C. Section A covered the profile of the user as well as the profile and patterns of Facebook use as well as that of other applications in the genre used, if any. As such, common demographic information such as age and gender were covered. Additionally, questions on number of social networking platforms other than Facebook subscribed to, the length of association with each, and login patterns followed for each were included.

Section B covered questions on unobservable user activities such as lurking (Nonnecke & Preece, 2001) which could not be captured in the activity log. These questions were included to gain an in-depth understanding of specific cases of use involving lurking, which according to available research is an important form of use within online communities (Nonnecke & Preece, 2001). Questions that covered silent reading habits or use patterns that did not leave any traceable prints were covered in this section so that a comprehensive understanding of silent use could be derived where the logs failed to reflect any user activity.

Section C aimed to uncover stressors or factors that gave rise to emotions or outcomes associated with fatigue. The objective was a probe of experiences and emotions arising out of, or related to use, which may have had an effect on user activity, as well as any factor that may have resulted in a change in activity patterns. Given the theoretical evidence of ‘fatigue–activity links’ (Anonymous, 1952; Potempa et al., 1986; Ream & Richardson, 1996) and the predominant experience of ‘tiredness’ or ‘unpleasantness’ caused by stressors associated with fatigue (Potempa et al., 1986; Piper et al., 1987; Shen et al., 1986), open questions exploring the ‘what’ and ‘why’ of past activity levels, and negative experiences related to the use of the platform were covered. For instance, questions such as “Was there a time when your level of activity on Facebook was higher?”, “If so, in what ways has it changed?”, “Could you describe instances when you may have felt any of the listed emotions in the course of using Facebook?”, “How did you cope with or respond to such experiences?” were used.

Guidelines for effective interviews as outlined by Meho (2006) were followed so as to ensure the efficiency and effectiveness of data collection using the interview and the trustworthiness of the results. Thus, clarity of the questions used in the interview was set as a top priority. The first draft of questions was refined iteratively through seven independent trial runs, with actual Facebook users who were not included in the final interview cohort, keeping in mind that the medium chosen to deliver the interview would be electronic, due to the geographically dispersed nature of the community sampled. Ambiguous usage or phrasing of questions were identified and amended, ordering of questions was changed and additional questions which would help to uncover useful information were identified. The in-depth nature of the interviews was preserved with the

help of multiple follow-up e-mails used for probing and clarifying where the need arose. The draft went through several rounds of refinements before the questions were finalized (Appendix E). The expected time for completing the interview was around 30-45 minutes on an average, excluding any follow-ups.

3.6.3. Interview Analysis

A qualitative content analysis that dealt with the underlying meaning of the text or the ‘latent content’ (Downe-Wamboldt, 1992) was employed for the interview. Since e-mail was the medium used to conduct the interviews, all interview responses were in the written form at the point of collection, which eliminated the need for transcription, an important first step in the analysis (Hycner, 1985). A qualitative content analysis that dealt the underlying meaning of the text referred to as ‘*latent content*’ was performed on the interview transcripts, as opposed to the ‘*manifest content*’ that deals with the visible obvious components (Downe-Wamboldt, 1992).

The emphasis of the interview on the experiential elements associated with use over time gives this aspect of research a phenomenological quality. Phenomenology has been defined as a study of individual experiences of users who have gone through a phenomenon (Hycner, 1985): The goal of the phenomenologist is to “*reduce the ‘what’ and ‘how’ of experiences to a brief description that typifies it*” (Creswell, 2007, p.235). In this instance, subjective negative experiences within the social network community leading to fatigue could be considered the central unspecified phenomenon under investigation. Thus, the analysis focused on reducing the observed fatigue phenomenon

into the why (antecedents) and how (effects) with a view to understanding the what (characteristics).

As such, the entire interview transcript along with the corresponding activity trace and indicators was taken together as the ‘unit of analysis’ (Graneheim & Lundman, 2004) or ‘theme’ (Boyatzis, 1998). This ensured that the unit was a meaningful whole, while at the same time compact enough to be kept in memory as a context for the analysis of the ‘*meaning units*’ identified from within. It was also in line with Hycner’s recommendation of “*listening to the interview for a sense of whole*” principle (Hycner, 1985).

In other words, each individual interview transcript was read as a whole and alongside the corresponding activity trace to get a general sense of the overarching experience conveyed by the unit of analysis. Any negative emotion revealed in answers to specific interview questions along with any peculiarities revealed by the activity trace of the user (For e.g: a declining trend, a trough) was used in combination to investigate and assess whether a user indicated fatigue at any point of use of Facebook. In addition, where the trace did not reveal any identifiable pattern due to its temporal limitation, answers to questions on any possible dip in activity since the early stages of use were analyzed to identify fatigue, since any change in level of use may be an indicator of fatigue.

Thus, the analysis was filtered through a theoretical lens developed from the review of fatigue from within the clinical and societal studies as has been espoused by grounded theorists (Cutcliffe, 2000; Heath & Cowley, 2004). Grounded theory has been said to help discover as well as relate concepts (Heath & Cowley, 2004) and the analysis in this instance attempted to do just this. The objective of the analysis was to relate the

characteristics of clinical fatigue culled from the literature review to the experiences and activity indicators identified from each of the data sets and through this distil the underlying factors leading to social network fatigue as well as their effects. From an understanding of the interplay of the antecedents of fatigue and their corresponding effects, the characteristics of social network fatigue were enumerated. Evidently, literature in this instance was an early influence as has been a facilitator in generating the research questions up front, in line with the Straussian grounded theory (Strauss & Corbin, 1990). Nevertheless, the researcher remained sensitive to possible new interpretations of experiences and indicators that may be unique to the context. Deduction based on available knowledge on fatigue was followed by validation and elaboration from further data comparisons (Heath & Cowley, 2004) across cases that shared similarities. This ensured that a unique theory related to social network fatigue could be derived.

Data analysis in grounded theory is termed coding, which Glaser (1992) defines as “conceptualizing data by constant comparison of incident with incident and incident with concept” (p. 38), in this instance, fatigue experiences and indicators. The coding process consisted of two procedures aimed at creating categories of fatigue experiences and indicators based on common stressors and their properties. In this instance, these procedures were applied in two steps. In step 1, a high level classification of the case was done on the basis of whether or not there was an indication of fatigue at some point of use either in the interview transcript or in the activity traced. ‘Meaning units’ (Graneheim & Lundman, 2004) or words, sentences or paragraphs from the interview transcript were picked out from within the unit of analysis or ‘themes’ (Boyatzis, 1998) which comprised of the interview transcript along with the corresponding activity trace and indicators. As a

guide to this step, ‘meaning units’ defined as “*words, sentences or paragraphs containing aspects related to each other through their content and context*” (Graneheim & Lundman, 2004) were identified from within the units of analysis. Thus any term, or sentence that conveyed a negative emotion related to weariness or tiredness such as irritation, annoyance, stress, caution - to name to a few - was picked out as a meaning unit from within the interview transcript. Additionally, such cases which depicted any visible break or gap in activity, lower levels of use, or a declining trend in the activity traces were also singled out. The analysis or coding used in this instance was predominantly substantive or data dependent. As such, the data set in its entirety (consisting of the interview and the activity trace) was used to code a case as fatigued or not. In doing so, memos were written and kept aside on cases where new possibilities needed to be explored even when coding was possible for elements that were evident: For instance, say, in a case where activity indicators reflected low levels of use but was not accompanied by any visible negative emotions. These memos served as useful tools that enabled comparison of a case with another that appeared to share similarities besides opening a case for scrutiny and further examination (Charmaz, 2008).

Thus, selected interview transcripts were revisited to see if the visible patterns in activity were accompanied by any form of negative experiences or lower interest or need. Further probing was done through follow up emails to investigate into the causes of these experiences and patterns before the case was confirmed as fatigued or otherwise. Thus, based on the indicators of fatigue as identified from the review of literature on clinical fatigue (Table 2-1) presented in Chapter 2, a set of fatigue indicators or emotions as well as a set of corresponding causes or sources were identified from the interview transcripts.

Hycner's principle of '*bracketing*' (Hycner, 1985) which requires a planned holding back of the researcher's individual experiences and prior knowledge of events and theories - knowledge of clinical fatigue in this instance - so as to keep an open mind towards the interpretation of 'meaning units' was followed during the step.

This approach allowed emotions such as 'guardedness' or 'wariness' to be picked up as distinct indicators of fatigue experiences unique to the social network environment even though these have not been listed as indicators of clinical fatigue. This also allowed units of analysis that did not explicitly indicate a fall in social network activity to be examined closely for possible fatigue experiences. Thus, for instance, the possibility of moderation in activity due to probable fatigue could be identified through probes in cases where, say, a set sceptical attitude towards the platform was evident in the interview transcript, although not explicitly manifest in any of the activity related indicators or pattern traced.

Additionally, same or similar fatigue related emotions were found as attributable to multiple causes or sources in different instances. For example, boredom was indicated due to predictability of response within the environment as well as due to boring content that did not cater to the user's interest. Similarly, annoyance or anger was reported as arising out of not getting a response as expected from network members, or due to unwarranted changes introduced into one of the design aspects of the platform. In other words, same or similar fatigue related emotions and indicators were found to be attributable to multiple causes or sources in some instances. Thus, some of the fatigue indicators and sources shared a many to many relation.

The common factors that ran through the causes or sources were identified from the data provided in the interview response so as to enable an aggregation of these factors. These common sources or causes for fatigue were identified and assigned a label that meaningfully described the category. Thus the analysis in step 2 started off as an open coding as espoused by Glaser (1978) where data is coded in “every possible way” (p. 56) and writing memos about the conceptual and theoretical ideas that emerge from the exercise. This allowed the researcher the theoretical sensitivity to deal with the data conceptually from a distance while at the same time maintaining sensitivity in understanding each fatigue case as unique. This was followed by an axial coding where a reduction and clustering of categories of antecedents (Strauss & Corbin, 1998) based on the commonality of the causes identified as shown in Table 3-3.

Table 3-3 Fatigue Indicators or Emotions Mapped to Causes or Sources

Group	Fatigue indicators or Emotions	Examples	Cause or Source	Common Factor
1	Weariness, feeling of being overwhelmed	<i>"I am overwhelmed by (hundreds of) birthday messages."</i>	High volume of member response	Network member response
	Annoyance, anger, frustration	<i>"All contact with her came to an end and I used to feel absolutely angry and frustrated."</i>	No response from member	
	Loss of interest, boredom, disappointment	<i>"I lost interest. It became predictable; you can guess who all will comment and what...People you like and look up to don't respond to posts."</i>	Predictable member response	
	Guardedness, wariness	<i>"I remain wary of people who may be reading my posts."</i>	Unwanted member scrutiny	
2	Disappointment, frustration	<i>"(I get) fed-up by ridiculous discussions."</i>	Uninteresting or low value content	Content
	Boredom, weariness	<i>"There is nothing there but boring posts and uploads... I stop logging in to check."</i>	Boring Content	

Gro up	Fatigue indicators or Emotions	Examples	Cause or Source	Common Factor
3	Awareness of an excessive use of social network	<i>"I felt that I was too addicted to FB."</i>	User feels addicted to FB	Self-immersion
	Desire to regulate SN time, sense of SN activities interfering with other priorities	<i>"From time to time I feel the need to regulate time spent on Facebook more strictly..Happens when I have spent inordinately long periods of time on Facebook at the expense of other important activities.... What a waste of my time"</i>	User feels he/she is wasting time on FB compromising on other tasks	
	Frustration, loss of control	<i>"I could not refrain from posting songs I like.....I felt trapped in this unreal world."</i>	User feels unable to control SN use	
4	Dissatisfaction, irritation	<i>"I am mostly irritated with the shoddy job Facebook does at building up (sic) this web site... Am appalled at the lack of basic design sense. Why do we have to like everything on FB?"</i>	The design of FB not catering to preference	Platform
	Annoyance	<i>"(I am annoyed at) their bad habit of changing the user interface and leaving one with no choice but to live with the change."</i>	Unwanted changes to FB interface	
5	Reduced activity levels after an initial high activity phase	<i>"In the beginning I used to be a frequent user but now I feel that I don't fancy it the way I used to."</i>	Natural fading of enthusiasm over a period of use	Life-cycle
	Lower need, lower interest	<i>"All of us used to be constantly on it through the day and we had a lot of fun...But over time slowly each of us started weaning of". .</i>	User community maturing over time	
6	Reduced activity, Lesser time spent	<i>"Work demands make it difficult to even log on. Sometimes this (Facebook time) competes with family time"</i>	User busy with other external commitments	External Demands

In step 2, the fatigue cases were aggregated based on the commonality of the causes or sources of stress identified in step 1 (Table 3-3), in line with a grounded theory inspired approach of categorization, where a category is developed in terms of its properties and dimensions of the properties (Strauss & Corbin, 1990). In this instance, a brief label indicating the underlying common causal condition as identified in column 5 of Table 3-3 was used to aggregate common cases. This allowed a ‘condensation’ or a shortening of the meaning unit picked out of the individual interview transcript and activity trace into its core.

Thus, for instance, ‘meaning units’ indicating any form of annoyance or tiredness arising out of perceived responses of social network members to activities performed on the platform, such as high volume of member response, lack of member response, predictability or undesirability of member response were grouped together and abstracted under the head ‘social dynamics related’ reflecting the common factor as being interaction related. Similarly, where negative emotions were directed at various aspects of the content made available such as uninteresting content, low value content or boring content were aggregated under ‘content related’. Cases which indicated excessive use and an awareness of this were classified under ‘immersion related’. Cases where any negative emotion towards any design aspect of Facebook was predominant were grouped under the label ‘platform related’. All natural waning of interest and reduction of use over time was classified under ‘life-cycle related’. Additionally, cases where a decline in activity was due to factors external to the community and use, were classified under external demands related’.

Thus, six distinct groups of fatigue cases were derived in this way; labels and definitions were created for these groups. While aggregating meaning units under groups, care was taken to identify differences amongst reported experiences that shared common elements yet at the same time showed distinct outcomes or effects: For instance, even through a ‘guardedness’ arising out of perceived social scrutiny was categorized under ‘social dynamics related fatigue’ alongside ‘annoyance’ caused by reportedly inappropriate response to posts, the distinct effect of the former experience namely the relatively more permanent moderation effects of such experiences on user behaviour was identified and noted. The six categories derived according to the source or causes identified, along with the indicators and examples of the experiences, are included in Table 3-4.

Table 3-4 Aggregated Stressors - Labels and Description

No	Label	Description	Indicators	Examples
1	Social dynamics related	Stress or negative emotions caused by perceptions about how individual network members respond or do not respond to the user within the community	Weariness, feeling of being overwhelmed	<i>"I am overwhelmed by (hundreds of) birthday messages."</i>
			Annoyance, anger, frustration	<i>"All contact with her came to an end and I used to feel absolutely angry and frustrated."</i>
			Loss of interest, boredom, disappointment	<i>"I lost interest. It became predictable; you can guess who all will comment and what...People you like and look up to don't respond to posts."</i>
			Guardedness, wariness	<i>"I remain wary of people who may be reading my posts."</i>
2	Content related	Disappointment or related emotions caused by how the user perceives the content made available on the network	Disappointment, frustration	<i>"(I get) fed-up by ridiculous discussions."</i>
			Boredom, weariness	<i>"There is nothing there but boring posts and uploads."</i>
3	Immersion related	Awareness of controlled/uncontrolled addiction or immersive tendencies impacting on social network activity or not: Caused by a feeling of having spent an excessive amount of time on the network	Awareness of an excessive use of SN	<i>"I felt that I was too addicted to FB."</i>
			Desire to regulate SN time, sense of SN activities interfering with other priorities	<i>"From time to time I feel the need to regulate time spent on Facebook more strictly..Happens when I have spent inordinately long periods of time on Facebook at the expense of other important activities."</i>
			Frustration, loss of control	<i>"I could not refrain from posting songs I like.....I felt trapped in this unreal world."</i>

No	Label	Description	Indicators	Examples
4	Platform related	Dissatisfaction/annoyance or related emotions caused by specific design features of Facebook (For e.g. : interface features, privacy features) or unwanted changes to the above	Dissatisfaction, irritation	<i>"I am mostly irritated with the shoddy job Facebook does at building up (sic) this web site... Am appalled at the lack of basic design sense. Why do we have to like everything on FB?"</i>
			Annoyance	<i>"(I am annoyed at) their bad habit of changing the user interface and leaving one with no choice but to live with the change."</i>
5	Life cycle related	No evident stressors: A visible or reported decline in use caused by lower interest or need after an initial high activity phase.	Lower interest after frequent use	<i>"In the beginning I used to be a frequent user but now I feel that I don't fancy it the way I used to."</i>
			Reduced activity levels after an initial high activity phase within the community	<i>"All of us used to be constantly on it through the day and we had a lot of fun...But over time slowly each of us started weaning of". .</i>
6	External demands related	No evident stressors: A visible or reported decline or break in use caused by reduction in time or energy to engage in social network activities	Reduced activity levels, Break or discontinuity in activity	<i>"Work demands make it difficult to even log on. Sometimes this (Facebook time) competes with family time"</i>

3.6.3.1. *Integrating Activity and Interview Analysis - Use of Probes*

Individual user interviews were analyzed in conjunction with the corresponding activity trace visually, as well as alongside the corresponding activity indicators namely the frequency of use, variety of use as well as the overall activity trend. Consequently, where the activity pattern or trend indicated what appears on the surface as a deviance from the expected, further probes were undertaken as a means of verification and reconciliation. For instance, where the user reported no stressors or unhappy experiences with Facebook in the interview, yet the activity frequencies and varieties were found to be low and the trend declining, or if the reverse problem was spotted, he or she was contacted again to enquire into the anomaly. Probing questions were used until the disparity could be reconciled satisfactorily. Such probes helped to reveal use patterns that may have gone undocumented in the activity trace such as lurking which threw further light on the relationship between the experiences and the activity indicators derived for the user.

In case a respondent did not report fatigue experiences in response to questions 20-25 under Section C of the interview (Appendix E) which probed negative experiences and emotions associated with Facebook use, but indicated higher activity levels at some point in time in the past in answer to question on past activity, probes were also used to investigate the reasons for this dip and to ascertain if this could be attributed to any form of fatigue. Thus, the integration of the activity indicators with the interview transcript served as a triangulation mechanism which improved the reliability of the analysis. Since the activity indicators are quantified and classified as described in Section 3.5.2, the errors due to subjectivity of assessment involved in this exercise was limited to those that may

have occurred during the interpretation of fatigue experiences. However, given the reliability checks enforced on the latter step with the help of inter-coder reliability indicators these could be considered negligible.

3.6.3.2. *Ensuring Consistency of Interview Analysis*

A second coder was used to assess and ensure the consistency of interview analysis. The coder was first briefed on the coding procedure and criteria for classifying a case as fatigued as also the basis for classifying the case under one or more of the causes. This was followed by an independent second coding of all 158 interview transcripts in two steps as outlined in section 3.6.3. Thus, the first step aimed to classify the transcript as a case of fatigue or otherwise. In the second step, the forms of fatigue evidenced in the fatigued cases were classified under one or more of the six categories based on a set criteria used by the first coder.

After an initial sampling of five transcripts a review of the coding criteria was done to arrive at a consistent and mutually agreeable set of criteria to determine if a case can be considered as indicating fatigue, and then subsequently to classify the cases into one or more of the six categories identified. Kappa values for each step as well as each category were calculated using SPSS 21. For step 1, where a case was classified as evidencing fatigue or not the Kappa value was found to be 0.937. For step 2, where the cases were categorised into one or more of the six fatigue categories, the Kappa was found to be within the range of 0.817 – 0.961 (Table 3-5) . Both set of Kappa values were found to be in the excellent range (Hruschka, Schwartz, St. John, Picone-Decaro, Jenkins

& Carey, 2004). Discrepancies were individually reconciled until the coders were in mutual agreement with regards to all cases.

Table 3-5 Inter-coder Reliability

Steps	Description	Kappa Values
Step 1	Classification as case fatigued or not	0.937
Step 2	Social dynamics related	0.908
	Content related	0.873
	Immersion related	0.871
	Life cycle related	0.961
	Platform	0.851
	External Demands	0.817

3.7. Ethical Considerations

All activities included in the analysis were extracted from the user provided activity logs. However, use of Facebook activity logs for research is a relatively new approach to data collection. Therefore, guidelines regarding ethical issues involved in collection and use of such data are yet to be made available. Nevertheless, guidelines proposed for online research (Hudson & Bruckman 2004; Eysenbach & Till, 2001; Bruckman, 2002; Berry, 2004; Capurro & Pingel, 2012; Batchelor, Bobrowicz, McKenzie & Milne, 2012) as applied to research done within chat rooms, online forums and social networking sites, were observed to ensure compliance with the broader ethical norms.

As such, a major ethical consideration is an assessment of the amount of risk or the degree of potential harm incurred by the participants in being a part of the study

(Hudson & Bruckman, 2004): The objective of the research namely to understand the antecedents and effects of social network related fatigue, suggests relatively low risk of exposure and potential harm to the participants and therefore the study as a whole could be considered low risk. Another ethical consideration is reflected in the metaphor used to describe the online environment studies (Capurro & Pingel, 2012; Eysenbach & Till, 2001; Hudson & Bruckman, 2004). Thus, the submitted logs and interview transcripts were viewed more as ‘private *living room spaces*’ rather than a ‘*public forum*’ where the information is freely accessible. This approach ensured a higher level of privacy for all participants involved as well as confidentiality for all information provided.

3.7.1. Use of Informed Consent for Full Disclosure

One of the vital components of ethics in online studies is the process of informed consent, which recognizes the autonomy of research subjects through a granting of the power of decision making to the subjects (Bruckman, 2002). The informed consent process involves three components: relating the information to subjects, ensuring that subjects comprehend the information and obtaining the voluntary agreement from subjects to participate (Bruckman, 2002).

As such, all solicitations were accompanied by an informed consent form, approved by the Institutional Review Board (Appendix F), detailing the nature and objectives of the research as well as the requirements of participation. Thus, all contacted users were allowed an opt-out option that was nonbinding which allowed them to pull out of the study even after they have consented to take part and after they have read the full disclosure on the nature of study. This helped to address the potential concerns of

participants who may develop anxieties (Hudson & Bruckman, 2004) at a later stage in the process of submitting his or her responses. The terms of participation allowed the users to opt out of the study at any point in time without furnishing any reasons, thus allowing them full control over their commitment to the study.

In the case of respondents who were under 21 years of age, who indicated their interest in participating in the study, a parent/guardian informed consent form (Appendix G) was used which provided information about the study and the terms and conditions of use to the parent of the respondent. Parental consents were gathered by email or physically in these instances before the wards were allowed to participate in the study. As such, the parents were fully informed about the nature of the study, the commitments required of their wards, the risks and terms of withdrawal as well as the precautions taken to ensure privacy of the respondents as well the confidentiality of the information provided by them.

3.7.2. Ensuring Participant Privacy and Confidentiality

The first step in ensuring confidentiality and privacy to the participants was the assignment of a designated numeric user code to identify the user with. Thus, individual user names were not disclosed to anyone other than the researcher at any point during the analysis. Additionally, the macro-enabled spreadsheet allowed users to automatically remove all activity details and names of persons involved so that only the activity labels are recorded. Thus, any revealing information regarding comments made or content shared was deleted upfront before the logs were submitted. Additionally, the activity data

for each individual user was used in an aggregated and encoded form for the analysis. This further ensured additional confidentiality of the activity log.

Similarly, special precautions were taken to ensure that the situation and contexts described in the interviews would not reveal the identities of people involved. One important step used to ensure this was ‘anonymization’ (Hudson & Bruckman, 2004), or the masking of all names and geographical contexts that came up in the transcripts so as to protect participant privacy. All identifying information was removed from the interview transcripts before extracts were used for analysis and presentation (Hudson & Bruckman, 2004). This, combined with the use of user codes, ensured that the privacy and confidentiality of the interviews could be protected through a de-contextualization and de-identification of all persons referred to in the course of the interview.

CHAPTER 4 ANALYSIS & DISCUSSION

This section presents the major antecedents and effects of social network fatigue that emerged out of the analysis of user experiences and activities as outlined in Chapter 3, followed by an enumeration of the characteristics of social network fatigue based on the antecedents and effects identified. To begin with, the common factors shared amongst the various fatigue related experiences reported by the participants were aggregated to identify distinct groups of antecedents. Thus, six categories of fatigue related antecedents and the corresponding effects on user activity were identified through an examination of the activity log and analysis of the interview transcripts. Significant differences in demographic factors and activity related indicators were tested between the various groups of fatigued users identified, using independent T tests. Finally, the characteristics of fatigue specific to the context of use of social networks as well as a working definition of the phenomenon are presented.

4.1 Participant Demographics

The average age of the 158 participants was 29.68 ($S.D = 10.98$); the youngest participant was 17 and the oldest 75. A demographic classification of the recruited participants is given in Table 4-1.

Table 4-1 Participants – Demographic Classification

Age Group	Male	Female	No of Participants
Under 20	1	7	8
20 – 24	35	28	63
25 – 29	19	10	39
30 – 34	7	6	13
35 – 39	3	1	4
40 – 44	3	3	6
45 – 49	5	6	11
50 - 54	7	2	9
55 and above	4	1	5
Total	94	64	158

The male-female ratio of the respondents was 94:64. All respondents reported use of multiple social networking platforms with an average subscription to 2.95 applications ($S.D = 1.38$). The average duration of Facebook subscription was 4.59 years ($S.D = 1.65$). The average network size of the participants was 474.03 ($S.D = 293.51$). All but two reported Facebook as the most used platform for connecting socially. On an average, a participant engaged in 962.3 activities ($S.D= 870.6$) belonging to an average of 12.1 varieties ($S.D= 3.9$) over a 6-month period. Median frequency of activity was 666 and the median variety was 12. Thus, the usage levels indicated by the average participant in terms of the frequency of use quartile (Fq) was 2.50 ($S.D = 1.13$) and the variety of use

level quartile (V_q) was 2.39 ($S.D = 1.11$) (Usage level indicators: 1= Very Low; 2= Low; 3= High; 4=Very High). On an average, the overall individual user activity over a six-month period traced a slightly positive trend at 2.10 ($S.D = 1.59$), (Trend indicators: 0= Falling ($-1 < \text{Slope} < -0.5$); 1= Falling slightly ($0 > \text{Slope} > -0.5$); 2= Steady ($\text{Slope} = 0$); 3= Rising slightly ($0 < \text{Slope} < 0.5$); and 4= Rising ($1 > \text{Slope} > 0.5$)).

4.2 Not Fatigued

Out of the total of 158, 73 participants did not indicate any experiences or use behaviours attributable to fatigue. The remaining 85 participants indicated fatigue related experiences or use patterns. The experiences reported by the not fatigued group as well as a demographic comparison of the two groups are presented in the following sections.

4.2.1 Not Fatigued Vs. Fatigued – Summary of Experiences and Emotional Attachment

All of the 73 respondents in the not fatigued group reported that their objectives for using the social network have been met and that their overall experiences with the use of the application have been enjoyable and satisfactory. A range of opinions ranging from good to excellent were expressed with respect to the question on whether the set goals for using the application have been met or not. For instance:

NF3: *Yes (My objectives for using SN have been met). I have only a casual interest in the first place. I would sum up my overall experience on SN as good.*

NF1: *“Yes, my motivations for using FB have been met satisfactorily as I was able to get in touch many of my friends with whom I never had any contact for many years. (I am) very satisfied.”*

NF14: *“Yes, it (Facebook) has opened up a whole new world of networking and getting back in touch with friends from bygone years. It also allows me to keep in touch with extended family like cousins who all live in different parts of the world all at one go. (My overall experience on SN has been) extremely pleasurable and useful....”*

NF65: *Yes. It keeps me entertained for hours and gives me common topics to talk to friends about and allows me to keep in touch with all my friends. My overall experience on was (sic) enriching yet I found out that there are a lot of dangers online and I should be very careful about what I post and say online. I shouldn't hang my emotions online.*

However, the above reported positive responses to questions whether objectives have been met are not unique to the not fatigued group. In other words, most of the fatigued group also responded positively to questions about whether their goals for social networks have been met.

The not fatigued group across all cases indicated a strong emotional attachment towards their social network unlike the typical respondent who indicated fatigue. This attachment however was not always platform specific or linked to Facebook per se although in some instances it was. These sentiments are reflected in the following excerpts:

NF14: *“SN is part of my daily routine. I feel connected with friends. No I don't feel proud to be associated with any SN. Neither do I feel out of touch when not logged on. But there is a community spirit within,... I use it to spread information*

as well. Yes, it would sadden me to see my favourite SN close down. ... it takes away my connection to the world. It's too much a part of my life now."

NF 65: *"Yes, it (is part of my daily routine) is where I check on my notifications, look at friends pictures (and through that I know what is going on with their lives). I don't think there is anything to be proud of when we have SN because everyone has it now. I think it would be cool if someone tells you they don't have twitter or Facebook these days. If it (the gap) is more than 1 week. Yes. Because I would have missed out notifications, fb messages (because some of my friends and I communicate heavily on fb message). Yes, (there is a community spirit) somewhat. Because we tend to have groups and photos on fb which gives us the sense of belonging. Yes (it would sadden me) (because) it has a database of all my photos etc. Life would be slightly different without Facebook. We can no longer get "silent" updates from our friends."*

However in the case of the respondent who reported a causal interest in Facebook these sentiments were more neutral as is seen in the following excerpt:

NF3: *"No. SN is not part of my daily routine or day-to-day activities. Neither do I feel proud to be associated with any SN. I also don't feel out of touch when not logged on because it is not my main mode of communication. But there is a sense of community and it would sadden me to see my favourite SN close down."*

It follows therefore that fatigue in the context may not be linked to the user's perception regarding whether his or her objectives of using the social network has been met or not, unlike in the context of work related studies where a link has been reported

between fatigue experienced and the worker's felt satisfaction that the goals have been fulfilled (Hardy et al., 1997).

4.2.2 *Fatigued Vs. Not Fatigued - Demographic Comparison*

The average age of the fatigued group was 29.44 ($S.D = 10.82$). The male-female ratio of this group was 51:34. On an average, a member of this group subscribed to 3.19 social networking applications ($S.D = 1.57$). The average duration of Facebook subscription was 4.68 years ($S.D = 1.73$). The average network size of the participants was 497.88 ($S.D = 288.45$). On an average, individual user activity traced a slightly negative trend at 1.85 ($S.D = 1.47$). The average fatigued participant fell in the 2.52 quartiles for both indicators of level of use: Frequency ($S.D = 1.05$) as well as variety ($S.D = 1.08$).

The average age of the not fatigued group was 29.97 ($S.D = 11.23$). The male-female ratio was 42:31. On an average, a member of this group subscribed to 2.67 social networking applications ($S.D = 1.08$). The average duration of Facebook subscription was 4.49 years ($S.D = 1.58$). The average network size of the group was 446.58 ($S.D = 298.85$). On an average, individual user activity in this group traced a rising trend at 2.38 ($S.D = 1.67$). The average participant in the not-fatigued category fell in the 2.48 quartile for frequency of use ($S.D = 1.22$) and in the 2.25 quartile for variety of use ($S.D = 1.14$).

A comparison of the fatigued group with the group which indicated no fatigue in terms of the various demographic features is presented in Table 4-2:

Table 4-2 User Demographics and Average Indicators - Fatigued Vs. Not-Fatigued

Participants	N	Age	M:F	SN apps used	Duration on FB	Network Size	Activity Trend	Fq	Vq
Fatigued	85	29.44	51:34	3.19	4.68	497.88	1.85	2.52	2.52
Not Fatigued	73	29.97	42:31	2.67	4.49	446.58	2.38	2.48	2.25

N=158; Legend: N – Number; M:F – Male:Female; Fq – Frequency quartile; Vq – Variety quartile

An independent samples T test was conducted to verify if the differences in the means for the demographic factors differed significantly between the two groups: Fatigued and not-fatigued. The test was significant for the mean number of SN applications used by the fatigued group ($M = 3.19$, $SD = 1.57$), $t(156) = 0.52$, $p = .01$. The 95% confidence interval for the difference in means ranged between 0.086 and 0.948. The result indicated that the fatigued group of participants used on an average, 0.52 SN applications more than the not-fatigued group. The test was also significant for the mean activity trend of the fatigued group ($M = 1.85$, $SD = 1.47$), $t(150) = -0.53$, $p = .006$. The 95% confidence interval for the difference in means ranged between (-1.028) and (-0.022). This indicated that the fatigued group of participants showed a significantly and sizeably lower falling trend in activity over the six-month period as compared to the not-fatigued group. The mean frequency quartile of the fatigued group was also significantly different from the not-fatigued group ($M = 2.52$, $SD = 1.053$), $t(156) = -0.038$, $p = .024$. However, the 95% confidence interval for the difference in means ranged widely between (-0.318) and 0.395. Thus, the average frequency of use of the fatigued group was slightly but significantly higher than that of the not-fatigued group of participants.

4.3 Antecedents of Social Network Fatigue

An analysis of the fatigue related individual user experiences that have had an effect on use alongside individual user activity patterns enabled the identification of six generic antecedents of fatigue which appeared to affect user activity in some way or the other in the context of use of social networks to stay socially connected. The following categories of fatigue antecedents were identified:

4.3.1 *Social Dynamics Related (SD)*

4.3.1.1 *SD Fatigue Experiences*

Out of the 85 participants who indicated fatigue related experiences, the highest number of cases (46) reported stressors aggregated as originating from the users' perceptions about how social network members perceive, respond or do not respond to their activities within the community which was labelled under social dynamics related.

Several of the users reported various negative emotions - annoyance, disappointment, weariness, boredom, irritation or anger - arising out of the social interactions taking place within the community. The experiences were found to result in a brief dip in their activity during a short period immediately following the experience in most cases; most of the users also reported staying away from the platform for a few days to 'get over the feelings'. Thus, such experiences appear to show the characteristics of a mild, transient variant of social dynamics related form of fatigue.

A feeling of being overwhelmed was reported arising out of the volume of posts on special occasions such as birthdays when activity spiked which then prompted the user to take a short break after the messages were acknowledged.

F157: *“I am overwhelmed with birthday messages, but do take the time to respond personally to each individual who took the time to wish me... (Once done) I take off for a few days to recoup.”*

The exhaustion in this situation is in line with the fatigue experienced within chat groups according to the theory of conversation congestion which highlighted that users experienced fatigue from cognitive overload when multiple overlapping threads of conversations ran simultaneously, or when the intervals between exchanges were perceived to be “excessively short” (Miura & Shinohara, 2005) as also a feeling of being overwhelmed by large volumes of tweets from a single ‘followee’ in the context of Twitter use (Kwak et al., 2011). Furthermore, Brandtzaeg and Heim (2007) have also cited time consuming experiences as reducing activity within online communities. A similar problem of overload as a factor reducing engagement of online gamers in the context of MMOGs was also reported in Ang et al. (2007). As such, the problem is similar to the information overload and resulting fatigue (Eppler & Mengis, 2004) in the context of IT use.

Additionally, this finding also corroborates the findings pertaining to ‘unfollow’ behaviour in the context of Twitter use where large volumes of tweets led to decisions to ‘unfollow’ which represents a broken relationship in Twitter (Kwak et al., 2011). However, in the context of chat groups, congestion at moderate density was reported to have a positive effect on engagement (Miura & Shinohara, 2005). Similarly, in the context of online gaming, a certain level of cognitive overload was reported to have brought in sufficient challenge for meaningful interactions for the users (Ang et al., 2007).

Nevertheless, no evidence to this effect was seen in the transcripts examined in this context.

In the following example, a user cites a specific incident involving an interaction where a social expectation was not met causing frustration.

F152: “There was this time (during my initial days on FB) when I had caught up with an old friend and used to chat daily with her. All on a sudden, all contact with her came to an end and I used to feel absolutely frustrated, waiting for her to come online late into the night in vain. After about a week of this, I got fed up and tired of FB totally and did not use it again as regularly as I used to, for a period about three weeks. It cleared up after an apology message from my friend with a plausible reason for her long absence..... Though I did feel angry with my friend at the time, part of my anger was directed against FB, which got me back into contact with her in the first place...”

Minor, short-lived disappointments result when an expected interaction or response does not occur, say in the form of a ‘like’ or a ‘comment’ on a post made by the user. In the case of F45, the incident appears to have led to reduced Facebook activity, following a realisation that such virtual interactions should not be afforded too much importance, whereas in the case of F2 the effect seems to have been short-lived.

F2: “I’m disinterested when I don’t have any friends online to like or comment on my pictures or post. I gain my interest when my friends comment on my photo or

post and we start our conversation in the post itself rather than having a private chat.”

F45: “I confronted my boyfriend to ask him why he hadn’t liked or commented on my new Facebook profile picture; he gave me a good sounding (sic) and told me that he really liked it but he couldn’t think of a comment and I shouldn’t pressure him about something so trivial. I was exasperated because I thought my boyfriend was defying a social paradigm – partners should show some online appraisal/affection to each other. Later on, I understood his perspective. However, this incident might have affected my preference for reducing the number of posts/updates on my profile because I realized that a like or comment may not really mean anything.”

The above findings once again are in line with reported findings of research done in similar environments. Reciprocity has been reported as an important determinant of engagement within online communities (Kwak et al., 2011). Thus, there is an expectation on the side of the user that there will be favourable responses to his or her postings from the network members and when this expectation is not met, a negative emotion in the form of disappointment results, leading to reduced motivation to engage in any further activity. This may also be considered as an instance where online etiquette, which is a factor that ensures growth of online communities (Kim et al., 2010), was not met, leading to reduced engagement. Additionally, rapid response has been cited as a determinant of online engagement within virtual communities (Raban et al, 2010) and in instances such as above, this expectation is clearly not fulfilled which would explain the feelings recorded.

Minor annoyances have been reported when members misconstrue posts originally shared with a noble or good intention or hijack a post in a different direction from what was originally intended.

F146: *“The other annoyance was when a friend posted something inappropriate and bordering on the pornographic in response to a short piece of philosophical prose from Chuang Tzu that I had posted. It “hijacked” the intended discussion for a while”.*

The above finding is in line with the theory of common ground formation with the help of a shared interpretive framework as outlined by Cook & Teasley (2011).

In another extreme situation, a transient, yet stronger emotion was reported that arose out of a “political coup” involving a group of Facebook friends (Ducheneaut et al., 2007) , which left a heavy user with a “*bitter experience*” invoking thoughts of deactivation and a decision to stay away from the platform for a few days.

F141: *“I had many bitter experiences from FB. I was active in many groups and in some I was admin too. I had a wide circle of virtual friends in groups. I use to spend lot of time in the groups with all my friends and we were all having lot of fun. I really got addicted during those days and I even lost concentration in my business. I am a fun loving person and use to crack lot of jokes during interactions in group and very soon I became the centre of attraction of the group and I had lot of admirers. I truly loved all my friends and interfered in their matters, settled any issues they had in between, treated every one close to my heart. I was not knowing that many cheap plays were going on behind my back cut copying inbox*

messages editing mine and sending to others at last a group of jealous friends back stabbed me , formed another group and unfriend me together. I was shocked how can they unfriend me without even telling me why??What's more painful than being abandoned is knowing I am not worth an explanation!!! I was dejected.... kept away from FB thought of even de activation. ” .

This supports the earlier reported findings about how interpersonal trust affects commitment within a virtual community, a factor which ensures its growth (Wang & Chen, 2012).

Disappointment and envy were reported when the user made comparisons with the lifestyle of a network member as reflected in his posts and felt a sense of inadequacy upon comparison as indicated in the extracts below:

F128: *“[I felt])Disappointed with posts & pictures of people travelling to different places and hanging out, that I may have wanted to visit or be a part of; de-motivated (when I saw): milestones & achievements that others may have accomplished, & then reflecting back on my actions accomplishments, that may not be worthy enough (to talk about) can be disappointing.*

F20: *“ Like (sic) when I see my friends eating healthily but I just ate rather unhealthily. Because I am such a nut about eating healthily, I feel terrible. Angry at myself for lacking discipline while others have, Again, its about allowing your emotions to be affected by what others are doing with their lives. Its stupid really. Comparison, comparison. Comparison is the root to (sic) all envy and all evil. ”*

Such feelings arising out of social comparisons have not been reported in any of the community related studies reviewed and could be unique to a social network designed to support social linking. As such, these feelings could be considered peculiar to the context. A characteristic of the above experiences is the transient nature of the emotion which is reflected in a resumption of social network activities after the user took a short break from the environment following the stressor events. There may also be a suggestion that the user's individual personality traits may have played an important part in the decision to resume activity after the break as indicated in the following responses of F152 and F128.

F152: *"..after a period of mourning (for want of other words!) I reasoned to myself that I was being silly... I resumed my normal level of activity of course.. I saw no reason why not.."*

F128: *"Yes,[I resumed my activities]. My emotions & feelings are short-lived. Move on."*

F141: *"Yes for some days I didn't use FB...coz i was feeling so low...after that I started using it again."*

Some of the experiences may result in a more permanent moderation of social network activities. For instance in the case of F129, interest waned after the user perceived social interactions to be predictable and hence boring and appears to have resulted in a permanent downward moderation of activities.

F129: *“I used to put up posts and photos regularly.. have lost interest now....It became predictable; you can guess who all will comment and what....”*

A feeling of disappointment may arise out of not having social expectations met, which once again may mould future interactions in a permanent way. The following two excerpts reflect similar sentiments in the form of disappointment and annoyance arising out of response from unexpected or unwelcome response and lack of expected responses on the network.

F129: *“People you like and look up to don’t respond to posts and those you don’t like may comment at times”.*

F15: *“Sometimes, when the people that I am not too close with or have a certain predisposed dislike for make a comment, I might feel annoyed as we don’t have similar interests/way of thinking.”*

All of the above experiences of disappointment when social expectations or gratifications are not met are unique to the context of social network use. The experiences are explained with the help of the ‘maintaining relationships’ use of social networks (Underwood et al., 2011). Obviously when this form of use is perceived to be not met, disappointment sets in.

In another instance, a user reports a perception that network members’ ‘social surveillance’ (Lampe et al., 2007) may result in them forming perceptions about the user’s persona.

F151: *“It (user activity) makes me understand these ‘friends’ better, their psychology, what makes them tick, and thus, what kind of friends they are. One can most silently form an opinion of what people display or contribute.”*

In this case, the interactions amongst the members of the community are perceived as exposing one to vulnerabilities. These feelings appear to bring in a certain amount of wariness in the user’s use and interactions within the platform which may influence the user to an extent that he or she moderates activity levels. This experience and a suggestion of permanence in the user’s set attitude towards use of the platform and interactions within can be seen in the following extract:

F151: *“I remain wary of people who must be silently reading my posts and forming an opinion (on me). I am trying to be very careful about what I post, for I am most aware that there must be people like me who see through and read into the need for my contributions and form an opinion of me”.*

A similar sentiment and experience of weariness and stress arising out of being exposed to vulnerabilities and the dilemma of how best of to manage contacts so as to minimize unwanted social scrutiny (Ellison et al., 2007) is also evident in the following extract.

F149: *“I’m also getting a little tired of the constant scrutiny that my profile is under thanks to family being on my friend list. I have considered putting people on a tighter privacy setting, but that would offend them and so on. It’s tiresome to deal with it.”*

In another related experience photographs uploaded to Facebook created certain impressions which caused the user some amount of discomfort. A guardedness or caution is evident in the user's interview transcript and this appears to have restricted the user's usage of Facebook.

F107: *"I was informed by my boyfriend that someone asked him if we ate expensive food for all/most meals. I was suddenly aware that whatever photos I took of food I ate for my meals gave people the impression that I spend extravagantly on food. From there, my uploading of photos of food stopped and I hid the album instead. I was extremely guarded and wary. I started to think thrice before each single action on FB, and I had a sharp realization that my actions are being watched and started to care about what kind of impression I'm giving people based on my actions on FB. I hid the albums and reduce(d) my actions(sic) on FB".*

The above experiences arising out of an awareness of the 'social scrutiny' that the user is exposed to is unique to the context and emerges as a key finding. Several forms of guardedness or wariness results from an awareness that network members may be judging or forming perceptions of a user who posts content on social networks which may in turn inhibit the free and frequent use of these networks. This may be especially a major factor if the user is particularly sensitive to such scrutiny and may be evident in measured responses and posts made within the network or a lack of thereof. Although unique to the context, this is similar to the stress induced by 'presenteeism' or invasion of personal lives (Ayyagiri et al., 2011) reported under technostress.

4.3.1.2 SD Demographics and Usage Levels

The user demographics in this category indicated an average age of 28.15 ($SD = 8.49$). The male-female ratio of this group was 25:21. On an average, a member of this group subscribed to 3.34 social networking applications ($S.D = 1.63$). The average duration of Facebook subscription was 4.89 years ($S.D = 1.68$). The average network size of the group was 528.59 ($S.D = 282.74$). On an average, individual user activity in this group traced a slightly falling trend at 1.81 ($S.D = 1.45$). As for frequency of use, the average participant in the category fell in the 2.64 quartile ($S.D = 0.987$) and for variety of use, in the 2.60 quartile ($S.D = 1.04$) (Table 4-3).

Table 4-3 User Demographics and Average Indicators - SD Fatigued vs. Not SD Fatigued

Participants	N	Age	M:F	SN apps used	Duration on FB	Network Size	Activity Trend	Fq	Vq
SD Fatigued	46	28.15	25:21	3.34	4.89	528.59	1.81	2.64	2.60
Not SD Fatigued	112	30.33	68:54	2.78	4.47	451.41	2.21	2.44	2.31

N=158; Legend: SD Fatigued – Those indicating social dynamics related fatigue; Not SD Fatigued – Those not indicating social dynamics related fatigue; N – Number; M:F – Male:Female; Fq – Frequency quartile; Vq – Variety quartile

An independent samples T test was conducted to verify if the differences in mean for the various demographic factors differed significantly between those categorized as indicating social dynamics related fatigue or not. The test revealed significant differences for the mean number of SN applications used by the SD fatigued group ($M = 3.34$, $SD = 1.63$), $t(156) = 0.557$, $p = .031$. The 95% confidence interval for the difference in means ranged between 0.087 and 1.026. The result indicated that the SD fatigued group used on

an average, 0.557 SN applications more than the not SD fatigued group. The test was also significant for the mean age ($M = 28.15$, $SD = 8.49$), $t(156) = -2.18$, $p = .005$. The 95% confidence interval for the difference in means however varied widely, between -5.96 – 1.59. This indicated that the fatigued group of participants were younger by 2.18 years as compared to the group that did not indicate SD fatigue. The mean number of friends of the SD fatigued group was also different from the not-SD fatigued group ($M = 528.59$, $SD = 282.74$), $t(155) = 77.17$, $p = .21$. The 95% confidence interval for the difference in means ranged widely between (-24.086) and 178.431. Thus, the average member of the SD fatigued group was found to have 77.17 more network members than a participant who did not indicate this type of fatigue although the variation was less significant than in the case of age.

The mean activity trend of the SD fatigued group also indicated a significant difference from the group that did not indicate this type of fatigue ($M = 1.81$, $SD = 1.45$), $t(150) = -0.397$, $p = .02$. The 95% confidence interval for the difference in means ranged between (-0.959) and 0.165. Thus, on an average, the activity trend traced by a user indicating SD fatigue would be lower than those with no such fatigue by a factor of 0.397. The average frequency quartile of activity of the SD fatigued group also indicated a significant, although small difference, from the group that did not indicate this type of fatigue ($M = 2.64$, $SD = 0.99$), $t(156) = 0.197$, $p = .014$. The 95% confidence interval for the difference in means widely fluctuated between (-0.191) and 0.584. Thus, on an average, a participant who indicates SD fatigue was likely to be in a higher activity quartile in terms of frequency of use by a factor of 0.197 as compared to one who did not indicate this type of fatigue.

4.3.2 *Content Related (C)*

4.3.2.1 *C Fatigue Experiences*

Twenty nine participants indicated stressors aggregated as originating from the content that network members or other entities in the network post and is made available through feeds on the network: These were labelled as content related. This category was differentiated from the ‘Social dynamics related’ group as the former included experiences and emotions directed at posts initiated by other entities, be it members or news agencies, whereas the latter focused strictly on members’ response to posts initiated by self.

In this case, the content made available with the network became stressors causing frustration, boredom or even anger to users who found it as not meeting their expectations or not catering to their interest or preferences. Feelings of tiredness, boredom and frustration over the content which comes across as not catering to one’s interests or beliefs, uninteresting, inane, lacking in originality, lacking in depth or relevant knowledge of the subject under discussion or “silly” were recorded which appeared to impact on usage.

F129: *“When you are bored otherwise and there is nothing interesting on Facebook, the same few people keep updating boring stuff and fwds....You look towards Facebook for entertainment and there is nothing there except updates from people you are not really interested in. You feel angry at those people who just keep on updating boring stuff every 10-15 minutes. You want to see something interesting but there aren’t any.”*

Several participants reported irritation over posts and comments that were perceived as trivial or lacking in in-depth knowledge.

F132: *“I get tired of inane conversations and posts that come across as worthless banter..For example, there was this discussion on Mothers’ Day (which I found) meaningless”*

F128: *“(I feel) Fed-up of ridiculous discussion that may involve important subject matter, but people posting opinions without any knowledge of the subject”*

F27: *“(I feel) Irritated because of stupid comments that people make such as stupid political claims without remotely having any common sense or background knowledge. When people rant about stupid things like how fast the hello kitty by macs sell out, like hello?? If you want it so badly go get it fast, why drag?? LAME *****”*

F132: *“....might have been triggered by some people’s frequent postings which were not intellectually enjoyable. May have been fun / interesting (at first glance)... but had no original thought or contribution of the person who posted it. Too hackneyed comments and posts.”*

The above feelings can be explained with the help of earlier reported findings in the context of virtual community research. For instance, lack of quality content has been reported to bring about ‘death’ of virtual communities (Iriberry & Leroy, 2009) as well as disengagement within (Brandtzaeg & Heim, 2007). High quality of content made available within a community has also been cited as a factor encouraging growth of virtual communities (Raban et al., 2010). As such, the above reported feelings can be

explained with the help of these findings. The feelings are also in line with the findings about how uninteresting feeds, although not necessarily of poor quality, might prompt a user to ‘unfollow’ a followee in the context of Twitter use (Kwak et al., 2011).

Annoyance is reflected in the following user excerpt where network member’s posts were perceived as ‘self-serving’. In this instance, it is the motivation behind the content posted that the user has issues with. Given that self presentation (Sutanto et al., 2008) is an important use of social networks, the probability that a user encounters such events where he or she attempts to portray self in a way that may be deemed unacceptable to the network members can be considered high and unavoidable.

F04: *“Sometimes I find that people post things to advance their personal agendas, or create some kind of image of themselves that I do not agree with. This annoys me and it has put me off reading the News Feed sometimes. Lately, I have taken to immediately unsubscribing from updates from these people if I don’t agree with.”*

Negativity, whether in the form of a complaining post from a member or in the form of news, reports and comments, also invoked negative emotions in users which resulted in users reporting a break away from the network or other strategies to avoid getting exposed to such content.

F87: *“I have a course mate whom I added years ago and I realised he likes to discuss about philosophy or politics on FB. I usually would ignore his posts as the topics did not interest me. I also get annoyed if the same friends keep posting sympathy or whiny posts eg. Complaining how sad their lives are, no appointments on a weekend etc.”*

F82: *“One such instance would be the recent blasts in India which was reported by ibnlive’s Facebook page. Upon logging into my fb account, what I saw was this post from ibnlive with photos of the dead and injured people. What I felt was disappointment, frustration and irritation to their maximum extent. On seeing the posts about such drastic incidents, you tend to logout quickly and take some time out to make your mind peaceful and calm before logging in; in this case which took almost 1 day.”*

F93: *“Last month someone posted about Riots in India and how people staying out of India won’t possibly know what it means to be an Indian. It was a post targeted at people like me as this friend of mine has just three Indian friends staying abroad - it completely frustrated me. I got into an argument and then chose to stay away from FB for few days (two I think).”*

The above two variants of content related fatigue arising from posts perceived as self serving or inciting negativity could be considered unique to the context of social network use to stay socially connected as these have not surfaced in research within virtual communities in general.

The volume and nature of information shared by network members also caused tiredness or irritation, especially when the user perceives the information shared as not specifically something he or she is interested in as is reflected in the following excerpts:

F57: *“Being on Facebook every day, I think I’ve reached that point when I think I’m getting too much information from people already. Information that I am not even sure I want to know.”*

F55: “I feel irritated when people post everything they do or they have. For example, they bought a new lipstick or nail polish; do they really have to post these things?”

Lack of freshness of feeds or feeds not refreshing fast enough to satisfy users who register frequent logins causes boredom as illustrated in the case of F51. In another case, staleness or repetitive nature of content made available appears to have resulted in a permanent decline in activity of the user, as illustrated in the cases of F28 and F87. The content gratifications expected of social networks (Joinson, 2008), explain these sentiments. In other words, when the content made available does not meet the users’ needs or gratifications, disappointment and subsequently fatigue, set in. Since information seeking as well as entertainment gratifications of social networks (Park et al., 2009) are important factors that determine their use, such disappointments are bound to serve as a deterrent for users. This may be especially true amongst the young users for whom the entertainment gratifications are reported to be the common motive (Special & Li-Barger, 2012).

F51: When I repeatedly login to SN and the newsfeed remain the same, making me bored and disinterested. This prompts me to seek out other activities to kill time and discourages me from using SN for perhaps a few hours.

F28: “I wish there were more discussion on interesting topics. (I) Used to check out more of the feeds (check feeds more often). (What changed the routine was that) the content got repetitive.”

F87: “ .. *when the same piece of news have been reposted several times, I get bored or disinterested.* ”

In response to this form of fatigue, users either take a break or a self-imposed rest as in the case of F132 or search elsewhere within the cyberspace for entertainment alternatives as in the case of F129. Attempt to pump new life into the scene by posting something that they consider original and interesting to jump start a “new” discussion was also cited as a strategy used to counter content related issues as illustrated in the case of F152. An effort to gain control over the situation was also seen in the case of F4 who reported active filtering of offensive feeds to manage such stressors.

F129: “*Nothing to do - will browse some other news website... I do resume normal activity when there is some discussion or interesting conversation suddenly.* ”

F132: “*(I) Stayed away for a couple of days and returned to normal level of activity (3-4 times a day) and it was interesting again* ”.

F152: “*...Sometimes when the content on the walls become boring and uninteresting I try to jump start a discussion by posting a picture or a status message in the hope of eliciting some form of response..* ” *It works..sometimes* ”

F4: “*I usually leave the SN or stop reading the News Feed. Lately, I immediately unsubscribe to such posts and I feel like I want to regain control over my news feed and it’s silly to let it become something that annoys me rather than give me enjoyment..... I don’t want my SN use to be determined by what others post, and*

it's my own experience to reclaim. I find ways to reduce the number of such posts that I read on Facebook."

The above experiences and feelings are in tandem with the findings reported within the context of Twitter use where tweets covering mundane daily life as well as random forwards, advertisements and automated messages have been reported to result in decision to unfollow (Kwak et al, 2011). As such, these may be generic to any form of community based exchanges. Given that information seeking and sharing is one of the important uses of social networks (Baek et al., 2011) and that content gratifications cannot be met when the networks are perceived to provide useless information (Joinson, 2008), the above content related issues become highly significant.

4.3.2.2 C Demographics and Usage Levels

The user demographics in this category indicated an average age of 28.69 ($SD = 12.01$). The male-female ratio of this group was 15:14. On an average, a member of this group subscribed to 3.41 social networking applications ($S.D = 1.63$). The average duration of Facebook subscription was 4.52 years ($S.D = 1.46$). The average network size of the group was 498.32 ($S.D = 311.22$). On an average, individual user activity in this group traced a slightly falling trend at 1.60 ($S.D = 1.26$). As for frequency of use, the average participant in the category fell in the 2.48 quartile ($S.D = 1.09$) and for variety of use, in the 2.55 quartile ($S.D = 1.18$) (Table 4-4).

Table 4-4 User Demographics and Average Indicators – C Fatigued vs. Not C Fatigued

Participants	N	Age	M:F	SN apps used	Duration on FB	Network Size	Activity Trend	Fq	Vq
C Fatigued	29	28.69	15:14	3.41	4.52	498.32	1.60	2.48	2.55
Not C Fatigued	129	29.91	78:51	2.84	4.61	468.75	2.20	2.50	2.36

N-158; Legend: C Fatigued – Those indicating content related fatigue; Not C Fatigued – Those not indicating content related fatigue; N – Number; M:F – Male:Female; Fq – Frequency quartile; Vq – Variety quartile

The independent samples T test for differences in means between those categorized as indicating content related fatigue or not revealed significant differences for the mean number of SN applications used by the C fatigued group ($M = 3.41$, $SD = 1.74$), $t(156) = 0.569$, $p = .058$. The 95% confidence interval for the difference in means ranged between 0.012 and 1.126. This means that the C fatigued group used on an average, 0.569 SN applications more than the not C fatigued group. The test was also significant for the mean duration for which the participant has been on Facebook ($M = 4.52$, $SD = 1.46$), $t(156) = -0.095$, $p = .153$. The 95% confidence interval for the difference in means however varied widely, between (-0.77) and 0.58. This indicated that the C fatigued group had been on Facebook for 0.57 years more than the average participant in the group that did not indicate C fatigue. The mean activity trend of the C fatigued group also indicated a significant difference from the group that did not indicate this type of fatigue ($M = 1.60$, $SD = 1.26$), $t(150) = -0.597$, $p = .005$. The 95% confidence interval for the difference in means ranged between (-1.278) and 0.084. Thus, on an average, the activity trend traced

by a user indicating C fatigue would be significantly lower by a sizeable factor of 0.597 as compared to one who did not indicate this type of fatigue.

4.3.3 Immersion Related (I)

4.3.3.1 I Fatigue Experiences

Twenty four participants indicated stressors associated with a perceived ‘excessive use’ of Facebook or a ‘sense of having wasted time on Facebook’ and found Facebook use at times as a distraction from other priorities such as work, studies or family. Such causes were aggregated under ‘immersion related’. A sense of ‘*wasting of precious time*’ and a feeling of ‘*worthlessness*’ of the time spent on social network activities which triggers thoughts of rejecting the environment or staying off the network were evident in the following interview excerpts. There were indications that such feelings arose from a perceived overuse of Facebook.

F151: *“When I realised how many precious man hours go into reading banal trivial posts, feeding other’s egos, writing nice things for them and liking posts to make them feel good and touched, ..such a waste of time really.*

F132: *“More frequent use of SN interaction has resulted in rejection of the idea as silly. When the level of activity increases, it creates a feeling of worthless experience. Feelings were directed at the network members whom I thought was “nothing better to do guys”. Feeling of rejection of the SN was strong. Wanted to abandon this whole “silliness”*

Users at some point of use felt as if they have been spending more time than they should engaging in social networking related activities as illustrated in the excerpts of F158 and F83. While F83 actively sought deactivation as a corrective measure F 158 merely reduced usage over time.

F158: *"I found that it took too much of my time... I use it much less these days."*

F83: *"I have deactivated my account (once when) I felt I was wasting too much time on FB for about 2-3 weeks".*

Additionally, they found the time spent on social networks as interfering with other activities they would have liked to engage in, or even a distraction from activities that should take higher priority such as work or studies. A form of frustration arose out of this loss of control; other experiences include feelings of overindulgence attributed to a lack of self-discipline and inability to manage immersive tendencies unless a self-imposed restriction is placed on use through a deactivation or a forced break as reflected in these extracts.

F74: *"During exams, I had to cut down on my Facebook logins and chats as I was losing my concentration. I had not logged in for nearly a week or 10 days."*

F128: *"(During my peak usage period) I was unable to concentrate: (I used to) constantly check Facebook during exam periodcan be distracting. Hence, I deactivate(d) my account for that temporary period (exam period) if I feel it's affecting my concentration... Also, to get some alone time, & test myself from not using SN."*

F149: “ *One thing that did happen that woke me up to how tiresome SN was – being made an admin of a Facebook page (at work) and having to constantly troll the internet for information to update the page and having to share it. Because of being made page admin, I had to be online a lot and that was affecting my work schedule – emails weren’t being sent on time, tasks weren’t being completed. Things got to a point when my 8-hour work day was filled with only Facebook activity. While it was work-related Facebook activity, it was coupled with my being on my personal page as well....And then I went ahead and deactivated my account.* ”

The extracts above reflect symptoms of addictive behaviour characterised by obsessive compulsive use (Ng & Wiemer-Hastings, 2005). Problems associated with addictive tendencies such as fatigue (Liu & Peng, 2009) and poor time management (Park, 2005) are evident in these experiences and feelings. This also supports the reported correlation between addiction and stress evidenced in addiction research (Salehan & Negaben, 2013; Ng & Wiemer-Hastings, 2005).

In the above instances, the immersive tendencies were recognized by the users themselves at some point and handled through deactivation of the respective accounts, which in turn helped the respondents to cope with the stress. When the activities were resumed after a re-activation, the users deliberately strategized their social network activities through housekeeping including pruning of the friends list, so that it was no longer such an intensive daily routine. In another instance, the user reported self-imposed breaks or controls or thoughts about ‘keeping off’ to cure the ‘addiction’ or finding other alternatives to ‘wean-off’ social networks as a means of taking control over their

immersive tendencies. Here, the corrective actions reported by the users were pre-emptive in nature.

F143: *“When I felt that I was too addicted to FB and wanted to distance myself from it for a while. So I did not log on for about 5 days to break my addictionIn the beginning it was difficult. But I held on and got thru a few days, and then it did not matter anymore.”*

F133: *“From time to time I feel the need to regulate time spent on Facebook more strictly. This usually happens when I have spent inordinately long periods of time on Facebook at the expense of other important activities. Facebook has eaten into such decidedly more fruitful activities and this concerns (sic) me.”*

The two users above resorted to various strategies to ensure they kept off the environment such as finding other things to do or forcing themselves to stay away through the shutting down of the devices that offered connectivity as illustrated below:

F143: *“(I coped by) finding other things to do and kept my laptop shut off.”*

F133: *“Normally turn my mind to other things like reading or spending more time painting and socialising with friends (in the real-world).”*

In another instance, the user reported an intention to stay away due to a realisation that time is wasted on SN but found it too troublesome to turn off the alerts so as to execute the strategy effectively as illustrated in the case of F151. In yet another case, the respondent nurtured thoughts of de-activation of the account to counter the uncontrollable

urge to engage in social network related activities without acting on the thoughts as illustrated in the case of F133.

F151: *“Just the other day, I thought, why not keep out for a week or two. But I don’t know how to deactivate the alerts on my mobile. That by itself needs time to sort out. Sigh!”*

F133: *“I have harboured that thought (of de-activating account) on occasion....However, the urge has not been strong enough for me to act on it. Not to say that that can’t happen in the future though.”*

In another case, a feeling of frustration arising from a feeling of being ‘trapped’ was reported when the user experienced addictive tendencies yet was unable to bring in some control and continued to use Facebook extensively. A lack of self control despite an attempt to control usage through a deactivation is evident in the case of F83. Both the excerpts below indicated signs of constant struggles to regulate their immersive tendencies. F126 attributes the inability to control use, to the ‘drug-like’ relief it provides, whereas F83 cites his own lack of self control and peer pressure as reasons for the inability to exercise sufficient control over SN use.

F126: *“Many times (sic) I could not refrain from posting songs I like... even if I want to go learn some music or read some books .. even if want to walk around in my garden.. .I felt trapped in this unreal world... but it gives me a lot of relief as well. Just like some drugs ..*

F83: I returned to FB afterwards (due to) lack of self-control plus peer pressure, getting bored at times, missing some friends. (I did) reduce my time spent on FB for a period of time. But am going back to square one logging on every 10-15 minutes”.

The extent of self-control a user is able to exercise determines the intensity of the experiences and the effects these experiences can have on user activity. It has to be noted that these immersive tendencies may not strictly follow addictive patterns of behaviour in other contexts as is illustrated in the case of gamer behaviour within MMORPG environments (Ng & Wiemer-Hastings, 2005).

4.3.3.2 I Demographics and Usage Levels

The average age of a participant indicating immersion related fatigue (I fatigue) was 29.13 ($SD = 9.67$). The male-female ratio of this group was 15:9. On an average, a member of this group subscribed to 3.21 social networking applications ($S.D = 1.56$). The average duration of Facebook subscription was 4.42 years ($S.D = 1.41$). The average network size of the group was 478.70 ($S.D = 278.06$). On an average, individual user activity in this group traced a slightly rising trend at 2.10 ($S.D = 1.48$). As for frequency of use, the average participant in the category fell in the 2.67 quartile ($S.D = 1.01$) and for variety of use, in the 2.83 quartile ($S.D = 1.17$) (Table 4-5).

Table 4-5 User Demographics and Average Indicators – I Fatigued vs. Not I Fatigued

Participants	N	Age	M:F	SN apps used	Duration on FB	Network Size	Activity Trend	Fq	Vq
I Fatigued	24	29.13	15:9	3.21	4.42	478.70	2.10	2.67	2.83
Not I Fatigued	134	29.78	78:56	2.90	4.63	473.22	2.10	2.47	2.31

N=158; Legend: I Fatigued – Those indicating immersion related fatigue; Not I Fatigued – Those not indicating immersion related fatigue; N – Number; M:F – Male:Female; Fq – Frequency quartile; Vq – Variety quartile

The independent samples T test for differences in means between those categorized as indicating immersion related fatigue or not revealed differences for the mean duration for which the user has been on Facebook in the case of I fatigue ($M = 4.42$, $SD = 1.41$), $t(156) = -0.210$, $p = .205$. The 95% confidence interval for the difference in means ranged between (-0.938) and 0.518. This means that the I fatigued group have been on Facebook on an average, 0.21 years less than an average member who did not indicate this fatigue. The average frequency quartile of the I fatigued group also indicated a significant difference from the group that did not indicate this type of fatigue ($M = 2.67$, $SD = 1.01$), $t(156) = 0.197$, $p = .13$. The 95% confidence interval for the difference in means fluctuated between (-0.298) and 0.691. Thus on an average, a participant who indicated I fatigue was likely to be in a higher activity quartile in terms of frequency of use by a factor of 0.197, as compared to one who did not indicate this type of fatigue.

4.3.4 Platform Related (P)

4.3.4.1 P Fatigue Experiences

A small but distinct group of seven participants indicated stressors associated with various aspects of Facebook as a platform which may have had some influence on their usage levels. This form of fatigue manifested in feelings of annoyance or irritation directed at various aspects of the platform on which the users' social network resides such as the design of the interface or the features and functionalities which the users perceived as not catering to their requirements or not giving adequate consideration to their preferences.

The design and layout of the site or the interface and the reliability of the functions supported by Facebook appeared to be sources of irritation in the case of F142 whose design expectations were not met by the platform. The user also felt constrained by the limited choices made available in terms of the self expression afforded and annoyed that the default filter setting for the feeds did not work reliably at all times.

F142: *"I am mostly irritated with the shoddy job Facebook does at building up(sic) this web site. .. Am appalled at the lack of basic design sense...Maintaining a engaging user experience is a fine line between form and function, too much of one without the other kills the experience..My least favourite part is Facebook's user experience. I evaluate it as a rather poorly constructed web site....I do not like that I have to be always politically correct by only liking posts. A Dislike button will be good.....I also do not like that Facebook second guesses my Top Stories for me. It*

also conveniently forgets my chosen filter....On multiple occasions Facebook Connect failed to connect to the site I like.”

In the following instances, the frequent changes made to the Facebook interface as well as the fact that user choice was not considered while implementing these changes, appear to have caused some amount of annoyance and frustration as in the cases of F146 and F116.

F146: “The Facebook “annoyance” was their bad habit of changing the user interface and leaving one with no choice but to live with the change.Facebook frequently changes its user interface, so the feelings of annoyance were directed at the people at Facebook responsible for foisting these changes on users who don’t see any compelling reason to change, and expect a certain backward compatibility in the software when new features are introduced.”

F116: “The introduction of ‘Timeline’ in Facebook was frustrating. I did not like the format and was very much against it. My habits were not too badly interrupted. I was still on the site regularly but was upset by (sic) being forced to accept the change. It was just a feeling of being forced into something new that you didn’t particularly appreciate (at the time). To a certain extent, it was a resistance to change as I was comfortable with what I had and wanted to continue with that format. I still wish the old format was an option and you could have timeline as one of the alternate options or one of the other pages on Facebook. Being spoilt (lol) and usually getting what I want, it was a feeling helplessness at being forced into something I didn’t like.”

In the case of F15, the annoyance is caused due to what the user perceived as excessive emphasis on product marketing and advertising on the platform. Introduction of paid advertising into feeds and the fact that the user was not given a choice to filter these pre-emptively seemed to have caused annoyance.

F15: Facebook in my opinion has also changed into less of a posting haven, but more of a product/advertising/marketing platform and it makes everything less appealing to post.... Also, another time I felt irritated was how Facebook slotted in paid advertising into my feeds and that irked me quite a bit as I felt forced to view these ads and they also cluttered my viewing.

In the following excerpt, the Facebook feeds and the complexities associated with Facebook privacy settings and tagging features were cited as major irritants.

F149: "I got tired of the endless conversations that everyone was having and Facebook's courtesy of informing me of everything. I have considered putting people on a tighter privacy setting, but that would offend them and so on. It's tiresome to deal with it... Privacy settings are very hard to decipher and sometimes the access provided to my profile via tagging means my privacy settings are almost militant! Off (sic) late, my efforts to curate who sees what on my Facebook profile has reached an extreme.... The new tagging/privacy settings on Facebook are annoying."

The experiences and emotions evident in the above extracts share similarities with the techno-uncertainty component of technostress (Tarafdar et al., 2007), in that constant changes and developments in technology induce stress to users. Additionally, as seen in

some of the excerpts above, support of anonymity by the platform has been cited as a factor that determines engagement within virtual communities (Miura & Shinohara, 2005). Utz (2000) has already reported how scepticism towards the platform inhibits participation within online communities and the above experiences confirm this finding.

4.3.4.2 P Demographics and Usage Levels

The average user in this group was 35.57 year of age ($S.D = 13.79$). The male-female ratio of this group was 4:3. On an average, a member of this group subscribed to 4.43 social networking applications ($S.D = 2.37$). The average duration of Facebook subscription was 5.57 years ($S.D = 1.51$). The average network size of the group was 411.00 ($S.D = 224.58$). On an average, individual user activity in this group traced a slightly falling trend at 1.50 ($S.D = 0.84$). As for frequency of use in the group, the average participant fell in the 2.29 quartile ($S.D = 1.11$) and for variety of use, in the third quartile ($S.D = 1.00$) (Table 4-6).

Table 4-6 User Demographics and Average Indicators – P Fatigued vs. Not P Fatigued Group

Participants	N	Age	M:F	SN Apps Used	Duration on FB	Network Size	Activity Trend	Fq	Vq
P Fatigued	7	35.57	4:3	4.43	5.57	411.00	1.50	2.29	3.00
Not P Fatigued	151	29.41	89:62	2.88	4.55	476.97	2.12	2.51	2.36

N=158; Legend: P Fatigued – Those indicating platform related fatigue; Not P Fatigued – Those not indicating platform related fatigue; N – Number; M:F – Male:Female; Fq – Frequency quartile; Vq – Variety quartile

The independent samples T test for differences in means between those categorized as indicating platform related fatigue or not revealed significant differences for the mean number of SN applications used by the P fatigued group ($M = 4.43$, $SD = 2.37$), $t(156) = 1.548$, $p = .023$. The 95% confidence interval for the difference in means ranged between 0.515 and 2.581. This means that the P fatigued group used on an average, 1.548 SN applications more than the not P fatigued group. The test was also significant for the mean age ($M = 35.57$, $SD = 13.79$), $t(156) = -6.16$, $p = .151$. The 95% confidence interval for the difference in means however varied widely, between (-2.20) and 14.52. This indicated that the fatigued group of participants were older than the group that did not indicate P fatigue by 6.16 years on an average. The mean activity trend of the P fatigued group also indicated a significant difference from the group that did not indicate this type of fatigue ($M = 1.50$, $SD = 0.84$), $t(150) = -0.623$, $p = .008$. The 95% confidence interval for the difference in means ranged between (-1.929) and 0.682. Thus, on an average, the activity trend traced by a user indicating P fatigue would be significantly lower by a sizeable factor of 0.623 as compared to one who did not indicate this type of fatigue.

4.3.5 External Demands Related (ED)

4.3.5.1 ED Fatigue Experiences

Twenty two participants indicated stressors that originated not from within the users' community or the platform, but from an external source or factors outside of the user's social network: such as family, work, studies, other personal commitments or crises or even other competing social network or entertainment options. Such causes were

aggregated under ‘external demands related’. This results in the user having to reduce the time spent on social networking activities as he or she may have less energy or time to spend on it. The external demands faced by the user necessitates a prioritisation, which results in his or her available time being split between competing priorities such as work, family, studies, a personal crisis, or other external obligations or even an alternate social networking platform or entertainment option.

In all of such instances, the external demands took priority over social networking which in turn resulted in a reduction of activities until such time that the conflicts were resolved and when the user could once again free time to engage in social network activities as indicated in the following excerpts. In the case of F17, there is a clear evidence of exhaustion, yet not caused by any factors related to social network use or originating from it. However, the fact that user activity within the environment was affected due to the exhaustion gives it a physiological dimension as opposed to a psychological or emotional form.

F17: “Honestly, when I was in National Service I did not use Facebook at my normal level usually because I was exhausted or focused on other things. It was challenging to keep in touch with friends during that time. NS made it challenging. Additionally, I was in a long distance relationship, and that was my main focus, not Facebook... You learn to adapt to NS, but it’s still hard to find time and energy to log onto Facebook, especially when I wanted to use that time and energy to maintain my relationship.... (My normal activity level) was kind of resumed. After

my relationship ended I had more time, so my SN activity increased but it did not reach it's pre-National Service level."

F147: "Extraneous factors (play a part). Work demands make it difficult to even log on. Sometimes this (Facebook time) competes with family time. My daughter might insist I talk to her instead of logging on to Facebook and I will have to yield. There are also times when I was busy following events on Linked In when I was searching for a new career option. Naturally I diverted attention to LinkedIn during that period although my favourite platform is Facebook; My Facebook time was less then.."

F157: "I was more active a few years ago, when my work was less hectic, that was late 2007 and 2008. Since then, as I got progressively busier, my time spent on Facebook has correspondingly diminished."

F150: "Yes, (I was more active) between 2009-2010. (My SN activity was) hectic, like all the posts, comment on all posts, play all the games and try all the new fads and things on the network. Schedule (changed my SN routine), got promoted so work doubled."

A variation of this form of fatigue is one where external demands and more interesting or more important priorities such as a family or social occasions, kept the user away from social networking activity for a while and the user subsequently found it difficult to resume normal levels of social network activity after the break (F144). There is an indication in the transcript of F17 which also points to a difficulty in attaining pre-stressor levels of activity as is reflected in the statements *"My normal activity was kind of*

resumed” and “after my relationship ended, I had more time so my SN activity increased but it did not reach its pre National service level”. A similar disinterest in resuming normal levels of social networking activity was also reported by a user who was forced to take a break from the platform following an illness or during trips abroad (F62). These examples point to external demands leading to a form of psychological weariness as illustrated by the reported difficulty in resumption of normal levels of use.

F144: When I become busier than usual while there are other social commitments to fulfil such as a wedding or any other function (I will not follow my usual social network routine). . Sometimes there are other more interesting activities such as going for an outing, an interesting book etc., making SN (activities) boring, disinteresting and overwhelming. (When I got back after the break) I became (sic) unable to concentrate (on social networking activities) for up to 2 weeks or more.”

F62: “An occasion I remembered (sic) would be when I was not feeling well or when I was overseas. (Upon my return) I felt disconnected with SN and totally not motivated to find out anything which was going on for a period of time.”

These findings are in line with reports that an imbalance between various personal demands could predict fatigue in the context of work (Hardy et al., 1997; Viner & Christie, 2005). External demands have also been cited as reducing engagement within online communities (O’Brien & Toms, 2008). Time limitations have also been reported to shorten the life cycle of communities (Iriberry & Leroy, 2009) as well as lead to disengagement within (O’Brien & Toms, 2008). As such, the above findings corroborate what earlier research efforts have established.

4.3.5.2 ED Demographics and Usage Levels

The average participant in this group was 26.50 ($S.D = 6.24$). The male-female ratio of this group was 17:5. On an average, a member of this group subscribed to 3.23 social networking applications ($S.D = 1.23$). The average duration of Facebook subscription was 4.68 years ($S.D = 1.59$). The average network size of the group was 580.91 ($S.D = 277.41$). On an average, individual user activity in this group traced a slightly falling trend at 1.76 ($S.D = 1.48$). As for frequency of use, the average participant in the group fell in the 2.59 quartile ($S.D = 1.01$) and for variety of use, in quartile 2.68 ($S.D = 1.00$) (Table 4-7).

Table 4-7 User Demographics and Average Indicators – ED Fatigued vs. Fatigued Group

Participants	N	Age	M:F	SN Apps Used	Duration on FB	Network Size	Activity Trend	Fq	Vq
ED Fatigued	22	26.50	17:5	3.23	4.68	580.91	1.76	2.59	2.68
Not ED Fatigued	136	30.20	76:60	2.90	4.58	456.61	2.15	2.49	2.35

N=158; Legend: ED Fatigued – Those indicating external demands related fatigue; Not ED Fatigued – Those not indicating external demands related fatigue; N – Number; M:F – Male:Female; Fq – Frequency quartile; Vq – Variety quartile

The independent samples T test for differences in means between those categorized as indicating external demands related fatigue (ED fatigued) or not, revealed significant differences for gender (Male=1; Female=0), ($M = 0.77$, $SD = 0.43$), $t(156) = 0.207$, $p = .000$. The 95% confidence interval for the difference in means ranged between (-0.015) and 0.428. The results indicate that there is a significant indication that the ED fatigued group on an average, tended towards being male by a factor of 0.207 as

compared to the group that did not indicate this type of fatigue. The test was also significant for the mean age ($M = 26.50$, $SD = 6.24$), $t(156) = -3.70$, $p = .000$. The 95% confidence interval for the difference in means however varied widely, between (-8.67) and 1.27. This indicated that this group was younger than the group that did not indicate ED fatigue by 3.70 years on an average.

The mean activity trend of the ED fatigued group also showed a significant difference from the group that did not indicate this type of fatigue ($M = 1.76$, $SD = 1.48$), $t(150) = -0.39$, $p = .20$. The 95% confidence interval for the difference in means ranged between (-1.13) and 0.35. Thus, the results show that on an average, the activity trend traced by a user indicating ED fatigue was lower by a factor of 0.39 as compared to one who did not indicate this type of fatigue. The mean frequency quartile of the group also showed a small but significant difference from the group that did not indicate this type of fatigue ($M = 2.59$, $SD = 1.01$), $t(156) = 0.11$, $p = .15$. The 95% confidence interval for the difference in means ranged between (-0.41) and 0.62. Thus, the results show that on an average, the frequency quartile within which a user indicating ED fatigue would be placed was higher by a factor of 0.11 as compared to one who did not indicate this type of fatigue.

4.3.6 Community Life Cycle Related (LC)

4.3.6.1 LC Fatigue Experiences

Thirty two participants indicated a type of fatigue indicated by a lower need or reduced interest brought about by a stabilising of the social networking activity levels of the member after the community he or she belongs to matures over time. A natural fading

of enthusiasm or lowering of interest or need to engage in social network activities ensues once the community as a whole matures and progresses to the later stages of its life cycle (Iriberri & Leroy, 2009). It took the form of a decline and stabilising of activity at a relatively lower level after a high activity period. Respondents in this group reported a dip in their activity as compared to the levels registered during the initial stages.

Although a stressor as such was not evident, the users admitted to a lower level of motivation or need to engage in social network activities after a phase of frenzied activity during the formative stages of the community (Iriberri & Leroy, 2009) which is symptomatic of fatigue (Anonymous, 1952). This change in activity levels may be considered a natural cyclical phenomenon related to the maturing of the life cycle of the community in which the user is a member. Therefore, this fatigue may apply in the cases of most users who register high activity or interest levels when they are first initiated into the environment (Iriberri & Leroy, 2009).

The need to expand the network by adding new friends and the resulting high or frantic activity during the initial days of SN adoption is evident in the following excerpts. They also illustrate a reduction in use once the network is formed and the community life cycle has matured, and the need felt by the user is no longer as strong as it used to be.

F02: “Yes, I was more active during my undergraduate college days. At those times we thought that people with more friends in SN are great (sic) and we wanted to bring more and more friends and comments. Now since I’ve realised to have very good friends on fb, I do not unnecessarily comment anything or friend

anyone. I also do not chat with anybody I do not know personally which I previously did to get new friends.”

F147: *“Initial days probably were more hectic/frantic in search of friends to connect with. But once you have done that initial mapping then....you don’t have too many people to connect to. Once the network is fully formed and members start to feel a certain level of comfort I did not think there was a need to invest that much time in it anymore”.*

The frequent log-ins and use during the initial days of adoption is also illustrated in the following excerpt where there is an indication that it was the network members who reduced use over time. This appeared to have contributed to the user’s own decline in activity.

F134: *“I used to log in more frequently, almost daily, and take time to chat with friends. All of us used to be on constantly on it through the day and we had a lot of fun.. But over time slowly each of us started weaning off.”*

In a similar illustration of reduced usage, the weaning off of network members from Facebook was evident; however in this instance, the reason for the network member’s reduced Facebook usage which resulted in the community maturing was that they migrated to another SN platform after a period of heavy use of Facebook.

F15: *“I was much more into Facebook 2 years ago, when it was more active as well. Now, a lot of my friends no longer post on Facebook as well. They usually post more on Twitter.”*

In a case that could be considered a variant of F15 above, we can see indication that activity levels have reduced since the initial days for a different reason. The reason for the dip here is that the members of the community were not available to provide the user with ‘social support’ as they used to, due to them becoming busier with other demands.

F119: Yes (I was more active at one time). When I was an undergraduate (two years ago), I was more likely to share my experiences with friends on SN. I was inclined to post many photos and personal statuses during that period. Additionally, I was more interested in commenting others’ posts. Many friends became not active on SN gradually after they graduated and began to work. As a result, there’re few social supports I could obtain from the SN.

For some, this experience appears to go further to a feeling of fading of the “magic” or novelty or newness felt during the initial days of use, which may hint at a slight disillusionment once the activity levels settle down after a phase of frantic activity due to a natural tiredness that follows heavy use. These feelings are illustrated in the excerpts below:

F127: “In the beginning I used to be a frequent user but now I feel that I don’t fancy the platform the way I used to.... It is like the magic has faded. “

F137: “ I used to use FB a lot during the initial days. It got a bit boring after a while, the same old people and the same old things. Nothing new.”

F158: “I used to log in very frequently on a daily basis when I first started using Facebook. The novelty wore off.”

One participant agrees that the activity declined after an initial high phase simply with the passage of time. The lowering of activity in this instance was a natural decline over time although an expected wearing out of the novelty of the application is implicit in the extract.

F62: “ Perhaps, there was a time when I was more active on SN, this was when I just got started and everything seems to be out of the ordinary that it appeals so much to my naturally inquisitive nature .I would be logging into SN every now and then, at any chance I have, and would go bonkers updating them with my activities. I think time has basically changed my SN routine. As time passes, what seemed to be novelty at that time had lost its uniqueness, therefore as with all technology; old things have to make way for something new at one point or another.”

In another case, the user reported a similar decline in activity which was attributed to a maturing of the user and use which came with experience and over time.

F112: “Yes during my first year of joining my work in 2009. I am active even now but I know my own limits. I am active in checking the posts put by others but not that active in writing the posts myself. At those times, I use to update my profile pics with decent ones and looking to get many likes for the same. And also liking others photos if they are good. My experience of using SN and my age maturity have changed my SN usage routine.”

4.3.6.2 LC Demographics and Usage Levels

On an average, a participant indicating this type of fatigue was 27.31 years of age ($S.D = 8.09$). The male-female ratio of this group was 19:13. A typical user of this group subscribed to 3.16 social networking applications ($S.D = 1.82$). The average duration of Facebook subscription was 4.53 years ($S.D = 2.02$). The average network size of the group was 499.00 ($S.D = 265.46$). On an average, individual user activity traced a slightly falling trend at 1.63 ($S.D = 1.52$). As for frequency of use, the average participant in the group fell in the 2.31 quartile ($S.D = 1.06$). In terms of variety of use, an average user in this group fell within quartile 2.47 ($S.D = 1.14$) (Table 4-8).

Table 4-8 User Demographics and Average Indicators – LC Fatigued vs. Not LC Fatigued Group

Participants	N	Age	M:F	SN Apps Used	Duration on FB	Network Size	Activity Trend	Fq	Vq
LC Fatigued	32	27.31	19:13	3.16	4.53	499.00	1.63	2.31	2.47
Not LC fatigued	126	30.29	74:52	2.90	4.61	467.63	2.21	2.55	2.37

N=158; Legend: LC Fatigued – Those indicating life cycle related fatigue; Not LC Fatigued – Those not indicating life cycle related fatigue; N – Number; M:F – Male:Female; Fq – Frequency quartile; Vq – Variety quartile

The independent samples T test for differences in means between those categorized as indicating life cycle related fatigue (LC fatigued) or not revealed significant differences for the number of SN applications used ($M = 3.16$, $SD = 1.82$), $t(156) = 0.26$, $p = .015$. The 95% confidence interval for the difference in means ranged between (-0.28) and 0.80. Thus, the results indicate that there is a significant indication that the LC fatigued group on an average, tended to use 0.26 SN applications more than

an average user in the group that did not indicate this type of fatigue. The test was also significant for the mean age ($M = 27.31$, $SD = 8.09$), $t(156) = -2.97$, $p = .006$. The 95% confidence interval for the difference in means however, varied widely, between (-7.26) and 1.31. This indicated that this fatigued group was significantly younger than the group that did not indicate LC fatigue by 2.97 years on an average.

The mean duration for which an average LC fatigued user had been using Facebook also showed a significant but small difference from the group that did not indicate this type of fatigue ($M = 4.53$, $SD = 2.02$), $t(156) = -0.08$, $p = .066$. The 95% confidence interval for the difference in means ranged widely between (-0.73) and 0.57. Thus, the results show that on an average, the mean duration of subscription of Facebook for a user indicating LC fatigue was lower by a slight 0.08 years as compared to one who did not indicate this type of fatigue. The mean frequency quartile of the LC fatigued group also showed a difference from the group that did not indicate this type of fatigue ($M = 2.31$, $SD = 1.06$), $t(156) = -0.24$, $p = .20$. The 95% confidence interval for the difference in means ranged between (-0.68) and 0.21. Thus, the results show that on an average, the frequency quartile within which a user indicating LC fatigue was placed was lower by a factor of 0.24 as compared to one who did not indicate this type of fatigue.

4.3.7 Multiple Antecedents and Account Deactivation

Multiple fatigue antecedents interact sometimes when a user is exposed to several of the antecedents at the same time. As such, more than one antecedent could be found within the same interview transcript at various points of use or as existing together at the same point in time. Sometimes, when this happens, the user may be forced to quit the

environment which is the major source of stress through a deactivation of his or her SN account at some point of use. This act suggests that the exposure to multiple antecedents pushes the user to the far end of the fatigue continuum where an extreme response seems necessary. The act of deactivation also implies a certain level of finality to the decision to cease engagement within the environment as opposed to staying away or taking a break from it.

This was illustrated in the case of two respondents whose transcripts indicated a combination of fatigue experiences such as social dynamics related, content related, platform related and immersion related fatigue. The experiences reported were severe enough to take them to the extent of deactivating their social network accounts for a period of time, an action which can be considered akin to ‘burnout’ or quitting the environment that creates the stressors and extreme fatigue (Maslach, 1981).

In both cases, there were indications of multiple fatigue antecedents co-existing. In the case of F149, there were indications that the user experienced multiple stress causing factors related to social dynamics, content, immersive tendencies as well as platform related fatigue in the interview. The user countered these experiences through a planned deactivation of the social network account after careful deliberation. The interview excerpt indicated that the user felt “too tired” from a combination of negative experiences felt over time caused by multiple antecedents, which at a certain point in time led to the decision to deactivate the account. A sense of relief and happiness with the de-activation was also evident.

F149: *“I deactivated my Facebook profile in April. I did it because I was being tracked by strangers under the guise of wanting to connect for work. The new tagging/privacy settings on Facebook are annoying. Too many people had too much of an eye on what I was doing*
I was too tired....Thought about it for about a week.. Felt great! I didn't need to be online or anything at all. I was not being piled with information I did not need. I read more books. Good times!”

In the second instance too, the user reported multiple sources of stressors including social dynamics, content related, immersive tendencies and external demands related factors.

F128: *“(I was) disappointed: Posts & Pictures of people travelling to different places and hanging out, that I may have wanted to visit or be a part of. (I was) de-motivated: Milestones & achievements that others may have accomplished, & then reflecting back on my actions accomplishments, that may not be worthy enough can be disappointing. (I felt) fed-up: Ridiculous discussions that may involve important subject matter, and people communicating opinions without any knowledge of the subject. (I was) unable to concentrate: (I used to) constantly check Facebook during Exam period.. Can be distracting. Hence, I deactivated my account for that temporary period so that it won't affect my concentration.”*

Upon probing both users revealed that the accounts were reactivated after some 3 and 4 weeks respectively, after what could be considered a complete break-away from the stress causing environment. The respite allowed both users to clean up and rearrange their

respective social network lives with the help of the controls provided by the platform for a more protected and stress free social network experience: F149 reported ‘*unfriending*’ 175 friends from the 512 long contact list ; while the F128 reported enforcing ‘*strict screening rules*’ for ‘*friending*’ and use of the social network, keeping friends neatly compartmentalised with the help of the ‘lists’ feature besides cleaning up the contact list to ensure privacy and to control stress caused by unwanted feeds and social scrutiny.

Additionally, a pre-emptive strategic deactivation of account was reported as a planned approach to control immersive tendencies and the resulting fatigue especially when the users felt they had more important priorities to attend as illustrated in the case of F17. The main difference between the deactivation in the previous cases and this was that this was pre-emptive, was not preceded by a deliberation and was not followed by any housekeeping on the account.

F17: “Yes. I have deactivated my SN account.. during exams so that I could concentrate on studying. It did not affect me much since I knew it was a bad distraction. (I thought about it) (for) not too long about 5minutes. (I left the account deactivated) for about 1 month. Yes (I did return to SN) so that I could reconnect with the rest of the world. No (I did not incorporate any changes to my SN routine when I returned) so checking FB is not my priority nor am I addicted to FB.”

4.4 Discussion

4.4.1 *Antecedents of Social Network Fatigue*

The factors that precede social network fatigue discussed above originate from within the individual as in the case of immersion related fatigue; the community within which he or she interacts as in the case of social dynamics related, content and life cycle related fatigue; the application that hosts the community as in the case of platform related fatigue; or from factors that reside outside of all of these as in the case of external demands related fatigue. Thus, these factors may be classified into two major heads: intrinsic or related to inherent traits and predispositions of the user or extrinsic or arising from external factors as has been reported in available literature on social network use (Brandtzaeg, 2012; Moore & McElroy, 2012; Racke & Bonds-Racke, 2008).

4.4.1.1 *Handling of Antecedents - Individual Differences*

The intrinsic antecedents of fatigue include factors related to the individuals themselves such as the immersive tendencies experienced by the user and the extent of self-control he or she is able to exert on such tendencies. This was revealed in the individual variations in the intensity of experiences reported as well as the perceived user control apparent in the reported management of such experiences in the cases presented. Thus cases of F143 and F133 appear unique in that both seemed to be able to identify their individual immersive tendencies and take pre-emptive actions to manage these. A degree of self control and will to persevere to stay off the addictive environment was evident in both cases.

F143: *“When I felt that I was too addicted to FB and wanted to distance myself from it for a while. So I did not log on for about 5 days to break my addictionIn the beginning it was difficult. But I held on and got thru a few days, and then it did not matter anymore.... “(I coped by) finding other things to do and kept my laptop shut off.”*

F133: *“From time to time I feel the need to regulate time spent on Facebook more strictly.....Normally turn my mind to other things like reading or spending more time painting and socialising with friends (in the real-world).”*

In contrast other users fail to enforce sufficient self-regulation even when they are able to detect immersive tendencies as is reflected in the excerpt of F126: *“Many times .I could not refrain from posting songs I like....I felt trapped in this un real world...”* , or are not disciplined enough to stick to a disciplined pattern of use as in the case of F83 who admits to slipping into his old pattern of uncontrolled use after a period of deactivation which was expected to regulate the user’s Facebook use: *I returned to FB afterwards (due to) lack of self-control plus peer pressure, getting bored at times, missing some friends. (I did) reduce my time spent on FB for a period of time. But am going back to square one logging on every 10-15 minutes”*.

Thus, individual variations are evident in this type of fatigue where individual traits play an important part in determining intensity of fatigue experiences as well as the effects such experiences would have on user activity levels within the environment.

Extrinsic antecedents that originate from within the community in which the user interacts include those arising out of the users’ perceptions of and reactions to the social

interactions occurring or the content made available within. These perceptions are also highly individualistic and vary from individual to individual. Thus, whether user activity is affected or not due to an SD stressor experienced and to what extent, would depend on the user's personality traits which determine the user's motivations for use of social networks. For instance, these motivations have been reported to be dependent on personality traits such as neuroticism, and introversion (Prins et al., 2006). These traits, therefore, may influence how a user responds to any of the SD related stressors in terms of what and how much he or she shares on these networks (Utz & Kramer, 2009). Similarly, stressors arising out of a social expectation not being met or a social interaction going in an unintended direction and whether it affects the user to an extent to which he or she decides to take a break from social network related activities may also be influenced by individual user traits.

In the case of content related fatigue, the user responses to content that do not cater to the individual's preferences and tastes also showed variability from individual to individual. Three varied responses to uninteresting content illustrate this as seen in the cases illustrated by F4, F132 and F152. In the case of F4 the user appeared to want to exert control in response to feeds that did not meet the interest and expectations: *"I immediately unsubscribe to such posts and I feel I want to regain control over my news feeds and it is silly to let it become something that annoys me...I find ways to reduce the number of such posts that I read"*. In contrast, F132 resorted to staying away from the environment until such time when interesting content was made available. *"I stayed away for a couple of days and returned to normal activity (3-4 times a day)"*. Additionally F152 decided to be proactive and create interesting discussions when he found the content

lacking in interest creation: *“Sometimes when the content on the walls become boring and uninteresting I try to jump start a discussion by posting a picture or a status message in the hope of eliciting some form of response”*.

Platform related antecedents of social network fatigue are also extrinsic in that they arise from users’ perception of an external factor. In this instance, the different design aspects of the platform that hosts the community or of the changes made to these by the vendors. Once again, individual differences in the responses to these factors are evident. Thus, while both F146 and F116 were annoyed at the changes to the interface, such as implementation of the ‘Timeline’, forced on the user from time to time, F146 maintained that the event per se had not affected his usage: *“These events did not reduce my level of activity.”*; while F116 came to terms with the change and restored activity after a time period: *“I did not like the format (of the new Timeline) and was very much against it. I was still on the site regularly but was upset by being forced to accept the change. But then again, change, as commented earlier, is good. It was just a feeling of being forced into something new that you didn’t particularly appreciate (at the time). I have since gotten used to it”*.

4.4.1.2 *Antecedents that Induce Physiological Fatigue*

External demands that keep users away from engaging in social networking activities are also extrinsic factors. The fatigue resulting from these factors have a predominantly physiological characteristic as compared to the others that are psychological in nature since the tiredness or wearing out is more of a physical exhaustion that leaves the user with less energy to expend on social networking activities rather than

an emotional exhaustion. Furthermore, these stressors not only tire the user physiologically and necessitate a prioritization of the user's multiple demands but also affect the users' resumption of activities by posing some difficulties when they eventually return to the application as is evident in the case F144 "*When I got back after the break I became unable to concentrate on social networking activities for up to 2 weeks or more*". The cases indicate that at some point the physiological fatigue may turn into a psychological weariness.

Similarly, the fatigue that results from overwhelming amounts of personal messages one has to handle on events such as birthdays as illustrated by F157: "*I am overwhelmed with birthday messages*" also suggest a physiological wearing out as opposed to a psychological tiredness. As such, these fatigue experiences can be viewed as taking more of a physiological form and this suggests that just as clinical fatigue (Shen et al., 2006), social network fatigue also can take either a psychological or a physiological form based on the nature of tiredness experienced.

4.4.1.3 *Antecedents that Affect Uses and Gratifications of SN*

When the cases are analysed from a different dimension and across all types of antecedents, the failure of various factors such as the content posted, network members' responses, or even the design of the platform to meet the expectations of the user, emerge as a significant factor inducing fatigue, in line with the theory of uses and gratifications sought through social network use (Park et al., 2009). When the content made available disappoints, the cognitive and even the hedonic gratifications of the user would not be met as illustrated in the cases of F129 and F132 for instance. Similarly, when the design of the

platform ignores user preferences, once again, the cognitive gratifications are left unfulfilled as seen in the cases such as that of F146 and F116. Additionally, as indicated in the cases of F107 and F141 amongst others, when social interactions within the community do not go according to one's expectations or become too predictable, his or her social gratifications are not satisfied. Thus, failure of social network features and functions to meet with the cognitive, hedonic or social gratifications sought by users may be a significant contributor to social network fatigue. This also corroborates the expectation-disconfirmation theory (Oliver, 1977) which states that whether an expectation is confirmed or disconfirmed would have an effect on user perceptions of product performance (Oliver, 1977) within a marketing context.

The 'guardedness' that emerges as a distinct negative emotion under social dynamics related fatigue confirms the findings of technostress literature that cites 'presenteeism' as a factor affecting stress (Ayyagiri et al., 2011) as was illustrated in the cases of F151, F149 and F107. Thus, users appear to feel a certain degree of wariness as they engage in social networking activities letting others have a peek into their lives, likes, dislikes and views and through this expose themselves to vulnerabilities of being judged by the others which results in them being careful about what they share on such networks. However, given the importance of fulfilling user gratifications in order to avoid fatigue, this problem of guardedness arising out of social surveillance could be a difficult issue to manage. This is because the level of satisfaction derived from the use of social networks has been found to be related to levels of self disclosure (Special & Li-Barber, 2012). Additionally social surveillance is cited as one of the major uses of social networks (Lampe, 2009). Higher levels of self-disclosure, thus, will ensure higher gratification

through fulfilling the social surveillance needs of members, while at the same time expose the users who share, to higher vulnerabilities, in turn inducing fatigue. The ‘social compensatory friending’ phenomenon cited by Lee et al. (2012) where users low in self-esteem accumulate large numbers of friends as a means of compensation also may expose users to high levels of stress from social dynamics and content related antecedents.

4.4.1.4 *Controllability and Dynamism of the Antecedents*

It can also be seen that some of the antecedents discussed above may be relatively more dynamic in nature and controllable than the others. For instance, the intrinsic factors related to the user, such as his or her immersive tendencies and the control exerted by self on these tendencies may be relatively stable and not easily manageable as they are inherent to the individual user. However, extrinsic antecedents of fatigue such as the content posted and the social interactions taking place within the community may have a more dynamic quality in comparison. These can also be moderated through the use and enforcement of appropriate community norms and etiquette which have been known to improve the social interactions (Wang & Chen, 2012) and reduce fatigue.

The other extrinsic antecedent grouped under community related factors namely the stage of maturity of the community, may also be subject to change at a relatively lesser pace and may be controllable to a certain extent. This is because the stage of maturity of the community is dependent on a variety of factors such as rate of member renewal and member activity (Irriberi & Leroy, 2009). Factors such as the critical mass of members and the heterogeneity of the community also determine the length of time for which a community can sustain interest amongst its members (Raban, Moldovan & Jones,

2010). Therefore, introducing new members or novel activities (Irriberi & Leroy, 2009) as well as ensuring the heterogeneity of the network members (Raban et al., 2010) may help to control fatigue to some extent. However, these measures may not be entirely left to any individual member of the community to implement. This inability of a single user to influence community maturing which leads to a drop in activity is evident in the interview excerpt of F15: *“I was much more into Facebook 2 years ago, when it was active as well (sic). Now a lot of my friends no longer post on Facebook...There is nothing I can do about it.”*

Consequently, each of these factors is likely to have varying influence on the timing, duration and intensity of the fatigue felt, influencing user activity levels differently. Additionally, individual fatigue experiences may result from any of these antecedents that may co-exist and interact with one another to influence user activity levels in distinctly different ways as discussed below.

4.4.2 Effects of Social Network Fatigue

The fatigued group of participants displayed certain unique characteristics which complied with the theory of clinical fatigue reviewed in Chapter 2 and provided some insights into the effects the fatigue experiences has on user activity. For one, the group of fatigued participants were found to have been exposed to more number of social applications than their not fatigued counterparts. This suggests that these users may have had more opportunities to make comparisons between the various available applications and assess how the experiences with one compare with those provided by the others. This in turn may also have caused them to be less tolerant to stressors or irritants embedded

within the environment or arising out of their interaction with it. They also indicated significantly lower activity trend over a six-month period at 1.85 which suggested that while the activity trace of the average not fatigued participant indicated a slightly rising trend at 2.38, those of the fatigued users traced a slightly falling trend on an average. This ties-in with the theory of clinical fatigue which confirms a negative effect of fatigue on activity levels (Ream & Richardson, 1996; Small & Lamb, 2000; Shen et al., 2006; Yu, Lee & Man, 2010). Additionally, the fatigued users were found to belong to a slightly higher activity frequency quartile as compared to those who fell in the not-fatigued group. This finding suggests that a higher level of SN activity may be one of the determinants of fatigue experiences. In other words, if a user were to keep one's activity levels low, there may be lower chances that he or she may be exposed to antecedents causing any of the reported experiences leading to fatigue. A certain level of activity would thus predetermine fatigue, which also is in line with the earliest theories of clinical fatigue which states that fatigue is brought about by continued activity (Anonymous, 1952) or exertion (Hardy et al., 1997). Thus, both the activity indicators, namely trend and frequency when taken together, corroborates the applicability of the fundamental theory of clinical fatigue which characterises fatigue by a deterioration or determinable changes in activity brought about by high or continued activity (Anonymous, 1952; Hardy et al., 1997).

The effect of the antecedents of fatigue on user activity varies depending on the interplay of the extrinsic and intrinsic factors that contribute to the intensity of the fatigue experience felt. A range of emotions from mild or transient to intense or relatively permanent ones was identified from the user responses to fatigue antecedents, which in

turn led to varying effects on user activities. Thus, social network fatigue may have a transient quality and may result in effects lasting a day or two on one hand, and on the other, it may lead to a longer term permanent moderation of activity. At the extreme end of the fatigue spectrum the user may even decide to leave the environment causing stress, the social network in this context, through a deactivation of the account. Thus, three possible gradients of effects on user activity on SN can be identified, each of which may progress to any of the higher states depending on the intensity of emotions triggered by the antecedent and his or her endurance level (Figure 4-3) as discussed in the following sections.

4.4.2.1 Short Breaks in Activity

When certain social dynamics related and content related factors come into play to cause boredom, annoyance or a form of disappointment, users appear to take a short break from social network activities. However, normal activity levels were found to be restored after a short, self-imposed rest-break following the stressor event which helps to manage the resulting stress. This is illustrated in the cases of F157, F152, F141, F132 and F4 to cite a few. F157 *“took off for a few days to recoup”* (Figure 4-1) while F152 took a break from normal activities *“for a period of about three weeks”* after experiencing the respective stressor events: Huge volumes of birthday messages in the case of F157 and a social expectation not met in the case of F152. The transience or the short lived nature of the emotion and the effect of the emotion on user activity are evident in these cases. F152: *“After a period of mourning I reasoned that I was being silly.. I resumed normal level of activity.”* To that extent, such fatigue experiences and the resulting effects appear to be transient in nature.

Figure 4-1 Rest-break after hectic interaction

As such, these transient fatigue experiences may be viewed as normal and restorative in nature much the same way as acute clinical fatigue which also serves as a restorative phenomenon (Shen et al., 2006). It can also be viewed as an easy means of managing the stress arising out of unexpected or undesirable social interactions within social networks. In fact, in the case of high activity users with larger social networks, which SD fatigued users appear to be (Table 4-3), these transient forms of social network fatigue may even enforce a much needed respite for the user from SN activities in the form of such self-imposed rest-breaks from time to time. Users who go through the experience may feel re-invigorated to resume normal levels of activity once they are rested enough which may enable the users to continue engaging with their networks longer and in a more meaningful manner. Nevertheless, it is likely that frequent occurrences of such unwanted social interactions and resulting fatigue have longer term effects on user activities.

4.4.2.2 Controlled Activity

Where platform related and community life cycle related factors were reported there were no immediate visible effects on individual activity traces in the form of a discontinuity or a trough. In the case of P fatigue, however, the activity analysis (Table 4-6) presents evidence that the users indicating this type of fatigue were more likely to trace an activity trend that fell between the falling slightly and steady range (Figure 4-2) as opposed to the group that did not indicate this fatigue who traced a slightly rising trend. This suggests that this group of users may have brought in a certain degree of control or downward moderation of their social network activities, although not necessarily consciously, in response to the concerns they felt over the various design aspects of the platform. This deduction is also supported by the theory that scepticism towards the platform inhibits participation within the community (Utz, 2000).

Figure 4-2 Steady levels of activity in platform related fatigue

A downward moderation is also possible when the user experiences life cycle related fatigue as indicated by the activity analysis summarized in Table 4-8. The analysis presents evidence that the average user indicating life cycle related fatigue may have been on Facebook for a slightly lesser duration than those that did not indicate this fatigue. They were also younger and fell in a lower frequency quartile than the ones who did not indicate this fatigue. Thus, a negative effect of this fatigue on user activity in terms of frequency of use is evident. This is also supported by the theory of community formation and maturing (Irriberi & Leroy, 2009) which states that user participation dwindles towards the end stages of maturing of the community.

A permanent moderation of use may also arise from apprehensions about ‘social surveillance’ as seen in the case of P151 who openly admits to moderating activities due to the wariness felt from such surveillance: *“I am trying to be very careful about what I post”*. In the case of F107, a similar wariness and open admission of how this had resulted in reduced activities on Facebook could be seen: *“I started to think thrice before each single action on FB and I had a sharp realization that my actions are being watched.. I reduced my actions (sic) on FB.”*

Concerns over self-detected immersive tendencies also leads to a conscious moderation of activities as seen in the cases of F158: *“I found that it took too much of my time.. I (deliberately) use it much less these days.”* and F133: *“From time to time I feel the need to regulate time spent on Facebook more strictly”*. Frequent exposures to irritants such as uninteresting content or predictable, boring social interactions could also result in a permanent moderation of social network use as implied in the extract of F129 who admits to annoyance over content and disappointment over the predictability of social

interactions occurring within the community: *“You look towards Facebook for entertainment and there is nothing there except updates from people you are not really interested in”*. *“I have lost interest now....It became predictable; you can guess who all will comment and what”*. In such instances, it is likely that user activity may be controlled and may manifest in lower levels of use than what would be possible if these antecedents were not present. As such, these effects may lead to longer term effects as identified in the chronic form of fatigue (Shen et al., 2006).

4.4.2.3 *Suspended Activity*

Exposure to a combination of fatigue antecedents may drive some users beyond their endurance thresholds to a de-activation of their social network accounts. The action can be considered akin to ‘burnout’ or a state of extreme form of fatigue characterised by increased feelings of emotional exhaustion leading to the user’s eventual decision to quit (Lewis & Wesley, 1992) . Thus, this effect could be viewed as a result of experiencing fatigue at the extreme end of the fatigue continuum as reflected in the case of two respondents whose interviews indicated a combination of social dynamics related, platform related and immersion related experiences which resulted in extreme negative emotions at a certain point in time which pushed them to a deactivation of their network accounts. For instance, F149: *“Things got to a point when my 8-hour work day was filled with only Facebook activity.....The new tagging/privacy settings on Facebook were annoying. Too many people had too much of an eye on what I was doing. I was grossed out... I was too tired.... I deactivated my account for a brief time in April. Before I did that, I unfriended about 120 people from my friend list.”*

In this instance, the effect is a suspension of user activities until such time when the user feels ready to re-activate his or her account. While the act is more drastic than staying away from the environment for a period of time and removes any possibility of any form of activity once completed, it does not imply finality in the user's decision to end his or her engagement with social networks. Interestingly, the fact that both users resumed their respective social network activities after a period of time – three weeks and one month respectively - suggests that experiences at the extreme end of the fatigue spectrum need not be as permanent as it may appear. There is also a suggestion in the case of F149 that the experience may even be helpful in that the user may take it as an opportunity to perform housekeeping on his or her social network which helps to control fatigue causing factors upon resumption of activities.

However, once activity resumes there is a possibility that the user once again goes through fatigue experiences caused by the various antecedents discussed above and the corresponding changes to activity patterns may be effected once again in a cyclical process as illustrated in Figure 4-3.

Figure 4-3 Antecedents and Effects of Social Network Fatigue

4.4.3 *Characteristics of Social Network Fatigue*

The antecedents and effects of social network fatigue uncovered from an analysis of the user interviews and activity logs and discussed at length in sections 4.4.1 and 4.4.2 bring to light the interplay of these two factors and enable an enumeration of certain specific aspects that characterise fatigue as presented in the following sections.

Context: The context of social network fatigue is the use of social networks to stay socially connected. As such, the findings are unique to this setting, where members interact within a virtual community with the intention of connecting and staying in touch with family and friends, voluntarily, over a platform designed to support these requirements.

Nature: The differences in the way individual users feel about, and respond to similar fatigue antecedents, point to the subjective character of such experiences. Thus, for instance, although two users may both feel bored with uninteresting content, the intensity of the feeling as well as the individual responses to this may differ. This was illustrated by the cases of F129 and F152. While F129 browsed away from Facebook due to boredom over content, F152 was more proactive in the approach to handling the experience. While the latter admitted to boredom, rather than taking a break, the user resorted to “jumpstarting” interesting discussions to keep things alive and interesting within the community.

Additionally, the experiential nature of the phenomenon is evident in the context, as reflected in the variety of emotions arising from the various reported user experiences. Thus, individual user experiences related to the self such as the perceived immersive

tendencies, or those that pertain to the community related social dynamics, or the interactive experiences provided by the platform that hosts the community, or even those originating from the external environment of the user, may each by itself, or in combination, give rise to user fatigue. In other words, it is not the existence of any of the antecedents per se that causes fatigue, but the emotional experience arising from the exposure to it that determines whether fatigue sets in or not. This can be illustrated with the help of the users who indicated platform related changes as an irritant and those who may have undergone the same changes but did not cite those as factors that annoyed them. Thus, imposition of the Facebook timeline was cited as an irritant that interfered with activity by only certain users who perceived this universal change as a stressor.

In instances where life-cycle related experiences result in fatigue, it is likely that a certain cyclical pattern may be followed. Fatigue experience first sets in when the user has attained a certain level of familiarity and maturity of use, which in turn is dependent on the life cycle of the community within which he or she participates. However, when the community reinvigorates itself with say, the help of newly injected members or novel activities, the interest level may be reinstated and a new cycle may emerge in line with the theory of evolution of online communities (Irriberi & Leroy, 2009).

Dimensionality: Just as clinical fatigue, social network fatigue is also multidimensional (Piper et al., 1987) in that the experiences comprise emotional, psychological, cognitive and behavioural aspects. Thus, for instance, at an emotional level users may feel angry, disappointed or annoyed (E.g.: cases of F149, F129) when exposed to fatigue antecedents. At a psychological level, user may become guarded (F151), wary (F107) experience boredom (F129) or feel en-trapped (F126).

At a cognitive level, thinking, reasoning and remembering may be affected when users are excessively immersed within the network or overwhelmed by external demands as reflected in the cases of F128 and F147. The way the users respond to the experience in terms of taking rest breaks, moderating, holding back or reducing activity levels or quitting the environment determines the behavioural dimensions of fatigue.

Intensity: The varying intensity of social network fatigue is also evident as reflected in cases ranging from mild irritation and short lived annoyance, to those that expressed deeper anxieties and concerns over social surveillance as well as the disruptive addictive tendencies one develops in the course of use. While on one hand mild annoyance or even anger resulting in the sufferer taking short planned breaks from the environment have been reported (F152, F157), more intense emotions leading to drastic actions such as a deactivation (F149, F128) due to burnout were also identified.

Thus, there are indications that there exists a continuum of social network fatigue varying from mild to severe experiences, that start off with a transient feeling of tiredness or annoyance resulting in short breaks in user activity on one end and ends with an intense emotional experience resulting in the user deliberately breaking away from the environment through a deactivation of account. This continuum of social network fatigue, thus, traces a pattern much the same as what has been reported in clinical or occupational fatigue (Ream & Richardson, 1986).

Form: Social network fatigue may be physiological or psychological in form. For instance, the fatigue caused by external demands that force users to reduce time spent on social network activities, is physiological in nature as it does not appear to reduce the

wish to engage in the activities as seen in the case of F147. Similarly, the feeling of exhaustion from having to deal with huge volumes of responses on birthday reported by F57 also appears to be physiological in nature. All other experiences reported result in fatigue that is predominantly psychological.

Alternatively, the acute-chronic classification based on the duration for which the experience persists, also serves as a useful framework in the context. Thus, certain experiences lead to transient forms of fatigue as in those related to social dynamics related experiences reported by F152. Content related experiences also appear to result in transient forms of fatigue which are relieved by short rest-breaks. Relatively ‘permanent’ forms of fatigue are evident in the case of those caused by platform and community life cycle related experiences. Thus, the transient form of fatigue may be viewed as a natural protective function that maintains the general overall health of the user much like the acute form of clinical fatigue (Shen et al., 2006). The onset of this form is sudden and linked to single isolated incidents/experiences. Thus, the transient form of social network fatigue could be viewed as a common, restorative and harmless phenomenon as compared to the permanent form, which may have long term repercussions such as the users leaving the environment for good.

Antecedents: Various groups of factors as discussed in Section 4.3 may give rise to social network fatigue. These antecedents are unique to the context of use of social networks and affects individual users differently as illustrated by the variations in response to the same antecedents amongst the users. The antecedents may also coexist and act in combination with one another as was illustrated in the cases of F128 and F149.

Prevalence: Certain fatigue antecedents were more prevalent amongst younger users.

Thus, SD, P, LC and ED fatigue were more commonly reported by users who were relatively younger within the sample. P fatigue was prevalent amongst older users while ED fatigue was reported more by males as compared to the female users. SD fatigue was reported more commonly by users with larger social networks. This suggests that demographic differences may play a part in influencing fatigue experiences.

Indicators: With regard to *symptoms and indicators*, social network fatigue appears in the form of weariness, tiredness, boredom, irritation, poor coping ability or a feeling of being overwhelmed, loss of interest or motivation and withdrawal. Additionally, the following symptoms could be culled from the interviews: Guardedness, wariness, envy, annoyance, anger, disappointment and disillusionment, reduced need, interest or motivation.

The guardedness reported suggests that users could hold back from getting fully involved in the environment. Thus, a user reporting this sentiment may tone down his or her level of use so as to protect the self from the perceived vulnerabilities and may be choosy about the activities he or she engages in, which may have longer term implications for social networks. Similarly, a sense of disillusionment indicated by users may also result in a permanent downward moderation of activities and thus have longer term implications.

Effects: While low performance output or activity is an *effect* of clinical fatigue (Ream & Richardson, 1996), not all social network fatigue experiences may result in lower social network activities immediately after the experience. The links

between various types of fatigue caused by the various antecedents identified, and the levels of use, may be variable, although highly probable.

For instance, in the case of the transient form, sufferers may recover from the experience after a rest which may be self imposed. However, frequent occurrences of transient fatigue may have longer term effects and could lead to a relatively permanent moderation of activities or even a decision to deactivate the account in extreme cases. On the other hand, the permanent form of fatigue may result in longer term implications such as a permanent lowering or moderation of user activity levels.

4.4.4 Social Network Fatigue – A Working definition

Thus, social network fatigue could manifest in different ways: For one, the user who is subject to a stressor event may take a short rest break to relieve self of the associated stress after which he/she may resume activities at the pre-fatigue level. This may be a natural restorative phenomenon that would ensure the overall well-being of all regular social network users. Second, the user who is subject to a stressor event may permanently moderate his/her activity as a means to mitigate or counter the resulting stress. This may lead to a long term and relatively permanent stabilising of activity at a level lower than the initial registered one and may result in a decline in user activity. Thirdly, the user who is subject to severe or multiple stressors may resort to an extreme measure and quit the environment through an account deactivation as a means of avoiding the stress. This may result in a cessation of all user activities on his/her social network.

In summary, social network fatigue may be described as a subjective, multi-dimensional user experience comprising feelings such as tiredness, annoyance, anger,

disappointment, guardedness, loss of interest, or reduced felt-need or motivation, affecting various aspects of social network use and interactions. The experience may vary in intensity and may be influenced by factors related to the user, the social network he or she participates in or its use, or the technical platform that hosts the network.

The result could be a corresponding and immediate decline or moderation of social network activities, or even a planned departure from the environment in extreme cases: It may be self-regulated; and either 'transient', in which case an immediate short-term decline in activities may be followed by resumption of pre-fatigue levels of use, or 'permanent', in which case the effects may be relatively longer term. The transient form could be viewed as a normal restorative phenomenon that would ensure heavy users maintain healthy social networking habits while the permanent experiences could result in a long term decline in social network use.

In short, social network fatigue may be defined as an experience affecting user motivation and influenced by factors related to the social network or its use, which results in an alteration of social network use patterns.

CHAPTER 5 CONCLUSION

This chapter summarizes the key findings of the research which set out to conceptualize fatigue in the context of use of social networks to stay socially connected. Six major groups of antecedents and three main effects of these on user activity have been identified. In the course of analyzing fatigue related experiences, nine key characteristics of social network fatigue were enumerated which helped in the derivation of a working definition of the phenomenon. The findings reported have implications that are theoretical as well as practical. These implications are presented followed by the contributions of the research. Finally, the limitations of the research and potential future extensions to the work carried out are discussed.

5.1 Summary of Findings

The research set out to conceptualize fatigue in the context of social network use through an identification of the factors that precede fatigue experiences and their effects on user activity levels. The demographic profile and activity indicators of the fatigued users were also analyzed so as to verify how these factors compared with those of the group that did not register any fatigue. The data for the mixed methods study were gathered from 158 Facebook users who were recruited through a purposive snowball sampling involving multiple channels. The participants submitted their Facebook activity log covering six consecutive months besides completing an e-mail interview that gathered their demographics, usage patterns as well as experiences relating to Facebook use. The distinct characteristics of fatigue in the context of use of social networks to stay socially

connected as well as a working definition was derived from a qualitative content analysis of the interview alongside a quantitative analysis of user activity and demographics.

The first research question explored was:

RQ1: What are the antecedents of social network fatigue?

From the analysis and discussion presented in Chapter 4, six groups of antecedents of social network fatigue were identified. Social dynamics related antecedents (SD) arise from the user's perceptions of how individual network members respond or do not respond to one's activities on the social network. Content related antecedents (C) arise from how the content made available is perceived. Immersion related antecedents (I) comprise of awareness of addiction or immersive tendencies. Platform related antecedents (P) arise from perceptions of specific design features of Facebook (E.g.: interface features, privacy features) or any changes made to the above. Life-cycle related antecedents (LC) constitute no evident stressors but a visible or reported decline in use caused by lower interest or reduced need on the part of the user following a high activity phase. External demands related antecedents (ED) make up factors external to the social network that compete for the users' time and energy causing stress.

Some of these antecedents share commonality in terms of the fundamental source of stressors and hence could be grouped based on their proximity or physical distance from the environment comprising of the user and his social network. Thus, these antecedents can be seen as originating from (1) within the *individual* as in the case of immersion related fatigue (I fatigue); (2) the *community* within which he or she interacts as in the case of SD, C and LC or (3) the *application* that hosts the community as in the

case of P or from (4) *external factors* that reside outside of the social network environment as in the case of ED.

Additionally, although how the user responds to any of the antecedents appear to be influenced by the individual traits of user, some of the antecedents may be more manageable at an individual level than others. Thus, the antecedents could be classified into two major heads based on ‘internality’ or the extent to which the inherent user traits may influence the resulting experiences: (1) *Intrinsic* or related to inherent traits and predispositions of the user or (2) *Extrinsic* or arising from factors external to the user (Brandtzaeg, 2012; Racke & Bonds-Racke, 2008) (Table 5-1).

This also implies that the controllability of the antecedents may vary: the extrinsic antecedents may be more difficult to control and manage at an individual level than the intrinsic ones. Likewise, the users may be able to exert more control over antecedents that originate from self and the community than over those that originate from the platform or the external environment. In the case of the latter two, the antecedents may be more tightly controlled by external entities that may have more influence within each of these contexts: The application developers in the case of platform related antecedents and the key influencers within the family, work or educational contexts in the case of external demands related antecedents.

Table 5-1 Antecedents of Social Network Fatigue

No	Antecedent	Description	Fundamental source of fatigue	Internality
1	Social dynamics related	Stress or negative emotions arising from perceptions about how individual network members respond or do not respond to the user within the community	Community	Extrinsic
2	Content related	Disappointment/boredom or related emotions arising from how the user perceives the content made available on the network	Community	Extrinsic
3	Immersion related	Awareness of controlled or uncontrolled addiction or immersive tendencies impacting on SN activity or not: Caused by a feeling of having spent an excessive/wasteful amount of time on the network	User	Intrinsic
4	Platform related	Dissatisfaction/annoyance or related emotions arising from how specific design features of Facebook (For e.g. : interface features, privacy features) or unwanted changes to the above are perceived	Platform	Extrinsic
5	Life-cycle related	No evident stressors: A visible or reported decline in use caused by lower interest or reduced need after an initial high activity phase.	Community	Extrinsic
6	External demands related	A visible or reported decline or break or reduced use caused by reduction in time or energy to engage in social network activities brought about by external demands	External environment	Extrinsic

The second research question investigated how individual user activity reflected fatigue experiences, which was answered with the help of three related research questions:

RQ2: How does individual user activity within social networks reflect fatigue experiences?

RQ2a: What is the typical activity profile of the fatigued user?

RQ2b: How is this different from that of a user who is not fatigued?

RQ2c: What are the specific effects of fatigue on user activity patterns?

With regard to RQ2a and RQ2b, statistical analysis revealed distinct demographic and activity profiles of users indicating each of the types of fatigue associated with the six antecedents. The demographic profile of the users was described using the following: (1) age (A); (2) gender (G); (3) number of SN applications used (N); (4) duration on FB (D); and (5) network size (S). The activity profile of the users was described using three major activity indicators: (1) the activity trend traced over a six-month period (T), the frequency of use (F) and variety of use (V).

In the case of fatigued users, the number of social networking applications used was found to be higher; a falling activity trend as well as a lower activity frequency was recorded as compared to those with no indication of fatigue (Table 5-2). This corroborates the relationship between fatigue and activity as reported in clinical studies (Ream & Richardson, 1996; Small & Lamb, 2000; Shen et al., 2006; Yu et al., 2010)

Table 5-2 Reflection of Fatigue on User Activity

Antecedent	Demographic Profile					Activity Profile			Specific effect on user activity pattern
	A	*G	N	D	S	T	F	V	
Social dynamics related	▼	NA	▲	NA	▲	▼	▲	NA	Rest-breaks; downward moderation
Content related	NA	NA	▲	▼	NA	▼	NA	NA	Rest-breaks
Immersion related	NA	NA	NA	▼	NA	NA	▲	NA	Rest breaks; downward moderation; suspension of activity
Platform related	▲	NA	▲	NA	NA	▼	NA	NA	Downward moderation
Life-cycle related	▼	NA	▲	▼	NA	NA	▼	NA	Downward moderation
External demands related	▼	▲	NA	NA	NA	▼	▲	NA	Downward moderation; suspension of activity
Any of the above	NA	NA	▲	NA	NA	▼	▲	NA	Rest-breaks; downward moderation; suspension of activity

* Male = 1; Female = 0; ▼ Lower than that of the not fatigued group; ▲ Higher than that of the not fatigued group; NA = Not applicable
Legend: A- Age; G-Gender; N-No of applications used; D-Duration on FB; S-Size of network; T-Activity Trend; F-Frequency; V-Variety

Age (A) had a bearing in the case of SD, P, LC and ED fatigued groups. The SD, LC and ED groups were relatively younger whereas the P group was found to be significantly older than the not-fatigued group. In these instances, the younger users may be tiring more easily possibly due to their communication preferences which place weightage on control (Madell & Muncer, 2007) as well as their emphasis on affection and pleasure gratifications (Auter, 2007), all of which come into play in these types of fatigue. As for the P fatigued group, the older users may have reported unhappiness over design aspects and changes to platform more than the younger users due to the fact that they may be less adept at adapting to technological changes (Morris & Venkatesh, 2000). Gender (G) did not have any bearing on any of the forms of fatigue except ED which was found to be reported more by males than females. This may be due to the fact that men are more likely to experience stress from multiple sources since women choose not to multitask when the choice is available, which reduces stress from competing demands for them (Buser & Peter, 2012).

With regards to the number of social networking applications used (N), the SD, C, P and LC fatigued groups are exposed to more of these applications than those with no such fatigue. This exposure may have caused these users to fatigue from Facebook use more easily through comparisons. The duration for which the users have been on the social network (D) did not appear to be a contributory factor for any of the fatigue antecedents as suggested by the lesser duration of subscription of fatigued users in the C, I and LC category. This may be because more than the length of subscription, there are other factors such as higher usage frequency that expose the users to these antecedents. The size of the social network (S) did not appear to have any bearing on any kind of fatigue, except for SD. In this case, the network size of the users was found to be larger than of

those that did not report this fatigue, a finding that tallies with the basic nature of the antecedent: Larger social networks expose members to higher vulnerabilities of undesirable social interactions.

As for the activity profile of the fatigued users which is the focus of RQ2a and RQ2b, the activity trend (T) indicated a falling pattern across four of the groups (SD, C, P and ED), below the average recorded by those outside these groups. This reaffirms the negative relationship between overall activity levels and fatigue experienced as theorised (Ream & Richardson, 1996; Shen et al., 2006). However, interestingly, the frequency indicators (F) displayed mixed results. Only the LC fatigued group recorded lower frequency of activity evidently due to the fact that the community life cycle of these users had matured, resulting in natural stabilising of use at lower levels (Iriberry & Leroy, 2009).

Higher frequencies of activity (F) were indicated in the case of SD, I and ED fatigued group on the other hand. In the case of SD, this may be due to the fact that the often reported effect of rest-breaks used in response to fatigue reinvigorated the user to resume normal activity levels. This is further enhanced by the greater interaction opportunities afforded by the larger social networks of this group of users. The I fatigued group may have registered higher frequency as immersed users must naturally be high frequency users in order for them to feel and report immersive tendencies. The higher frequency of use of ED fatigued group appears unexplainable but this may be due to the fact that this group is made of naturally heavy users of social networks which may have played a part in them feeling stressed when faced with multiple demands. The higher frequencies of use registered by both SD and ED fatigued group of users may be a

reaffirmation of the basic theory of fatigue, which states that fatigue itself is a result of high levels of exertion and activity (Anonymous, 1952).

Variety of activities performed (V) had no bearing on any of the types of fatigue. Thus, although variety has been found to address monotony and thereby alleviate or preempt the onset of fatigue (Shen et al., 2006), it does not appear to hold true in the context of social network fatigue. However, this has to be viewed in the light of the fact that during the 12-month period covering data collection, Facebook had offered incrementally wider variety of features and functionalities. This may have interfered with the comparability of the data gathered at various points in time over the period of study.

With regard to RQ2c, the analysis revealed that the antecedents resulted in one or more of the following three effects on user activity as reported by users or as evidenced by the individual activity patterns traced: (1) A rest-break whereby the user stays away from the environment for a short period of time after experiencing a stressor; (2) a downward moderation of activities whereby the user consciously or unconsciously lowers the level of use on a relatively permanent basis; (3) a suspension of activities or a conscious and planned departure from the environment following a de-activation of the network account.

It was not possible to tie a specific antecedent to any one effect due to the fact that the antecedents often co-existed and may have interacted with one another to influence the overall user experience. Furthermore, the individual differences in the handling of these antecedents as discussed under Section 4.4.1.1 also may have resulted in a situation where an antecedent may have resulted in any of the identified effects. Additionally, it can be concluded that a user who initially responded to a stressor event such as undesirable social interaction with a short rest-break, may resort to a permanent moderation of activities or

even a de-activation, if he or she were to experience a series of such stressors in quick succession, or were to experience multiple antecedents.

The third research question explored the characteristics of fatigue in the context of social network use:

RQ3: What are the characteristics of ‘fatigue’ in the context of social network use?

Based on the analysis of the user experiences under the six distinct forms of fatigue and the effects identified, social network fatigue shows some distinct characteristics of its own, that may be unique to the context. These characteristics distilled from the analysis and described in detail (Section 4.5.4) can be summarised in Table 5-3.

Table 5-3 Characteristics of Social Network Fatigue

	Unique Features
Context	Use of social networks to stay socially connected
Nature	Subjective; experiential; may follow a cyclical pattern tracing the evolution of the community
Dimensionality	Multiple: Involving psychological, emotional, cognitive, behavioural, temporal and severity elements
Intensity	Variable along a continuum between mild irritation or weariness and advancing to a state of extreme exhaustion where an account deactivation due to burnout may be resorted to
Forms	Based on dimensions – predominantly physiological in external demands related fatigue and psychological in the rest. Based on duration – ‘Transient’ where the experience is shorter and relieved by a break; ‘permanent’ where experience lasts longer
Antecedents	Unique to the use of social networks - social scrutiny; predictability of responses, inappropriateness or lack of responses to posts; hectic activity; lack of interesting content; self-detected immersive tendencies; lack of control over interface, frequent changes to interface; competing external demands; maturing life-cycle of the community
Prevalence	SD, LC and ED fatigue more prevalent amongst younger users, P fatigue prevalent amongst older users. ED fatigue more prevalent amongst male users. SD fatigue prevalent amongst users with larger networks. In general, fatigued users use social networks more frequently and are exposed to more number of social networking applications.
Indicators	Tiredness, boredom, exhaustion, irritation, discomfort, loss of interest, lower energy, reduced enjoyment, annoyance, anger, disappointment, guardedness, wariness, reduced motivation or need, fading of novelty
Effects	Downward moderation of activity, rest-break in activity, suspension of activity

The *context* of social network fatigue is specifically the use of social networks to stay socially connected. In terms of the *nature* of the phenomenon, social network fatigue, just as its clinical counterpart, is found to be subjective and experiential. However while clinical fatigue follows a circadian rhythm which is based on a twenty- four hour biological clock (Piper et al., 1987), in the case of social network fatigue, there appears to be a cycle which follows the evolution of the community to which the user is attached.

The *dimensionality* of social network fatigue suggests the existence of multiple manifestations just as in clinical fatigue, including psychological, emotional, cognitive, behavioural, temporal and severity elements. Thus, emotions such as anger have been recorded as a dimension of fatigue. Likewise, cognitive manifestations such as a feeling of being overwhelmed and behavioural manifestations such as staying away from the environment have also been reported. Time and severity dimensions are evident in cases where the experience lasted for different lengths of time and was at varying levels of intensity. The psychological manifestations of the phenomenon are unique to the context. Thus, users report guardedness, wariness or even a feeling of being entrapped when fatigued, all of which are peculiar to the context of being socially connected at all times.

As for the variability of the *intensity* of fatigue experiences, this has been confirmed in line with the characteristic of clinical fatigue. However, the range within which this variance is observed is distinct to the context. As such, social network fatigue varies along a continuum ranging from a mild transient feeling of annoyance or related emotions to an extreme experience, resulting in a deactivation of account much the same way as a person experiencing ‘burnout’.

Social network fatigue *forms* can also be classified based on duration or dimension of the experience just as clinical fatigue. Thus, a transient variant of social network fatigue exists which shares similarities with the acute form of clinical fatigue. The permanent form of social network fatigue is akin to chronic clinical fatigue. However, the transient form may have a restorative quality about it which ensures the overall health of the users of social networks. As such, this form of fatigue may present heavy social network users with benefits in terms of maintaining the interest in the environment for longer.

The *antecedents* of social network fatigue are unique to the context of use of social networks to stay socially connected. Concerns over the social scrutiny one is exposed to and unfulfilled expectations of the members with respect to community response may bring about fatigue. Likewise, content expectations that are not met also bring about fatigue. Unwarranted or undesired changes to interface, as well as design features that do not cater to users' needs and tastes result in fatigue. Similarly, a maturing life cycle of the community of which the user is a member and self-detected immersive tendencies may give rise to fatigue in the context. Competing external demands faced by the user from time to time, such as work, family or studies may also lead to fatigue.

As for *prevalence*, demographic differences exist between users reporting various types of fatigue. Thus, age and gender differences were found between the various fatigued groups and those who did not report the fatigue. Likewise, fatigued users were also characterised by larger network sizes in the case of social dynamics related fatigue and higher number of social networking applications exposed to, as shown by fatigued cases in general. Fatigued users were also found to be higher frequency users of social networks as compared to those with no fatigue.

The *indicators* of clinical fatigue related to tiredness, boredom, exhaustion, irritation and discomfort as also loss of interest and lower energy or enjoyment also apply to social network fatigue. However, additional indicators such as annoyance, anger, disappointment, guardedness, wariness, reduced motivation or need and a fading of novelty were identified as unique to the context of social network fatigue. The *effects*, although largely negative in terms of the impact on activity as in the case of clinical fatigue, at least one of the effects namely the self-imposed rest breaks, could be restorative in that these help the user to rest after a stressor event so that he or she is ready to resume activity at normal levels. Similarly, self imposed moderations also help to keep fatigue experiences within acceptable limits when users perceive themselves to be excessively immersed within the environment. As such, these fatigue experiences may be helpful in maintaining healthy social network use patterns overall.

5.2 Implications

The manifestation of fatigue in the context of social network use is not always immediately visible in activity traces except in certain instances involving the social dynamics related and the content related antecedents where visible troughs were traced following a stressor event. In the case of the other antecedents, user experiences and resulting perceptions appear to shape activity patterns and moderate usage on a relatively permanent basis, which may manifest in the general trend and relative frequencies of use. Unconscious moderation of activities due to a natural decline in interest over time and after prolonged use was seen in the case of life-cycle related fatigue. A different kind of activity moderation - a conscious self imposed one - was also reported by users experiencing immersion related fatigue. Consequently, these effects may have implications to the various stakeholders of the domain in different ways.

First, from a design perspective, since social surveillance has been cited as one of the major uses of social networks (Komito, 2011; Lampe et al., 2007), the finding that this use in itself may be a built-in source of stress to users is of special significance. Thus, provision of surveillance features must be adequately complemented by support of individual user controls that would enable him or her to determine the extent to which tracking may be allowed on his or her social network activities. This is in line with the finding that ensuring anonymity and privacy of users is an important determinant of success of online communities (Miura & Shinohara, 2005). This may be an important consideration especially in the case of users with higher levels of neuroticism (Hughes et al., 2012), which makes them particularly vulnerable to stress from social surveillance. Enhanced privacy and anonymity features that facilitate ‘deindividuation’ or a state of decreased self-evaluation leading to uninhibited behaviours (Miura & Shinohara, 2005) might be helpful in addressing feelings of guardedness arising out of social surveillance.

Second, designers also need to look into injecting novel experiences (O’Brien & Toms, 2008) into the environment through the introduction of new and interesting features from time to time so as to manage LC fatigue. This may help to prolong user experience and sustain their initial interest for longer, thereby delaying the onset of LC fatigue. Yet, at the same time dynamism could also work against the set purpose especially if the changes destabilise the community (Birnholtz, 2010). Similarly, immersion enhancing features could be a ‘double edged’ sword which the designers would need to yield with caution. The implication of effective engagement enhancing features is that while they may work well in terms of providing immersive experiences to the user, they may also cause the user to become aware of the disruptive effects of his or her immersion on functions that should take higher priority such as work or family. Fatigue experiences may kick in resulting in a

self-imposed moderation of activities which may render these features counter-productive. This, once again, underlines the importance of treading the fine line between engaging the users while at the same time affording individual users control over their activities.

Third, better content management tools may help the users in deciding what is presented on his or her interface more effectively, thus pre-empting the onset of content related fatigue. Appropriate content filters and flags that allow segregation and highlighting of content may be helpful in managing this form of fatigue to a large extent. However, the onus still falls on the user to ensure he or she uses discretion while expanding his or her social network as a first line of defence. Additionally, there may be instances where the users may require help with resumption of social network activities after a long break as was illustrated in the cases of F144 and F62 under Section 4.3.5.1. In such instances, visual cues and book marking features may help the user in getting over the difficulties in resuming interactions. Features such as summary feeds that provide a brief overview of what transpired during the time the users were away from the community without overwhelming them would also be a helpful design feature.

Fourth, affording user feedback and control at an interface level could help in minimizing platform related fatigue to a large extent. While providing set features that have been pre-identified would make the design simpler and easy to manage from a designer perspective, there is evidently an expectation that these be made more flexible and customizable. Thus, design changes should be left as a matter of choice to the user, so that that he or she may adopt or reject them at will. Design features such as buttons and icons that could be co-created by users with the necessary skills could further enhance the

customizability of the interface and render the platform more democratic and participative.

Fifth, from a user perspective, SD fatigue has implications which highlights the importance of use of effective social networking strategies such as (1) being selective in adding and managing contacts (Birnholtz, 2010) and (2) establishing and following norms of behaviour that are acceptable within the communities within which they participate. This will ensure shared values and trust (Cohen & Prusak, 2001; Iriberry & Leroy, 2009) are preserved within the community. The fatigue that stems from a feeling of being overwhelmed after having to handle large volumes of responses during special events such as birthdays such as the one reported by F 157, can only be managed if the number of social contacts is kept manageable. Similarly, annoyance or irritation arising out of inappropriate responses to posts can only be kept under control if contacts are segregated with the help of lists and groups. In the case of LC fatigue, the users will have to look into rejuvenating the community, to which they belong through strategies such as admitting new members.

Establishing and following social norms and etiquette within the community may have a greater bearing on keeping social dynamics related fatigue under check. This is evident in the interviews that indicated social dynamics related fatigue such as in the case of F15 who reported annoyance with people who are not close commenting, F141 who reported “backstabbing” from newly acquired Facebook friends and F146 who reported annoyance from inappropriate response. However, the problem with group norms and expectations is that it is highly variable from community to community: What is acceptable within a community of artists or a special interest group may not be applicable

for a professional community. When members choose to participate in widely diverse groups using a single social network account a unified set of acceptable norms of participation may be harder to derive and adhere to. At a design level, the above may call for support of fluid, communally created norms and etiquette guidelines (Hew 2009) that can evolve organically with the changing constitution and nature of the community/communities (Iriberry & Leroy, 2009) to which the user subscribes so as to help address such issues. Thus, maintaining acceptable and pleasant social interactions within the community emerges as an important takeaway as effective social interactions play an important role in facilitating sharing within communities (Chiu et al., 2006; Lin & Bhattacharjee, 2009; Sussman & Siegal, 2003). This is significant when viewed in the light of the finding that social dynamics related form of fatigue is the most commonly reported form of fatigue amongst the respondents.

Sixth, besides the implications for individual users identified above, the findings may also have implications at a higher level, say, corporate and societal levels. For instance, there may be valuable takeaways in the reported findings for companies and governments, the two key entities that are pushing for higher adoption and integration of social media into their day to day functioning in the current times. The conceptual clarification of social network fatigue which brings to light its antecedents and effects on user activity as well as its characteristics would serve as a guide for effective policy formulation in the context of social network use within these contexts. For instance, unpleasant, unwanted or unexpected social interactions and undesirable content have been found to induce fatigue amongst users of social networks. This knowledge could provide a baseline for the establishment of grouping and interactional norms within a corporate or government sponsored social network which would alleviate or manage fatigue to a

certain extent. Thus interest based grouping or grouping based on commonality of objectives could be adopted depending on the context of use of social networks. Similarly organic group formation could be encouraged to facilitate free and improved sharing of ideas and information within organizational networks.

Additionally, there may be societal implications for the findings especially at a time when more and more social networking applications offer their mobile versions which increases their accessibility and availability besides improving upon the functionalities afforded. These trends have been reported to have brought about general shifts in the social preferences and behaviour of young users (Ellison et. al., 2007; Park et al., 2009) especially in countries, where wire-less connectivity as well as access to the Internet is faster, easier and more affordable. The findings reported in the study may therefore provide valuable cues that would help to understand and explain these changes in social behaviours. Such an understanding could form the basis for schemes aimed at addressing the needs of the larger community besides ensuring their reach and uptake within the target segments.

At a governmental level, the knowledge of social network fatigue related factors and effects could help policy makers in formulating and fine-tuning policies aimed at addressing larger social issues. For example, issues of social exclusion and isolation (Brandtzaeg, 2012) faced by segments of the society as well as the civic engagement or lack of it reported amongst young adults (Park et al., 2009) can be better understood and managed in the light of the findings reported here. The information may also help in managing some of the administrative and governance related challenges faced through

cues for the implementation of social networks- based government initiatives that are better designed to address user fatigue.

5.3 Contributions

The research was initiated primarily from the conceptual vagueness surrounding the use of the term ‘social network fatigue’ as well as from what appears to be an inadvertent omission of the experiential elements from fatigue related research in the domains of computer mediated communication. A lack of qualitative studies focused on negative experiences within the domain of social network use also served as an impetus for this study. This research addresses all of these concerns in that it provides conceptual clarity to the term social network fatigue through an analysis of fatigue related experiences. The contributions of the research, therefore, are twofold: Theoretical and practical.

From a theoretical perspective, first, it enabled a derivation of a working definition of ‘fatigue’ in the context of social network use, which in turn provides a conceptual understanding of the phenomenon for each of the stake holders within the environment. This also will guide the development of a standardized vocabulary of related terms which is expected to help in empirical assessment of the phenomenon with the help of appropriately designed scales. The most significant contribution of the research is towards concept development or the basic art of developing a concept - social network fatigue in this context - as an important first step in the creation of knowledge (Argyris, 1975) within the domain. As one of the pioneer efforts in describing what has until now been a fuzzy terminology, this research helps to bring to the realm of academic discourse (Walker & Avant, 1995), issues and concerns surrounding the phenomenon of social network

fatigue. Researchers in the domain would thus benefit from a common understanding of the basic elements that make up social network fatigue and a common vocabulary to which future research efforts could make valuable contributions, further strengthening the understanding of a maturing domain.

Second, the results presented could guide the development and testing of appropriate models of social network fatigue which in turn would lead to a more comprehensive, in-depth understanding of the phenomenon in line with Eppler & Mengis' (2004) view that testable models based on a literature-based understanding of the phenomenon are theoretically more valuable. Additionally, from a theoretical perspective, the study distinguishes social network fatigue from two other closely related phenomena reported from within the domain of ICT use namely information overload and technostress. This in turn allows a conceptual clarification of the phenomenon of social network fatigue from other related terminologies discussed in available literature. From a practical point of view, the findings of the study would help social network developers and users, through the provision of useful pointers so as to understand and better manage social network fatigue. Developers of social networking applications would be better informed about the effects of interface design elements which may help them to address fatigue causing factors more effectively. An understanding of social network fatigue enables social network users to be better managers of their activities thereby affording more enjoyable experiences.

5.4 Limitations

The research was done on a specific platform namely Facebook, and within a sampled set of users who participate in diverse communities: Therefore, the

generalizability of the findings may be restricted to social network platforms that share similar characteristics and to users who share similar demographic characteristics as the one studied. Thus, the findings may be more applicable in the context of use of social networking applications that focus on social linking. In the case of others that cater to other forms of networking such as professional linking as in LinkedIn, mass broadcast as in the case of Twitter and connections based on interests and hobbies as emphasised by Pinterest, some of these findings may not be applicable as such. For instance, the “social guardedness” of the user and the resulting reluctance to use Facebook arising out of a fear of being judged discussed under social dynamics related antecedents in 4.3.1, may not apply in the case of LinkedIn or Pinterest in the exact form as reported, given the nature of information shared on these platforms.

As such, the generalizability of the findings may be restricted to other applications in the genre that cater to social linking with the help of features that support network formation and sharing in ways that are similar to Facebook such as Google Plus. Nevertheless, differences in privacy protection and content filtering capabilities afforded by each distinct application within the genre will play a part in determining the extent to which each of the antecedents identified would have an effect on user activity in these distinct contexts. Thus, in the case of an application that supports segregation of a new contact upfront at the time of addition such as Google Plus, users may have fewer issues with social dynamics related stressors as compared to Facebook, which supports grouping after a friend has been added. Similarly, the fatigue antecedents reported appear to be dependent on the socializing features and functionalities afforded by Facebook which present opportunities for stressors as discussed in Chapter 4. As such, all of these antecedents may not be entirely applicable to other applications within the genre that

support a different set of features for socializing. This is so because the visibility of one's posts, the response to these from the network members and the level of control the user is able to exert to restrict the posting as well as the visibility of these responses are governed to a large extent by these built-in features.

Once again, for the same reason as above, some of the content related antecedents that are identified within the Facebook environment may not feature prominently in the case of a social application which offers better filtering features. This in turn may have an impact on the high level model of social network fatigue derived in the context of Facebook. Thus, these limitations have to be borne in mind while porting the findings over to other social networking platforms.

The high level model of fatigue antecedents and effects illustrated in Chapter 4 is based exclusively on the reported experiences of the sampled users and the activity patterns that emerged from the activity analysis. Hence, the possibility that the list of antecedents and effects presented in the report may not be exhaustive has to be acknowledged as a limitation. Thus, user responses and effects that may not have been indicated in the data set from which the conclusions are drawn may exist. For instance, it is perceivable that a user may respond to stress induced by undesirable posts or responses with a relatively high frequency of abusive posts, which could manifest as higher levels of activity instead of breaks or moderation. Such a response, while highly probable, was however not evident in the data set examined. It is however, important to acknowledge the possibility of user responses and consequent activity effects that may vary distinctly from the ones that are uncovered in the research and provide allowances for their impact on the model of fatigue presented in Chapter 4.

While the completed research suggests the existence of extrinsic and intrinsic antecedents of fatigue, this list is by no means exhaustive. In fact, the analysis reveals possible additional intrinsic factors such as personality related traits such as the neuroticism of the user, the level of extroversion of the user ((Prins et al., 2006), his or her openness and sociability (Ellison et al., 2007; Hugh et al., 2012), to name a few, that may have played a role in influencing fatigue experiences. This has to be borne in mind while applying the high level model of social network fatigue to any given situation.

The strategy of including all age groups was deliberately used since the explorative nature of the study prevented the researcher from forming any assumptions regarding possible variations in fatigue with age. Furthermore, since the study aimed to conceptualize an unidentified phenomenon, an investigation within specific age groups was not deemed a requirement. Thus, the user demographics indicate that the average respondent was 29.68 years of age (S.D = 10.98), with a network size of 474.03 (S.D = 293.51) and an average subscription to 2.95 applications (S.D = 1.38), and has been on Facebook for 4.59 years (S.D = 1.65). These demographic peculiarities also have to be considered while applying the findings of the research to other populations that may not share similar demographic features.

The diverse age-group of the respondents might have introduced confounding factors related to age which may have been missed out in the study. This also has to be acknowledged as a limitation. However, due to the pioneering nature of the work, the findings reported are valuable in that they address the issue of conceptual vagueness that surround the use of the term 'social network fatigue'.

The sampling method used, namely snowball sampling using multiple channels, contradicts many of the assumptions underlying conventional sampling. For instance, the social networks of the referrals may share similarities which may result in ‘isolates’ or unique cases being ignored (Atkinson & Flint, 2001). As such, there may be problems of representativeness, since snowball samples could be biased towards inclusion of individuals with inter-relationships. This could result in an overemphasis on the cohesiveness in social networks, which may in turn translate into similarity of responses to interview questions. However, larger sample sizes are said to eliminate such biases (Pollok & Schlitz, 1988). In this case, a sample size $N=158$ is considered large for a qualitative interview (Bernard, 2000; Green & Thorogood, 2009). Additionally, referral chains were started from several contact points chosen from a variety of locations and from a mixture of sources as against a limited number of seeds, so as to ensure diversity within the sample. Furthermore, the maximum number of referrals from one point of contact was restricted to five to mitigate the effect of this problem (Biernacki & Waldorf, 1981) to a certain extent.

Yet another methodological limitation is that the period of observation of activities was restricted to six months. As such, the fatigue-activity links investigation has been constrained by this window. For instance, activity patterns traced over the initial days of use by seasoned users, especially those that appear to indicate life cycle related fatigue, were not available for analysis. This poses a limitation as the conclusions drawn in these instances regarding activity effects were solely based on interview responses and could not be validated against actual activity traces. Follow-up interviews were conducted in these cases to confirm the conclusions drawn and to verify if the user had indeed

registered high levels of activity during the period outside of the window used for activity trace so as to mitigate the risk of erroneous analysis.

Additionally, only activities traceable by the activity log have been collected and analysed, unrecorded activities such as lurking behaviours may have been excluded from the analyses, although reported in the interview. Therefore, the traces may not be entirely reflective of the actual activities performed by the users within the environment, although recorded activities could serve as a useful indicator of the overall activities. However, it has to be noted that unreported lurking activities, if there were any, may have caused erroneous conclusions to be drawn regarding fatigue – activity links in those cases, a problem that is difficult to detect and mitigate. Thus, for instance in the case of a user who habitually indulges in silent lurking activities, the activity trace would have registered low frequencies and varieties or none at all. If the user failed to report this in the interview either deliberately or accidentally, yet indicated fatigue experiences, the analysis may have erroneously concluded a correlation between fatigue experiences and low activity where none exists. As such, provisions have to be set apart for possible erroneous conclusions drawn in cases where lurking was not reported in the interview transcripts. Nonetheless, the risk of this problem ought to be in line with what is expected in any self reported response based studies.

There is a possibility that the occurrence of multiple fatigue antecedents as well as any unidentified factors that may have had an effect on fatigue amongst the cases examined may have interfered with the t tests results. However, given the fact that there were no common shared antecedents amongst any two groups, it is unlikely to have invalidated the reported results. Additionally, since the study cannot claim to have ruled

out antecedents that may have gone unidentified from within the not-fatigued group, as explained in page 204, a comparison between cases that reflected any one antecedent exclusively and the not fatigued group would also have presented a similar limitation.

Similarly, the dynamism of the Facebook platform during the period over which the data were gathered may have interfered with the comparability of one set of data with another. For instance, due to the constant rollout of new features, the variety of uses afforded during the initial months of study may have been fewer in number as compared to that made available during the later period. As such, the comparability of the variety measure may be questionable. The statistical non-significance of variety of use as a differentiating factor between fatigued and not fatigued groups has to be viewed in the light of this fact. Nevertheless, variety being only one of the indicators of use, the quality of the main results reported, namely the antecedents and effects of social network fatigue, has not been compromised in any way by this limitation.

5.5 Suggestions for Future Research

Several of the findings presented in Chapter 4 highlight the potential for focused, empirical investigation into the correlations between factors associated with social network fatigue and its effects. This would ensure an extension of the findings presented here which would lead to conclusive empirical assessments of the effect of these factors. First, demographic factors such as age and gender as well as activity indicators such as frequency and trend appear to vary significantly between the fatigued and not fatigued group of users in the case of certain fatigue antecedents. However, no valid inferences regarding how these factors may differ with age or gender could be drawn based on this study alone. Additionally the nature of correlations between these factors and fatigue

experiences is also not evident since the focus here was on testing if any differences exist for the said factors and indicators, between the fatigued and the not-fatigued group. Thus, separate studies could be conducted amongst specific age groups such as teenagers, young adults or the elderly users to gather focused insights into how fatigue experiences manifest within these age groups.

Second, although the antecedents and effects of social network fatigue that emerged from the exploratory analysis provide a high level view of the phenomenon as a whole (Figure 4-1), further extensions and fine-tuning of the model would be needed to gain a more thorough understanding of the phenomenon which may be generalized to a wider population of social network users. Proposed future work, for instance, could aim to fine-tune the model of social network fatigue by identifying the specific antecedents of each of the types of fatigue and their relative effects on the user's fatigue experiences with the help a quantitative questionnaire. The quantitative data gathered would help in an empirical assessment of the possible relationships between potential antecedents as well as the various demographic and use indicators, and fatigue experiences, which would further deepen the understanding of this phenomenon. The knowledge derived from this research would provide a theoretical frame to guide the design, development and testing of the appropriate scales for the assessment of fatigue as well as the effects.

Third, possible additional intrinsic factors such as personality related traits as well as the role of extrinsic and intrinsic motivation in influencing fatigue experiences may also be an area worth investigating (Chou et al., 2010). Studies focused specifically on these factors will help to uncover new knowledge pertaining to the influence of extrinsic and intrinsic motivators on fatigue experiences and their effects on user activity.

Furthermore, an empirical study, with the help of appropriately developed scales, would enable testing of the relative effects of one set of factors over the others.

Fourth, qualitative interviews specially designed to independently probe each of the types of fatigue antecedents could provide additional knowledge previously uncovered. Such revelations would also help in the ‘triangulation’ of the findings reported in the quantitative studies besides providing additional dimensions for analysis. Triangulation has been defined as a process of corroborating evidence using different sources, types of data or methods of data collection for greater insights into the investigated phenomenon (Creswell 2008) and has been known to strengthen the reliability of the findings of mixed methods research.

Additionally, the methodological limitations cited above also call for future work that would address or mitigate some of these issues. For instance, the temporal limitations presented by the activity trace restricted to six months of use can be addressed through a study of activity over the entire period of use starting from the activation of a user account. Such a comprehensive analysis of activity may reveal more reliable data on how activity is linked to fatigue experiences over the entire course of use of social networks to stay socially connected. Furthermore, future research could also delve into some of the conceptual questions that may arise from this study such as whether external stressors and activity effects due these should indeed be considered social network fatigue, so as to help fine-tune the proposed initial model.

Secondly, a larger sample of users from a more heterogeneous mix of social networks originating from different parts of the world will help to mitigate the issue of homogeneity of users and experiences identified in the earlier section. Such a sample

would also reveal antecedents that may not have emerged in the data set collected in the study and would provide a more comprehensive understanding of all possible antecedents in the context of social network use. Additionally, such a study could also focus on fatigue experiences and effects within networks originating in one geographic region, say, Asia, as against another, say, Europe to reveal differences between them if any.

Thirdly, the focus on Facebook limits the generalizability of the findings and presents the opportunity of a similar study amongst users of other types of social networking applications used for say, professional linking, or even linking of users sharing similar interests or hobbies as in the case of Pinterest. Furthermore, it would be worthwhile to initiate comparative studies that would explore how fatigue antecedents in one context of use of social networks, say, social linking, would vary with those identified in another, say, professional linking. This would broaden the understanding of fatigue in the context of social networks use across the entire breadth of the fare available within the genre and further contribute towards knowledge about the social network fatigue phenomenon.

Fourthly, social networking applications have gone increasingly mobile in the recent years with most of the popular applications launching their mobile versions. As such, the functionalities and features afforded are different from those supported by the initial web based counterparts. For instance, the limited screen size and location sensing capabilities of the mobile device impose restrictions on the design of the interface as well as offer possibilities for support of enhanced features such as check-in and related uses besides the formation of transient social networks while users are on the move. The factors related to fatigue in the context of mobile social networks, thus, may be distinctly

different. The characteristics of fatigue experiences as well as the activity effects of fatigue in the context may be unique and may need to be investigated independently. There may also be additional value in a comparative evaluation of fatigue experiences with use of mobile social networks vis-à-vis those based on the Internet.

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Appendix A: General Solicitation

Hello,

Have you been a Facebook user for at least one year?

Or have been a Facebook account holder at some point in time for the duration of at least one year?

Are you within the age group of 14 or above?

If so, I would like to invite you to participate in a PhD level study that investigates Facebook use and experiences.

Your current activity level or usage of Facebook is not a consideration for this. Irrespective of whether you have been active on Facebook at some point in time or not, you could be a participant.

The research is purely academic in nature and has been approved by NTU Institutional Review Board (IRB-2012-10-026). As such, all sensitive information shall be protected and the findings shall only be used for submissions for publication in relevant academic journals and conferences.

In order to help with this research you would need to do two things:

1. Submit your Facebook activity log for the most recent 6 months. Detailed instructions on how to save your Facebook activity log in excel sheets can be mailed to you once you consent to participating or upon request.
2. Take an in-depth e-mail interview (May take about 60 minutes or less) that probes your social network related activities and experiences.

There is 30 SGD incentive for completing all the requirements of this study!

Please drop me an email at thara@bhasi.net or thar0006@e.ntu.edu.sg if you are interested in being part of this study.

Looking forward to hearing from you!

Regards
Thara

Appendix B: Informed Consent

INFORMED CONSENT TO PARTICIPATE IN A RESEARCH STUDY

Social Network Fatigue Study

Hi

I am Thara, a Year II PhD candidate at the Wee Kim Wee School of Communication and Information, Nanyang Technological University, Singapore. My research interests are in the domain of Social Networks, and currently I am undertaking a study that investigates social network fatigue which has been approved by the NTU Institutional Review Board (IRB-2012-10-026). As such, I am interested in identifying the forms in which fatigue manifests itself in the course of use of social networks to stay socially connected, and how fatigue experiences may influence activity levels of users.

I would like to invite you to participate in this study. To be able to participate, you are only required to be a Facebook user or a Facebook account holder for a period of least one year, and within the age group of 14 or above. Your current activity level or usage of Facebook is not a consideration for this invitation. Irrespective of whether you have been active on Facebook at some point in time or not, you could make valuable contributions towards this research. Even if you only have a registered Facebook account but have not performed any activities on the platform, or happen to have deactivated your Facebook account, your input would be of interest to the research. The research is purely academic in nature and is undertaken as part of my PhD study; as such, the findings may be submitted for publication in relevant academic journals and conferences.

In order to help with this research:

1. You would need to submit your Facebook activity log for the most recent 6 months. The activity log is available on your Facebook home page and is only accessible to you. You could click on the button which opens up the activity log placed on the right side of your page. Detailed instructions on how to save your Facebook activity log in excel sheets can be mailed to you once you consent to participating or upon request.
2. You would need to participate in an in-depth e-mail interview (May take about 90 minutes) that probes your social network related activities and experiences. This can be e-mailed to you and it would be great if you could return to me within a week. I may need to call or e-mail to clarify your responses, so please estimate some additional time for that.

Be assured that the research is only interested in the coding of the FB activities performed over time so as to identify trends and patterns, in terms of your frequency and variety of

use and not in the actual content or who the user may be interacting with. Additionally, all personal identifiers, geographic contexts and other information which may reveal identities of the persons mentioned in the interview transcripts will be removed before extracts are used for analysis through a de-identification. As such, your privacy and confidentiality of the information you provide would be guarded at all times. None of your personal information or identifiers would be revealed or used in the course of the study. Your responses will not be identified with you personally; neither will your response be seen by anyone other than individuals working on the project. Your participation is voluntary and there are no penalties if you choose not to participate. Neither are there any specific benefits in participating in the study.

Your e-mail accepting the request would be taken as your consent to participate in the study. As a small token of appreciation of your efforts, there would be a SGD15 compensation for submitting your activity logs which would be disbursed to you once the log is submitted and verified to be complete. An additional SGD 15 dollar incentive would be disbursed to you for participating in the interview and cooperating with the necessary follow-ups once this has been completed. Thank you very much for taking the time to do this. I appreciate your help!

If there are any ethical concerns you may take them up with the NTU Institutional review Board at 65- 6791857. If you have any questions or concerns about completing the interview or about being in this study, please get in touch with me at (65) 98763451 or thara@bhasi.net. I would be happy to help with your questions.

Looking forward to hearing from you!

Regards

Thara Ravindran (Ph.D. Candidate)

Supervisor and PI: Dr. Alton Chua Yeow Kuan (Assoc. Prof.)

Co Supervisor: Dr. Goh Hoe – Lian, Dion (Assoc. Prof)

Address:

31 Nanyang Link

Wee Kim Wee School of Communication and Information

Nanyang Technological University

Singapore 637718

Appendix C: Participant Information Sheet

PARTICIPANT INFORMATION SHEET

Title: Social Network Fatigue Study

I would like to invite you to participate in a study investigating Social Network Fatigue undertaken by a group of researchers for the Wee Kim Wee School of Communication and Information, Nanyang Technological University, Singapore. .

1. What is the study about?

The study investigates social network fatigue with the intention of conceptualizing it. As such, it aims to identify the forms in which fatigue manifests itself in the course of use of social networks to stay socially connected, and analyze how fatigue experiences may influence activity levels of users so as to conceptualize the phenomenon.

2. Why have I been invited to participate? Do I have to take part?

You have been invited as you were referred to as a possible Facebook user by a friend or associate. To be able to participate, you are only required to be a Facebook user or a Facebook account holder for a period of least one year, and within the age group of 18-55. Your current activity level or usage of Facebook is not a consideration for this invitation. Irrespective of whether you have been active on Facebook at some point in time or not, you could make valuable contributions towards this research. Even if you only have a registered Facebook account but have not performed any activities on the platform, or happen to have deactivated your Facebook account, your input would be of interest to the research.

Your participation is voluntary and there are no penalties if you choose not to participate.

What does the study involve?

In order to help with this research:

3. You would need to submit your Facebook activity log for the most recent 6 months. The activity log is available on your Facebook home page and is only

accessible to you. You could open up this up by clicking on the button labeled activity log placed on the right side of your page in your Timeline view. Detailed instructions on how to save your Facebook activity log in excel sheets can be mailed to you once you consent to participating or upon request.

4. You may be invited to participate in an in-depth e-mail interview (May take about 90 minutes) that probes your social network related activities and experiences. This can be e-mailed to you and it would be great if you could return to me within a week. I may need to call or e-mail to clarify your responses, so please estimate some additional time for that.

3. What are the possible risks and benefits of participation?

The risks in participating in the research are minimal. There are no benefits to be derived from being a participant either.

4. Will my participation be kept confidential?

Be assured that the research is only interested in the coding of the FB activities performed over time so as to identify trends and patterns, in terms of your frequency and variety of use and not in the actual content or who the user may be interacting with. Additionally, all personal identifiers, geographic contexts and other information which may reveal identities of the persons mentioned in the interview transcripts will be removed before extracts are used for analysis through a de-identification.

As such, your privacy and confidentiality of the information you provide would be guarded at all times. None of your personal information or identifiers would be revealed or used in the course of the study. Your responses will not be identified with you personally; neither will your response be seen by anyone other than individuals working on the project.

5. What will happen to the results of the research project?

The research is purely academic in nature and is undertaken as part of my PhD study; as such, the findings may be submitted for publication in relevant academic journals and conferences.

6. How do I get more information

If you have any questions or concerns about completing the questionnaire or about being in this study, please get in touch with me (Thara Ravindran) at (65) 98763451 or thara@bhasi.net. I would be happy to help with your questions.

The contact details of the Principal Investigator and Co- Investigator are also given below:

Supervisor and PI: Dr. Alton Chua Yeow Kuan (Assoc. Prof.) - AltonChua@ntu.edu.sg

Co Supervisor: Dr. Goh Hoe – Lian, Dion (Assoc. Prof) - ASHLGoh@ntu.edu.sg

Address:

31 Nanyang Link

Wee Kim Wee School of Communication and Information

Nanyang Technological University

Singapore 637718

7. What if I have complaints or concerns

This research has been planned in accordance with the guidelines outlined by the Institutional review Board of the Nanyang Technological University, Singapore. If you have concerns or complaints please direct them to the contact person:

Secretariat of NTU-IRB

Email address: irb@ntu.edu.sg

Telephone: 65-65922495

Address: Block N2.1 B4-07

76 Nanyang Drive

Singapore 637331

THIS SHEET IS FOR YOUR INFORMATION AND FOR YOU TO KEEP

Appendix D: Template for Activity Log

Welcome!

Activity Log Submission - Instructions

You will need to submit your Facebook activity log for the most recent 6 months immediately preceding the submission. For instance, if you are starting on your log submission on say, 15th of January 2013, your log for the period 15th July 2012 – 15th January 2013 would be needed.

Here are some simple instructions:

*** Where to find Activity Log?**

Your activity log is available on your Facebook Timeline and is only accessible to you.

If you are logged in to Facebook, you can access your log directly at "<http://www.facebook.com/<username>/allactivity>".

E.g : If my username is "pnpranavrao", my activity log is at "<http://www.facebook.com/pnpranavrao/allactivity>"

*** Copy and Paste month-wise**

- Now copy the complete month's activity log by holding and dragging.
- Navigate to the sheet "Month 1" on this spreadsheet and paste it.
- Rename the spreadsheet according to the month. E.g March 2012

*** Activating the Macro to clean your data**

- Once you have pasted your data in "Month 1" sheet, proceed to "View --> Macros --> View Macros".
- Now select "**fbfeedcleaner**" from the list, and click on "**Run**"
- There, your data must be cleaned.

*** Please repeat the same step for 5 other months.**

Appendix E: Interview

Thank you for being part of this research that investigates possible social network fatigue related experiences! I appreciate your taking the time and effort to do this!

The research is approved by the NTU Institutional Review Board (IRB-2012-10-026); as such, your privacy as well as the confidentiality of the information you provide would be protected at all costs. All personal identifiers and contextual cues shall be removed and all human subjects de-identified before any of the content provided is used for analysis. This is to ensure your privacy as well as that of any individual referred to in the course of the interview.

Do read the following instructions carefully before proceeding to take the interview. It would be a great help if you could return it by e-mail within a week. I may need to call/email you for further clarifications where needed. Hope you can bear with a few follow-ups questions as and when required.

In case you have further questions or concerns do email me at thara@bhasi.net or call me at 65-98763451 and I shall be glad to help!

Thanks again!

INSTRUCTIONS

1. There are 28 questions in the interview. You may need around 90 minutes to answer the full set
2. Please answer all the relevant questions. Where the question is not applicable in your case please indicate NA
3. Be honest and spontaneous as also descriptive. The richer and truer the details (not necessarily in that order), the more useful your interview is for the research
4. Feel free to use up as much space as you think is necessary
5. Do take a first person narrative style in answering the questions. The answers must be based on your individual experiences and not on what you believe is the case with others you may know
6. Where you are uncomfortable with answering a given question indicate your preference and move on to the next one
7. At any point in time if you wish to abandon the interview you may do so without furnishing any reasons

A: User and Use Profile (Q1- 5)

1. Please provide a brief (1/4 page) description of yourself. Include:
 - a. Age
 - b. Gender
 - c. Highest Qualification
 - d. Profession
 - e. A self assessment of your personality (Extrovert – Introvert, Trusting – Cautious etc)
2. What are the social networking platforms (applications such as Facebook, Twitter, LinkedIn, Google+ , Pinterest and such that allow you to create a network of friends/associates and interact with them) you are/were subscribed to?
 - a. Identify the most used and the least used ones?
 - b. What is the duration of subscription of each
 - c. How long have you been on Facebook?
 - d. How many friends do you have on Facebook?

The following questions can be answered based on the most used SN platform/s. If a question does not apply in your case please indicate NA rather than skip the question altogether)

3. Could you describe your normal login patterns with reasons? (cite frequency and duration of each login as well as place or situation when you would normally log in)
4. Could you cite typical instances/situations where the usual login patterns may not be followed?
5. What would you say is/was/are/were your major goals/motivations for logging on to your chosen SN platforms? (Provide details of the most and least favourite SN activities and why you like or dislike them)

B: Unobservable Activities (Q6-14)

Probes possible lurking behaviour and unobservable activities

6. Do you silently read or check out posts on SN without leaving any prints (likes, comments etc)?
 - a. Can you share an example/situation when this happened?
 - b. Why did you choose to do this?
7. Do you silently check out friends' activities on SN without leaving any prints (likes, comments etc)?
 - a. Can you share an example/situation when this happened?
 - b. Why did you choose to do this?
8. Do you silently check out applications recommended by friends on SN without leaving any prints (likes, comments etc)?
 - a. Can you share an example/situation when this happened?

- b. Why did you choose to do this?
- 9. Do you silently check out games recommended/used by friends on SN without leaving any prints (likes, comments etc)?
 - a. Can you share an example/situation when this happened?
 - b. Why did you choose to do this?
- 10. Do you decline requests (friend request, application requests etc) on SN?
 - a. Can you share an example/situation when this happened?
 - b. Why did you choose to do this?
- 11. Do you delay response to post /requests on SN?
 - a. Can you share an example/situation when this happened?
 - b. Why did you choose to do this?
- 12. Do you ignore posts/messages/ requests on SN?
 - a. Can you share an example/situation when this happened?
 - b. Why did you choose to do this?
- 13. Do you delete posts/comments from your wall?

a. Can you share an example/situation when this happened?

b. Why did you choose to do this?

14. Do you 'Unfriend' or 'Block' people on your network?

a. Can you share an example/situation when this happened?

b. Why did you choose to do this?

C: Possible Fatigue Experiences and Antecedents (Q14- 28)

15. Do you feel your goals/motivations for using SN have been met satisfactorily? Why?

16. How would you sum up your overall experience on SN?

17. Was there ever a time when you were more active on SN?

18. Can you describe how different your SN activities were during that phase?

19. What do you think changed your SN routine?

20. Have you ever felt any of the following emotions/related experiences during your SN use?

Tired/Drained	Annoyed	Unable to concentrate	Exasperated
Bored	Disappointed	Fed-up	Withdrawn
Frustrated	Disinterested	Exhausted	Guarded
Irritated	Overwhelmed	De-motivated	

Others _____(Indicate)

Yes/No

(If ‘**Yes**’, please circle the feelings above appropriately. You may choose more than one if applicable)

If ‘**No**’, go to Q: 26, if ‘**Yes**’ please continue

21. Can you describe some situations that you recall when you felt any of the above emotions and were not motivated to use it at your normal level for any length of time? (Include details of the occasion when it might have happened , and an estimate of how long your normal SN activities may have been affected).

22. Could you describe your feelings (Provide details about how you felt and who/ what the feelings were directed at)

23. What in your personal experience were the major factors that may have caused/ contributed to your feelings? Why?

24. How do you cope with those feelings?

25. Have you ever resumed your normal level of SN activity after such experiences? Why?

26. Have you ever deactivated any of your active SN accounts ever? Yes/No

27. If **'Yes'** :

- a. Why? (Describe the circumstances that led to it)
- b. How did you feel doing it?
- c. How long did you think about deactivating the account, before actually doing it?
- d. How long did you leave your account deactivated?
- e. Did you return to SN after a period of time? Why?
- f. Did you incorporate any changes in your SN routine when you returned?
Please explain

28. Have you ever nurtured thoughts of de-activating your account? Why?

Appendix F: IRB Approval Letter

Research Support Office

Reg No. 200604393R

IRB-2012-10-026

27 November 2012

Associate Professor Alton Chua Yeow Kuan
Wee Kim Wee School of Communication and Information

NTU INSTITUTIONAL REVIEW BOARD APPROVAL

Project Title: FORMS AND CHARACTERISTICS of SOCIAL NETWORK FATIGUE

I refer to your application for ethics approval with respect to the above project.

The Board has deliberated on your application and noted from your application that your research involves interviewing subjects.

You have also confirmed that informed consent will be obtained from the participants and you have guaranteed the confidentiality of your participants' biodata obtained from them.

The documents reviewed are:

- a) NTU IRB application form dated **15 October 2012**
- b) Participant information sheet and consent form: version 1 dated **15 October 2012**
- c) Data collection form: version 1 dated **15 October 2012**

The Board is therefore satisfied with the bioethical consideration for the project and approves the ethics application under **Expedited** review. The approval period is from **27 November 2012** to **01 December 2013**. The NTU IRB reference number for this study is **IRB-2012-10-026**. Please use this reference number for all future correspondence.

The following protocol and compliances are to be observed upon NTU IRB approval

1. All research involving procedures greater than minimal risk on minors (individuals who are less than the legal age of 21 years old) requires IRB approved written Parental Consent and assent from the participant to be obtained before any research protocols can be administered. Minimal risk refers to an anticipated level of harm and discomfort that is no greater than that ordinarily encountered in daily life, or during the performance of routine educational, physical, or psychological examination.
2. Only the approved Participants Information Sheet and Consent Form should be used. It must be signed by each subject prior to initiation of any protocol procedures. In addition, each subject should be given a copy of the signed consent form.

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Tel : +65 6791 9857, Fax: 6793 2019
www.ntu.edu.sg

Research Support Office

3. No deviation from, or changes of, the protocol should be initiated without prior written NTU IRB approval of an appropriate amendment.
4. The Principal Investigator should report promptly to NTU IRB regarding:
 - a. Deviation from, or changes to the protocol.
 - b. Changes increasing the risk to the subjects and/or affecting significantly the conduct of the trial
 - c. All serious adverse events (SAEs) which are both serious and unexpected.
 - d. New information that may affect adversely the safety of the subjects of the conduct of the trial.
 - e. Completion of the study.
5. Continuing Review Request/ Notice of Study completion form should be submitted to NTU IRB for the following:
 - a. Annual review: Status of the study should be reported to the NTU IRB at least annually using the Continuing Review Request/ Notice of Study completion form.
 - b. Study completion or termination: Continuing Review Request/ Notice of Study completion form is to be submitted within 4 to 6 weeks of study completion or termination.

A handwritten signature in black ink, appearing to read "Lee Sing Kong", is positioned above the typed name.

Prof Lee Sing Kong,
Chair, NTU Institutional Review Board
encl.

cc Chair, Wee Kim Wee School of Communication and Information
Members, NTU Institutional Review Board

Appendix G: Parent/Guardian Informed Consent Agreement

Parent/Guardian Informed Consent Agreement

Please read this consent agreement carefully before you decide to allow your ward to participate in the study. Your ward will also receive a separate information sheet.

What is the study about: The study investigates social network fatigue with the intention of conceptualizing it. As such, it aims to identify the forms in which fatigue manifests itself in the course of use of social networks to stay socially connected, and analyze how fatigue experiences may influence activity levels of users so as to conceptualize the phenomenon. This is a purely academic research done as part of a PhD study.

Why is your ward approached : Your ward has been invited because he/she has been referred to as a possible Facebook user by a friend or associate and has expressed a desire to be part of the study. He/she has been identified as a Facebook user or a Facebook account holder for a period of least one year, and within the age group of 14-20.

What your ward is required to do: In order to help with this research, your ward:

1. Would be required to submit his/her Facebook activity log for the most recent 6 months. Detailed instructions on how to save go about doing this will be mailed to your ward once you consent to his/her participation.
2. May be invited to participate in an in-depth e-mail interview that probes his/her social network related activities and experiences.

How much time is my ward required to commit to: The estimated time for compiling the activity log depends on the extent of use of Facebook. However for a medium user this may take about 15- 30 minutes as an estimate. The interview is estimated to take about 30 minutes. There may be follow-ups for which some additional time will have to set apart. The total time commitment however is not expected to exceed 90 minutes for all these components.

Risks: The risks in participating in the research are minimal. There are no benefits to be derived from being a participant for your ward either.

Confidentiality: The research is only interested in the coding of the FB activities performed over time so as to identify trends and patterns of use and not in the actual content or who the user may be interacting with. Additionally, all personal identifiers, geographic contexts and other information which may reveal identities of the persons

mentioned in the interview transcripts will be removed before extracts are used for analysis through a de-identification.

As such, your ward's privacy as well as the confidentiality of the information provided would be guarded at all times. None of the personal information or identifiers would be revealed or used in the course of the study. The responses will not be identified with the respondent personally; neither will the response be seen by anyone other than individuals working on the project

Voluntary participation: Your ward's participation in the study is completely voluntary.

Right to withdraw from the study: You have the right to withdraw your ward from the study at any time without penalty. The same applies to your ward. In case he/she chooses to withdraw from the study he or she may do so at any time without prior warning.

There is no penalty for withdrawing.

Payment: There would be a SGD15 compensation for submitting the activity logs and an additional SGD 15 dollar incentive for participating in the interview and cooperating with the necessary follow-ups.

What will happen to the results of the research project?

The research is purely academic in nature and is undertaken as part of my PhD study; as such, the findings may be submitted for publication in relevant academic journals and conferences.

How do I get more information?

If you have any questions or concerns about completing the questionnaire or about being in this study, please get in touch with me (Thara Ravindran) at (65) 98763451 or thara@bhasi.net. I would be happy to help with your questions.

The contact details of the Principal Investigator and Co- Investigator are also given below:

Supervisor and PI: Dr. Alton Chua Yeow Kuan (Assoc. Prof.) - AltonChua@ntu.edu.sg

Co Supervisor: Dr. Goh Hoe – Lian, Dion (Assoc. Prof) - ASHLGoh@ntu.edu.sg

Address:

31 Nanyang Link

Wee Kim Wee School of Communication and Information

Nanyang Technological University

Singapore 637718

What if I have complaints or concerns?

This research has been planned in accordance with the guidelines outlined by the Institutional review Board of the Nanyang Technological University, Singapore. If you have concerns or complaints please direct them to the contact person:

Secretariat of NTU-IRB
Email address: irb@ntu.edu.sg
Telephone: 65-65922495
Address: Block N2.1 B4-07
76 Nanyang Drive
Singapore 637331

Consent:

Iconsent to my ward/son/daughter
participating in the research study described above.

Signature: _____ **Date:**

You will receive a copy of this form for your records

Appendix H: Conferences and Publications

1. Ravindran, T., Chua A., Goh, DH. (2014). Antecedents and Effects of Social Network Fatigue. *Journal of the Association for Information Science and Technology*, 65(11), 2306–2320.
2. Ravindran, T., Chua A., Goh, DH. (2013). Towards a Working Definition of Social Network Fatigue. Paper presented 2013 Conference of the International Communication Association, 17-21 June, 2013, London, UK.
3. Ravindran, T., Chua A., Goh, DH. (2013). Characteristics of Social Network Fatigue. In *Proceedings of The International Conference of Information Technology: New Generations. ITNG 2013*. 15-17 April 2013, Las Vegas, Nevada, U.S.A.
4. Ravindran, T., Chua A., Goh, DH. (2011). Effect of Social Gaming Experiences on Intention to Adopt SPLASH - A Mobile Social Content Sharing Application Prototype incorporating Game-infused Elements. Paper presented at SOFOGA July 20- 23, Stuttgart, Germany.
5. Ravindran, T., Chua A., Goh, DH. (2011). Blending of Socializing, Gaming and Information – Related Activities in Mobile Social Application prototypes, *Proceedings of the International Conference on Information Science and Applications (ICISA)*, Apr 26- 29, Jeju Island, South Korea. 1-8
6. Ravindran, T., Chua A., Goh, DH. (2011). Whither Mobile Social Application Prototypes? Implications for Development and Research. *Proceedings of the 8th International Conference on Information Technology: New Generations (ITNG)*, April 11-13, Las Vegas, USA , 1088-1089
7. Ravindran, T., Wu, H.J., Chia, Y. B., & Nourbakhsh, A. (June, 2009). Scaffolding for Knowledge Creation in a Constructive Learning Environment - The Case of the Professional Seminar. Paper presented at the 3rd Redesigning Pedagogy International Conference, June 2009, Singapore.