Social Capital Sites - Understanding Digital Networks from a Resource Perspective

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1. Introduction

Within less than a decade, social network sites (SNSs) have become a worldwide phenomenon and a pervasive part of modern culture. From Greenland to Australia, across all ages and social classes, websites like facebook, myspace, orkut, and studiVZ are being used to build and maintain social connections and to communicate[1]. The number of people who use SNSs worldwide has extremely increased in recent years, the number of monthly active facebook users alone has grown from 197 million in the beginning of 2009 to 680 million in the beginning of 2011 (Statista 2014a). In the light of this dynamic development and its ubiquitousness, this dissertation asks to what extent SNSs influence the lives of their users.

In this thesis, the concept of *social capital* is used as a theoretical framework through which to understand and empirically analyze SNS-based networks (= digital networks), the information resources embedded in these networks, and their implications for the lives of users. Specifically, these implications are in the form of information seeking benefits and in the form of diverse risks that are associated with the use of SNSs.

This thesis is among the first pieces of social scientific research to utilize data-mining technology and combine it with traditional questionnaires, and it is the first to analyze changes in network size over a longer period of time. In addition, original SNS-specific scales were developed and applied during this thesis. Furthermore, a sample of German students was used for the empirical research that adds a cross-cultural perspective to a body of literature that is mainly centered on the United States.

[1] The term SNS refers to a large number of websites. In this thesis, the *SNS* has a narrower focus, specifically on SNSs catering to all kinds of users and not being limited to a specific function.

In the following passages, I will briefly outline the key theoretical and empirical elements of this thesis according to the following two guiding questions:

- Why and by what means do SNSs influence the lives of users?
- How and in what ways do SNSs impact the lives of users?

The first question is: Why and by what means do SNSs influence users? Moreover, in what ways does the influence of SNSs on users differ from the influence of older media like TV, email, or the telephone?

In this thesis, I argue that SNSs impact the lives of users by facilitating the capacity and mobilization of individual information resources. Specifically, the technology of SNSs allows users to build and maintain large digital networks that contain a wide variety of contacts, ranging from close family members to complete strangers. Thereby, SNSs strongly increase the amount of information resources that users have at their disposal. Furthermore, the technology of SNSs assists users in receiving the requested information by facilitating contact search as well as communication. The described combination of web-based technology and social relations differentiates SNSs from both other media and from traditional offline social networks and it contributes to the quantity, quality, and accessibility of SNS-based information resources.

The empirical work in this dissertation emphasizes the size and structure of ego-centered facebook networks. This thesis is the first piece of research in its field to analyze not only the size, but also the growth of these networks over time by using data-mining technology. In addition, I analyze three different measures of network structure that represent the qualitative diversity of facebook contacts. These three measures refer to isolated contacts (isolates), isolated groups of contacts (components), and the connectivity

between the contacts in the network on an aggregate level (actor betweenness centrality). I analyze to what extent characteristics of SNS users, like personality or facebook use, predict the size, growth, or structure of their networks. In addition, I analyze to what extent users actually perceive their networks as being rich in terms of information resources. Furthermore, I test to what extent this perception is connected not only to their use of facebook, but also to their satisfaction with the website.

The second guiding question is: How and in what ways do SNSs impact the lives of users? I address this question in terms of benefits and risks. Benefits are in the form of information-seeking processes that are facilitated by the large capacity of social capital in digital networks and by SNS-specific mechanisms of social capital mobilization. Specifically, I assume that users can utilize these websites to seek information that help them deal with day-to-day stressors, thereby curtailing the development of chronic stress.

While SNSs do offer the potential for improved well-being, they are also associated with specific risks. This thesis is the first to present a systematic overview on risks that are associated with the use of SNSs and I will show in how far the technology of SNSs facilitates these risks. In addition, I introduce the concept of *network demand*, which refers to the fact that large networks with a high rate of interaction can easily become stressors when users face frequent requests for advice or opinions.

Empirically, I analyze to what extent facebook is already used for stress-related information seeking and I compare the use of facebook for information seeking to the use of other media. Moreover, I analyze the impact of user`s perceived information resources on media choice. Additionally, I analyze to what extent users perceive their networks as demanding, and test in how far the size of the network and the vulnerability of the user affect his or her perception of demand.

This thesis is divided in ten chapters and it is structured in the following way:

In Chapter 2, I introduce a number of current SNSs and discuss the commonalities and differences between popular sites, such as facebook, LinkedIn, studiVZ, and Flickr. I then present an original list of criteria to differentiate between SNSs. They are *popularity*, *area*, *focus group*, *function*, *costs*, and *design & features*. Subsequently, I introduce facebook in general and from the perspective of a user, since this specific SNS is at the focus of my empirical work. The chapter closes with an overview of the current research on SNSs from a psychological perspective that refers to comparative studies, motivations for SNS use, personal characteristics associated with the use of SNSs, and to media effects.

Chapter 3 introduces social capital, a well established concept in the social sciences that refers to resources embedded in social relations (e.g., Bourdieu 1986; Coleman 1988; Lin 2001; Putnam 2000). I introduce the concept from the perspectives of three different schools, which Adam and Rončevic′ (2003) refer to as critical, normative, and network-based utilitarian. I further demonstrate how the concept has been applied to the realm of SNSs. Then, I lay out how my work will contribute in terms of theory, empirical research, and applied methodology to the literature and to the understanding of SNSs from a social capital perspective. Finally, I introduce and define *online social capital* as a concept that explicitly refers to information resources associated with digital networks.

In Chapter 4, I specify the explicit mechanisms by which SNS use contributes to the capacity and to the mobilization of information resources for individual information-seeking. I argue that the mere existence of digital links as well as SNS-mediated virtual social interaction contribute to the maintenance of social relationships and positively affect the diversity and amount of information resources in the network. Furthermore, I argue that SNS-based mechanisms of contact search and communication facilitation help

users to mobilize information resources and thereby increase the efficiency and applicability of these resources.

Chapter 5 introduces the risks that are associated with SNS-based information resources. While social pressure, different forms of harassment, deleterious social comparisons, the potential for conflict, and network demand are not limited to digital networks, I argue that the technology of SNS may nevertheless intensify them. In addition, some risks are associated with the use of SNSs in general, like data abuse and problematic/ addictive SNS usage behaviors. This thesis is the first to give an overview on the little research on SNS associated risks and to point out concrete mechanisms of risk facilitation by SNS-based technology.

Chapter 6 lists the basic theoretical assumptions that were developed in the first chapters of this thesis and that are at the basis of my empirical research. Then, I derive research questions and hypotheses that cover four main areas: network size/ growth and structure, embedded information resources, the use of facebook for coping-related information seeking, and network demand.

Chapter 7 introduces the methodology that was used in the empirical research in this thesis. The chapter starts with a description of the research design and the three samples. Then scales and network measures are depicted and I introduce two scales that were developed especially for this research. These scales assess network demand and the likelihood of individuals to use specific media options for coping related information seeking. Chapter 7 also includes a short section on the methods of data analysis in general and on the process of building multilevel regression models in order to analyze the longitudinal change of facebook networks.

Chapter 8 presents empirical results with regard to the research questions and hypotheses that have been developed before.

The empirical results are discussed in Chapter 9 as well as the limitations of the present study and areas for future research. A special emphasis is on the discussion of digital networks, corresponding measures and their integration into a social scientific approach.

In Chapter 10 I summarize the main theoretical and empirical contributions of the present thesis to the body of literature. In addition, some theoretical and practical implications of this thesis are presented.

2. Facebook in the Context of Social Network Sites (SNSs)

This dissertation is centered around the idea that SNSs have an impact on users' daily lives. Facebook is the most popular SNS and therefore the empirical research in this thesis is carried out with samples of facebook users. In this chapter, I will give a short introduction regarding the nature of SNSs in general (Chapter 2.1) before I focus on facebook in specific (Chapter 2.2). The final section will offer an overview of the emerging field of psychological SNS research (Chapter 2.3).

2.1 Commonalities and Differences of Current SNSs

The evolution of SNSs started in 1997 with the pioneering website sixdegrees; since that time a plethora of different SNSs have evolved, with the most prominent being facebook, myspace, LinkedIn, and studiVZ (in Germany). The terms *social network sites* and *social networking sites* are often used synonymously. However, Boyd and Ellison (2007) point out that the word "networking" in this context is misleading, since it suggests that these websites are primarily used to initiate new relationships. Following this argument, I will refer to such websites as *social network sites*. The term *social media*, which is also often used to refer to SNSs, is more inclusive and contains other internet-based interactive media such as review sites, online games, and blogs. The most widely used definition in research is by Boyd and Ellison (2007). They view SNSs as:

> [W]eb-based services that allow individuals to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system. (P. 211)

Rather than traditional websites, SNSs are "bundles of technological tools that incorporate features of earlier technologies (such as personal websites) but

recombine them into a new context that supports users' ability to form and maintain a wide network of social connections" (Ellison, Steinfield, Lampe 2011).

Besides their basic commonalities in terms of composition and technology, SNSs exhibit a multitude of differences. I created a list that helps to differentiate the current SNSs according to six main criteria and to put facebook in the context of other SNSs. The criteria are popularity, area, focus group, function, costs and design & features (see Table 1).

Table 1 Criteria for Differentiating between SNSs

Criterion	Description	Examples
Popularity	Number of users	- Facebook: 870 million. [a] - Myspace: 50 million. - StudiVZ: 2.1 million.
Area	Geographic area where the SNS is popular	- Worldwide: facebook[b] - Germany: studiVZ - China: Qzone
Focus group	Universal vs. catering to a specific group of users	- Universal: Facebook, myspace - Groups: Asianavenue, gayromeo
Function	Designed for a specific function vs. for general use	- General: Facebook, - Photography: flickr - Business: LinkedIn
Costs	While most of the popular SNSs are free of charge, few of them are *freemium*[c].	- Free: facebook, studiVZ, - Freemium: LinkedIn, flickr
Design, & Features	The design and features often reflect the function of an SNS.	- LinkedIn: searching for jobs, uploading CVs

Note. SNS = Social Network Site.
[a] *Users* refers to account holders. The data presented in this table represent July 2011. Source: thomashuttner.com. [b] Source: vincos.it. [c] Freemium (free + premium) means that users can access a free basic version, but they have to pay for the premium version with additional features.

2.2 Facebook – The Prototypical SNS

Facebook is the most popular SNS, both worldwide and in Germany (e.g., Hutter 2011) and it is not limited to a specific focus group or function (see Table 1). The empirical research of this thesis will therefore be conducted with samples of facebook users. In the present section, I will provide readers with some basic information on facebook.

2.2.1 Facebook in Numbers

The website facebook was launched in February 2004 by Harvard students Zuckerberg, Saverin, Moskovitz, and Hughes, and it is today owned by Facebook Inc. (CEO: M. Zuckerberg). Initially, the website was created to connect Harvard University students via a digital form of a yearbook and over the years, the website has increased its audience from select US universities, to colleges, high schools, and finally to anyone worldwide in 2006 (see e.g., Boyd and Ellison 2007).

Worldwide

As of 2011, 70% of facebook users reside outside the US and the user base is constantly growing (Facebook n.d.). From October 2010 to July 2011 alone, i.e. the time during which I collected data for the empirical research, the number of monthly active facebook users worldwide grew from 608 to 800 million (Statista 2014a). The average facebook user (worldwide) has between 130 and 190 contacts in his or her digital network (Ugander et al. 2011; Roth 2011).

Germany

As of June 2009, facebook is also the most popular SNS in Germany and from 10/2010 to 7/2011 the number of monthly active facebook users grew from

around 12 to more than 20 million (Statista 2014b)[2]. As a comparison, in 1/2011 two of facebook's main competitors in Germany exhibited 2.8 (studiVZ) respectively 5.1 (wer-kennt-wen) million monthly active users (Hutter 2011). German users spend an average of around 19 minutes per day on facebook (Firsching 2011). With regard to their demographic characteristics, German facebook users are quite heterogeneous. About 48% of users are female (Statista 2013a) and they come from a variety of age groups (see Figure 1).

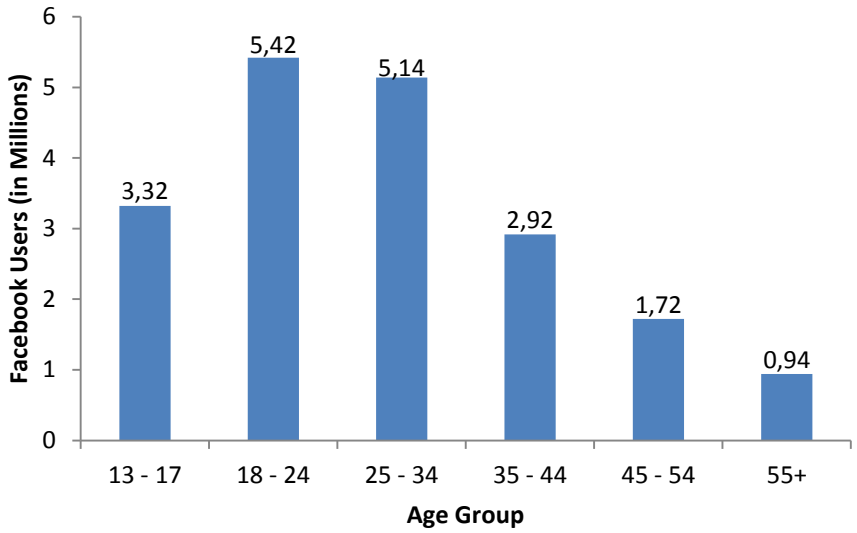

Figure 1 Facebook Users in Germany According to Age Groups in Millions in July 2011 Adapted from "Number of active facebook users in Germany according to age groups from 2010 to 2013 (in millions)." Retrieved February 19, 2014 (http://de.statista.com/statistik/daten/studie/70194/umfrage/nutzer-von-facebook-in-deutschland-nach-altersgruppen-seit-2009/)

[2] There are three main problems associated with the use and interpretation of the available data on facebook users in general, and these problems are exacerbated for users outside of the US. First, there is little data from official sources, and unofficial sources are often biased, as they usually refer only to highly active user groups. Second, data related to SNSs change rapidly and data quickly become outdated. Third, the same terms are often used to refer to different phenomena. For example, some sources define *users* as all individuals who own an SNS account on that site, while others only count those users who visited the site in the last month. These different understandings of key terms complicate the understanding of data sources, even more when data providers do not provide information on how they exactly define such terms.

2.2.2 Facebook from the User Perspective – Profile, Network, and Use

Since its 2004 launch, facebook has changed constantly, and many new features have been added to the website. It is beyond the scope of this thesis to give a detailed description of all website elements; I will instead give a short overview of the features and functions that are crucial to this thesis, since they are related to maintaining relationships, to communication, and to processes of information seeking. Letters in brackets refer to Figure 2.

From the perspective of users, the first step is to register and open an account on facebook. Afterwards, users create personal profiles, i.e., virtual self-representations, with a profile picture (A) and information on their gender, age, occupation, relationship status, hobbies, interests etc. (B). The amount of information that is displayed on users profiles depends on their willingness to share information, hence there are large differences with regard to the information richness of facebook profiles. Most users also share pictures of themselves, which are then displayed on their profiles (C). Once users have created a profile, they can use the medium to connect with contacts like friends, family, acquaintances or colleagues. These connections are also displayed on the profiles of users (D).

After a profile was created and connections have been made, facebook can be used to stay informed about one`s contacts and to communicate. Both functions are facilitated by the website, e.g., by a display that updates users about the recent activities of their contacts (F), or by an inbuilt chat program (G). In addition, users can use *facebook walls* (E) to semi-publicly communicate with a larger audience. As I will argue in Chapter 4, wall posting is a function highly specific to SNSs and at the same time highly functional in terms of facilitating information seeking processes. Figure 2 shows a facebook user profile with the elements (A – G) described in this section.

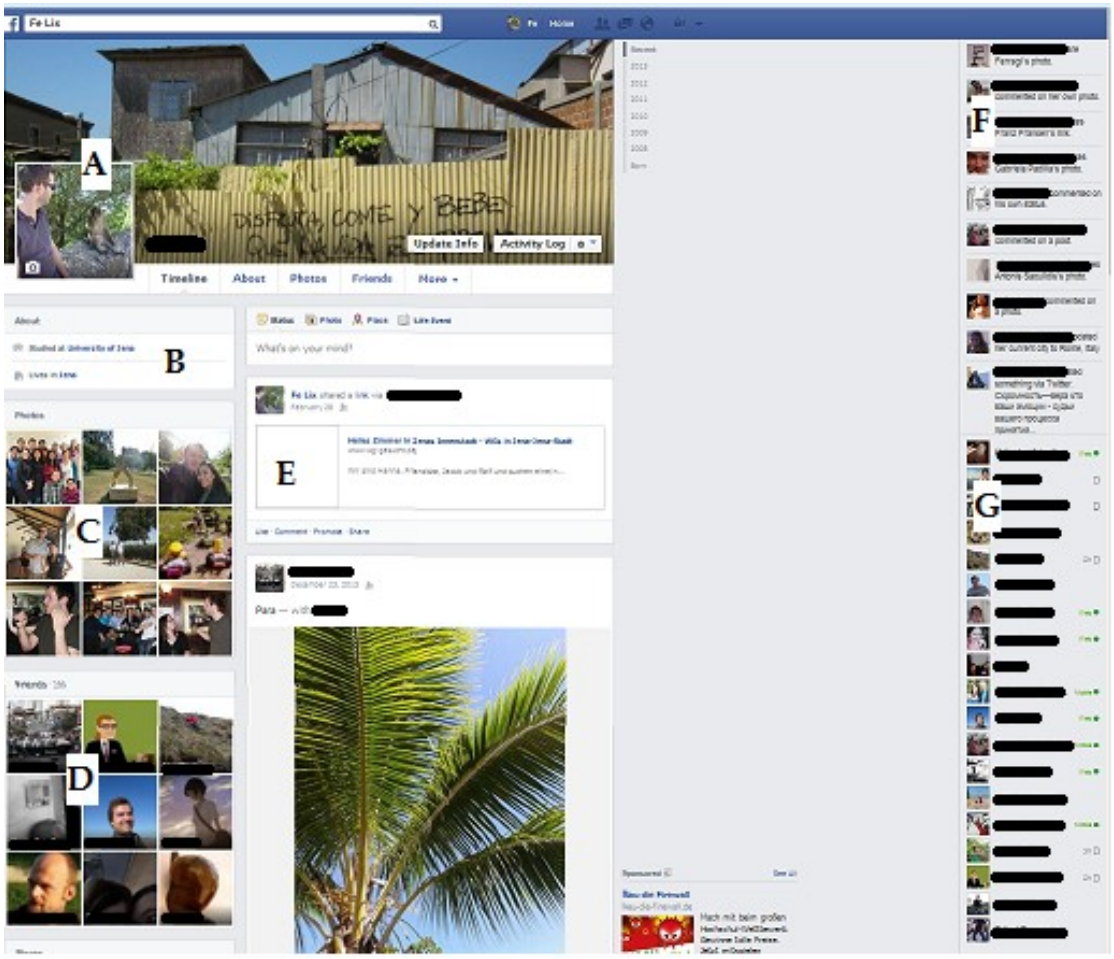

Figure 2 Facebook User Profile The following elements are displayed in this screenshot: A = profile picture. B = user information (university and place of residence). C = photos associated with the user (i.e. personal photo albums and pictures where the user had been tagged in). D = associated facebook contacts (selection). E = facebook wall with two posts. F = information about recent contact activities. G = inbuilt chat program. Source: Author.

2.3 State of Research on SNSs

In this section, I give an overview of the body of literature that addresses SNSs from a psychological vantage point, in order to put my thesis into the research context. Therefore, I categorized the existing literature into four main areas which are mainly comparative, related to motivations for SNS use, related to the prediction of SNS use and to the effects or consequences of SNS use.

The vast majority of research was conducted with samples of facebook users and users of other SNSs are rather underrepresented. The only exception is the category of comparative studies, where there are more studies addressing alternative websites, mainly myspace. In the following paragraphs, I will introduce all four areas and give examples for each.

Comparative. Scholars compared different SNSs or groups of SNS users with each other. This comparative research work especially was done in the earlier phases of research, i.e. before 2010, when social media were new. For example, scholars in this category compared users of SNSs with people that did not use them(Hargittai 2007) and older with younger users of the website myspace (Pfeil, Arjan and Zaphiris 2009). Others scholars compared the use of facebook with that of an instant messaging program (Quan-Haase and Young 2010) or the underlying architecture of different SNSs -facebook, LinkedIn, ASmallWorld- with each other (Papacharissi 2009).

Motivations for SNS Use. Researchers analyzed what are the reasons for SNS use and they found motivations that were either intrinsic to users or attributes of the websites. For example, Bonds-Raacke and Raacke (2010) found three main user-related motivations for the use of facebook that were the exchange of information, the maintenance of friendships and the making of new connections.; results that are also supported by the results of other scholars

(e.g., Papacharissi and Mendelson 2010). Some scholars, put more focus on the specific activities that motivate individuals to use the website, like the exchange of photographs or the possibility to "surf" the profiles of contacts (Joinson 2008). In general, there are large differences between the researched motivations in terms of specificity and inclusiveness. However, the theoretical and methodological procedures are most coherent in this research are. I.e., almost all studies in this area are based on the *Uses and Gratifications Approach* (e.g., Blumler and Katz 1974), a theoretical framework from media psychology that emphasizes the role of individual needs in the process of media choice. Another commonality between studies in this area is their explorative character and the use of primary component analysis to extract underlying motivations from large listings of items.

Prediction of SNS Use. Scholars connected personal characteristics to the use of SNSs in general or to specific forms of SNS use. For example, they analyzed the influence of the Big Five personality traits[3] on facebook use (Amichai-Hamburger and Vinitzky 2010; Orr et al. 2009; Ross et al. 2009) or of Narcissism and Extraversion on self presentation in facebook (Ong et al. 2011). Christofides, Muise and Desmarais (2009) analyzed the relationship between users` need for popularity and their information disclosure behavior on facebook.

Effects/ Consequences of SNS Use. Scholars analyzed the effects of SNS use on individual users. For example, thaey found out that facebook use was connected to increased jealousy in romantic relationships (Muise, Christofides and Desmarais 2009) and to negative effects on users` academic performance (Junco 2012a). On the other hand, the use of facebook was also connected to

[3] The Big Five personality traits (also: the Five Factor Model) are Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness. For more information on the definitions of single traits or the measurement of the Big Five see Section 7.2.1.1.

beneficial outcomes, for example in terms of life satisfaction, civic participation, and social capital (Ellison, Steinfield and Lampe 2007; Valenzuela, Park and Kee 2009). The studies connecting SNS use with social capital outcomes will be discussed in great detail in Chapter 3.2.

This thesis addresses SNSs from a resource perspective and can therefore to a great extent be located in the last category of SNS effects. More specific, my research will contribute to the literature on social capital related to SNSs, which is in its beginning phase.

3. Understanding SNSs from a Social Capital Perspective

Social capital is a widely used concept in the social sciences in order to refer to resources linked to social relations. In recent research, the metaphor has also been applied to the realm of SNSs. In this chapter, the following three aspects are addressed. First, I give an overview of the existing literature on social capital (Chapter 3.1). Second, I show to what extent the concept of social capital has already been applied to the realm of SNSs (Chapter 3.2). Third, I outline how the present thesis contributes to the literature in terms of theoretical understanding, empirical research and applied methodology (Chapter 3.3).

3.1 The Social Capital Metaphor

Although the term *social capital* has been used since 1916 (Hanifan 1916), its popularity among scholars started in the 1980s, with the French sociologist Bourdieu (1979, 1986). To date, the concept has been applied to many different fields and disciplines. It is therefore not surprising that scholars are faced with a plethora of different concepts, definitions, operationalizations, and implications of social capital. While an exhaustive discussion of the complete social capital literature is clearly beyond the scope of this thesis, this section offers a general overview, organized according to three main schools of thought and their most prominent representatives[4]. Based on Adam and Rončevic´ (2003), the three schools are referred to as critical, normative, and network-based utilitarian[5].

[4] Readers interested in a more extensive review of the social capital literature are referred to the comprehensive books by Lin (2001) and Field (2003).

[5] The categorization of the literature on social capital into critical, normative, and network-based utilitarian schools is not unanimous. For example, in the context of economic

3.1.1 The Critical School

The critical school is mainly represented by Bourdieu, who used the term *social capital* to explain social stratification and the mechanisms of its persistence over time (Bourdieu 1986). Influenced by the ideas of Weber and Marx, Bourdieu conceptualized social capital as one form of capital among others (i.e., cultural and economic), with the distribution of capital representing the inherent structure of the social world. Since over time, capital has the tendency to reproduce itself and to accumulate, structural inequalities are passed from one generation to the next.

According to Bourdieu's often-cited definition, social capital represents "the aggregate of the actual or potential resources which are linked to the possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition" (Bourdieu 1986: 51). The amount of social capital that an individual can access and benefit from depends on the extent of the social relationships that she or he can mobilize, as well as on the richness of these relationships (Bourdieu 1986).

Compared to the other two schools, there is only little empirical research from the critical perspective. For example, scholars analyzed the connections between social capital resources in urban neighborhoods and health-related behaviors of their residents (Carpiano 2007) or gentrification processes in London areas (Butler and Robson 2001).

Criticism

On the one side, Bourdieu can be credited with popularizing the concept of social capital and with providing a coherent theory to explain societal

development, Woolcock and Narayan (2000) use the categories of communitarian, networks, institutional, and synergy view on social capital.

inequalities. On the other side, he has been criticized for giving to much priority to economic capital as compared to the other forms of capital and for failing to consider the positive impacts of social capital and the potential of societies for social change (Jenkins 2002; Wakefield and Poland 2005). The critical perspective has not been extended to realm of SNSs.

3.1.2 The Normative School

The normative school is named according to its focus on shared norms and it is strongly connected to its two main representatives, the sociologist Coleman and the political scientist Putnam.

Coleman, the pioneer of the normative school, in his approach to social capital combines an emphasis on the social context with the concept of a utility-maximizing self interested actor that is typical for economic approaches (Coleman 1988). For him, social capital is a "variety of different entities, with two elements in common: they all consist of some aspect of social structures and they facilitate certain actions of actors—whether persons or corporate actors—within the structure" (Coleman 1988: 98).

Coleman (1988) explicitly points out three forms of social capital that may more or less exist in a social structure. These forms are (1) the obligations, general trustworthiness and expectations of reciprocity that exists in social structures, (2) the potential for information that is inherited in these structures, and (3) the norms and effective sanctions that accompany these structures. Actors may benefit from social capital by receiving solidarity from their network, by obtaining valuable information, or by being able to exert influence on other actors (Sandefur and Laumann 1998). Social capital does not only exist on the level of societies, but also in smaller social structures like organizations or extended families (Coleman 1994; Laumann and Pappi 1976).

In contrast to Coleman, Putnam (1993, 1995, 2000) introduces a much more political concept of social capital. He argues that interpersonal connections (e.g., those developed in voluntary organizations or bowling clubs) contribute to social capital in a society. He defines social capital as "features of social organization, such as trust, norms, and networks that can improve the efficiency of society by facilitating co-ordinate actions" (Putnam 1993: 167). Hence, communities that are rich in social capital have the best chances for social, political, or economic development[6].

In his later work, Putnam (2000) differentiates between two forms of social capital. While *bonding social capital* refers to relationships with similar others (e.g., in terms of race, income, or age), *bridging social capital* is based on relationships among heterogeneous people, and is therefore more meaningful on the community level. This differentiation will become important again for the application of the social capital concept to SNSs (Chapter 3.2).

Empirical Research (Examples)

A great deal of empirical research has been conducted in the normative school. Putnam` s empirical work, e.g., suggests that there is a positive effect of regional social capital on the development of government efficiency and economic development in that region (Putnam 1993). Furthermore, he analyzed "the strange disappearance of social capital in America" and empirically linked reduced participation in conventional voluntary organizations among US citizens with a severe decrease of political participation (Putnam 1995). Other scholars have emphasized the preconditions of existing trust and civic norms (Knack and Keefer 1997), the dynamics of social change (Inglehart 1997), or the importance of trust for national economic performance (Fukuyama 1995).

[6] Since Putnam's interest is on the community level, his perspective is also referred to by many authors as "the communitarian view" (Woolcock and Narayan 2000; Wakefield and Poland 2005).

Criticism

The normative school has contributed widely to the understanding of social capital as a community-based resource, but it has also faced criticism on a number of fronts. The most common criticism refers to the blurriness of its terminology. For example, Coleman's definition of social capital on the one hand includes expectations of reciprocity (causes) along with the potential for information access (effects) (see, e.g., Lin 1999; Portes 1998). Putnam treats social networks as both sources and forms of social capital (Adam and Rončevic´ 2003). Unlike in the critical school, scholars in the normative school also largely ignore the potential negative impacts of social capital and the inequalities between actors' ability to make use of existing resources (Portes 1998; Wakefield and Poland 2005). The normative school influenced research in the realm of SNSs.

3.1.3 The Network-Based Utilitarian School

The network-based utilitarian school brings together network theory with a focus on individual action. It is closely linked to its main representatives Lin (1999, 2001) and Burt (1992, 2000).

Based on his extensive review of the literature, Lin (1999) defines social capital as the "resources embedded in a social structure which are accessed and/or mobilized in purposive actions" (P. 35). Resources comprise wealth, power, or status and they are directly or indirectly accessible via one's social connections. Lin (2001) can be credited for developing a structured approach that clearly differentiates between three main segments of social capital that are often confounded in the literature. Adam and Rončevic´ (2003) summarize the segments of Lin`s model:

> The first (segment] represents an individual`s structurally conditioned position which facilitates or limits the investment of social capital. The second segment accentuates

> the process of mobilization, access to and use of contact resources. The third segment is related to the effects of social capital in terms of […] returns." (P. 168).

In addition, Lin differentiates between the potential access to social capital and its mobilization. This differentiation is important, since not all resources that an actor could theoretically access may actually be mobilized by him or her in a specific situation. For example, in some cases, actors may just not know about the existence of specific resource in their networks. I will draw on this separation, when I differentiate between the capacity of individual resources and their mobilization in Chapter 4.

The network-based utilitarian school shifts research focus to the qualities of social structures, like the size of individual networks or an actor's position in a social network. Network structure hereby is not only relevant in terms of vertical structure, i.e. the position of an actor in a hierarchy, but also in terms of horizontal structure. As Burt (1992, 2000) argues, actors that form a bridge between different groups, may benefit from that bridging position as they have access to non-redundant sources of information and can exert control over the flow of information between these groups. Hence, for example managers that inherit such positions empirically exhibit more successful careers than such that do not. Bridging contacts are also beneficial on the level of corporate actors, as their presence, for example, was shown to facilitate the cooperation of start-up companies (Walker, Kogut and Shan 1997).

Criticism

The network-based utilitarian school emphasizes individual utility and provides researchers with distinct definitions that are oriented towards empirical validation. However, with this mindset of straightforwardness, scholars often ignored those aspects of social capital that are less open to operationalization and measurement, such as trust or implicit norms that exist in a society (Adam and Rončevic′ 2003). Just like the normative school, the

network-based utilitarian one has also been criticized for ignoring the potential negative effects of social capital that may come from the very same structural preconditions as positive effects (Adam and Rončevic′ 2003; Portes 1998). The network based-utilitarian school has influenced research in the realm of SNSs.

3.2 Social Capital and SNSs

Until now, only few scholars have applied the social capital concept to the realm of SNSs. I classify the studies in the following first section as belonging to the normative school, since the authors refer to social capital as either *trust* (Valenzuela, Park and Kee 2009) or as *shared values and mutual reciprocity* (Zúñiga, Jung and Valenzuela 2012). I refer to the studies in the second section as an eclectic approach, since they combine elements of the normative school, like Putnam`s (2000) differentiation between bridging and bonding social capital, with such from the network-based utilitarian school., like the conceptualization of social capital as an individual asset .

3.2.1 The Normative School and SNSs

Two studies address SNSs from the perspective of the normative school and shed light on the relationship between SNS use and political and civic participation.

Valenzuela, Park and Kee (2009) view social capital as consisting of three domains: intrapersonal, interpersonal, and behavioral. Following Scheufele and Shah (2000), they operationalize these three domains as life satisfaction, generalized social trust, and civic/political participation, respectively. With their results, the authors contradicted the idea that facebook use takes away time from civic participation. With regard to the only weak connections between the use of facebook and all three domains of social capital, the authors conclude that "it would be quite troubling if a sole

technological platform such as Facebook determines young adults' stock of social capital"(P. 893).

Zúñiga, Jung and Valenzuela (2012) conceptualized social capital more similarly to Putnam`s political approach (e.g. Putnam 2000). In addition, unlike in the study by Valenzuela, Park and Kee (2009), there is no individual level in their conceptualization of social capital. They define it as "features of social life that enable participants to act together more effectively to pursue shared objectives in their communities" (P. 323). In particular, features of social life are shared values, mutual help, and a feeling of connectedness. The authors show that individual who used facebook in order to receive news had both more social capital and a higher likelihood to engage in civic and political engagement. Civic and political engagement in this study, for example, included activities such as purchasing socially responsible products, writing to politicians, volunteering, and participating in a political rally.

Criticism

Both studies introduced in this section (Valenzuela, Park and Kee 2009; Zúñiga, Jung and Valenzuela 2012) are promising, since they address the civic and political dimensions of SNSs. With the widespread global use of these websites, there is a large potential for civic and political engagement, and its effects can already be witnessed. For example, SNSs played an important role in the presidential election campaign of Barack Obama in 2008 and during the Arab spring (see e.g., Gerbaudo 2012; Khondker 2011). In the political realm, SNSs were used for many different reasons, from shifting attention to specific issues of public interest and campaign fundraising to the organization of street protest.

The main criticism with regard to the presented studies refers to their conceptual blurriness, since in both cases the authors merge causes and effects

in one definition of social capital. Specifically, Valenzuela, Park and Kee (2009) merge trust with political and civic participation, while Zúñiga, Jung and Valenzuela (2012) combine shared values and mutual help in one concept. To complicate matters, participation is viewed as a form of social capital by Zúñiga, Jung and Valenzuela (2012) and as a consequence of social capital by Valenzuela, Park and Kee (2009). Zúñiga, Jung and Valenzuela (2012) also cannot completely rule out that the direction of causality goes from civic and political engagement to the highly specific use of facebook to receive news. Finally, it is quite surprising that neither study grasps the potential of SNSs for political participation via online grassroots communities like Avaaz that use social media to promote issues like animal protection or human rights on a worldwide scale (see http://www.avaaz.org).

3.2.2 The Eclectic Approach

The eclectic approach is centered around the three scholars Ellison, Steinfield, and Lampe who analyzed the connections between facebook use and users perceived individual social capital resources.

The authors (e.g., Ellison, Steinfield and Lampe 2007;; Ellison et al. 2011) view bonding social capital as associated with groups of individuals who share a strong emotional bond and who may, for example, provide the actor with emotional or financial support. Bonding social capital may, for example, refer to an actor`s relationships with close friends and family. Bridging social capital, in contrast, they view as rooted in large and heterogeneous networks and as being a resource in terms of information or new perspectives. In addition to the differentiation between these two forms based on Putnem (2000), Ellison, Steinfield and Lampe (2007) also introduced the concept of *maintained social capital*, which refers to social connections from previous to college, e.g., those with acquaintances from high school. These maintained

connections may benefit facebook users with pieces of information or small favors.

The authors showed that facebook use contributed to individuals' perceived bonding, bridging, and maintained social capital (Ellison, Steinfield and Lampe 2007; Ellison et al. 2010; Steinfield, Ellison and Lampe 2008). Facebook use had the strongest effects on users´ perceived bridging social capital. Additionally, users with low self-esteem and those who explicitly use the website to find out more about people they already know from offline interaction especially benefit from SNS-based social capital generation.

In a most recent study that was published during the writing of this thesis Brooks et al. (2014) addressed the relationship between the structure of facebook networks and users' perceived social capital. Specifically, they assumed a connection between average degree centrality[7] and perceived bonding social capital that was not confirmed by the data. Contrary to the expectations of the authors, the correlation between network cohesion and perceived bonding social capital was found to be negative. The assumed connection between groupings of contacts in the network and perceived bridging social capital was confirmed, but mediated by behavioral variables. One reason for these mixed results may be the fact that the social capital scales used by the authors capture a wide and diverse set of different aspects. For example, the bridging social capital scale contains items -including a felt sense of community, an individual's willingness to contribute money, and the likelihood of meeting new people- that could be further differentiated. Furthermore, the interpretation of facebook network structure in terms of social capital has some general limitations that I will discuss in a later section (Chapter 9.3.2.1).

[7] Average degree centrality = average number of links for all contacts in the network of a user.

Criticism

The eclectic approach shifts attention to the potential of SNSs to generate resources for individual users. However, the authors' conceptualization of maintained social capital seems unnecessary, since its functional and structural differentiation from bridging social capital remains unclear. The analysis of the connections between network structure and perceived resources is promising, since it integrates a network perspective and creates a space for interdisciplinary research.

Table 2 gives an overview of the traditions of social capital research discussed in the previous sections. It also includes the main criticisms of these schools with regard to their conceptualization of social capital. Furthermore, each school's contribution to the study of SNSs is displayed.

Table 2 The Three Schools of Social Capital Research and Their Application to SNSs

	Critical School	Normative School	Network-based/ Utilitarian School
Definition of *Social Capital*[a]	"the aggregate of the actual or potential resources which are linked to the possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition" (Bourdieu 1986: 51)	"variety of different entities, with two elements in common: they all consist of some aspect of social structures and they facilitate certain actions of actors […] within the structure" (Coleman 1988: 98) "features of social organization, such as trust, norms, and networks, that can improve the efficiency of society by facilitating co-ordinate actions" (Putnam 1993: 167)	"resources embedded in a social structure which are accessed and/ or mobilized in purposive actions" (Lin 1999: 35)
Main Criticism[b]	Focus on negative impact (Wakefield and Poland 2005)	Blurry definition; confounding causes and effects of social capital as well as resources and the ability to mobilize them; ignores negative effects (e.g., Lin 1999; Portes 1998)	Reductionism for the sake of measurability, ignores negative effects (Adam and Rončevic´ 2003; Portes 1998)
Applied Social Capital Definition[c]	No direct application, although the definition is often referred to.	"features of social life that enable participants to act together more effectively to pursue shared objectives in their communities" (Zúñiga, Jung and Valenzuela 2012: 323) Social capital consists of life satisfaction, generalized trust, and civic / political participation (Valenzuela, Park and Kee 2009)	Two main different forms of social capital: bridging (based on weak ties) and bonding (based on strong ties) (e.g., Ellison, Steinfield and Lampe 2007)

Note. SNS = Social network site. The differentiation into three schools is based on Adam and Rončevic´ (2003).

[a] The social capital definitions of main representatives for each school are displayed. [b] *Main criticism* refers to criticism that is directly related to the conceptualization of social capital in that specific school; criticism of the wider theoretical context is ignored. [c] Applied refers to the application of the concept social capital to SNS related research.

3.3 Contributions of this Thesis to the Social Capital Literature

In the previous sections, I showed that social capital is a useful concept in order to link resources embedded in social structures with outcomes and behaviors on the level of individual actors. My thesis builds on the work of authors that already applied this concept to the realm of SNSs and it will contribute to this young research tradition. In this section, I will briefly outline the contributions of this thesis to the existing literature which are in the form of theoretical understanding, empirical research and applied methodology.

Theoretical Understanding.

In this thesis, I develop a social capital-based approach to the understanding of SNSs that emphasizes the impact of these websites on the lives of their users. I outline the mechanisms in which SNSs contribute to the capacity and the mobilization of individual information resources in the process of information seeking. Additionally, I show how the technology of SNSs affects the quantity and quality of resources that users have at their disposal.

As Portes (1998) points out, risks are only rarely integrated in research from a social capital perspective (for exceptions, see e.g., Moore et al. 2009). However, a more balanced approach contributes not only to theory, but also to the practical applicability of the social capital concept. Hence, I include the potential risks that are associated with SNS use into my approach.

Empirical Research and Applied Methodology.

Although social capital by its definition is rooted in social structures, scholars have largely ignored this crucial element (e.g., Moody and Paxton 2009). With regard to the social capital literature in the realm of SNSs, Ellison et al. (2011) state that the "analysis of server-level data is another necessary step for making claims about the extent to which Facebook or other SNSs support

social capital and the mechanisms by which this might happen." (p. 140). In this thesis, I address this research gap by incorporating data mining technology into social capital research (network size and structure).

This thesis contributes to the literature by analyzing not only social capital resources, but also their practical implications for users in the forms of information seeking and network demand.

My thesis is the first piece of research in this field to use German samples, thereby adding an intercultural perspective to the existing literature that has been completely based on samples from the US. In general, intercultural differences between facebook users are rarely addressed in research (for an exception, see Dohmen 2012).This validation is needed, since there may be differences between users in the US and such from other countries.

4. Capacity and Mobilization of Online Social Capital (OSC) for Information Seeking

In this chapter, I introduce *online social capital* (OSC), in order to point out the essential role of SNSs with regard to the capacity and the mobilization of individual information resources and the fact that these resources differ in terms of both quantity and quality from other forms of social capital. I define OSC as the resources that SNS users can directly or indirectly access via their networks of SNS contacts. These resources are primarily in the form of information, such as expertise or knowledge.

In the present chapter, I discuss in detail to what extent facebook[8] technology contributes to the capacity and mobilization of information resources in terms of information seeking. The differentiation between the capacity and mobilization of social capital is based on Lin (2001). Based on the definition by Case (2007), I view information seeking in a general and inclusive way, as the conscious effort of an individual to acquire information in response to a need or gap in his or her knowledge. Reflecting my social-capital-based approach, *information seeking* refers to information that is directly or indirectly accessible via social relationships.

The present chapter consists of three parts. The first one addresses SNS-based relationship maintenance and its effects on the amount and diversity, i.e. the capacity, of OSC available to a user (Chapter 4.1). In the second part, I discuss the mobilization of OSC, i.e., to what extent SNS-based technology helps users to find and address contacts that have access to required information (Chapter 4.2). I also point out to what extent the technology of facebook contributes to a more efficient mobilization and a wider applicability

[8] The mechanisms and processes addressed in that chapter refer to facebook. However, they are not exclusive to this one website, but can be generalized to other SNSs. Therefore, in this chapter, the terms facebook and SNS are used synonymously.

of information resources. The third part is dedicated to the existing empirical research on facebook and information seeking (Chapter 4.3).

4.1 Capacity of OSC

In this section, I argue that the ways in which SNSs facilitate the maintenance of individual social networks increase the size and diversity of these networks, and thereby the quantity and diversity of embedded information resources.

4.1.1 SNS-Based Mechanisms of Network Maintenance

On facebook, social relationships are maintained in two main ways, passively via the mere existence of a digital link and actively via social interaction.

Passive relationship maintenance

Passive relationship maintenance refers to the fact that no active contribution from the user is required to maintain social relationships via facebook[9]—the very presence of a virtual connection confirms relationships before an audience of contacts (Donath and Boyd 2004). The mere existence of a virtual link therefore is the most minimal form of maintaining social relationships, and it is highly specific to SNSs. Additionally, facebook technology encourages users to keep relationships alive by creating an "ambient awareness" of contacts in the minds of users (Kaplan 2012). This awareness is achieved through site features like information displays in facebook profiles (see Figure 2 F in Chapter 2) that keep users updated about the latest activities of their contacts. In addition, the more comprehensive and editable newsfeed[10] also

[9] While no user effort is required to maintain connections, at least minimal effort (i.e., sending or accepting friend requests) is required to initiate new contacts. A connection on facebook exists until one of the two users involved decides to end it.

[10] The newsfeed is a facebook feature that gathers all new information in a user's network (birthdays, new friends, relationships, occupations, recently uploaded pictures, etc.) and

informs users about new events in their digital networks and allows users to comment and interact. Furthermore, users can always access the profiles of specific contacts in order to keep updated about them. As a consequence, users can easily stay connected with contacts who may be distant in terms of time, space, or lifestyle.

With the low costs of passive relationship maintenance, it is therefore not surprising that the maintenance of social relations is the most prominent reason for people to join SNSs like facebook (e.g., Bonds-Raacke 2010; Quan-Haase and Young 2010; Joinson 2008; Papacharissi and Mendelson 2010).

Active Relationship Maintenance

This form of relationship maintenance is quite intuitive, since it is similar to social interactions in the offline world. Specifically, with active maintenance, I refer to social interaction via facebook, e.g., exchanging texts, pictures, or other digital information with ones colleagues, friends, or relatives. The highly interactive forms of communication in SNSs keep social relationships alive. Two main features of facebook-based communication are especially interesting in terms of social capital, since they allow users to communicate in a highly effective way, unprecedented by offline interaction or other media. In the case of facebook, these two features are *wall posting* and *liking*.

Wall posting refers to the ability of users to post information on their facebook wall where it is visible to all of their contacts (see Fig. 2 E in Chapter 2)[11]. In this way, interactions with a large number of contacts may evolve, like conversations or discussions. In some ways, wall posting therefore is a digitalized form of offline conversations that may take place at a party or in a

displays it for the user. On the default setting, displayed news items are pre-selected by an algorithm based on a set of criteria such as the regularity of interactions between the user and a specific contact. Users' privacy settings may prevent certain events from being displayed.

[11] The possibilities for contacts to communicate via wall posting may be reduced due to individual users' privacy settings, which may limit access. In addition, users may block posts by specific contacts.

café. Different from its offline counterparts, wall posting includes a wider range of potential contributors (the complete network) and timing is less relevant. Additionally, wall postings also confirm existing relationships in front of an audience of contacts (Donath and Boyd 2004).

The second form of communication that is relevant for relationship maintenance is *liking*. The "like" button is a facebook-specific feature that allows users to comment on most content displayed on facebook (and also outside the website) in the most minimal way. By liking a specific political statement, personal life event, or holiday picture, users instantly signal their affirmation of that content[12] and they engage in a social interaction with the contact that has posted the content. In that way users keep social relations alive. Figure 3 shows a wall post that had been commented by one contact and liked by two contacts.

Figure 3 Wall Post with Comments and Likes The screenshot shows a wall post by a facebook user that has been liked by one contact and commented by two. Source: Author.

[12] While the concrete meaning of *liking* differs depending on the liked content, liking mostly always implies that the "liker" has acknowledged and positively evaluated a specific content.

In conclusion, passive maintenance is the default option of relationship maintenance on facebook for all contacts in the network, and it does not involve additional costs for the user like time or attention. It is supported by the technology of the website (like newsfeed). Active maintenance, on the other hand, entails active user participation, and may therefore be limited to a specific group of contacts. It is supported by facebook features like wall posting and the "like" button. Passive forms of relationship maintenance may easily become active forms, for example, when a user replies to a piece of information that she received earlier via the newsfeed.

4.1.2 Effects on Amount and Diversity of OSC

Since neither active nor passive maintenance involve much effort[13], SNS users can build up and maintain large networks without much effort, a fact reflected in the 303 facebook contacts that the average American user had in 2013 (Edison Research 2013). All things being equal, a larger social network contains more information resources in terms of OSC.

Building and maintaining large sets of contacts is especially important with regard to contacts that are not part of a user's circle of close friends and family. For many of these contacts, without the help of SNSs, the "potential benefits of staying in touch are overwhelmed by the costs of coordination, making it unlikely that the connection persists" (Ellison et al. 2010: 138). In other words, it is very likely that individuals will stay connected with their close friends, family, and relatives, i.e. their "strong ties" (Granovetter 1973), with or without the use of SNSs. However, the cognitive effort and time that individuals are willing to invest in order to keep up relationships with contacts outside of this circle—i.e. "weak ties"—is limited. By using SNSs, the costs for

[13] The effort of maintaining social relations via facebook requires little effort from individual users. The significance of this low maintenance cost becomes especially obvious when compared to the effort (mainly in terms of time) that would be required to maintain relationships with the same number of contacts without SNSs.

relationship maintenance are low and users can afford to stay connected with even the weakest ties (Ellison et al. 2011). Therefore, the connective potential of SNSs is especially effective in supporting those ties, which are more likely to be different from the user with regard to aspects such as lifestyle, experience, culture, occupation, hobbies, age, or socioeconomic status. As Ellison et al. (2011) argue, such contacts could include participants from a workshop, members of a club, students in a class, or parents on a playground. When these contacts become part of a user`s social network, the diversity of OSC is also increased.

In conclusion, by facilitating the maintenance of large and diverse sets of contacts at very little cost (especially with regard to time), facebook increases the amount and diversity of users` OSC.

4.2 Mobilization of OSC

As I argued, the mere existence of a resource does not necessarily imply its purposeful mobilization. In order to mobilize OSC, users have to know where in their networks they can find a contact with the specific requested knowledge and they have to request the information from him or her, i.e. they have to communicate. In this section, I argue that SNS technology supports users in searching for and addressing of the "right" contact, thereby increasing the efficiency and applicability of OSC.

4.2.1 SNS-Based Strategies of Mobilization

When using DNS technology for contact searching a specific contact to request information, two major strategies can be used. Users can either directly search or they can post a request and wait for a reply (undirected search).

Directed Search for Contacts

If users want to directly search for a contacts to benefit from their knowledge, they can utilize the profile information of their contacts (see Fig. 2 B in Chapter 2), which acts as cues for the knowledge, expertise etc. of the profile owner. Based on profile information, they can then directly address the appropriate contact and request, e.g., the opinion or advice of this contact. For example, if a user wants to find a flat in Hamburg, he or she may request support from those contacts who list Hamburg as their current place of residence. Clearly, the efficiency of such a direct search strategy depends on how easily specific knowledge can be accessed from contacts' profile information. Therefore, it is especially useful when the requested knowledge can be associated with standard Facebook profile information, like occupation, education, and city of residence[14].

Direct searching may have limited success if contacts offer little personal information, or have restricted access to their profile information. Furthermore, for searching to be effective, users must have a certain degree of previous knowledge regarding which contacts are likely to have certain knowledge. Otherwise, the search for profile cues can quickly become prohibitively time consuming. Once the matching contact has been found, he or she can easily be addressed via the communicative infrastructure of SNSs, which lowers the transaction costs for social interaction (Ellison et al. 2011; Williamson 1981). Hence, users do not need any additional contact data and the felt proximity of contacts also lowers psychological barriers to initiating communication, especially with respect to distant contacts that users have not met in person for a long time.

[14] Suggestions on the effective composition of SNS profiles in terms of knowledge management can be found in the study by Wodzicki, Schwämmlein and Cress (2009).

Undirected Search for Contacts

While the directed search strategy is basically a more technologically advanced version of offline searching, undirected searching is highly specific to SNSs[15]. Undirected search refers to the fact that users post requests for information on the walls of their profiles, thereby addressing a large number of contacts at the same time. Contacts with the requested knowledge (and the willingness to share it) can then directly reply to the user.

Obviously, this strategy has several advantages to directed searching. First, it can be used when users do not know who, if anyone, in their networks has access to a specific knowledge and a directed search strategy would be prohibitively time consuming. Second, undirected search can be used when the user is not interested in a specific piece of information, but rather in more interactive processes of knowledge generation, like adiscussion or the exchange of opinions. Third, undirected searching can be a more polite alternative to directly addressing a specific contact, especially when the user is not sure if that specific contact is willing to reply. By posting on his or her wall, the poster can both avoid being rude and avoid being refused.

4.2.2 Effects on Efficiency and Applicability of OSC

Using the directed and undirected search strategies described above, users can mobilize the resources embedded in their digital networks for information-seeking purposes. Especially undirected search may strongly affect the efficiency of resource mobilization and their applicability with regard to the range of requests.

[15] One could argue that internet forums also allow users to post information requests and wait for replies. However, there are two significant differences between posting on an SNS and on a forum, which affect the nature of the information seeking. First, unlike most forums, facebook is not topic specific, allowing a wider set of requests. Second, since facebook networks refer to personal contacts, trustworthiness and personal relatedness of replies are in general higher.

By posting a request on their wall, users are likely to receive replies from contacts who they would not have thought to contact directly. Hence, undirected search strategies increase the efficiency of social capital mobilization, thereby giving access to resources that would otherwise have remained unused. The low costs involved in posting a request makes this form of information seeking sensible, even in cases when users do not know who, if anyone in their network, has (access to) the requested knowledge. Therefore many requests that users would not have asked their social networks without facebook, can now be addressed via the website. As a consequence the applicability of OSC is much wider, compared to traditional un-mediated forms of social capital.

Table 3 summarizes the effects of SNS use on the capacity and mobilization of OSC that were discussed in this section.

Table 3 Effects of SNSs on the Capacity and Mobilization of OSC

Area	Processes Facilitated by SNSs	Outcomes[a]
Capacity of Resources	- Passive network maintenance via the digitalization of social relationships - Active network maintenance via SNS-mediated communication	Larger and more diverse networks with more and more diverse embedded information resources (e.g., knowledge)
Resource Mobilization[b]	- Directed contact search based on profile information - Undirected contact search via posting - Communication facilitation via communicative infrastructure	More efficient mobilization Applicability of resources to a wider range of areas

Note. SNS = Social network site, especially facebook. OSC = online social capital.
[a] Refers to the outcomes of SNS-facilitated processes with regard to the capacity of information resources, and their mobilization. b Refers to the purposeful mobilization of network based information resources (see, e.g., Lin).

4.3 Facebook and Information Seeking – Empirical Evidence

I argued that SNSs allow users to access and mobilize information resources to an extent that has been unprecedented in both mediated and unmediated forms of communication. Interestingly, only two studies have directly addressed the use of facebook for information seeking; their results are outlined below.

In the first study, Lampe et al. (2012) showed that, although users generally assume that their digital networks represent an information resource, they make little use of it in terms of actual information seeking. The authors suggest that this may be, because users perceive facebook as a tool that is primarily for socializing, and therefore inappropriate for information seeking. Lampe et al. (2012) also showed that female, younger, more active, and more communicative users, and those that who had greater numbers of either offline or online contacts, were all more likely to seek information via facebook.

In the study by Morris, Teevan and Panowich (2010), half of the participants reported having used their facebook walls to post information requests to their contacts, i.e. in the terminology of this chapter they used undirected search strategies. About 80 % of the information requested was subjective in its nature. For example, users asked their contacts for personal recommendations, opinions, or they wanted to start a discussion. Additionally, only 11% of requests were related to professional issues (11%). The majority of requests addressed personal topics, such as hobbies, leisure activities, entertainment, and family. Furthermore, Morris, Teevan and Panowich (2010) asked participants why they had preferred to use facebook over alternative forms of information seeking, such as search engines or specialized websites. Participants cited the trustworthiness of their facebook networks and the fact

that they possessed highly specific knowledge in a personal context. Furthermore, they described facebook-based information seeking as easy, reliable, informal, and sufficiently fast and efficient, while simultaneously satisfying social needs.

However, these results have to be interpreted with care, as the study sample was comprised of software firm employees, a population with a presumably high affinity to technology. This population may be much more likely than others to use facebook for information seeking. As with the first study by Lampe et al. (2012), the results of Morris, Teevan and Panowich (2010) are based on US samples and may only be generalized to populations outside the US with care[16].

While Morris, Teevan and Panowich (2010) asked participants about concrete information-seeking events, Lampe et al. (2012) asked to what extent users perceived the medium as an information-seeking tool in general. From these results we can conclude that facebook, although not primarily perceived as an information seeking tool, is used for that purpose in concrete cases. SNSs offer a highly specific and social form of information seeking that is related to personal and subjective information. The fact that only two studies were suitable for review demonstrates to what extent research in this field is only just beginning. The present thesis will contribute to this field by empirically analyzing the use of facebook for information seeking, with regard to information needed for dealing with daily stressors.

[16] For an analysis of cultural differences in SNS use, as well as for information on SNS use in the US, the UK, China, and India, see Yang et al. (2011).

5. Risks Associated with SNSs

SNSs impact the day-to-day lives of their users in terms of an information resource, but the use of these websites is associated with specific risks that I outline in this chapter. I use the term *risks*, as opposed to *costs* or *negative effects*, to emphasize that the harmfulness and the relevance of the presented threats may differ widely for individual users. While research on SNS associated risks in general is scarce, with this chapter, I want to give a comprehensive overview.

The first group of *social risks* is directly associated with the presence of digital contacts that can become the source of cyberharassment, social pressure, deleterious social comparisons, conflict, and network demand (Chapter 5.1 – 5.5). I will show that the very same SNS-technology that facilitates the capacity and mobilization of OSC also facilitates these social risks. Furthermore, there are risks associated with data abuse (Chapter 5.6) and addictive and problematic SNS usage behaviors (Chapter 5.7).

5.1 Forms of Cyberharassment

The risk associated with virtual contacts that has attracted the most media coverage to date is cyberharassment, which can take the form of cyberstalking or cyberbullying (e.g., Wiggin 2011).

5.1.1 Cyberharassment and Cyberstalking

Although cyberharassment and cyberstalking are sometimes used synonymously in the lay discourse, it is generally agreed that cyberstalking is the less widespread but more severe of the two forms of harassment. Specifically, *cyberharassment* is defined as the threatening or harassing of an individual by another individual or by a group of individuals, perpetrated

through or utilizing electronic means (in this case, SNSs). In contrast, *cyberstalking* is more persistent and severe, and involves a pattern of threatening or malicious behaviors (Maple, Short and Brown 2011).

Empirical research indicates that 92% of internet users in the UK experienced some form of cyberharassment at least once in their lives, and around two thirds of participants reported having been harassed at least once via a social networking site (Maple, Short and Brown 2011). Cyberharassment on SNSs takes place, for example, when users receive threatening messages, rumors are spread via the medium, or perpetrators hack a target's account (i.e., gain unauthorized access to private content).

Wilsem (2013) found that users with low self-control may be at increased risk for being victimized online, probably since they are more likely to exhibit impulsive and potentially risky internet behavior, and are less able to anticipate future harm. In the context of SNSs, this could mean that users with low self-control may post more sensitive information and be, in general, less aware of the potential risks associated with the content they post, thereby providing more material for harassers.

The consequences of cyberharassment are similar to those of offline harassment, including fear, distress, and anxiety relating to physical injuries, injury to feelings, damages to one's reputation and reduced work performance and social activities (Maple, Short and Brown 2011). In at least one instance, facebook stalking was connected to the death of a user (Blunden 2012).

5.1.2 Cyberbullying

If both the perpetrator and the target of cyberharassment are minors, this is referred to as *cyberbullying* (see e.g., stopcyberbullying.org). Cyberbullying takes place when someone "repeatedly makes fun of another person online or repeatedly picks on another person through email or text message or when

someone posts something online about another person that they don`t like" (Hinduja and Patchin 2012).

Hinduja and Patchin (2011) report that 20% of their participants between 11 and 18 years of age had been targets of cyberbullying at least once during their lifetime, and about 10% admitted to having been both targets and offenders. Individuals who used computers more frequently, who gave their passwords to friends, and who were already involved in verbal or physical aggression at school were most likely to be involved in cyberbullying, either as a target or as an offender (Mishna et al. 2012).

Consequences of cyberbullying include feeling depressed, sad, angry, and frustrated, as well as lower self-esteem (Hinduja and Patchin 2010 2011). Targets were also more prone to family problems, academic problems, school violence, delinquent behavior, and suicidal ideation. While these results refer to cyberbullying in general, i.e., via electronic media in general, there is no reason to doubt their relevance for specifically SNS-based bullying.

Cyberharassment, cyberstalking, and cyberbullying are evidently severe problems that many SNS users face at least once in their lifetime. They have become a prominent social problem to the extent that a number of organizations exist to address the topic and protective legal efforts are also being undertaken by policy makers[17]

Just like offline forms of harassment, online harassment can have severe consequences for the health of individuals. With regard to the similarities in terms of causes and motivations between the two, Kwan and Skoric (2013) argue that cyberharassment and offline harassment are quite similar and

[17] Websites like wiredsafety.org provide information and help related to cyberharassment and cyberbullying for many audiences from the targets of harassment to policy makers. An overview on laws against cyberharassment (in the US) can be found on the website http://www.ncsl.org/research/telecommunications-and-information-technology/cyberstalking-and-cyberharassment-laws.aspx.

differentiating between the two may be unnecessary. While I do recognize this similarity, the specific nature of SNSs may nevertheless facilitate harassment and strengthen its impact on targets. For example, the existence of SNS profiles gives potential harassers easy access to sensitive information that they can use against their targets. Additionally, large and highly interactive digital networks can be used to quickly spread rumors and defamation, thereby increasing the pressure on individual targets.

5.2 Social Pressure

Digital networks can easily become sources of social pressure, with negative effects on individual users, since much of the user activity takes place in front of an audience: posting of content, adding new contacts, or displaying information on their profile. Therefore, individuals that are vulnerable to being evaluated by others may experience social pressure in the digital realm.

Empirical research on that phenomenon is limited. A recent report shows that users who added contacts to their facebook networks who can be considered quite critical in terms of monitoring and evaluating the user's virtual behavior (i.e. parents or employers) exhibited increased levels of anxiety and stress (University of Edinburgh 2012). Moreover, having a network that provided mainly negative feedback caused users to experience decreased well-being and self-esteem (Valkenburg, Peter and Schouten 2006).

Being evaluated by others can cause stress in individuals, online as well as offline. However, SNSs facilitate this problem in two key ways. First, digital networks are larger and more diverse than their offline counterparts and they are always present, as soon as a user logs into the website. Therefore, users have to simultaneously take into account a wide set of diverse potential evaluators from different fields of their lives, like colleagues, family, or friends.

Second, the highly interactive nature of SNS-based communication may increase the likelihood of (negative) evaluations in general.

5.3 Deleterious Social Comparisons

Social network sites represent virtual spaces where individuals can—among other activities— share information about themselves and the current events in their lives with a circle of friends and acquaintances. Until the beginning of 2013, about 250 billion photos were uploaded to facebook by more than a billion users and users shared about 350 million of photos each day (Facebook 2013).

Research shows that, in general, the information users share is realistic, i.e., it represents them in terms of personality and behavior (Gosling and Vazire 2007; Weisbuch, Ivcevic and Ambady 2009). However, as it is in an online setting, users have more control over the information they share than they do offline[18]. They can therefore select what aspects of their lives they do and do not want to share with contacts. As a result, SNS communication is full of pictures and posts regarding positive life events such as celebrations, holidays, and weddings, as well as individual achievements like graduations or new jobs. This simultaneously realistic and positively biased self-presentation on SNSs may be harmful to some users. For example, users with low self-esteem, those who are prone to depressive thoughts, and those undergoing crisis may easily get the impression that everybody else is happier and more successful than they are. Such users may feel even more alone in their problems, triggering more depressive thinking (Jordan et al. 2010).

[18] There are aspects of self-presentation that users cannot directly control on SNSs, such as when others post information about them. However, as compared to offline situations, individual users have a much greater ability to manage the impressions that others form about them.

Few studies have addressed the phenomenon, yet. One study by Chou and Edge (2012) found that SNS use was empirically connected to the incidence of negative social comparisons and that long-terms users and those who use SNSs frequently were more likely to be affected. Such negative comparisons have been linked to the experience of envy, lowered decreased satisfaction, and depressive symptoms (Feinstein et al. 2013; Kross et al. 2013; Wenninger et al. 2013). Smith, Hames and Joiner (2013) found that maladaptive facebook usage-which they defined as a mixture of social comparisons and self inflicted negative social evaluation- resulted in bulimic symptoms and increased body dissatisfaction in female users.

In conclusion, negative social comparisons on SNSs can severely affect the health of users. The nature of SNSs may contribute to these negative effects, as SNSs increase both the amount and the invisible bias of social information that individuals are exposed to.

5.4 Potential for Conflict

On SNSs individuals with diverse backgrounds and interests connect and communicate. On the one hand, this offers users a way to overcome social barriers and build up more diverse networks[19], on the other hand, it may also lead to a higher incidence of conflicts.

On SNSs, users connect in what has been termed a *loose situation*, i.e., a situation in which there are few guidelines as to appropriate behavior (Goffman 1963; Papacharissi 2009). Individual SNS users may therefore utilize the medium according to their own norms regarding appropriate behavior, for example, with regard to the degree of formality or informality of

[19] Compared to close friends and family, it is less likely that users know or care much about the social values or political affiliations of their facebook contacts. Therefore, SNS-mediated networks are likely to contain more potentially conflicting viewpoints and opinions than do social networks without this medium.

communication, or to the nature of posted content, i.e. what photos, comments, etc. are adequate to post. When different SNS users engage in the same conversation, differences in these norms may easily lead to conflict. Wall posting exacerbates the potential for conflict, since it allows previously uninvolved conversation partners to join in without invitation or expectation, such as when parents burst into a conversation between their teenager and his or her friends.

While there is, theoretically, a high potential for conflict in SNS-based communication, around 85% of SNS-users in a study by Rainie, Lenhart and Smith (2012) perceived the atmosphere in SNSs as generally kind. Around 73% encountered offensive language, images, or humor only "once in a while" or "never." However, despite what may be an overall positive atmosphere, SNSs are not conflict-free zones, especially with regard to younger users. Rainie, Lenhart and Smith (2012) assessed the negative effects of SNS on the lives of adult and teenaged users. They asked their participants, in how far something that had happened on an SNSs, like an argument, had negatively affected their (offline) lives. The results, for adults and teenagers, can be found in Table 4. They show that specifically teenagers report a higher incidence of conflict, which may either reflect the higher general incidence of conflict or the greater overall use of SNSs in this age group, both in terms of time and in terms of number of contacts (e.g., Edison Research 2013).

Table 4 Negative Consequences of SNS Use in Adult versus Teenage Users

As a consequence of something that happened on an SNS, users have…	Adult users (%)[a]	Teenage users (%)[a]
gotten into trouble at work or school	3	6
gotten into a physical fight	3	8
caused a problem within their family	11	13
had a face-to-face argument	12	25
ended a friendship	15	22

Note. SNS = Social network site. Adapted from "The tone of life on social networking sites," by L. Rainie, A. Lenhart and A. Smith, 2012, *Pew Research Center's Internet & American Life Project*, p.3.
[a] Percentage of users (adults or teenagers) who have had these experiences.

In addition, SNSs may facilitate conflict also in romantic partnerships: partners have been found to use facebook to spy on each other, leading to jealousy and negative effects on the romantic relationship (Muise, Christofides and Desmarais 2009; Tokunaga 2011). Further, news coverage shows that employees have been expelled from work for posting content on their facebook pages that was deemed inappropriate by their employer (e.g., Smith and Kanalley 2010).

In conclusion, the general atmosphere on SNSs has been found to be positive, although younger users may sometimes face negative consequences of virtual activities. Compared to offline situations, conflicts may be facilitated on SNSs by the fact that users are exposed to more information, along with more potential conflict partners. In addition, users are often not aware as to who will read their postings, since they post them only with a specific audience in mind (Schmidt 2011).

5.5 Perceived Network Demand

Perceived network demand refers to demand from users' facebook contacts that may easily become a stressor, and can be considered a downside of the SNS-

based facilitation of information seeking. The idea behind perceived network demand is that SNSs facilitate information seeking, making it relatively convenient for individual users to utilize the medium to request opinions, advice, or support from contacts. From the perspective of the user that searches information, the SNS-facilitated mobilization of information resources is highly beneficial. However, the same mechanisms that facilitate information seeking—i.e., facilitation of large networks and the reduction of communication thresholds—may easily add up and become stressors. This is especially problematic, if one considers the large digital networks and the high degree of interaction that exists on facebook. Over the time, a high amount of perceived network demand may therefore contribute to chronic stress and it may prevent users from taking care of alternative activities, e.g., academic or social ones. This thesis is the first work to explore perceived network demand empirically and to develop and apply a corresponding scale.

Table 5 summarizes the social risks that are associated with the use of SNSs (Chapter 5.1 – 5.5) and the different mechanisms of SNS-based risk facilitation.

Table 5 Risks Associated with Digital Networks

Risk	Mechanisms of risk facilitation by SNSs (Examples)
Cyberharassment[a]	Easy availability of personal information can be abused by perpetuators Large networks allow rumors and defamation to spread quickly
Social Pressure	Large networks of diverse contacts increase the likelihood of users being evaluated Large volume of semi-public communication increases the amount of evaluable content
Deleterious Social Comparisons	Large amounts of comparable information in the form of profiles, pictures, postings, etc. General bias towards sharing positive information may increase the perceived gap between contacts
Potential for Conflict	Presence of many diverse contacts and opinions increases the likelihood of conflict Users are often unaware of the actual audience of their postings
Perceived Network Demand[b]	Large networks increase the likelihood of requests for information Lowered barriers to the initiation of communication make requests more likely

Note. SNS = Social network site.
[a] Cyberharassment includes the more severe cyberstalking as well as forms of cyberbullying, i.e. harassment between minors. [b] Perceived Network demand refers to the fact that users may get requests for information from their contacts, which may become a stressor for users.

5.6 Privacy and Data Abuse

In the present section, I introduce the risks of criminal data abuse. I will first give information regarding the comprehensiveness and personal nature of the user information accessible on facebook and other SNSs[20] and then point out some risks associated with the criminal abuse of these data.

[20] SNSs with a decentralized structure, in terms of server structure, in general, show a lower risk of data abuse by criminal hackers. Such networks are, e.g., diaspora (https://diasporafoundation.org/) and friendica (http://friendica.com/).

In general, users share a great deal of personal information with their contacts. This information for example refers to their age, email address, contact information, occupation, relationship status, political orientation, hobbies, interests and their social networks. Not all information that users share via facebook is necessarily displayed to all of their contacts, but it gets stored at the servers of the website. In addition the website stores information on the surfing behaviors of its users inside facebook (e.g., profile browsing, the use of facebook search) and outside facebook (e.g. site visits).

The huge amount of personal data posted on SNSs can become a problem when accessed by criminals. However, until now, no systematic overview has been conducted on the criminal abuse of facebook user data. Hence, in the following I will give some representative examples from news coverage. For example, there have been reports of criminal hackers who assumed the facebook identity of their victims and then asked their victims' contacts for money (see Facebook 2011). Other news coverage reports that criminals hacked into an account to steal user data like credit card numbers (e.g., Chumley 2013; Melgarejo 2013). In other cases information posted on facebook was used to determine the best time to break into people's homes (Bilton 2010) or to fake kidnappings and extort ransom from family members (McMillan 2011), a practice referred to as *virtual kidnapping.* These cases show that data abuse constitutes a problem on SNSs, that most likely will become even more relevant in the future.

As recent news coverage has reported (see e.g., Risen and Poitras 2013), there is also a serious potential for data abuse by intelligence agencies. The consequences of this systematic data leakage cannot presently be foreseen, but the extensive surveillance of citizens without a warrant may become a major problem for democratic nations in the future.

5.7 Addictive and Problematic SNS Use

Although problematic facebook use and especially the concept of facebook addiction are quite popular in the news media (e.g., Cohen 2009), systematic scholarly examination is limited. In this section, I give an overview of Problemati/ addictive facebook usage[21], along with potential causes and consequences for users.

Excessive facebook use in itself can have negative implications, since it takes away time from other activities. Few studies showed that an excessive use of facebook was connected to lower academic engagement and average grades of students (Junco 2012a; Junco 2012b; Kirschner and Karpinski 2010).

Andreassen et al. (2012) are the first to suggest a coherent and usable definition of facebook addiction. Based on literature on addiction (e.g., Browns 1993; Griffiths 1996 2005), the authors postulate a multifaceted conception similar to the definition of other behavioral addictions such as gambling or working addiction. Addictive facebook behavior has serious cognitive, behavioral, emotional, and social implications for users. Table 6 gives the six dimensions of facebook addiction, short definitions of each dimension, and the corresponding items from the Facebook Addiction Scale (Andreassen et al. 2012).

[21] I will use the term of *addictive facebook usage* (as opposed to *facebook addiction*), to refer to facebook usage patterns that fall below the level of a clinically diagnosable behavioral addiction. While these behaviors are sub-clinical, they may nevertheless have problematic consequences for users.

Table 6 Facebook Addiction: Dimensions, Definitions, and Corresponding Items from the Facebook Addiction Scale

Dimension	Definition	Item: "How often during the last year have you…
Salience	Facebook use dominates thinking and behavior	spent a lot of time thinking about facebook or planned use of facebook?"
Mood modification	Facebook use modifies or improves mood	used facebook in order to forget about personal problems?"
Tolerance	Increasing amounts of Facebook use are required to achieve previous effects	felt an urge to use Facebook more and more?"
Withdrawal	The occurrence of unpleasant feelings when facebook use is discontinued or suddenly reduced	become restless or troubled if you have been prohibited from using facebook?"
Conflict	Facebook use causes conflicts in relationships, work or education, or other activities	used Facebook so much that it has had a negative impact on your job or studies?"
Relapse	A tendency to revert to earlier patterns of social media use after abstinence or control	tried to cut down on the use of facebook without success?"

Note. Source: "Development of a facebook addiction scale," by C. S. Anreassen, T. Torsheim, G. S. Brunborg, S. Pallesen, 2012, *Psychological Reports*, 110, p. 501.

Empirical research on facebook addiction is rare and only a few risk factors have so far been discovered. Researchers suggest that users with high scores in either Extraversion or Neuroticism, or with low scores in Conscientiousness, are more likely to develop addictive behaviors (Andreassen et al. 2012; Wilson, Fornasier and White 2010). Individuals who highly identify as SNS users, as well as those who have a high need for belongingness are also more likely to develop addictive usage patterns (Pelling and White 2009). Furthermore,

researchers shed light on the neurobiological correlates of addicted facebook use which are similar to those of other addicted behaviors. Meshi, Morawetz and Heekeren (2013) showed that positive feedback from facebook contacts coincides with the activation of specific parts of the *nucleus accumbens*, the cerebral reward center.

A few studies have addressed the consequences of addictive facebook use, linking it to poor sleep quality (Wolniczak et al. 2013), problems in one's professional life, and the reduction of social activities (Karaiskos et al. 2010).

Chapter 5 showed that risks associated with SNS use are diverse and they affect the lives of users in multiple ways. Therefore, rather than applying preventive interventions that target only one specific area, social media competence training at an early age would be a useful tool to prepare future users by providing them with strategies for safer media use. For example, users could learn to reduce the risk of being harassed by selectively excluding problematic contacts or by restricting the access of specific contacts to their data. In addition, critically reflecting their own posting behavior could help users to avoid conflicts and reduce their vulnerability to data abuse. Furthermore, once risks have turned to problems, self-help groups for addicted facebook behavior, psychological coaching for targets of cyberharassment, or mediation for facebook related conflicts are useful interventions.

In Table 7, I list all risks discussed in this chapter, along with risk factors and consequences supported by the existing literature. These risks are also associated with OSC, since OSC depends on the use of and facilitation by SNSs.

In general, the risks depicted in this chapter, will only continue to gain relevance as more and more people worldwide use SNSs. Therefore, empirical

research on risk factors and risk groups as well as the development and evaluation of adequate interventions are crucial.

Table 7 Risks Associated with the Use of SNSs, Risk Factors, and Consequences

Risk	Definition	Risk factors	Consequences (examples)
Cyberharassment	Threatening or harassing of an individual through or utilizing SNSs (see e.g., Maple, Short and Brown 2011).	Increased computer use, giving away passwords, involvement in aggression at school (Mishna et al. 2012), low self-control (Wilsem 2013)	Fear, distress, anxiety, fewer social activities (Maple, Short and Brown 2011), feelings of depression, lowered self-esteem (Cyberbullying, Hinduja and Patchin 2011)
Social Pressure	(Potential) evaluation by SNS contacts may lead to perceived social pressure.	Parents or employers as contacts (University of Edinburgh 2012), negative contact feedback (Valkenburg, Peter and Schouten 2006)	Increased anxiety (University of Edinburgh 2012), lower well-being and self-esteem (Valkenburg, Peter and Schouten 2006)
Deleterious Social Comparisons	Social comparisons with contacts may have deleterious consequences for individual users.	Long-term SNS membership and frequent SNS use (Chou and Edge 2012)	Lower life satisfaction (Kross et al. 2013), envy (Wenninger et al. 2013)
Potential for Conflict	Information shared via SNSs (e.g., posts, pictures) may lead to conflict.	Younger age (Rainie, Lenhart and Smith 2012)	Conflicts with friends (Rainie, Lenhart and Smith 2012)
P. Network Demand	Requests for information by SNS contacts can easily become a stressor.	Perceived network demand is addressed empirically for the first time in the present thesis; therefore, no empirical data on risk factors or consequences yet exists.	
Data Abuse	User data may be accessed and abused by criminals.	Sharing of critical information and adding of critical contacts	Credit card fraud (Chumley 2013), burglary (Bilton 2010)
Addictive SNS Use	Patterns of addictive SNS use, with cognitive, emotional, behavioral, and social dimensions.	High Extraversion and Neuroticism, low Conscientiousness (Andreassen et al. 2012), high identification as SNS user and high need for belongingness (Pelling and White 2009), positive facebook feedback (Meshi, Morawetz and Heekeren 2013)	Poor sleep quality (Wolniczak et al. 2013), reduction of other activities (Karaiskos et al. 2010)

Note. While the risks presented here refer to the use of SNSs in general, most empirical research was conducted with facebook users.
[a] I use *cyberharassmen*t as an inclusive term that includes cyberstalking and cyberbullying. Cyberstalking refers to more severe and persistent forms of harassment, and cyberbullying to harassment between minors (see e.g., Hinduja and Patchin 2011 2012; Maple, Short and Brown 2011).

6. OSC as Research Agenda – Digital Networks, Embedded Resources, and Implications for Users

In the Chapters 3, 4, and 5, I introduced OSC as an SNS-based resource and the information benefits as well as risks that are associated with the use of SNSs. The present chapter is dedicated to deriving research questions and hypotheses for empirical testing.

In the first section (Chapter 6.1), I summarize the basic assumptions from the theoretical part, on which the research questions and hypotheses are based. In the following sections (Chapter 6.2 – 6.5) I develop research questions and hypotheses that address the three main areas related of OSC: digital networks (= structural precondition of OSC), embedded information resources (= OSC), and associated benefits and risks that affect the lives of users (= consequences of OSC). With regard to digital networks, my hypotheses and research questions address the size, growth, and structure of facebook networks as well as the prediction of these measures by user variables (e.g., personality traits). With regard to OSC, my research addresses the relation between the perceived presence of these resources and facebook satisfaction and use as well as the prediction of resources by the size and structure of facebook networks. With regard to coping-related information seeking, my research addresses the use of facebook in the context of mediated alternatives (internet, telephone) and the prediction of this form of coping by age, gender, shyness of users. Related to the risks, I investigate the individual perception of digital networks as demanding and the prediction of this perception by the size of individual facebook networks, and Neuroticism.

6.1 Basic Assumptions

The following basic assumptions are based on the previous chapters and they are underlying the empirical work in this thesis:

(1)Digital networks are the key element of SNSs in terms of influence on the day-to-day lives of their users. These networks are, on average, large, and contain many different contacts, ranging from family members and close friends to acquaintances, superficial encounters, and strangers.

(2)Online social capital refers to the information resources that SNS users can directly or indirectly access via their digital networks. OSC can be in the form of expertise or knowledge etc. Users can benefit from it in terms of information seeking, e.g., coping related information seeking.

(3)Social network sites like facebook facilitate the capacity of OSC (in terms of amount and diversity) by significantly reducing the costs of maintaining large and diverse networks.

(4)Social network sites like facebook facilitate the mobilization of OSC (in terms of efficiency and the range of applicability) by facilitating contact searching and communication between users.

(5)The use of SNSs is associated with specific risks, like perceived network demand.

6.2 The Network Basis of OSC – Size and Structure of Facebook Networks

Online social capital, like all other forms of social capital, is based on social relations (see e.g., Bourdieu 1986; Coleman 1988; Lin 2001; Putnam 2000). In the case of facebook, these social relations are manifested in the form of ego-centered digital networks. Digital networks can be described in terms of their size and structure. In this section, hypotheses and research questions with regard to the size and structure of digital networks will be derived. For the first time, also the growth of network size over time is part of the analysis. Table 8 introduces some terms that are important for understanding network measures.

Table 8 Definitions of Network-Related Terms

Term	Definition
Actor	Individual facebook user that is at the center of a given network. The actor is also referred to as *i*.
Contact	Any contact that is part of an actor's facebook network. Contacts are referred to as *j*, *k*,…
Network	Ego-centered network of contacts that belongs to an actor.
Link	Digital facebook connection between two individual users (e.g., *i-k*, *j-k*).

6.2.1 Network Size and Growth

Size refers to the number of facebook contacts in an actor's digital network. The present section presents hypotheses and research questions with regard to the size of facebook networks, their growth over time and the prediction of network size and growth by user-related variables.

6.2.1.1 Exploratory Analysis of Network Size and Growth

While there do exist some data on US users (e.g., Edison Research 2013), little is known about the size of facebook networks outside the US. Further, these data are often based on self-reports by facebook users, which may be biased. To date, there have been no data collected on the growth of facebook networks over time. In this thesis, I want to address this research gap, by conducting an explorative analysis of the size and growth of facebook networks in a sample of German first-year college students. The analysis will follow the growth of facebook networks from the beginning of the first semester over the following eight months. In order to avoid biased self reports, I use data that was accessed using data-mining technology. The analysis is guided by three main research questions, which refer to network size and growth in general.

RQ1: How large are the digital social networks of facebook users?
RQ2: How do facebook networks grow over time? (Specifically: speed, form)
RQ3: How stable is the growth of facebook networks?

6.2.1.2 Predictors of Network Size at the Beginning of the Semester

The beginning of college is an important time in students' life: one meets a lot of new people, while still trying to stay connected with old friends. Clearly, this situation is likely to have repercussions on the digital networks of first-year college students. In the following sections (Chapter 6.2.1.2.1 – 6.2.1.2.5) I will present hypotheses with regard to variables that affect the size of facebook networks of students after their first month of college. Explicitly, these variables refer to students' offline social relationships, their residential status, the amounts of Extraversion and identification with fellow students they exhibit, and their facebook use.

6.2.1.2.1 Offline Social Relationships – Family, Friends, and Acquaintances

Facebook is, to a large extent, used to connect with people who users already know from previous social interactions such as friends, relatives, and acquaintances (e.g., Ellison, Steinfield and Lampe 2007 2011; Subrahmanyam et al. 2008). As a consequence, I assume that the number of social relationships a user has in the offline environment is a predictor of the size of her or his digital network.

H1: The number of offline social relationships will be positively associated with digital network size.

6.2.1.2.2 Residential Status - Native versus New Residents

Individuals who go to college far from their last place of residence leave behind old friends and acquaintances. In order to stay connected, despite the distance between them, these students connect via facebook. In contrast, those students who had lived in the same area in which they now attend college may not depend so much on the use of facebook to stay connected, since many of their friends are still around. As a consequence, students` residential status (native versus new residents) will influence the size of their facebook networks.

H2: Individuals who go to college far from their last place of residence will have larger digital networks than those individuals who had lived in the same area in which they go on to attend college.

6.2.1.2.3 Extraversion

Personality traits refer to emotional, interpersonal, experiential, attitudinal, and motivational styles that are persistent over long periods of time and that differ between individuals (e.g., McCrae and John 1992). Extraversion is the

one personality trait associated with outgoing and socially active behaviors (Costa and McCrae 1995). Since extraverted individuals encounter more people in general, they would logically also have larger facebook networks.

To date, two studies have assessed the effect of Extraversion on facebook networks in a US context; however, their results have been inconsistent. While Amichai-Hamburger and Vinitzky (2010) found a positive effect of Extraversion on digital network size, Ross et al. (2009) found no significant influence from this personality trait. In this thesis, I hope to clarify these results by testing the influence of Extraversion on the size of facebook networks using a non-US sample.

H3: Extraversion will be positively associated with digital network size.

6.2.1.2.4 Identification with Fellow Students

Not all first-year students easily adapt to the new social environment of their university and fellow students. I assume that their identification with their fellow students is an important factor in predicting their networking behaviors in the first month of the semester. Precisely, students who highly identify with their fellow students will also be more open to connect with them, which may be reflected in the size of their facebook networks. In contrast, students who identify less with their fellow students will have smaller facebook networks.

H4: Identification with fellow students will be positively associated with digital network size.

6.2.1.2.5 Facebook Use

As with any other media, individuals differ in the time they spend on facebook. I assume that users which spend more time on the website, also more likely use it for making digital connections.

H5: Facebook use will be positively associated with digital network size.

6.2.1.3 Predictors of Network Growth – Extraversion and Facebook Use

In Hypotheses 1–5, I suggested a set of variables that may influence the size of student`s facebook networks after their first weeks at college. I assumed that the number of offline social relationships, residential status, and identification with fellow students influence users network size at a specific moment in time. However, once all offline friends and acquaintances, the contacts from the former place of residence, and the fellow students are added to the facebook network, these variables no longer play a role. This is different for Extraversion and facebook use, which may also influence the growth of facebook networks over time.

Facebook use in general is quite stable over time (e.g., Steinfield, Ellison, Lampe 2008) and therefore users that were active at the beginning of the semester are very likely to continue being active throughout the semester. As a consequence, these users may exhibit more pronounced network growth than freshmen who make little use of the medium at the beginning (and throughout the semester).

H6: **Extraversion will be positively associated with the growth of digital networks.**

In addition, I argued that Extraversion predicts a higher likelihood of connecting with people not only offline, but also in the virtual realm. Since Extraversion is a personality trait, and thereby highly stable, its influence will continue over time and influence network growth.

H7: **Facebook use will be positively associated with the growth of digital networks.**

6.2.2 Network Structure - Components, Isolates, and Actor Betweenness Centrality

Facebook networks can not only be described according to their size, but also according to their structure. Despite this fact, facebook network structure is rarely integrated into the social scientific research on resources within facebook. Until now, a few studies have addressed facebook networks from a sociocentric, large-scale approach (Ferrara 2012; Ugander et al. 2011), and fewer still have addressed the structure of individual, ego-centered facebook networks. Specifically, Spiliotopoulos and Oakley (2013) analyzed the connection between users' motivation to use facebook and the structure of their networks, in terms of measures like density, components or the average path length between any two contacts in the network[22]. Brooks et al (2014) analyzed the empirical connections between different measures of network connectivity and forms of social capital (see Chapter 3).

In my thesis, I introduce three measures of network structure that have not been addressed in the context of social capital in SNSs until now. The first two measures, components and isolates, reflect the macrostructure of ego-centered networks. The third measure, actor betweenness centrality, is an index variable reflecting the general level of connectivity within a specific network.

6.2.2.1 Components and Isolates – The Macro Structure of Networks

A facebook network consists of a central actor and a specific number of contacts linked to him or her. These contacts may form groups or isolated contacts, if the actor were removed. Groups of contacts are referred to as

[22] This thesis focuses on three specific measures of network structure in the context of a social capital framework. Hence, a comprehensive overview of the many possible ways of measuring the structure of ego-centered networks is therefore beyond its scope. Readers seeking a more detailed analysis of social networks are referred to books by Jackson (2011) and Wasserman and Faust (1994).

components and single contacts as *isolates*. The following research questions guide my exploratory analysis of network structure:

RQ4: How many components do the digital networks of facebook users contain after the first semester of college?
RQ5 How many isolates do the digital networks of facebook users contain after the first semester of college?
RQ6: Is there an empirical connection between the numbers of components and isolates in digital networks?

I also want to analyze to what extent individual users may or may not influence the number of components and isolates in their facebook networks. Basically, there are two main possibilities with regard to the link between network structure and user variables. First, users may deliberately choose specific facebook contacts that then exhibit a specific kind of linking pattern, thereby indirectly influencing the structure of their networks. For example, connecting with overtly outgoing facebook contacts increases the likelihood that these contacts will form links with each other. Second, it could also be that users do not have any (or only marginal) influence on the structure of their networks, since this structure is a consequence of mainly situational variables. In addition, I argued before that users may be less selective with regard to their facebook contacts than with regard to offline friends. As a consequence, there may be only little connection between users` personal preferences and her facebook contacts. The following research questions were stated:

RQ7: Do gender, age, Big Five personality traits (Neuroticism, Extraversion, Openness to Experience, Agreeableness, Conscientiousness), or residential status influence the number of components in the networks of facebook users?

RQ8: Do gender, age, Big Five personality traits, or residential status predict the number of isolates in the networks of facebook users?

6.2.2.2 Actor Betweenness Centrality – An Index for Contact Connectivity

Actor betweenness centrality represents the aggregate connectivity of contacts in a user`s network with more actor betweenness centrality indicating less linkage between contacts. As with the questions concerning components and isolates, the following three research questions pertain to the average betweenness in facebook networks of students, and the influence of personal variables on this index.

RQ9: How high is the average betweenness centrality of individual facebook users in their digital networks after the first semester of college?
RQ10: Do gender, age, Big Five personality traits (Neuroticism, Extraversion, Openness to Experience, Agreeableness and Conscientiousness), or residential status predict the betweenness centrality of facebook users in their digital networks?

While components and isolates represent network fragments on the level of macro structure, actor betweenness centrality represents connectivity of contacts on the level of links. To date, it remains unclear how these measures are connected in the networks of facebook users.

RQ11: To what extent are actor betweenness centrality, number of components, and number of isolates empirically related?

6.3 OSC – SNS-Based Information Resources

In this section, I will set forth research questions and hypotheses on the perception of OSC in general and on its connection to facebook usage behavior and facebook satisfaction. Subsequently, I will argue that the size of facebook networks, the number of isolates and components, and the degree of actor betweenness centrality predict the perception of OSC.

6.3.1 OSC in General

Ego-centered facebook networks are the virtual representations of users' social capital resources. However, since facebook is, in general, perceived as a place for socializing (e.g., Joinson 2008; Papacharissi and Mendelson 2010), it is not clear if users are aware of the resources they have at their disposal. Lampe et al. (2012) found out that US users in general perceived their networks as providing them with useful information. However, it is unclear if these results can be extended to German facebook users, since due to the fact that facebook is a newer phenomenon in Germany (as compared to the US) the socializing aspect of the website may even be more pronounced. The first question is therefore:

RQ12: To what extent do facebook users perceive their digital networks as rich in OSC?

6.3.2 OSC, Facebook Use and Facebook Satisfaction

Online social capital represents the information richness of individual facebook networks. This information richness may affect not only selective processes of information seeking, like for coping with stressors, but also satisfaction with facebook use. This argument becomes clear, when one tries to imagine a network without information. Since all forms of interaction in the

digital realm are basically exchanges of information, such a network would be meaningless. On the other hand, information rich networks provide users with more news, gossip, and entertainment. I therefore assume that there is a connection between the perceived OSC in a network and users` satisfaction with their facebook activities in general.

H8: Perceived OSC will be positively associated with users` general satisfaction with their facebook activities.

Moreover, since richer networks are more likely to provide a stimulating environment, users may also spend more time on the website.

H9: Perceived OSC will be positively associated with facebook use.

In OSC-rich networks the likelihood of communication and social interaction in general should be higher, e.g., in terms of discussions or conversations. Users that "like" content show that they actively engage in facebook based communication.

H10: Perceived OSC will be positively associated with "liking" content.

6.3.3 Network Size as a Predictor of OSC

Every contact in a facebook network represents an individual source of information. Hence, all things being equal, more contacts imply more OSC.

H11: Digital network size will be positively associated with perceived OSC.

6.3.4 Network Structure as a Predictor of OSC

Network structure can be interpreted in terms of diversity of information resources embedded in digital networks. The underlying idea is that increased diversity means less redundancy, and thereby more OSC

6.3.4.1 Components and Isolates as Predictors of OSC

Isolates and components refer, respectively, to contacts and to groups of contacts that are not connected to any other contacts in the network. Since connecting via facebook is almost effortless and is done frequently, the fact that two contacts are not linked can be interpreted. More precisely, a contact or a group of contacts who are not linked to the rest of the network in the virtual realm probably have little overlap with those contacts in the offline world, too. This lack of overlap may reflect the fact that these contacts or groups of contacts live in different places, belong to different age groups, or have different social backgrounds. Therefore, it is very likely that components/ isolates are also different from the rest of the network in terms of the information that they can provide to users. In addition, contacts from components/ isolates are also more likely to be part of different social circles outside of the actor's network, thereby increasing the actor's indirect access to diverse information (Burt 1992, 2000; Granovetter 1973 1983). The following hypotheses are therefore stated:

H12: The number of components will be positively associated with perceived OSC.

H13: The number of isolates will be positively associated with perceived OSC.

6.3.4.2 Actor Betweenness Centrality as a Predictor of OSC

Actor betweenness centrality is an aggregate measure for the connectivity between contacts in a facebook user's network. Analogous to isolates and components, the absence of links between contacts can be interpreted in terms of increased diversity of contacts and therefore of embedded information. Therefore, the following hypothesis is stated:

H14: Actor betweenness centrality will be positively associated with perceived OSC.

6.4 Mobilizing OSC - Coping-Related Information Seeking (CIS) via Facebook

In Chapter 4 I argued that, due to the resource capacity of digital networks, along with the ease with which these resources can be mobilized, facebook is a valuable tool for information seeking on a daily basis. In my empirical work, I will focus on one specific form of information: information that helps users to deal with daily hassles. After a general introduction to the topic, I will present the research questions and hypotheses with regard to coping and media choice and to the influence of demographic variables and shyness on the use of facebook for coping related information seeking. Finally, hypotheses on the effect of OSC on the choice between multiple coping options will be given.

6.4.1 The Use of Facebook for CIS in General

Students are faced with a wide set of potential stressors in their daily lives, especially when beginning their studies away from home. These stressors include managing their coursework and living in a shared flat. While none of these minor stressors are harmful in themselves, their accumulation may contribute to the development of chronic stress and associated phenomena like reduced wellbeing, depression, obesity, cancer, or heart disease (Dimsdale 2008; Fuller et al. 1996; Reiche, Nunes and Morimoto 2004; Scott, Melhorn and Sakai 2012; Tafet and Bernardini 2003).

In many cases, a specific advice or piece of information may help students to deal with these stressors before they accumulate, e.g., when older students give advice on which classes to choose in the first semester. SNSs like facebook increase the capacity of information resources available to students and they facilitate the mobilization of these resources so that they can be used as efficient tools with which to seek coping-related information. C*oping* hereby

refers to the processes of consciously addressing a stressor in a goal-directed way (Lazarus and Folkman 1984).

As I argued in Chapter 4, via facebook users can directly request information from contacts who they perceive as competent, or they can post requests on their walls. Although facebook is, theoretically, a valuable coping tool, this does not necessarily translate into practical usefulness, since the medium is still mainly conceived of as a place for socializing (e.g., Bonds-Raacke 2010; Joinson 2008). The two studies to date on information seeking on facebook suggest that users do not perceive SNSs as places for information seeking (Lampe et al. 2012), but, nevertheless, they do use them for this purpose, especially when directly asked for concrete events (Morris, Teevan and Panovich 2010). Morris, Teevan and Panovich (2010) highlighted facebook's use in seeking personally relevant and subjective information (e.g., opinions, advice), as opposed to for objective facts. Hence, the medium would be a useful coping tool.

RQ13: Do users utilize facebook for coping-related information seeking?

It also remains unclear to what extent the age and gender of users may affect the use of facebook as a coping tool.

RQ14: Do gender or age influence the use of facebook for coping-related information seeking?

6.4.2 OSC as a Predictor of CIS via Facebook

In the words of the Uses and Gratifications Approach (e.g., Blumler and Katz 1974, see Chapter 6.4.4 for more information on the approach), networks that are rich in terms of OSC offer more potential gratification for users that

experience the need for information. Hence, they will more likely turn to facebook for information seeking.

H15: Perceived OSC will be positively associated with the use of facebook for coping-related information seeking.

6.4.3 Shyness as a Predictor of CIS via Facebook

The use of facebook for coping-related information seeking may be especially attractive to shy users, who are threatened by offline social interaction. For these users, SNSs like facebook may provide a form of social interaction that is much more comfortable. The existing literature shows that shyness is connected to increased time spent on facebook and more positive attitudes towards the medium in general (Orr et al. 2009). Moreover, for shy individuals, the use of facebook is connected to higher satisfaction and felt closeness with friends, as well as with more perceived social support in general (Baker and Oswald 2010). These results strengthen the argument that shy users may compensate for lower offline interaction with more interaction on facebook. It is, however, unclear if this compensatory strategy also extends to the active seeking of supportive information. Hence, the following hypothesis is stated:

H16: Shyness will be positively associated with the use of facebook for coping-related information seeking.

6.4.4 CIS via Facebook in the Context of Functional Alternatives

The Uses and Gratifications Approach (UGA) is a theoretical framework from the field of media psychology[23] that is mostly concerned with the motivations of users to utilize a specific medium or media content (e.g., Lee 1998; Leung and Wei 2000; Papacharissi 2010; Quan-Haase 2008; Rubin 1984; Turow 1974). According to scholars in the UGA tradition, individuals deliberately choose a specific medium, since they expect the consumption of this medium to gratify a need that they are experiencing, e.g., a need for entertainment or information (e.g., Blumler and Katz 1974). In choosing one medium, individuals implicitly discard other options.

In the context of this study, users who experience the need to seek coping-related information have different media options to choose from[24]. First, they could use facebook. Second, they could utilize other web-based alternatives, like email, instant messaging, search engines, online encyclopedias, specific websites, and forums. Third, they could use the phone in order to get supportive information. In order to assess the relative importance of facebook as a coping tool, the following research question is stated:

RQ15: How likely are Facebook users to utilize the website for CIS, compared to alternative web-based options or the phone?

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[23] Interested readers may find it useful to consult the book by Schenk (2007) for a more comprehensive introduction to the Uses and Gratifications Approach and its relevance in research on media behavior.

[24] By choosing a specific communication technology, users also choose a specific set of addressees, communication possibilities, communication formats, etc. For example, in a forum, a person most likely addresses strangers, while with the telephone she or he talks to close friends. In addition, the telephone is limited to speaking, while other options can include written text or external links. Some media provide answers quickly (e.g., instant messaging), while others may take some time (e.g., email). While the author is aware of the relevance of all these aspects for media choice, since this thesis is the first study exploratory study in this area, the only differentiation for these other media options was made between internet and phone.

6.5 Perceived Network Demand as an SNS-Specific Risk

As I showed in Chapter 5, the use of SNSs is linked to specific risks. In the empirical part of this thesis, I focus on perceived network demand, since this risk is strongly connected to the facilitation of information seeking that takes place in SNSs. In addition, I will analyze in how far network size and users Neuroticism are empirically related to perceived network demand.

6.5.1 Perceived Network Demand in General

Perceived network demand refers to requests for information (e.g., opinions, advice) from users' contacts. I refer to network demand as a risk, since requests may easily accumulate and become stressors in the long run. Until now, no empirical research exists on the topic. Therefore the first question is:

RQ16: To what extent do facebook users perceive their facebook networks to be demanding?

6.5.2 Network Size as a Predictor of Perceived Network Demand

All things being equal, larger networks imply a higher probability of contacts requesting information from the user.

H17: Digital network size will be positively associated with perceived network demand.

6.5.3 Neuroticism as a Predictor of Perceived Network Demand

Stress is not an objective fact, but rather, to a large extent, a subjective experience that is influence by many different factors. *Neuroticism* refers to individual psychological vulnerability on the trait level. An extensive literature connects this trait with a higher perception of and reactivity towards

stress, more experienced social stressors and maladaptive coping strategies against this stress (Bolger and Schilling 1991; Bolger and Zuckerman 1995; Connor-Smith and Flachsbart 2007; Gallagher 1990; Gunthert, Cohen and Armeli 1999). Neuroticism may also affect the perception of facebook-related stress and users who score highly on the trait of Neuroticism may be more prone to experiencing their contacts as demanding.

H18: Neuroticism will be positively associated with perceived network demand.

7. Methodology

In this chapter, I will introduce the methodological aspects of my empirical work according to the following areas. First, I depict the general research design that contains three student samples (Chapter 7.1). Second, I will introduce the measurement that was used during the empirical work and that is related to personal variables (Chapter 7.2) and facebook related variables (Chapter 7.3). In addition, two original scales that were developed, tested and applied during the course of this work – the CMC Scale and the Network Demand Scale – will be introduced along with the facebook related variables. Third, I depict measures related to the size and structure of facebook networks (Chapter 7.4) that were accessed via data mining technology. Finally, I give a short overview of the methods of data analysis used in the course of this work with a special focus on the analysis of the longitudinal change of network size via multilevel modeling (Chapter 7.5).

7.1 Research Design and Samples

The empirical analyses are based on three student samples of facebook users from a mid-sized German university city. For all three samples, participants were recruited in courses, via flyers in bars, restaurants, clubs and student places all over the city. Participants that took part in an assessment were also invited to the subsequent assessments.

Participants were invited to fill out questionnaires and to join a facebook application that accessed the size and structure of their facebook networks. Therefore, the data analyzed in this work refers to two different categories, personal data accessed via questionnaires and network data accessed via a facebook application. The questionnaires were handed out at three time points (Samples 1, 2, 3). They were presented to participants together with questionnaires and items from two fellow researchers M.

Opuszko and K. Wodzicki. Network data – size, components, isolates, actor betweenness centrality - was collected at several time points by M. Opuszko, starting in November 2010, and later matched with the questionnaires.

At each time point, participants could take part in a lottery where they could win vouchers for an internet-based retailer. All three samples were conducted to answer specific questions that are based on the theoretical part of this work. In Table 9 I give an overview on the three samples that were used for the empirical research in this work. Besides a short description of the sample, the table also gives information on the accessed data and on the research questions and hypotheses that were addressed with the specific sample.

Table 9 Overview of the Three Samples Used in this Research

	Sample 1 (N= 91)	Sample 2 (N= 143)	Sample 3 (N= 118)
Description	Longitudinal; contains first-year college students	Cross-sectional; contains college students	Cross-sectional; contains college students
Questionnaires[a]:	Big Five personality traits[b] (October/2010)	Neuroticism, Shyness, CMC, Network Demand (January/2011)	OSC, Facebook Satisfaction, CMC, Network Demand, Likes (April/2011)
Sample contains network data[c]	Yes, from five time points (T1 = Nov/2010 - T5 = July/2011).	No network data.	Yes, from June/2011.
Main goal of analysis[d]:	Network size, growth and structure and their prediction by psychological variables (RQ1 - RQ11; H1 – H7).	Influence of personality on CIS via facebook[e] and network demand (RQ13 – RQ15; H15, 17, 18).	Prediction of OSC by network size and structure; OSC and facebook use and satisfaction, OSC and CIS via facebook[e] and network demand (RQ12, RQ16; H8 – H14, H16).

Note. OSC = Online social capital. CMC = Coping-related media choice. Likes = Use of the like-button to comment on content that was shared on the user`s facebook wall.
a Refers to the questionnaires and scales that have been used with a specific sample. Dates in brackets refer to the time point when the questionnaires were applied. Gender, age, semester, amount of offline social relations and facebook use have been assessed in all three samples. [b] Big Five personality traits are Neuroticism, Extraversion, Openness to Experience, Agreeableness, Conscientiousness [c] Network data refers to network size, the number of components and isolates in a network and to the actor`s betweenness centrality. [d] The information in brackets refers to the research questions (RQ) and hypotheses (H) that have been addressed using a specific sample. [e] CIS via facebook = the use of facebook for coping-related information seeking.

7.2 Personal Variables

In the following, I introduce measurement referring to basic demographic variables, users` personalities, and identification with fellow students.

7.2.1 Basic Demographic Variables

In all three samples, I asked participants for their age (in years), gender (0 = female; 1 = male) and the college semester they were in. In addition, I assessed how far away their last place of residence was from their actual one in kilometers. The variable *residential status* is based on this distance, but coded in a bimodal way (0 = less than 150 km, 1 = more than 150 km). Furthermore, I asked participants how many friends, close friends and acquaintances they have. The items were then combined into *offline social relationships*.

7.2.2 Personality: The Big Five and Shyness

With regard to personality, in this thesis the five basic personality traits and shyness were accessed.

The Big Five Personality Traits

The assessment of participants personality is based on the *Five Factor Model* of personality which assumes that individual differences can be described with regard to five basic personality traits, the *Big Five* (McCrae and John 1992, German: Borkenau & Ostendorf, 1993). *Neuroticism* reflects an individual's tendency to experience psychological distress and high levels of Neuroticism are associated with increased sensitivity to danger. *Extraversion* reflects the tendency to be sociable, active, talkative, outgoing and likely to experience positive emotions. *Openness to Experience* reflects an individual's willingness to consider alternative approaches, be intellectually curious and enjoy artistic

pursuits. *Agreeableness* reflects the tendency to be trusting, altruistic, benevolent, sympathetic and cooperative. *Conscientiousness* reflects the tendency to be scrupulous, diligent and organized.

In Sample 1, for the assessment of the Big Five, I used the German version of the NEO-FFI by Borkenau and Ostendorf (1993) which is based on the U.S. version by Costa and McCrae (1989, 1992). Participants could agree on 60 items from 1 (= not at all) to 5 (= completely). For the assessment of Neuroticism in Sample 2, I used the BFI-S that has been introduced by Gerlitz and Schupp (2005), where participants could answer 15 items (3 for Neuroticism) from 1 (= not at all) to 7 (= completely).

Shyness

Shyness is a sub factor of Extraversion and it is related to the uneasiness in unfamiliar or socially evaluative situations (Asendorpf and Wilpers 1998). In the Sample 2, I used the German five item version of the shyness scale by (Asendorpf 1997), where participants could indicate their agreement with the items from 1 (not at all) to 5 (completely).

7.2.3 Identification with Fellow Students

In order to measure in how far participants *identify with their fellow students*, a four item scale was used. The items were based on a scale by Simon and Massau (1991) and it showed good internal consistency (Cronbach`s α = .82). Again, participants could agree on from 1 (not at all) to 7 (completely). The items are:

- I identify with the students from my discipline.
- I am glad to be a student in this discipline.
- I feel strongly connected with the students in my discipline.
- I believe I am like other students in my discipline.

7.3 Scales and Items related to Facebook Use and Perception

In this section, I present scales and items that were used to assess variables related to participants' facebook use, associated motivations and perception of facebook related phenomena. The section also contains two scales that were originally developed, evaluated and applied in this thesis. They refer to media choice with regard to coping related information seeking (CMC Scale) and perceived network demand (Network Demand Scale).

7.3.1 Facebook Use and Associated Motivations

Participants were asked how many minutes per day they actively use facebook during the week and at the weekend, both of which were highly correlated ($r_s = .82$, $p < .001$). Later, a weighted average of these two items was computed which represents *facebook use*. Users were also asked if they had used the German SNS studiVZ before beginning to use facebook. In addition, the amount of content that users "liked" on their own facebook wall was counted (variable *likes*). Like in the case of network data, I am thankful to M. Opuszko for letting me work with this data. Moreover, participants were asked how many *facebook contacts* they have and in how far facebook is part of their daily lives (Item: "Facebook is part of my daily routine.").

Furthermore, participants in all three assessments were asked to mark their agreement on the following statements on their motivation to use facebook on a scale from 1 (not at all) to 7 (completely):

"I use facebook to…

- stay in contact with old friends and acquaintances."
- exchange information and pictures with old friends and acquaintances."
- build up contacts with fellow students."

- pursue my hobbies."
- have conversations and discussions about leisure-related issues."

7.3.2 Facebook Satisfaction

Users general *satisfaction with facebook* was assessed with four items that were based the Satisfaction with Life Scale (SWLS) by Diener et al. (1985). Items could be answered from 1 (not at all) to 7 (completely) and the scale showed good internal consistency (Cronbachs α = .82). A principal component analysis was carried out, suggesting that the scale assesses only one underlying dimension. Specifically, only one factor showed an eigenvalue above one (Kaiser`s criterion) and it explained 65.80% of variance. The scale can be found in Appendix A.

7.3.3 OSC Scale

The *OSC Scale* assesses the extent to which facebook users perceive their digital networks as a resource in terms of information and access to new people outside their usual social realm. The scale uses four items that were translated and adapted from the bridging social capital scale by Williams (2006) which also has been the basis for the bridging social capital scale introduced by Ellison, Steinfield and Lampe (2007). In addition, I included two items that directly assessed in how far participants perceived their digital networks as a source of interesting news and useful information.

The principal component analysis confirmed that the scale assesses only one underlying dimension explaining 59.8% of variance. In addition, the OSC Scale exhibited good internal consistency (Cronbach`s alpha = .86). The six items of the OSC Scale can be answered from 1 (= completely not true) to 7 (= completely true):

"Through my facebook contacts, I…

- often get to know interesting news."
- get to know new people."
- get lots of suggestions."
- feel like I am part of a larger community."
- get to know different perspectives."
- often get useful information."

7.3.4 Coping-Related Media Choice Scale (CMC Scale)

The *Coping-Related Media Choice Scale (CMC Scale)* assesses the likelihood by which participants choose a specific medium in order to ask others for supportive information. Supportive information hereby is understood as information that helps the user to directly address a specific stressor, i.e. in terms of problem-focused coping (Lazarus and Folkman 1984). The three media options participants could choose from are facebook, internet, and phone.

In total, the CMS Scale consists of six different items that represent stressors from the day-to-day lives of students, e.g., problems with organizing courses or with understanding contracts and applications. The items have been developed based on both, conversations with students and psychological literature on stressors (e.g., Elfering et al. 2005; Gadzella 1994; Kohn 1986; Ross, Niebling and Heckert 1999) and the scale has been pretested in a sample with 120 users of the German facebook copy studiVZ. Results, criticism and remarks from participants in this pre test sample were used to develop the scale that was then used in the empirical part of this thesis. The scale can be answered from 1 (= very unlikely) to 7 (= very likely). All three media options showed good internal consistency in terms of Cronbach`s α (facebook = .86,

internet = .74, phone = .80). The scale and results from its evaluation can be found in Appendix B.

7.3.5 Network Demand Scale

The *Network Demand Scale* was used in Samples 2 and 3 to assess in how far participants experience demand from the contacts in their facebook networks. Specifically, items asked for the perception of users in how far they gave support or advice to their facebook contacts, spend time on the website helping others, and were asked questions or for their opinion on facebook. The five items can be answered from 1 (completely not) to 7 (completely agree) and the scale shows high internal consistency (Cronbach's alpha = .92). Items as well as results from the evaluation of the scale can be found in Table 19 (Chapter 8) as part of the results.

7.4 Network Related Measures - Size and Structure

Network measures refer to the size and structure of ego centered facebook networks. All network measures had been accessed via a facebook application[25] programmed by M. Opuszko (see, e.g., Opuszko and Ruhland 2013). They were then matched with the questionnaire data. In the following, I will describe the four measures used in this research that are network size, components, isolates and actor betweenness centrality.

[25] A facebook application is a program that can be used to access the data of facebook users via an application programming interface (API). After participants agreed to the procedure, the data had been anonymized and stored on a MySQL database at a university server. Highest standards were applied for data protection and privacy during the whole research process and data was only used for scientific purposes.

7.4.1 Network Size

Network size refers to the amount of contacts a user is connected with via facebook, i.e. his or her facebook contacts. Facebook connections are based on mutual agreement, since one user has to send a request that the other one has to confirm. The assessment of network size via an application is superior to the one via questionnaire, since it is less biased and it requires less effort to track the change over time, i.e. no additional questionaires. Empirical data on network size, its distribution and its change over time can be found in Chapter 8 (Table 11).

7.4.2 Components and Isolates

One of the most straight forward ways of measuring network structure is in terms of components and isolates. Both represent isolated clusters in a user`s facebook network and can be understood most easily, if one imagines removing the central actor from his or her network. In this case, the network falls apart and the remaining contacts would form isolated contacts (isolates) or isolated groups of contacts (components). For this research, the numbers of components and isolates in an individual network were counted. Empirical data on the incidence and distribution of both can be found in Chapter 8 (Table 14). Figure 1 shows an ego-centered facebook network (without the central actor) with components and isolates.

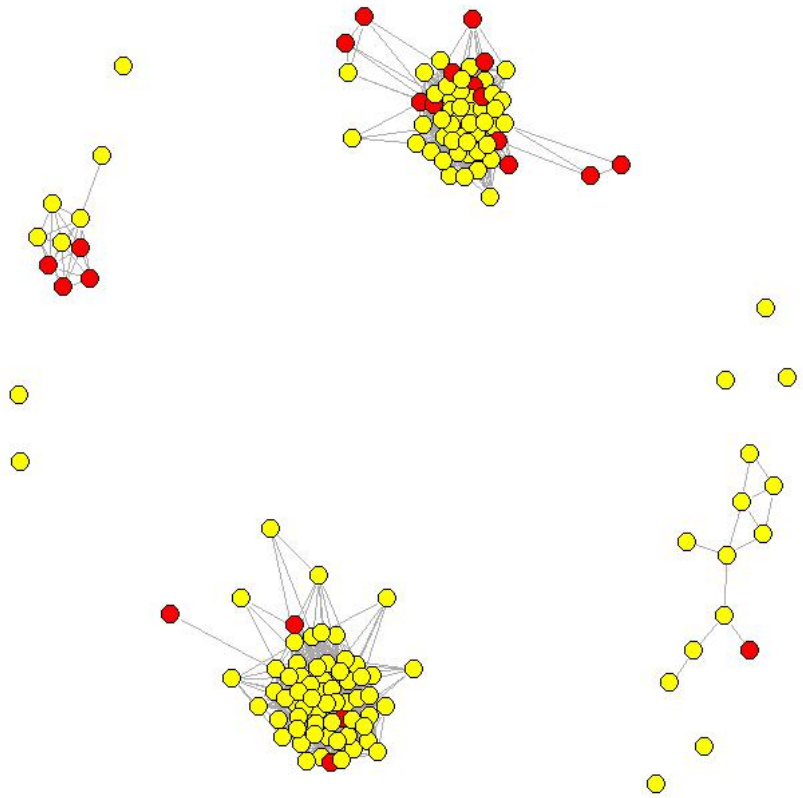

Figure 4 Components (4) and Isolates (8) in an Ego-Centered Facebook Network (without the Actor). Red dots refer to older connections. Source: Author. The figure was created using igraph software (Gábor Csárdi, Tamás Nepusz. 2006."The igraph software package for complex network research." *InterJournal Complex Systems*, 1695).

7.4.3 Actor Betweenness Centrality

Actor betweenness centrality was introduced by Freeman (1977) as a measure that depicts an actor's potential to control communication between contacts in his or her network. In this thesis, the index is used as a representation of the interconnectedness of contacts in the network of a facebook user.

Actor betweenness centrality represents the relative amount of geodesics[26] between any two contacts *k* and *j* in the network that contain the

[26] Geodesic refers to the shortest path between two contacts in a network. Between two contacts there can be more than one geodesic.

central actor i. More precisely, the computation of actor betweenness centrality for any actor i with a facebook network g is shown in the following formula[27]:

$$Actor\ BetweennessC_i\ \ (g) = \sum_{k \neq j : i \notin \{k,j\}} \frac{P_i(kj)/P(kj)}{(n-1)(n-2)/2}$$

In the formula, $P_i(kj)$ denotes the number of geodesics between k and j that contain actor i and $P(kj)$ denotes the total number of geodesics between k and j, while n represents the amount of facebook contacts in the network of i.

Since the analyzed networks are ego centered, k and j are always linked via the actor i (k-i-j). In addition, k and j may also share a direct link (k-j), an indirect link via one other contact, e.g., k-a-j, or a direct link via more than one contact, e.g. k-a-(…)-j. Actor betweenness centrality is the highest (= 1) when there is no link between any two contacts j and k in the network and it decreases for two reasons. First, when the number of direct links between contacts j and k increases, since then i is no longer part of a geodesic. Second when the number of geodesics between contacts j and k increases, since then the relative number of geodesics that contain i decreases. Links between k and j that contain more than one other contact have no influence on the measure, since they do not affect the number of relative or total geodesics between j and k.

As a conclusion, the higher the actor betweenness centrality, the less connected are the contacts in the network of i. In this thesis, I interpret the lack of virtual connections as a representation of the diversity of contacts.

[27] The formula for the computation of actor betweenness was adapted from the book by Jackson (2011).

7.5 Methods of Data Analysis

In this section, I will give an overview on the methods of data analysis that were used in this research. While the first section briefly summarizes the methods in general, the second section is dedicated to scale evaluation. The third section is rather detailed in introducing multilevel model building as a way of analyzing the change of network size over time. All statistical analyses in this thesis have been carried out with IBM SPSS 19.

7.5.1 General Methods

This thesis contains descriptive analysis with regard to the variables used throughout the three samples that can be found in tables in Chapter 8 (Table 10). Throughout the empirical part, correlations have been used to assess the connections between variables. Specifically, Person`s correlation coefficient ($r$) was used when the distribution of data was approximately normal and/ or sample size was large and Spearman`s correlation coefficient (r_s) was used in other cases. The differentiation of correlation sizes into weak (.1–.3), moderate (.3– .5), and strong (>.5) is based on the categorization by Cohen (1988). Dependent and independent t-tests were used to compare different variables throughout the empirical analysis.

Most analyses were done using linear regression analysis. Since normally distributed data cannot always be assumed bootstrapping has been used in all regressions. Whenever bootstrapping is used in this work, it is based on 10.000 replications unless it is noted otherwise.

7.5.2 Scale Evaluation

In the course of this thesis, the Network Demand Scale and the three dimensions of the CMC Scale were evaluated.

The first step in the evaluation was an analysis of the descriptive statistics for each item (mean, standard deviation, median) and of correlations (item-item, item-scale). Then, I tested the theoretically assumed one-dimensionality of network demand and of every single coping dimension (facebook, internet, phone). Therefore, principal component analyses with Promax Rotation were carried out. Beforehand, the applicability of principal component analysis had been tested and confirmed by the Kaiser-Meyer-Olkin Measure of sampling adequacy and Bartlett`s test of sphericity

In order to assess the internal consistency of the scale/ dimensions, Cronbach`s α was computed. The results of scale evaluations can be found in Table 19 (Chapter 8) for Network Demand and in Appendix B for the dimensions of coping related media choice.

7.5.3 Modeling Longitudinal Change

For the analysis of network growth in Sample 1, I used multilevel modeling[28], since it has many advantages in the analysis of longitudinal datasets when compared to traditional methods like multivariate analysis of variance (MANOVA). For example, with multilevel modeling, researchers can take into account unequal variances or different time intervals between the points of measurement. The process of model building in this thesis is based on the work by Shek and Ma (2011). Like for other regressions in this thesis, bootstrapping with 10.000 replications (unless otherwise noted) was used.

I estimated mixed effect models using maximum likelihood estimation. During the process of model building parameters were added as fixed effects and/ or random effects and an unstructured covariance matrix (UN) was assumed for the random effects. Due to the small sample size, only *intercept*

[28] Readers with interest in multilevel modeling with IBM SPSS are recommended to the books by Heck, Thomas and Tabata (2010) and by Raudenbush and Bryk (2002) or the paper by West (2009).

and *time* were added as random effects. Goodness of fit between the different models was compared using the Hurvich and Tsai`s Criterion (AICC). The AICC is based on the widely used AIC (Akaike`s information criterion), but adapted to small sample sizes. In the following, I will give an overview of the model building process and highlight the relevance of each step for my analysis.

Model 1: In the Unconditional Mean Model *intercept* is added as the only fixed as well as random effect and therefore the model represents a one-way ANOVA. From the results, the Intraclass Correlation Coefficient (ICC) was computed[29]. Since the ICC represents the autocorrelation of network size, it is used as a measure for the stability of network size over time in this thesis.

Model 2: In the Unconditional Linear Growth Curve Model *time* and *intercept* are added as fixed and random effects. If time is a significant predictor, this indicates that there is linear change over time. Intercept and slope in the unconditional linear growth curve model indicate the initial network size, respectively its growth rate. A significant correlation between intercept and growth parameter can be interpreted in terms of an interaction, i.e. networks with different sizes at the beginning exhibit different growth rates.

Model 3: In the Quadratic Growth Curve Model *time*time* is added as an additional fixed effect. Its significance indicates that there is either acceleration or deceleration of growth over time. If quadratic growth is not significant, *time*time* is removed from further model building.

[29] ICC = estimated intercept variance / estimated intercept variance + estimated residual variance.

Model 4: In this final model, predictors of network size at the beginning and predictors of growth are added. Before adding predictors, they had been centered on their grand means to ease later interpretability (Kreft, Leeuw and Aiken 1995).

8. Empirical Results

In this chapter, I will present the results of my empirical work. The chapter starts with a presentation of basic descriptive statistics related to all three samples used in this thesis (Chapter 8.1). Then, I present results related to the size, growth, and structure of facebook networks and to the prediction of these measures by user- and facebook-related measures (Chapter 8.2 – 8.3). Subsequently, results related to OSC and its connections with facebook use and satisfaction, as well as with network size and structure are presented (Chapter 8.4). Finally, results with regard to the use of facebook for CIS in the context of functional alternatives (Chapter 8.5) and to perceived network demand (Chapter 8.6) are presented.

8.1 Descriptive Sample Statistics

Three samples were recruited for this thesis: a longitudinal one (Sample 1) and two cross sectional ones (Samples 2 and 3)[30]. Table 10 presents basic descriptive statistics of the three samples, as well as information on predictor variables relevant for the specific samples.

A table on the correlations between personal variables/ facebook-related variables and users` facebook use can be found in Appendix C. It shows that there are no significant correlations between user-related variables (personality and age) and facebook use. However, there are weak correlations between facebook use and both, the distance to the last place of residence and offline social relationships. Additionally, there is a moderate correlation between facebook use and liking content.

[30] Further details on research design, sample characteristics, utilized measurement, and the combination of questionnaire and network data can be found in the methodology chapter (Chapter 7) of this thesis.

Table 10 Descriptive Statistics for the Samples 1, 2, 3

	Sample 1 (*N* = 91)	Sample 2 (*N* = 143)	Sample 3 (*N* = 118)
Age	20.2 (1.9)	21.4 (2.5)	21.4 (2.1)
Women (in %)	67	65	67
Residential Status (> 150 km, in %)[a]	67	-	-
Neuroticism[b]	2.8 (0.7)	4.0 (1.1)	-
Extraversion[c]	3.5 (0.5)	-	-
Openness[c]	3.4 (0.6)	-	-
Agreeableness[c]	3.6 (0.5)	-	-
Conscientiousness[c]	3.6 (0.5)	-	-
Shyness[c]	-	2.5 (0.8)	-
Offline relationships[d]	163.7 (106.9)	-	-
Facebook Use (in minutes/day)	27.9 (29.2)	36.4 (38.4)	43.1 (44.0)
Facebook Likes[e]	-	-	55.6 (48.7)
Satisfaction with Facebook[f]	-	-	4.5 (1.2)
Identification [fg]	4.6 (1.2)	-	-

Note. Numbers in brackets represent standard deviations.
[a] Residential status refers to the percentage of participants that came from faraway (> 150 km) to their current college town. [b] The Neuroticism scale in Sample 1 ranges from one to five, the Neuroticism scale in Sample 2 from one to seven. [c] Scale ranges from one to five. [d] Number of friends and acquaintances offline. [e] Amount of content that a user "liked" since the introduction of the like-button; refers to content that had been posted on the facebook wall of the user. [f] Scale ranges from one to seven. [g] Refers to participant`s identification with their fellow students.

8.2 Size and Growth of Digital Networks

In this section, I will present the results of my analysis of the facebook networks of 91 first-year college students. General results are first given on network size and growth, followed by results on the prediction of size after the first month of the semester, and on the prediction of growth over eight months.

8.2.1 Explorative Analysis

RQ1 and RQ2 asked how large the networks of German facebook users are, on average, and how they grow over time. In order to answer these questions, I analyzed the networks of 91 German first-year students over the course of two semesters of college (a total of eight months).

Table 11 displays the average network size, standard deviation, median, smallest, and largest network at each time point (T1-5). The results show that networks grow over time and that there is in general a large variation between individual networks that continues to exist throughout the duration of the complete measurement period.

Table 11 Change of Facebook Networks over Eight Months in a Sample of First-Year College Students

	T1 (N = 91)	T2 (N = 88)	T3 (N = 85)	T4 (N = 82)	T5 (N = 68)
Average NW-size (SD)	157 (112)	167 (112)	182 (118)	194 (122)	223 (131)
Median	125	141	148	160	197
Smallest NW	20	24	29	34	45
Largest NW	478	487	527	548	581

Note. NW = Network. SD = standard deviation. Network size represents the number of facebook contacts. Time points of assessment: T1 = Nov/26/2010, T2 = Dec/23/2010, T3 = Feb/10/2011, T4 = Mar/18/2011 , T5 = . July/09/2011.

In order to test whether network growth was linear or quadratic, I created two regression models (see Chapter 7.5.3 for more information on the process of model building). Table 12 shows that while *time* was a significant predictor of network size for the linear growth curve model (Model 2) and that *time*time*

was not significant for the quadratic growth curve model (Model 3). Hence, during the eight months of study observation, growth was linear and showed no significant acceleration or deceleration. The slope coefficient in Model 1 indicates that first-year students' networks grew at an average rate of 2.3 contacts per week. Since $time^2$ was no significant predictor, it was not included in further model building (see Chapter 8.2.2).

The significant positive correlation between intercept and the linear growth parameter (β = 24.61, SE = 10.57, $p < .05$, CI 7.47, 49.18) in Model 2 indicates that networks that were already large at T1 also exhibited stronger growth compared to networks that were small at the beginning of the measurement period.

Table 12 Unconditional Linear Growth Curve Model (Model 2) and Quadratic Growth Curve Model (Model 3)

	B	SE B	*p*	95% CI
Model 1				
Intercept	157.12	2.14	.000	[152.84, 161.17]
Time[a]	2.26	0.08	.000	[2.11, 2.43]
Model 2				
Intercept	156.78	2.23	.000	[152.41, 161.00]
Time	2.36	0.18	.000	[1.99, 2.72]
$Time^2$	-0.003	0.01	.648	[-0.017, 0.010]

Note. N = 455. SE = standard error. CI = confidence interval. Standard errors, *p*-values, and confidence intervals are based on a bootstrap with 10,000 replications.
[a] Time was measured in weeks starting at T1.

RQ 3 asked about the stability of individual growth trajectories. The ICC can be used to answer this question. Since every student represents a class, and the different time points (T1–5) represent class members in the multilevel

modeling, the ICC therefore represents the average autocorrelation of network size over time, i.e., the stability of growth.

With an ICC of .92, the growth of facebook networks in general was highly stable among the first-year college students. In order to analyze the effect of network size on the stability of growth, I compared the growth of networks that were below the median network size of 125 at T1 with those that were above. Results showed that networks that were already large at the beginning of the semester yielded much higher stability (ICC = .91) than the group of smaller network (ICC= .55).

8.2.2 Predictors of Network Size and Growth

I argued that different situational and personal variables influence the size of first-year student`s facebook networks when they start college. More precisely, I assumed that individuals' offline social relationships (H1), residential status (H2), their Extraversion (H3), their level of identification with fellow students (H4), and the time they spent on facebook (H5) would all be positively associated with network size at T1. I also assumed that Extraversion (H6) and facebook use (H7) would be positively associated with the growth of facebook networks during the eight-month study period.

In order to address H1–7, a multilevel regression was build, using the variables from H1–5 as predictors (Regression *Model 4* in Chapter 7.5.3). To determine if Extraversion and facebook use predicted growth, their interactions with time were also added as predictors. Results showed that offline social relationships, residential status, Extraversion, identification with fellow students, and facebook use all positively predicted network size at T1. In addition, facebook use significantly influenced network growth. Extraversion did not significantly predict the growth of networks. Table 13 displays the regression.

Table 13 Predictors of Facebook Network Size and Growth

	B	SE B	*p*	95% CI
Intercept	118.04	2.61	.000	[113.99, 123.97]
Offline relationships	0.22	0.02	.000	[0.18, 0.25]
Residential status[a]	61.28	4.26	.000	[51.11, 67.57]
Extraversion	15.35	2.63	.000	[9.91, 20.67]
Identification w. f. students	19.81	1.16	.000	[17.58, 22.26]
Facebook use (in minutes/ day)	1.31	0.08	.000	[1.18, 1.48]
Time (in weeks)	2.24	0.08	.000	[2.09, 2.41]
Time*Facebook use	0.02	0.004	.000	[0.02, 0.03]
Time*Extraversion	0.06	0.16	.654	[-0.24, 0.38]

Note: $N = 91 \times 5 = 455$. SE = standard error. CI = confidence interval. Standard errors, *p*-values, and confidence intervals are based on a bootstrap with 5,000 replications.
[a] Residential status refers to the place that participants had lived in before they started college; 0 = Jena or its vicinity (< 150 km), 1 = participants from faraway places (> 150 km).

8.3 Structure of Digital Networks

I used the facebook networks of first-year college students to analyze network structure. Since the interpretation of network structure is most meaningful in networks where the user and the majority of his or her contacts had sufficient time to form links, I used network data from after the end of the first semester (T4) and only included networks with more than 100 contacts[31].

The first section offers an explorative analysis of the three structural measures, while the second section presents results regarding the prediction of components, isolates, and actor betweenness centrality using the demographic variables and personality traits of users.

[31] The problem of network saturation will be discussed in Chapter 9.3.2.1.

8.3.1 Explorative Analysis

The first research questions (RQ4, RQ5) asked to what extent components and isolates, respectively, are present in the networks of facebook users. In addition, RQ9 inquired about the average betweenness of facebook users in their ego-centered networks. The results of the explorative analysis can be found in Table 14.

Table 14 Components, Isolates, and Actor Betweenness Centrality after the First Semester

	M (SD)	Median	Min	Max	Skew	Kurtosis
Components	3.23 (1.97)	3.00	1	10	1.12	1.62
Isolates	7.49 (6.05)	5.0	0	25	1.07	0.44
Actor BC	.31 (.09)	.31	.12	.46	-0.14	-0.96

Note. N = 82. SD = standard deviation. BC = betweenness centrality. Time of measurement T4 (Mar/18/2011).

RQ 6 and RQ11 concerned to what extent components, isolates, and actor betweenness centrality are related. To answer these questions, I correlated the three measures. Results indicate that there are medium to large correlations between components and actor betweenness centrality (r_s = .48, p < .001) and between components and isolates (r_s = .52, p < .001), as well as a medium-sized correlation between isolates and actor betweenness centrality (r_s = .34, p < .01).

8.3.2 Prediction of Network Structure by Demographic Variables and User Personality

Research Questions 7 and 8 asked to what extent the demographic variables of age and gender, scores for the Big Five personality traits, and residential status influenced the number of components (RQ7) and isolates (RQ8) in users'

facebook networks, as well as the betweenness centrality of users in their networks (RQ9). To answer these questions, several regressions were conducted with demographic variables, personality-related variables, and residential status as predictors of all three structural measures. Network size was added as a control variable.

The analysis showed that only age (actor betweenness centrality) and Neuroticism (isolates) had a significant influence on the structural measures. Gender, residential status, and scores in Extraversion, Openness to Experience, Agreeableness, or Conscientiousness had no significant effect. In order to yield parsimonious regression models, only Neuroticism and age were included in the final regression models presented in Table 15. Correlations between the structural measures and the remaining personality traits as well as *t*-tests (gender and residential status) can be found in Appendix D.

Table 15 Age and Neuroticism as Predictors of Components, Isolates, and Actor Betweenness Centrality

	R^2	B	SE B	*p*	95% CI
Components[a]	.11*				
Intercept		3.25	0.22	.000	[2.85, 3.70]
Network Size		0.002	0.002	.410	[-0.002, 0.006]
Age		0.37	0.19	.054	[0.06, 0.79]
Neuroticism		0.28	0.27	.307	[-0.25, 0.81]
Isolates	.14**				
Intercept		7.50	0.63	.000	[6.32, 8.79]
Network Size		0.01	0.01	.054	[0.001, 0.023]
Age		0.70	0.45	.128	[-0.09, 1.69]
Neuroticism		2.25	0.84	.012	[0.68, 3.97]
Actor BC	.20**				
Intercept		0.31	0.01	.000	[0.292, 0.326]
Network Size		0.000	0.000	.983	[0.000, 0.000]
Age		0.02	0.01	.000	[0.02, 0.03]
Neuroticism		0.01	0.01	.235	[-0.01, 0.04]

Note. N = 82. CI = confidence interval. BC = betweenness centrality. Standard errors, *p*-values, and confidence intervals are based on a bootstrap with 5000 replications.
*$p < .05$. **$p < .01$.

8.4 OSC – Correlates and Predictors

Online social capital refers to the information resources embedded in digital networks. With an average agreement of 4.1 (SD = 1.3) on a scale from one to seven, participants, on average, perceived their networks as providing them with information resources to a medium degree (RQ12). In this section, I will present results on the connections between OSC, facebook use, and facebook satisfaction, as well as on the prediction of OSC by network size and structure.

8.4.1 OSC, Facebook Use and Facebook Satisfaction

I assumed that the presence of OSC in facebook networks was associated with both behavioral and cognitive aspects of facebook use. Specifically, I assumed that OSC was positively related to participants' satisfaction with facebook (H8), general facebook use (H9), and use of the "like" function (H10). In order to test these assumptions, a correlation analysis was performed.

The results confirmed all three hypotheses, with significant moderate-to-strong correlations between OSC and users' satisfaction with facebook, (r = .42, p < .001), as well as between OSC and the frequency with which participants used the "like" function (r_s = .52, p < .001). A weak correlation was confirmed between OSC and the amount of time participants spent on facebook (r_s = .25, p < .01).

8.4.2 Prediction of OSC by Network Size and Structure

I argued that the size and structure of facebook networks are empirically related to OSC. Specifically, I argued that network size (H11), the number of components (H12), the number of isolates (H13), and the degree of actor`s betweenness centrality (H14) all positively predict OSC. In order to test these hypotheses, I conducted four separate regressions with network size and each structural measure as predictors of OSC. Results confirmed that network size explained 13 % of overall variance in OSC and the number of isolates explained 10%. However, components and actor betweenness centrality showed no significant effects. The complete regressions can be found in Table 16.

In order to determine if there was a curvilinear relation between predictors and OSC, I added quadratic predictors, e.g. *components*^{2}. Since none of the quadratic predictors yielded significant results, they were removed in the final regressions.

Table 16 Prediction of OSC by Network Size, Components, Isolates, and Actor Betweenness Centrality

	R^2	B	SE B	*p*	95% CI
Network Size	.13**				
Intercept		3.57	0.21	.000	[3.16, 3.97]
Network Size		0.004	0.001	.000	[0.002, 0.006]
Components	.02				
Intercept		4.23	0.31	.000	[3.63, 4.85]
Components		0.08	0.08	.287	[-0.07, 0.23]
Isolates	.10*				
Intercept		3.98	0.26	.000	[3.45, 4.49]
Isolates		0.07	0.03	.016	[0.02, 0.14]
Actor BC	.02				
Intercept		3.62	0.67	.000	[2.33, 4.97]
Actor BC.		2.53	1.91	.186	[-1.28, 6.29]

Note. N (Network Size) = 119. N (Components/ Isolates/ Actor BC) = 61. OSC = online social capital. BC = betweenness centrality. CI = confidence interval. Standard errors, *p*-values, and confidence intervals are based on a bootstrap with 10,000 replications.
* = $p < .05$. *** = $p < .001$.

8.5 The Use of Facebook for CIS

In Chapter 4, I argued that facebook may serve as a tool for CIS. In the following sections, I will present the corresponding results with regard to the use of facebook for coping and its prediction by OSC. Additionally, I will present results on the prediction of facebook coping by gender, age, shyness, and facebook use, as well as on the use of facebook in the context of internet and phone.

8.5.1 CIS via Facebook and OSC

The first question asked whether participants used the medium for CIS (RQ13). Results showed a low-to-medium likelihood of participants using facebook for coping, with an average agreement of 2.9 (SD = 1.5) on a scale from one to seven.

I also assumed that digital resources impact the daily lives of users, hypothesizing that perceived OSC is positively associated with the use of facebook for CIS (H15). To test this hypothesis, I carried out a regression with OSC as the predictor of facebook coping. Hypothesis H15 was confirmed, with OSC predicting 30 % of the variance in facebook coping (see Table 17).

Table 17 OSC as a Predictor of Facebook Use for CIS

	B	SE B	*p*	95% CI
Intercept	.15	0.36	.667	[-0.55, 0.85]
OSC	.68	0.09	.000	[0.50, 0.85]

Note. N = 116. R^2 = .30, p < .001. CIS = coping-related information seeking. CI = confidence interval. Standard errors, *p*-values, and confidence intervals are based on a bootstrap with 10,000 replications.

8.5.2 Prediction of CIS via Facebook by Gender, Age, and Shyness

In RQ14, I asked if the demographic variables of age and gender influenced the use of facebook coping. Moreover, I assumed that shy users would be especially attracted to facebook coping, since it allows them to avoid face-to-face conversation (H16). To answer RQ14 and test H16, a regression was conducted with gender, age, and shyness as predictors, facebook use as the control variable, and facebook coping as the dependent variable. Results showed that none of the assumed predictors had any significant influence on the dependent variable of facebook coping. Results are displayed in Table 18.

Table 18 Prediction of the Use of Facebook for CIS by Gender, Age, and Shyness

	B	SE B	*p*	95% CI
Intercept	3.17	1.07	.003	[1.06, 5.28]
Facebook Use	0.015	0.004	.000	[0.009, 0.023]
Gender [a]	0.49	0.29	.091	[-0.08, 1.04]
Age	-0.09	0.05	.058	[-0.18,0.01]
Shyness	0.15	0.16	.330	[-0.16, 0.46]

Note. N = 142. R^2 = .19, p< .01. CIS = coping-related information seeking. CI = confidence interval. Standard errors, *p*-values, and confidence intervals are based on a bootstrap with 10,000 replications.
[a] Gender was coded with 0 = female and 1 = male.

8.5.3 CIS via Facebook in the Context of Functional Alternatives

I analyzed how likely college students would use facebook for CIS as compared to alternative media options (RQ15). Specifically, In order to answer RQ15, I asked participants how likely they were to use one of the three media options (facebook, web-based options, phone) if they were seeking coping-

related information. Results showed that participants were significantly more likely to use internet-based options (M = 4.6, SE = 0.12) than facebook (M = 2.9, SE = 0.13; $t(141) = -11.46$, $p < .001$). They were also more likely to use the telephone (M = 5.2, SE = 0.11) than facebook ($t(141) = -14.53$, $p < .001$).

8.6 Perceived Network Demand

The first part of this section contains the exploratory analysis of participants' perceived network demand. In the second part I will present results regarding the prediction of perceived network demand by the size of facebook networks and the vulnerability of individual users.

8.6.1 Explorative Analysis

RQ16 asked to what extent users perceive their networks as demanding. In order to answer RQ16, the Network Demand Scale was applied. It assessed participants' subjective perceptions of diverse aspects of perceived network demand, such as whether they felt that they were often being asked to give support or their opinion.

The data showed that participants generally perceived themselves to experience little network demand; in many cases they perceived no demand at all. Participants' answers to specific items and general scale agreement can be found in Table 19. In addition, the table contains information about the evaluation of the scale, i.e. the results of the principal component analysis and its internal consistency. The scale was evaluated two times, with Sample 2 and 3, in both cases with similar results.

Table 19 Participants` Perception of Network Demand

		Agreement (in %)	
Item: "On facebook, I...	M (SD)	None [a]	High [b]
1. often get asked to give support."	3.3 (1.5)	10.9	27.7
2. often give advice."	3.1 (1.6)	19.3	23.5
3. spend a lot of time helping others."	2.7 (1.4)	22.7	11.8
4. often get asked for my opinion."	3.2 (1.7)	17.6	30.2
5. often get asked questions related to various topics."	3.2 (1.5)	11.8	21.0
Complete Scale "Network Demand"	3.1 (1.4)	6.7	26.1

Note. *N* = 119. SD = standard deviation. Items translated by the author. For the evaluation of the scale, a principal component analysis was done. It showed that the scale was one dimensional, i.e. only one component showed an eigenvalue above 1 (Kaiser`s criterion, Kaiser 1960), with an explained variance of 76.2%. The scale showed high internal consistency (Cronbach's alpha = .92). Corrected item-scale correlations for all items were good (between .78 and .83).
[a] *None* entails a score of 1 on a scale from one to seven; [b] *High* entails a score of 5–7; [c] *Highest Demand* entails a score of 7.

8.6.2 Prediction of Perceived Network Demand by Network Size and Neuroticism

I assumed that different aspects related to facebook use and to user personality would significantly contribute to perceptions of network demand. Specifically, I stated that larger networks (H17) and higher scores for the personality trait of Neuroticism (H18) would be associated with higher perceived network demand. In order to test these hypotheses, a regression was conducted with network size and Neuroticism as the predictors of perceived network demand, and facebook use as a control variable. Results confirmed a positive influence of network size, but not of Neuroticism, on perceptions of network demand (see Table 20).

Table 20 Network Size and Neuroticism as Predictors of Perceived Network Demand

	B	SE B	*p*	95% CI
Intercept	1.67	.25	.000	[1.16, 2.16]
Facebook use	0.002	.002	.204	[-0.001, 0.006]
Network Size	0.003	.001	.000	[0.002, 0.004]
Neuroticism	-0.02	.06	.700	[-0.13, 0.91]

Note. N = 143. R^2 = .21, p < .001. CI = confidence interval. Standard errors, p-values, and confidence intervals are based on a bootstrap with 10,000 replications.

In this present chapter I presented the results of my empirical analysis with regard to the three dimensions of OSC: first, with regard to its structural preconditions, i.e., the size, growth, and structure of facebook networks; second, with regard to OSC itself, i.e., information resources embedded in digital networks; and third, with regard to the consequences of OSC for individual users, i.e. CIS and perceived network demand.

A summary of all research questions and hypotheses addressed in this empirical part, along with the corresponding results, can be found in Table 21.

Table 21 Summary of the Hypotheses, Research Questions and Corresponding Results

Size and Growth of Digital Networks

RQ1: How large are the digital social networks of facebook users? – The average size of facebook networks changed from 157 contacts at the beginning of the semester to 223 after eight months.

RQ2: How do facebook networks grow over time? – On average, networks grew by about 2.3 contacts per week, in a linear way. Larger networks exhibited stronger growth.

RQ3: How stable is the growth of facebook networks? – Network growth was highly stable, especially for networks that were larger at the beginning.

H1: The number of offline social relationships will be positively associated with digital network size. – Confirmed.

H2: Individuals who go to college far from their last place of residence will have larger digital networks than those individuals who had lived in the same area in which they go on to attend college. – Confirmed.

H3: Extraversion will be positively associated with digital network size. – Confirmed.

H4: Identification with fellow students will be positively associated with digital network size – Confirmed.

H5: Facebook use will be positively associated with digital network size. – Confirmed.

H6: Extraversion will be positively associated with the growth of digital networks. – Not confirmed.

H7: Facebook use will be positively associated with the growth of digital networks. – Confirmed.

The Structure of Digital Networks – Components, Isolates, and Actor Betweenness Centrality

RQ4: How many components do the digital networks of facebook users contain after the first semester of college? – Average = 3.2 (SD = 2.0) components.

(continued)

Table 23 Summary of the Hypotheses, Research Questions and Corresponding Results (continued)

RQ5 How many isolates do the digital networks of facebook users contain after the first semester of college? – Average = 7.5 isolates.

RQ6: Is there an empirical connection between the numbers of components and isolates in digital networks? - Yes, a strong correlation.

RQ7: Do gender, age, Big Five personality traits, or residential status influence the number of components in the networks of facebook users? – None of these variables significantly predicted the number of components.

RQ8: Do gender, age, Big Five personality traits, or residential status predict the number of isolates in the networks of facebook users? – Only Neuroticism significantly positively predicted the number of isolates.

RQ9: How high is the average BC of individual facebook users in their digital networks after the first semester of college? – Average = .31 (SD = .09) actor BC.

RQ10: Do gender, age, Big Five personality traits, or residential status predict the BC of facebook users in their digital networks? – Only age significantly positively predicted actor BC.

RQ11: To what extent are actor BC, number of components, and number of isolates empirically related? - Actor BC was moderately correlated with both.

OSC– Information Resources in Digital Networks

RQ12: To what extent do facebook users perceive their digital networks as rich in OSC? – Medium to strong average user agreement on the OSC Scale = 4.1 (scale range 1–7).

H8: Perceived OSC will be positively associated with users` general satisfaction with their facebook activities. – Confirmed.

H9: Perceived OSC will be positively associated with facebook use. – Confirmed.

H10: Perceived OSC will be positively associated with "liking" content. – Confirmed.

H11: Digital network size will be positively associated with perceived OSC. – Confirmed.

H12: The number of components will be positively associated with perceived OSC. - Not confirmed.

(continued)

Table 23 Summary of the Hypotheses, Research Questions and Corresponding Results (continued)

H13: The number of isolates will be positively associated with perceived OSC. - Confirmed.
H14: Actor betweenness centrality will be positively associated with perceived OSC. – Not confirmed.
Facebook Coping as a benefit of OSC
RQ13: Do users utilize facebook for CIS? – Low to medium average user agreement on the use of facebook for coping-related information seeking = 2.9 (scale range 1–7).
RQ14: Do gender or age influence the use of facebook for CIS? - Not confirmed, but a tendency for younger users and men to more likely use facebook as a coping tool.
H15: Perceived OSC will be positively associated with the use of facebook for CIS. – Confirmed.
H16: Shyness will be positively associated with the use of facebook for CIS. – Not confirmed.
RQ15: How likely are Facebook users to utilize the website for CIS, compared to alternative web-based options or the phone? - Users were, in general, more likely to use the telephone (M = 5.2) or internet-based options (M = 4.6) than facebook (M = 2.9).
Perceived Network Demand as a Risk Associated with OSC
RQ16: To what extent do facebook users perceive their facebook networks to be demanding? - Average user agreement on the Network Demand Scale = 3.1 (SD = 1.4); scale range 1–7.
H17: Digital network size will be positively associated with perceived network demand. – Confirmed.
H18: Neuroticism will be positively associated with perceived network demand. – Not confirmed.

Note. SD = standard deviation. BC = betweenness centrality. OSC = online social capital. CIS = coping-related information seeking.

9. Discussion

In this chapter, I discuss the results of the empirical analysis. I start with the discussion of results regarding the size and growth of facebook networks over time (Chapter 9.1) and of network structure (Chapter 9.2). The discussion then turns to OSC (Chapter 9.3) and the implications of facebook use in terms of CIS and network demand (Chapter 9.4). The final section of this chapter outlines the limitations of the empirical work and potential areas for future research (Chapter 9.5).

9.1 Size and Growth of Facebook Networks

The empirical work in this thesis is among the first in the field of social science to assess the size and growth of facebook networks via data-mining technology. In this section, I discuss the corresponding results.

9.1.1 Network Size

Over the course of their first eight months in college, participants' facebook networks changed from an average size of 157 to 223 contacts. The distribution of network size over all time points showed a tendency towards a power law distribution, meaning that relatively more networks contained fewer contacts, and only a few networks contained many contacts. This tendency is much less pronounced than one would expect it for a representative sample of the complete population of facebook users, since the analyzed age group is among the most active facebook users in terms of networking (see, e.g., Edison Research 2013).

Networks showed large variation and a large difference between the smallest and the largest network (around 500 contacts) throughout the period of observation. While some of these differences can be explained by the

predictors that I analyzed, others may reflect differences in facebook membership duration[32] or in the general facebook affinity of participants and their friends.

In seeking to put my results into a wider context, I found that there is a scarcity of sources that were not only reliable, but also sufficiently comprehensive, representative, and well documented. *The Social Habit* (Webster 2012) is a report that drew on data from 2020 US citizens and it was conducted half a year after the end of my empirical study. It found that users between 18 and 24—the age group most comparable to participants in my study sample—had the largest facebook networks of all users. Specifically, they had around 429 facebook contacts each, while the average US facebook user only had about 262 facebook contacts.

The data from the report shows that there is a severe gap in network size between users in Germany and in the US. This difference is most likely due to the fact that facebook was already established and prevalent in the US some years before it spread to other countries. As a consequence, US users had more time, not only to socialize with their friends and acquaintances, but also to connect with casual contacts, as compared to German users in the study. As I argued in Chapter 4, the possibility to add casual contacts to one`s social network is highly specific to SNSs and this specificity may be the main reason for the size difference in facebook networks between Germany and the US.

9.1.2 Network Growth

Over the first two semesters participants' facebook networks grew at a rate of more than two new contacts per week, in a strictly linear and highly stable

[32] The effect of facebook membership duration has been assessed in this thesis; however, the quality of self-reported membership duration was not satisfying and the variable therefore was excluded from further analyses.

way. No acceleration or deceleration of growth was witnessed during the observed period.

The strong and stable network growth is a result of the fact that participants were in their first year at college, when students constantly add new contacts to their (facebook) networks. In addition, since relationship maintenance takes no effort, users are very unlikely to "unfriend" contacts. The data reflect that situation. They suggest that SNSs can be useful tools that help individuals, especially in contact-intense situations, to stay connected with many more individuals than they could without an SNS. Most of the new facebook contacts most likely are fellow students, but also new roommates, or casual encounters. Some of them may be the bases for future friendships, mutual support, or romantic relationships.

I do not expect facebook networks to stop growing at a certain point (at least not before the technological limit of 5,000 contacts). However, it is very likely that once the first semesters are over, saturation will take place and networks will grow less dynamically and in a more irregular fashion. However, with the current data set, this question cannot be addressed.

The dynamic network growth also reflects the status of facebook in Germany in 2010–2011, showing that at this time, the website was already quite popular among students; otherwise, participants would not have had so much possibility for networking. The results also reflect the migration of German users from studiVZ[33] to facebook, since about 90 % of participants stated that they had a studiVZ account before starting to use facebook. Now, in 2014, facebook by far is the most commonly used SNS in Germany, while studiVZ has fallen into oblivion.

[33] StudiVZ, a German facebook copy, was the most popular SNS in Germany among students before facebook was available. StudiVZ was marketed to college- and university-age users, while the associated SNSs meinVZ (for non-students) and schülerVZ (for grade-schools age students) served other user groups.

9.1.3 Prediction of Network Size and Growth

Digital networks reflect the situation of a user as well as his or her personal characteristics and commitment to the website. In the following, I will discuss results with regard to the prediction of network size and growth.

9.1.3.1 *Offline Social Relations and Residential Status*

The literature consistently identifies the maintenance of previously existing offline relationships as the most prominent reason for using SNSs (e.g., Bonds-Raacke 2010; Joinson 2008; Papacharissi 2010). The fact that in the presents research, the number of friends and acquaintances users had offline significantly predicted the size of their facebook networks gives cross-cultural validation to this offline-to-online trend in a German sample. Participants` statements also support these results, since they highly agreed on using facebook to stay in contact (M = 5.7, SD = 1.6) and to exchange information and photos with old friends and acquaintances (M = 4.9, SD = 1.7). Additionally, both motivations (*contact*; $r_s = .26$, $p < .05$ and *exchange*; $r_s = .31$, $p < .01$) were weakly correlated with participants' network size.

The significant effect of residential status on network size, points in the same direction. Participants who lived some distance from their college town before their studies had, on average, 67 facebook contacts more than their resident counterparts at the beginning of the semester. Most likely, these additional contacts represent social relations from their previous place of residence. Again, this suggestion is supported by statements made by participants. Those who did come from faraway (6.0) stated that they more likely use the website for staying in contact than did their local counterparts (5.1); $t(88) = -2.4$, $p < .05$. However, since the data were collected after the first month of college, it cannot completely be ruled out that some of these

additional contacts were the result of the more intense networking efforts of new residents.

9.1.3.2 Extraversion and Identification with Fellow Students

Users decide who they want to add to their networks. Unlike in the offline world, they also decide who they do not want to join their social network. Hence, user characteristics that are related to socializing behaviors could impact facebook network size. In this thesis, I tested the effect of Extraversion and identification with fellow students.

9.1.3.2.1 Extraversion

I showed that with regard to the influence of Extraversion on network size, the existing literature is inconsistent. While Ross et al. (2009) did not find a connection, Amichai-Hamburger and Vinitzky (2010) found a positive one between Extraversion and network size. The results of this thesis provide cross-cultural validation for Amichai-Hamburger and Vinitzky's (2010) findings, suggesting that extraverted users also have more facebook contacts.

While Extraversion did predict increased network size at the beginning of the semester, it did however not show any significant influence on growth. This result is surprising, since Extraversion is a highly stable personality trait that should influence (virtual) socializing behaviors at any time. A plausible explanation for this result is that the first semester is a time during which students meet many other students, most of them probably also interested in socializing, and via facebook they can connect without any effort and with few social barriers. In other words, in this situation, there is just no Extraversion required to build up large networks. However, the fact that Extraversion did not predict network growth might also be a consequence of the general small variation in the sample with regard to Extraversion. Future research could

address the effect of Extraversion on network growth using a more heterogeneous sample, and in a less networking-intensive phase. While it might be intuitive to assume an empirical connection between Extraversion and facebook use, this connection could not be verified in the study (r = .15, *p* = .16).

9.1.3.2.2 Identification with Fellow Students

The impact of identification with ones fellow students (= identification) on network size had not been empirically tested before this thesis. Results showed that identification significantly predicted network size at the beginning of the semester. This makes identification an important factor for the following time of studies, since during the semester, these networks may help students to psychosocially adapt to their new environment (e.g., Wodzicki et al. 2014). Compared to Extraversion, identification is more volatile and can be facilitated by the environment. Hence, colleges may directly strengthen students' identification through promoting SNS-based networking and social events in the first few weeks of the new semester.

Interestingly, no connection was found between identification and participants' explicit motivation to use facebook to build up contacts with fellow students (*r* = .14, *p* = .18). While this result may seem surprising first, it fits with Papacharissi's (2010) observation that the building of facebook networks may not be a goal-directed process, but rather a by-product of social interaction.

9.1.3.3 Facebook Use

Facebook use significantly predicted not only the size of networks at the beginning of the semester, but also their growth over time. I assume that the high relevance of variable is due to the fact that it represents the users``

commitment to the website. In other words, users that exhibit more frequent facebook use are also more likely to use the medium in many different areas of their (social) lives; for sharing their holiday pictures, gossiping, sending personal messages, organizing parties, and so on. This general high commitment to the medium is reflected in the time users spend on the website and it is also reflected in the larger network size at the beginning of the semester and the more pronounced growth. In accordance with this interpretation, the data also show a moderate correlation between participants' facebook use and their perception that facebook is a part of their daily routine ($r = .39$, $p < .001$).

The assumption of an underlying facebook commitment also fits with other data from this thesis. In Chapter 8, I showed that larger networks at the beginning of the semester showed stronger and more stable growth than their smaller counterparts. From the perspective of facebook commitment, these results make sense. While participants with huge networks at T1 are most likely frequent and regular users who fully embraced (both at T1 and at later times) the use of facebook for many aspects of their lives, participants with smaller networks at T1 likely form a more diverse. This group contains committed users who just started their account (and therefore only exhibit small networks) as well as users with little commitment that use the website only occasionally. As a consequence, the growth trajectories of users from this group are more heterogeneous and on average less dynamic.

9.2 Network Structure

In this thesis, I analyzed three related aspects of network structure: components, isolates, actor betweenness centrality. Results with regard to the explorative analysis of these three measures and with regard to their prediction are discussed in this section.

9.2.1 Prediction of Network Structure in General

In general, the exploratory analysis of the data showed that the assumed predictors - demographic variables, residential status, and personality traits - only played marginal roles, if any, in the prediction of network structure. These results suggest that other factors are more relevant for the prediction of network structure, for example, the general facebook affinity of a student`s friends and acquaintances might have played a crucial role. These results may also be a consequence of using a sample of people who tend to make many links via facebook, obscuring the more subtle influence of personal factors. Another explanation might be in the measures themselves, which may have been too coarse to capture more subtle differences.

9.2.2 Components and Isolates

Components and isolates represent what remains of an ego-entered network after the central actor has been removed. Their strong empirical connection indicates that there may also be a logical connection between the two. For example, they may both be the results of different college environments in which users interact. While some students may mostly be surrounded by the same fellow students in their courses, i.e. only few components and isolates, others may encounter different people in every course and therefore their networks may in general be more fragmented.

The analysis showed that, on average, facebook networks contained around three different components, but almost a quarter of participants only exhibited one component. Neither personality, nor demographic variables or residential status had any influence on this variable. Most likely, separate components represented isolated circles of individuals, such as old friends, fellow students, or colleagues from an internship.

Facebook networks in the study sample contained, on average, around eight isolated contacts per network, probably representing people who also had no offline connections with anybody else in the network besides the actor. Isolates may, for example, refer to someone a user met while on vacation or at a conference. While I tried to minimize the general incidence of facebook beginners by choosing T4 as my point of measurement, it cannot be completely ruled out that some isolates come from users who just started their accounts.

Moreover, isolates were the only aspect of network structure that was positively influenced by any personality trait of the user: Neuroticism had a significant positive influence on the number of isolates, which could point to the fact that highly neurotic users are less integrated into their social networks, in general. In addition, users with higher scores on Neuroticism may also be more likely to have similar friends, a principal that is referred to as homophily, increasing the likelihood that these contacts are also less integrated in their social networks.

9.2.3 Actor Betweenness Centrality

While actor betweenness centrality reflects network structure on a more abstract level than do components and isolates, it is moderately correlated with both of the other structural measures. This could indicate that the index (to some extent) represents—but cannot completely replace—the macro-

structure measures. However, more research is needed to validate these results in other samples.

First-year college students in this study had an average betweenness centrality of .31, indicating a medium to high amount of connectivity in those networks. Furthermore, this index was the only measure that was predicted by the age of users, suggesting that contacts in the networks of older users are less interlinked. This may be a consequence of the longer and more diverse life experiences of these users, which, all things being equal, would lead them to have more diverse friends and acquaintances. As these friends and acquaintances come from different areas of users` lives, they are not connected via facebook and this is reflected in the betweenness centrality of users.

On the other hand, one could argue that older users, following the principle of homophily, also have older facebook contacts. These older contacts in general tend to have fewer facebook contacts themselves (Edison Research 2013). Therefore, the higher betweenness centrality of older users might just represent the fact that their contacts in general have less virtual links. While I cannot completely rule out this argument, the data in the study showed no correlation between the age of students and the size of their facebook networks, probably as a consequence of the small age range of student participants.

9.3 OSC

I argued that OSC is an individual resource embedded in facebook networks. In this section, I will discuss the aspects of facebook use and satisfaction that are related to OSC and the prediction of OSC by the size and structure of individual users' facebook networks.

9.3.1 OSC, Facebook Satisfaction, and Facebook Use

In the empirical study, participants, in general, moderately agreed that they perceived their facebook networks as resources in terms of OSC, a result that replicates similar findings of Lampe et al. (2012) in the US. These results also suggest that there may be a sleeping potential in facebook networks that is worth being considered and which is often overseen in the public discourse on social media.

9.3.1.1 OSC and Facebook Satisfaction

There was a moderate connection between OSC and users' general satisfaction with his or her facebook activities. While the cross-sectional nature of this relationship does not allow for causal interpretation, it nevertheless suggests that OSC is a network quality that may have relevance beyond the narrow field of goal directed-information seeking. Hence, networks that are rich in OSC may represent stimulating environments where users are more likely to experience interesting conversations, news, or entertainment.

9.3.1.2 OSC and Facebook Use

A more stimulating network atmosphere may also explain the connection between OSC and the increased facebook use of participants. While the

connection between general facebook use and OSC was weak, the connection between OSC and the highly specific "liking" was quite strong. This might be a consequence of the fact that, unlike general facebook use, which also includes passive behaviors, "liking" is re-active communication (i.e., in order for content to be liked, it must first be posted). Therefore, the increased number of likes in OSC-rich networks can be seen as an indicator of the generally increased communication in these networks.

Facebook satisfaction, facebook use and liking are all empirically related to OSC, suggesting that OSC may represent the potential of digital networks for satisfying social interaction. The assumption that OSC is related to more social interaction is also reflected in the statements of participants. Specifically, there were moderate to strong correlations between OSC and (1) the use of facebook for exchanging photos and information with friends and acquaintances (r_s = .49, p < .001), (2) the use of facebook for pursuing ones hobbies (r_s = .50, p < .001), and (3) using facebook for conversations and discussions about leisure-related topics (r_s = .50, p < .001).

The relationships between OSC and communication/ satisfaction most likely are interactive processes, where OSC-rich networks provide a stimulating environment for active and satisfying facebook use, which over time leads to larger networks[34], and these networks, in turn, provide a more stimulating environment that facilitates communication and satisfaction.

Finally, the results also suggest that there are connections between the quality of users' facebook networks and behavioral as well as cognitive characteristics of the user. This is an important aspect, since current psychological research in the realm of SNSs rarely takes into account aspects of network quality.

[34] In the first section of this discussion, I showed that facebook use was the most important predictor of network size and growth.

9.3.2 Prediction of OSC by Network Size and Network Structure

I argued that network size and structure both predict the amount of OSC in a network. The empirical results only partly confirmed these assumptions. In this section, I discuss the corresponding results with regard to the prediction of OSC by network size, the numbers of components and isolates in the network, and by the betweenness centrality of the user. Since this thesis is one of the first pieces of research to interpret network measures in terms of social scientific concepts, I will begin this discussion with some general caveats.

9.3.2.1 General Caveats on the Interpretation of Network Measures

Two main caveats are associated with the interpretation of network measures from facebook networks, especially regarding the interpretation of structural measures. These caveats refer to the ambiguity of facebook links and to the unknown status of network saturation.

9.3.2.1.1 Ambiguity of Facebook Links

The problem of the ambiguity of facebook links refers to the fact that a facebook link in itself has no clearly defined social meaning. That means it may represent a wide range of offline relations, from close family members to complete strangers. However, network size and all measures of network structure are based on the presence or absence of links between users and contacts, respectively, between contacts and contacts. As a consequence, any interpretation of these measures is flawed and researchers also have to take into account alternative meanings. For example, facebook contacts could be interpreted as information resources, but they may also be potential bullies or stressful contacts. In addition, fragmented networks may represent diverse resources, but at the same time they could represent a lack of integration of the user in his or her social environment.

In this thesis, I tried to reduce the problem of structural ambiguity by keeping the interpretation as close to the structure as possible. For example, instead of arguing that isolates represent encounters from a conference that may benefit users with their specific conference-related knowledge, I argued that isolates provide users with diverse information due to the fact that they are not connected (online and most likely also offline) with other contacts in the network[35].

Future research could address the problem by including additional measures that assess the quality of facebook links, e.g., in terms of information exchange between user and contact. Additionally, in the case of components and isolates, researchers may directly present visualizations of participants` networks to the corresponding participants and ask them to tag components and isolates with labels like "colleagues from internship", "fellow students", or "met on a festival".

9.3.2.1.2 Status of Network Saturation

The second caveat to keep in mind when ascribing personal meaning to the size and, especially, the structure of facebook networks is the unknown status of network saturation. I understand a saturated network as one in which all facebook-using friends and acquaintances of a user (at a specific time) are represented as contacts in that user's facebook network. Obviously, in order to interpret network size in a meaningful way, actors need sufficient time to build their networks. However, to interpret network structure, also the contacts in users' networks need sufficient time to form connections. Otherwise, the absence of links between contacts may simply reflect the fact that the respective account has not existed long enough. Since all structural

[35] While I also made suggestions as to what offline phenomena isolates, components, and actor betweenness might represent, the structural argumentation was always of primary importance.

measures are essentially based on the presence or absence of links between contacts, these contacts that just stated their accounts may distort measures of network structure. Furthermore, without additional information on the status of contacts, the resulting bias can only hardly be estimated.

The problem of the unknown status of network saturation can be addressed in two main ways. The first way (which I used) is to only refer to networks for which the likelihood is high that users, as well as their contacts, had sufficient time to network. In this thesis, I used data from after the first semester (T4) as my point of reference, and only selected networks that contained more than 100 contacts. As a second way, researchers could create measures that assess and possibly correct for the networking status of contacts. Such measures could, for example, take into account the network size contacts. This second way is quite promising for future research in this area, since it extends the range of networks that can be fruitfully analyzed.

Readers should keep in mind these two caveats regarding ambiguity and saturation when reading the following sections on the prediction of OSC using network measures.

9.3.2.2 Network Size as a Predictor of OSC

The empirical results confirmed that the number of facebook contacts predicted perceived OSC and they suggest that network size alone explains about 13 % of OSC variance. Therefore network size is the most important predictor among network measures.

The data also support the idea that OSC is a resource that is highly specific to SNSs, since there is no significant correlation between the number of offline social relations and perceived OSC (r_s = .18, p = .06). These results fit with my argumentation (Chapter 4) that the highly specific mechanisms in

which SNSs facilitate the capacity and mobilization of social capital create a highly specific resource that differs from other forms of social capital in terms of quality and quantity. This interpretation is also supported by the results of Ellison Steinfield and Lampe (2011) who did not find an empirical connection between the number of (online) facebook contacts and perceived (offline) bridging social capital at college.

The results also suggest that the dynamic online connecting behaviors that participants in Sample 1 exhibited, significantly contributes to the amount of resources they have at their disposal.

9.3.2.3 Number of Components as a Predictor of OSC

Components represent isolated groups of contacts in a network. As I argued in Chapter 6, contacts from different components are most likely diverse with respect to characteristics like geographic area, age, or social background, etc. An increased number of components would therefore indicate more diverse resources. A network with more diverse resources is more likely to provide users with non-redundant information or new perspectives as compared to a less diverse network of the same size. I therefore assume that networks with a higher number of components also exhibit more OSC. This hypothesis was not empirically confirmed. In the following section I will discuss potential reasons for this result, as well as the general usefulness of components as a measure of social capital.

The major advantage of using the number of components as a social capital indicator is its intuitiveness and unambiguity. This unambiguity becomes especially clear, if one compares components to more complex measures of contact clustering that take into account groups linked with contacts outside the group (see e.g., Brooks et al. 2014). Depending on the

chosen algorithm, results for these more complex measures may significantly differ.

The most relevant problem associated with the number of components is its high conservativeness. Since it takes only the decisions of two individuals (one from each component) to link two components and thereby reduce the number of components by one, the likelihood of this happening is high. It is especially high, since connecting via facebook is effortlessly and frequently done. As a consequence of its conservativeness, the number of components may highly underestimate the true fragmentation of a network. The results of my empirical analysis support this notion. The data showed not only a low average number of components per user, but also that 22 % of participants had only one component, and more than 40% had only one or two components.

Furthermore, components may contain any number of nodes greater than or equal to two. This makes the interpretation of the measure quite challenging, since, all things being equal, a component with more contacts contains more OSC than a component with fewer contacts.

Conclusion

Components are an intuitive and unambiguous measure that likely represents different social spheres within a given network. However, the tremendous variation in the size of components, along with the high conservativeness of the measure, severely limits its interpretability in terms of social capital. Future researchers that want to use the number of components as an indicator for social capital may therefore wish to complement this measure with alternative measures, like the average amount of contacts per component.

9.3.2.4 Number of Isolates as a Predictor of OSC

Isolates are facebook contacts who share no link with any other contact in the network other than the central actor. I therefore argued that isolates are likely to not come from the same social realm as other contacts. Furthermore, isolates may act as bridges between users and other facebook users (contacts of the isolate) that they might otherwise not have had access to. In other words, isolates represent bridging contacts (Burt 1992 2000) or prototypical weak ties (Granovetter 1973 1983). In terms of social capital, isolates may provide users wit (direct and indirect) access to non-redundant information and new perspectives. An isolate may, for example, represent someone who a user met on vacation or at a conference.

In the present study, the number of isolates was the only structural measure that had a significant influence on users' perceived OSC. While there are some structural similarities between isolates and components -technically, an isolate is the smallest component possible- there are nevertheless important differences in how isolates can be interpreted in terms of social capital. Similarly to the interpretation of components, the interpretation of isolates is intuitive and their measurement is unambiguous. Also like components, isolates are a conservative measure, since a contact easily loses its isolate status by agreeing to link with any other contact from the network. Nevertheless, the interpretation of isolates in terms of social capital is much less problematic than the interpretation of components, since an isolate always consists of only one contact. Furthermore, the chance that a random link will bias the measure is much higher for components than for isolates. Random link thereby refers to a facebook link formed without conscious intention, e.g., when a contact mistakes a potential contact for somebody else. This random link may connect an isolate or component with the rest of the network, thereby biasing the respective measure. The risk for this occurring among components is higher,

since there are (Nodes in Component 1) × (Nodes in Component 2) possibilities for random links, while for isolates there are only 1 × (Nodes in Component) possibilities.

The number of isolates is the only structural measure that was empirically linked with a personality trait. The positive prediction of the number of isolates by Neuroticism points to a problem that I referred to as the ambiguity of facebook links (Chapter 9.3.2.1.1), i.e. the fact that one and the same structure may have different meanings. In the case of users with high scores on Neuroticism, isolates may, for example, also represent the lack of social integration.

Conclusion

Isolates are similar to components, both in terms of their unambiguous interpretation and their way of measurement. However, they are more suitable for interpretation than components since they are less conservative and only refer to one contact. On the other hand, isolates may also be related to an individual user's poor social skills. As a conclusion, the number of Isolates can be considered a valid measure for social capital, as long as alternative interpretations are kept in mind. Future research may focus more closely on this interesting measure and improve it. For example, researchers could further investigate the relationship between isolates and social integration, or take into account the indirect contacts that users may access via specific isolates.

9.3.2.5 Actor Betweenness Centrality as a Predictor of OSC

Actor betweenness centrality reflects the heterogeneity of a facebook network on an aggregate level, a fact that is reflected by its empirical relationship with components and isolates. Analogous to components and isolates, I assumed

that users with a higher actor betweenness centrality had more OSC. However, the empirical analysis did not confirm this hypothesis. In the following section, I will briefly discuss this measure in terms of its usefulness as an indicator for social capital.

One major advantage of using actor betweenness centrality is that it showed independence from network size for all analyses in the present thesis, unlike other measures of network connectivity, e.g., density. This makes the index a useful tool for comparing users with different network sizes. Actor betweenness centrality is also more robust than components and isolates, as additional links between two contacts do not significantly affect it.

Unfortunately, actor betweenness centrality is not as intuitive to interpret as the previous measures, and it does not take into account how the links between nodes are distributed over the network. Furthermore, the measure fails to differentiate between different phenomena of contact connectivity, despite the fact that this differentiation may be important for interpretation. Specifically, actor betweenness centrality reflects the relative proportion of diameters between contacts *j* and *k* that contain the central actor *i*. Therefore, actor betweenness centrality can either be reduced by an increase in the number of direct links between contacts *j-k* or by an increase in alternative diameters (e.g., *j–l–k*, *j–m–k*). However, it is very likely that a network with many direct links is much more redundant in terms of information than a network with more indirect links. Moreover, while actor betweenness centrality takes into account the shortest paths between contacts, it neglects longer ones. Explicitly, the index does not differentiate between the case when contacts *j* and *k* are connected via two other contacts or via more than ten. Again, both scenarios may have different implications in terms of information redundancy.

Conclusion

Actor betweenness centrality is a robust index of network connectivity and it is independent from network size. On the downside, the measure did not significantly predict OSC, it is less intuitive than components or isolates, it ignores the distribution of links over the network, and it fails to sufficiently differentiate between diverse patterns of connectivity that may be relevant in terms of social capital. As a conclusion, actor betweenness centrality is a promising measure, but more research is needed to improve its usefulness as a social capital indicator. For example, more data is needed to put the measured values into context.

9.4 Implications of SNS Use for the Lives of Users

I argued that SNSs impact the lives of users in two main ways. First, by facilitating processes of information seeking, specifically CIS. Second, by SNS-specific risks, specifically network demand. In this section, I will discuss both mechanisms.

9.4.1 The Use of Facebook as a Coping Tool

I argued that facebook users can mobilize OSC for CIS. In this way facebook may help users to address minor stressors, thereby contributing to the prevention of chronic stress, a condition linked to a wide array of disorders and psychological problems. In this section, I will discuss the results of this study's empirical findings with regard to the use of facebook for CIS and OSC, as well as with regard to the prediction of facebook-based coping via personal variables.

9.4.1.1 The Use of Facebook for CIS in General

Results showed that study participants, in general, had a low likelihood of using facebook for CIS; an agreement of 2.9, on a scale from one to seven. This result reflects the study by Lampe et al. (2012), where scholars showed that, although participants perceived their networks as a resource, they were not likely to actually use them as information resources. This contradicts the results of Morris, Teevan, and Panovich (2010) who found a general high use of facebook as a tool for asking contacts for opinion and advice.

Additionally, coping-related facebook use was not only low in absolute numbers, but also relative to the use of alternative media options. Participants clearly preferred the use of the phone and internet-based options compared to facebook. These results are surprising if one takes into consideration that users, in general, perceive their networks as resource-rich, and use facebook quite frequently for information exchange. For example, users highly agreed on the statement that they use the medium for exchanging information with friends and acquaintances (M = 5.4, SD = 1.6; Scale: 1-7). One possible explanation for these results is that, in 2010–2011, telephone and internet were much more established media among most age groups, while facebook was a new phenomenon that was mostly used by younger people. As a consequence, users who wanted to ask their parents or older relatives for information most likely would use the telephone. In addition, at this time, participants were already used to the traditional media, telephone and internet, and were habitually using them for information seeking. However, also the ongoing discussion about data protection on facebook may have prevented some users from utilizing the medium for coping with personal issues. It would be interesting to repeat the study now that facebook is more established in Germany.

Another possible explanation is that the overwhelmingly social nature of facebook may make users feel like the website is the wrong place for information seeking although they actually use it that way, a criticism that was already mentioned with regard to the study of Lampe et al. (2012). I tried to address this problem, by using explicit items that described specific situations of student life, like "problems with organizing one`s lectures". The idea was that these items would not capture a general attitude towards information seeking on facebook (that is low), but more concrete behaviors (that I assumed to be high). However, these items may still have been to unspecific and future researchers may, for example, directly analyze the postings and requests of users to avoid any bias.

9.4.1.2 The Use of Facebook for CIS and OSC

Online social capital significantly predicted 30 % of participants' likelihood to use facebook for coping. These results build a bridge between the quality of digital networks and user behavior, thereby empirically linking SNSs with the day-to-day lives of their users. It also shows that the well established connection between SNSs and social capital (e.g., Ellison, Steinfield and Lampe 2007; Steinfield, Ellison and Lampe 2008) has actual behavioral implications.

Furthermore, the use of facebook for coping was not related to the number of users` offline friends and acquaintances (r = .07, p = .46). These results support the idea that SNSs are not traditional media, in the way that they only mediate the communication between individual actors. Additionally, these websites establish a highly specific form of resource that is manifested in digital networks and mobilized via the use of the medium. As a consequence, these resulting resources are to some extent independent from the offline networks that they are based on.

Future research may take into account the nature of users' networks when analyzing the outcomes of SNS use, since, to date, in most psychological research in the realm of SNSs, aspects of the networks are being ignored.

9.4.1.3 The Prediction of CIS via Facebook by Gender and Age

In this study, I analyzed the effects of gender and age on the use of facebook for CIS in an explorative way, i.e. without directed hypotheses. Gender and age did not significantly influence the use of facebook for CIS.

Age was also uncorrelated with the use of the alternative options internet (r = .07, p = .41) and phone (r = .15, p = .08), suggesting that this variable in general was not a relevant predictor in terms of information seeking. However, these results may be a consequence of sample characteristics, since all participants were college students and in general exhibited little variation in terms of age.

With regard to gender, the results suggest a higher likelihood for men (M = 5.0, SE = 0.2) to use internet-based options than women (M = 4.4, SE = 0.14; $t(141) = -2.43$, $p < .05$), suggesting that gender may theoretically affect coping-related media choice. However, there was no significant difference between women (M = 5.35, SE = 0.13) and men (M = 4.95, SE = 0.20) with regard to the use of the phone for CIS; $t(141) = 1.7$, $p = .85$. In order to clarify, if the non-existence of a gender effect on coping-related facebook use reflects the fact that there is no gender difference or the general small variation in facebook coping in that sample, further research is needed.

9.4.1.4 The Prediction of CIS via Facebook by Shyness

I assumed that shy users would be more likely to use facebook for CIS, since the medium allows them to ask others for support while at the same time avoiding stressful social situations. This hypothesis was supported by

previous studies in the field that found positive relationships between shyness and the use of facebook in general, as well as between shyness and receiving social support via the medium (Baker and Oswald 2010; Orr et al. 2009). However, the hypothesis was not confirmed by the data in the present thesis.

The fact that there is no effect of shyness could indicate that this personality trait extends to virtual behaviors. Hence, they may appreciate the medium for passively receiving support, but they do not use it for actively asking for it. Again, the results could, alternatively, also reflect the fact that the study sample had little variation in terms of shyness, which may also be the reason why no empirical connection was found between shyness and facebook use ($r = -.05$, $p = .58$). To better understand the potential of facebook as a compensatory strategy for shy users, future research might, for example, use a sample of facebook users diagnosed with social phobias.

9.4.2 Perceived Network Demand

The same processes that turn digital networks into resources may also represent risk factors for some users, when information requests pile up and become stressors. In this section, I discuss results related to perceived network demand and to its prediction by network size and users` Neuroticism.

9.4.2.1 Perceived Network Demand in General

Results showed that users, in general, perceived little demand from contacts in their facebook networks, i.e. only few requests for information, advice, or opinions. With these results, the question was if network demand at all represents a potential stressor in this sample, since a low level of requests may not be perceived as stressful, but rather as part of a stimulating and rewarding environment. In other words, facebook is generally considered a virtual place for socializing and communication, and a network without any requests may

easily become as boring as a TV without programs. In order to assess the stressor potential of network demand, I correlated the measure with participants' general satisfaction with facebook. The result was a positive moderate correlation between perceived network demand and facebook satisfaction ($r = -.39$, $p < .001$). Hence, in the current sample, perceived network demand most likely did not represent a stressor to participants, but was rather perceived as positive.

However, these results have to be interpreted carefully, since they come from a highly specific time and sample. Over the years, the use of facebook has increased in Germany and on a worldwide level (e.g., Facebook n.d., Statista 2014a, b), therefore it is very likely that also the presence and meaning of network demand for individual users has dramatically changed since 2011 (see Chapter 9.4.3).

9.4.2.2 Prediction of Perceived Network Demand by Network Size and Neuroticism

In this thesis, I argued that objective as well as subjective factors, i.e. network size and Neuroticism, may impact users` perception of network demand. The results confirmed that network size positively predicts network demand, most likely, since every additional contact in the network represents an additional potential requester. Since there has been a continuous growth of average facebook networks over the years since the start of facebook (e.g., Facebook n.d.), this result suggest that network demand may also become more pronounced and also more problematic with time. In addition, there are large differences between age groups with regard to the size of their facebook networks. Specifically, in the US, the age group of US users between twelve and seventeen in 2012 had 396 facebook contacts, while users between 45 and 54 only had 163. Therefore in terms of experiencing network demand,

teenagers represent a risk group. This perceived demand may also be a factor that contributes to the increased likelihood of teenagers with regard to experiencing conflict related to the use of SNSs that I described in Chapter 5.4 (Rainie, Lenhart, and Smith 2012).

I assumed that Neuroticism, as a form of trait-based vulnerability, would make users more vulnerable to experiencing network demand. The idea that the interaction between individual predispositions and external stressors results in problematic psychological outcomes is a popular idea throughout clinical psychologists, often referred to as the diathesis-stress-model (e.g. Hankin and Abela 2005). However, the hypothesis was not confirmed by the data, probably as a consequence of the fact that network demand was not generally perceived as problematic. More research is needed to find out, if Neuroticism impacts users vulnerability network demand with regard to higher levels of demand. In addition, research may analyze other potential vulnerability factors, e.g. a general problem to refuse requests.

9.4.3 Conclusion

The empirical results demonstrated the existence of coping-related facebook use and perceived network demand, although to a small extent. The low incidence of both was most likely a consequence of the time at which this empirical research was conducted. In 2010–2011, facebook was still a new phenomenon in Germany. Users were just beginning to open their accounts, build networks, and explore the potential of the medium. Hence, the implications of habitual facebook use for users' lives were just beginning to appear in this population.

Since 2011 many things related to facebook have changed dramatically: from January 2010 to January 2014, the number of facebook users in Germany doubled from 13.9 to 27 million users (Statista 2014b) and the website has

become a part of everyday German culture. In 2014, it is quite unlikely to find a German brand that does not have a social media presence or a larger event that is not promoted via facebook. With this increased relevance of the website, it is very likely that also its implications for individual users have changed. Hence, it is likely that users more often utilize the medium for information seeking than they did in 2011 and it is also more likely that the average perceived network demand has increased.

Furthermore, perceived network demand may have become a severe health threat. Present data from my research already suggests that users for whom facebook is a part of their day-to-day lives are both more likely to use the website for CIS and to experiencing network demand ($r = .44$, $p < .001$ for both items). Therefore, more research is needed to analyze the relevance of the described phenomena in the current population of facebook users. This research may, for example, aim to prevent SNS-related stress and contribute to the implementation of SNS-based strategies to promote mental health.

9.5 Limitations and Future Research

Like any other study, the present study has limitations. In this section I address some general limitations related to the research design, samples, network measures, and the original scales that were developed and applied during the course of this research. Additionally, I suggest some areas for future research[36].

[36] A discussion with regard to the limitations (and the potential ways of improving them) of network measures that were used in this thesis can be found in the respective parts of the discussion (Chapter 9.3.2.1 – 9.3.2.5).

9.5.1 Research Design and Samples

During this thesis I analyzed two cross-sectional samples (Samples 2 and 3) one longitudinal sample of college students (Sample 1). In the following paragraphs, I will briefly outline limitations with regard to the generalizability of results, to the comprehensiveness of data collection, and to the size of Sample 1.

First, all samples in this study consisted of college students only. Students, however, differ from the general population in a number of ways. The most important difference in the context of the present thesis is that students, in general, spend more time on facebook and have more facebook contacts than any other age groups (e.g., Webster 2012). The results from this thesis are therefore limited in their generalizability; future research could include alternative populations for improved generalizability.

Second, in Sample 1, the observation of participants' networks started one month after the beginning of the semester. Unfortunately, as a result, the analysis did not include the first month of college, which is probably a phase of dynamic network growth. Furthermore, the available server capacity did not allow for daily data mining, which could have given insights into more subtle changes in networking behaviors over the course of the semester. In addition, the eight-month observation period was to short to include a phase during which growth decelerated. Future research could implement more frequent data mining, along with an earlier onset and a longer duration of data collection.

Third, Sample 1 only contained 91 participants at the start of the data collection period. The small sample size limited the statistical analyses that were possible, such as with regard to the inclusion of random factors into the multi-level modeling or to the inclusion of additional factors and interactions. Future research might prefer to utilize larger samples.

9.5.2 Scales

SNSs represent a unique phenomenon that differs from other media in many ways, since they combine web-based technology with social networks. In order to do justice to this phenomenon, I adapted already existing scales to an SNS context, specifically, the Satisfaction with Life Scale by Diener et al. (1985) and the Bridging Social Capital Scale by Williams (2006) (OSC Scale, Facebook Satisfaction Scale). In addition, I developed the CMC Scale and the Network Demand Scale. In the following paragraphs, I will point out some limitations of these scales that may be addressed by future research.

OSC Scale. It assesses to what extent users perceive their digital networks as providing them with information resources. Future research might find scales that also take into account the bonding social capital aspect of digital networks and that address the availability of specific pieces of information. For example, information that is related to social events or job search.

Facebook Satisfaction Scale. Reflects users' cognitive and global satisfaction with facebook. Future researchers could complement this scale with a measurement of the emotional component of satisfaction or refine the global focus of the scale. For example, users may indicate their satisfaction with specific aspects of facebook use, like communication or entertainment.

CMC Scale. Was constructed to assess to what extent facebook users utilize the medium for CIS. Future research could further differentiate this scale with regard to the utilized communication channel (e.g., posting, messaging, chat), the addressees (e.g., friends, colleagues, complete network), or areas of coping (e.g., professional, personal).

Network Demand Scale. Was constructed to estimate the risk of perceived network demand from requests for information. Future researchers could complement this scale with components assessing emotional and behavioral stress. Differentiating between acute and chronic network-related stress might also be useful.

10. Conclusion

In the last decade, SNSs have increasingly become part of daily life for many people worldwide. Two main questions caught my interest, and guided this work. First, I was interested as to why SNSs may influence the lives of users and why might their influence be different from that of other types of media. Second, I wanted to know in what specific ways SNSs impacted the lives of users.

In this conclusion, I summarize the theoretical considerations, empirical results and implications of this thesis according to my two main questions. The first part addresses digital networks, since they are the key variable in terms of SNS influence on users` lives (Chapter 10.1). The second part addresses the processes in which SNSs influence users lives (Chapter 10.2), which are related to information seeking and risks.

10.1 Digital Networks and OSC

Digital networks represent a key factor in terms of SNS influence on users` lives. Although networks are a crucial feature of SNSs, they are largely ignored in social scientific research until now. My thesis fills this research gap by empirically analyzing network size and, for the first time, the growth of facebook networks over time. I also introduce and critically discuss three different measures of network structure. On the methodological level, this thesis is among the first in the field to use data-mining technology and to combine to it with psychological and sociological frameworks (exceptions include, e.g., Brooks et al. 2014).

In this thesis, I analyzed networks in terms of size, growth (Chapter 10.1.1), and structure (Chapter 10.1.2). Furthermore, I analyzed the presence of OSC, its behavioral and cognitive correlates, and its prediction by network size and structure (Chapter 10.1.3).

10.1.1 Size and Growth of Facebook Networks

I monitored the facebook networks of first-year college students at a German urban college from the beginning of their first semester to the end of their second semester (eight months). During this period, participants` networks grew in a linear fashion from, on average, 157 to 223 contacts, at a highly stable rate of more than two contacts per week. Networks that were larger at the beginning showed stronger growth and higher stability, probably since they represented more committed facebook users. Users' commitment to facebook (as expressed by their facebook use) not only significantly predicted network size at the beginning of the semester, but also its growth over time. Compared to US samples, the networks of these German students were smaller, possibly since facebook has been established for a longer time in the US.

I argued that the size of students' facebook networks at the beginning of their studies reflected both their situation and personal attributes. The number of offline friends and acquaintances and the fact that students came from a different area to their college town for studying significantly predicted network size, pointing to the fact that facebook was used to keep in contact with old friends and acquaintances. The use of facebook as a tool to "stay connected" was also reflected in participants' statements and in the literature on US users (e.g., Bonds-Raacke 2010; Joinson 2008; Papacharissi 2010). Additionally, participants also used the website for networking with new contacts, as reflected in their statements and in the effects of Extraversion and identification with fellow students on network size.

The results on network size and growth indicate that SNSs like facebook are a powerful way for individuals to quickly and easily build and maintain large networks of old and new contacts. These networks are the structural basis for later social capital resources.

10.1.2 Network Structure

I introduced and analyzed three structural measures of ego-centered facebook networks -components, isolates, and actor betweenness centrality- and their connection with user characteristics. In addition to the general exploration of users' networks, the goals of this analysis were to describe, interpret, and critically discuss measures of network structure in order to promote their application in the social sciences.

In general, the explorative analysis showed that all three measures were not empirically related to gender, residential status and to the personality traits Extraversion, Openness to Experience, Agreeableness, and Conscientiousness. Most likely, the reason for this lack of prediction is that users (and therefore their characteristics) have only marginal influence on the linking behaviors of their facebook contacts, who ultimately determine network structure. In this section, I will briefly summarize the results, discussion, and potential implications of the three analyzed measures.

Components represent separate groups of contacts in the network of a central actor. Participants had an average of about three components each. None of the assumed predictors influenced the number of components in users' networks. Components most likely represent different social spheres that the actor belongs to, e.g., one component may contain old friends and another one new fellow students. While the measure is unambiguous to measure and intuitive to understand, it is also highly conservative and blurry, since components may vary greatly depending on the number of contacts they contain. In future research, I would recommend that components not be used alone, but rather in combination with other measures, and taking into account their size.

Isolates represent contacts in the networks of actors who are unconnected to the rest of the network. In the empirical analysis, facebook networks, on average, contained about seven isolates. Isolates could represent, for example, people the user met on vacation or at a conference. Neuroticism was the only significant predictor of isolates, which could point in the direction that networks with many isolates may reflect actors' poor social skills. Similarly to components, isolates are unambiguous to measure and intuitive to interpret. However, they are less conservative and easier to interpret, since an isolate always only contains one contact.

Actor betweenness centrality represents the relative number of shortest paths between any two contacts in a network that contain the actor, as compared to the complete number of shortest paths. Therefore, a low degree of actor betweenness centrality indicates that there are many direct links (*j-k*) and/ or indirect links via one other actor (*j-l-m*) in the network. Hence, the measure can be used as an indicator for the connectivity between contacts in a given network

The empirical analysis showed that participants had an average betweenness centrality of .31. The only significant predictor was user age, which may reflect the fact that older users know more diverse people. The moderate correlations of actor betweenness centrality with the two measures (components and isolates) may point to the fact that the index, to some extent, represents network macro-level phenomena.

Overall this explorative analysis gave some initial impressions on the empirical structure of facebook networks, its relationship with characteristics of users, and potential interpretations as to what these measures may represent. However, this research is just in its beginning phase and further

research is needed to put these results into context, to apply measures to different research questions, and to validate results among different samples.

10.1.3 OSC

Based on my review of the social capital literature (e.g., Bourdieu 1986; Burt 2000; Coleman 1988; Lin 2001; Putnam 2000) and of the literature on social capital in SNSs (e.g., Ellison, Steinfield and Lampe 2007; Steinfield, Ellison and Lampe 2008; Valenzuela, Park and Kee 2009 Zúñiga, Jung and Valenzuela 2012), I introduced an own SNS-specific definition of social capital that takes into account the unique combination of social relationships and web-based technology. I defined OSC as the information resources that SNS users can access directly or indirectly via their digital networks.

This thesis contributes to the literature by introducing and empirically testing the existence and the behavioral and cognitive correlates of OSC in a college student sample (Chapter 10.1.3.1) and by analyzing the empirical connections between the size and structure of facebook networks and OSC (Chapter 10.1.3.2). In the following sections, I will briefly present the main arguments, corresponding empirical results, and implications.

10.1.3.1 OSC, Facebook Use, and Facebook Satisfaction

The empirical analysis showed that facebook users, in general, perceived their digital networks as rich in OSC, a result that fits with studies from the US that link increased facebook use with bridging social capital (e.g., Ellison, Steinfield and Lampe 2007).

Users who perceived their facebook networks as richer in terms of OSC were also more satisfied with their facebook activities in general, and they were likely to use the medium more frequently, both in general and for communication ("liking" of content), specifically.

These results can be interpreted as meaning that facebook networks that are rich in OSC represent stimulating environments for their users. Hence, networks that contain more OSC will also be richer in terms of social interaction, interesting conversations, discussions, news, gossip, entertainment, and so forth. This stimulating environment may contribute to user satisfaction, facebook use, and communication. In the long run, facebook satisfaction, facebook use and liking may then contribute to larger networks and more OSC.

10.1.3.2 Prediction of OSC by Network Size and Structure

I introduced literature that theoretically and empirically connects social capital outcomes like information benefits with the size and structure of individual networks (e.g., Burt 1992, 2000; Granovetter 1973, 1983; Lin 1999, 2007, 2010), and with the size and structure of facebook networks specifically (Brooks et al. 2014; Spiliotopoulos and Oakley 2013). Based on this literature, I argued that larger networks and those with specific structures (i.e., one that reflects the diversity of contacts) are associated with more perceived OSC. These hypotheses were, however, only partly confirmed.

The empirical results confirmed that network size positively predicted OSC and that size was the single most important predictor of OSC variance. This result suggests that, all things being equal, every contact that is added to a user's network contributes to that user's amount of information resources. In the light of these results, the intense building of networks in the sample of first-year college students can be seen as a valuable investment into individual resources.

The number of isolates in an actor's network significantly predicted her or his OSC. Since they most likely come from different areas, age groups, or social spheres than the rest of the network, isolates probably have exclusive

access to diverse and non-redundant information that they can provide the user with. Isolates also connect users with others, which they would otherwise not be connected to. Hence, isolates most prototypically represent bridging contacts or weak ties (Burt 1992; Granovetter 1973). Isolates were the only measure of network structure that empirically predicted OSC and they seem to be a promising measure for future research. Scholars may, however, keep in mind alternative interpretations and combine the measure with complementary measures, e.g., with regard to information exchange between users and isolates.

I also assumed that the number of components and the degree of actor betweenness centrality would predict OSC; however, this was not confirmed by the empirical results. Most likely, these results are due to the fact that components are a far too conservative measure, and the aggregate nature of actor betweenness centrality fails to represent relevant aspects of users' networks. However, for future research specifically actor betweenness centrality may be a promising measure, especially when combined with complementary measures.

10.2 Implications of SNS Use – Information Seeking and Risks

In seeking to learn more about how SNSs influence the lives of users, I tried to avoid both a naïve techno-utopian approach as well as a culturally pessimistic one by developing a balanced framework based on the idea of OSC. Specifically, I introduced SNSs as a tool for information seeking, whose use is associated with SNS-specific risks. Empirically, I analyzed the use of facebook for CIS and network demand as a potential stressor. Beyond contributing to the research literature, my understanding of SNSs may also serve as a basis for the public discourse, as well as for interventions by health professionals.

In the following sections, I summarize the theoretical, empirical, and methodological contributions of this thesis in terms of SNS-based information seeking (Chapter 10.2.1) and risks (Chapter 10.2.2).

10.2.1 OSC and Information Seeking

I argued that digital networks facilitate users' information-seeking processes in general by facilitating the capacity and mobilization of OSC. Empirically, I analyzed the use of facebook for seeking coping-related information.

10.2.1.1 SNSs and Information Seeking in General

Information seeking refers to the conscious effort of an individual to acquire information in response to a need or a gap in his or her knowledge (Case 2007). Social network sites may assist individual users with information seeking by affecting the capacity and mobilization of their OSC.

First, SNSs facilitate users' abilities to build and maintain large networks that contain contacts as diverse as friends, colleagues, and causal contacts. The fact that SNSs allow users to keep in touch with contacts who would otherwise be lost contributes greatly to the amount and diversity of resources users may have access to, i.e. the capacity of their OSC. The empirical connection between network size and OSC, respectively, network structure and OSC, had already been shown in this thesis.

Second, SNSs facilitate the mobilization of information resources by providing technology that helps users to easily find specific contacts that may provide the requested information. These contacts can be found via directed search processes that make use of profile information. Alternatively, users can post information on their walls and then allow the information to come to them, an efficient and highly SNS-specific undirected form of search. Additionally, SNSs also facilitate communication via a communicative

infrastructure and the reduction of communication barriers. The SNS-facilitated mechanisms of mobilization are highly efficient and they increase range of applicability of resources.

The fact that SNSs facilitate the capacity as well as the mobilization of OSC makes them suitable tools for users` information seeking.

10.2.1.2 CIS on Facebook

To determine if the information-seeking benefits shown on the theoretical level empirically influence the lives of users, I analyzed to what extent facebook is used for seeking coping-related information. Through providing access to coping-related information, facebook use could prevent the accumulation of daily stressors and could thereby reduce the incidence of chronic stress. For the research conducted in this thesis, an original scale was developed, pre-tested, and applied (CMC Scale).

Results showed that participants did use facebook as a tool for CIS, but in general, only a little. They were also less likely to use facebook as compared to the alternative options internet and phone. I assumed that shy users would try to avoid direct social contact, and might therefore be more likely to use the medium for coping; however, this hypothesis was not confirmed.

While this form of facebook-based coping was not very common at the time of the study (first half of 2011), it is very likely that this has changed until now (first half of 2014), due to dramatic increase in popularity that facebook (and other social media) received in the recent years. Hence, a research update would be useful.

10.2.2 Risks

SNS use is associated with specific risks. Since OSC requires the use of an SNS, these risks are also associated with OSC. This thesis contributes to the

literature by conducting the first systematic listing of SNS-specific risks. Furthermore, I introduced and empirically analyzed perceived network demand as a risk directly connected to processes of information seeking.

10.2.2.1 General Risks associated with the Use of SNSs

In this section, I briefly present a listing of risks associated with the use of SNSs. Research on risks is in its beginning phase and scarce. My thesis may serve as a starting point for scholars interested in SNS –associated risks and the specific way in which they are facilitated by the websites.

Forms of Cyberharassment. SNSs can be a source of different forms of cyberharassment. Unlike offline forms of harassment, the effects of cyberharassment may be facilitated by the large amount of personal information available online and by the presence of large networks, which may facilitate the spreading of rumors or defamation.

Social Pressure. Digital networks can become a source of social pressure, since they create a situation of permanent (perceived) evaluation of users by their contacts. Social pressure is more problematic in SNSs (as compared to offline situations), because of the permanent presence of large networks and the fact that most communication is semi-public.

Deleterious Social Comparisons. The great amount of positively biased information posted by SNS contacts about themselves may trigger negative comparisons in users.

Potential for Conflict. Large, diverse, and communicative digital networks may contribute to an increased likelihood of conflict between users and their contacts, especially among younger users (Rainie, Lenhart and Smith 2012).

Privacy and Data Abuse. The large amounts of personal user data collected and stored on websites like facebook may be accessed by third parties such as criminal hackers or intelligence agencies. This information can be used in ways harmful to users, such as identity theft, credit card fraud, or extortion.

Addictive and Problematic SNS Use. There is a risk of deleterious facebook use that may take away time from alternative activities. More severely, there is in terms of addictive use, similar to other behavioral addictions, e.g., related to work.

10.2.2.2 Perceived Network Demand

Perceived network demand refers to the requests for information (e.g., advice or opinions) that users receive from contacts in their networks. I assumed that, due to the presence of large networks and the ways that SNSs facilitate information seeking, perceived network demand could easily become a stressor for some users. In order to empirically test the relevance of the variable, I developed, evaluated, and applied an original scale, the Network Demand Scale.

The empirical analysis showed that participants perceived little demand from their networks, and that this demand was not related to satisfaction with facebook. I therefore concluded that the amount of perceived network demand did not pose a stressor to participants. Matching with my hypothesis, larger networks were perceived as more demanding. I also assumed that Neuroticism was positively associated with perceived network demand, since

highly neurotic users may be more vulnerable to perceiving stressors. This hypothesis was not confirmed, probably due to the general low likelihood of perceiving network demand.

While the results showed little perceived network demand, this may have changed since the research was conducted in the first half of 2011. Since that time, facebook use and networking have greatly increased, and perceived network demand may have become a significant problem, especially for vulnerable users. More research is needed to clarify the relevance of perceived network demand today.

Appendices

Appendix A: Facebook Satisfaction Scale

(based on Diener et al. 1985)

Social networks like facebook offer many possibilities. Many things that are possible in "real" life are also possible online now. Also in the "virtual" life you can network with friends, arrange to meet someone, communicate, view photo albums and show others what is important to you, e.g., via posts. In this section, we are interested in how satisfied you are with your virtual life at the moment. Virtual life refers to everything related to your day-to-day facebook activity – facebook contacts, communication, use…Hence, this test is not about specific events, but about your general satisfaction. (1 = not at all, 7 = completely).

1. In most ways my virtual life is close to my ideal.
2. The conditions of my virtual life are excellent.
3. I am satisfied with my virtual life
4. I can hardly think of anything in my virtual life that I would like to change.

Note. Items translated by the author. In the questionnaire German items were used.

Appendix B: CMC Scale

During studies, challenges and difficulties appear all the time. Imagine you are in one of the following situations and want to get support from others. Please rate, how likely you would use each of the following media: facebook, internet, phone (1= very unlikely; 7 = very likely).

	Facebook		Internet		Phone	
Item	M (SD)	CISC	M (SD)	CISC	M (SD)	CISC
1. Problems with the organization of my courses.	3.7 (2.2)	.62	4.9 (2.0)	.37	5.3 (1.7)	.50
2. Problems with my computer.	2.7 (2.0)	.63	4.7 (2.2)	.39	5.4 (1.9)	.63
3. Problems with the preparation of an important test.	3.0 (2.1)	.64	4.6 (2.0)	.59	5.0 (1.9)	.57
4. I would like to furnish my room/ move.	3.1 (2.0)	.63	3.7 (2.2)	.45	5.3 (2.0)	.42
5. Problems with understanding applications or contracts.	2.2 (1.7)	.67	4.7 (2.2)	.61	5.3 (1.9)	.69
6. I want to ask somebody's advice before a costly purchase.	2.8 (2.0)	.68	4.9 (2.1)	.47	5.2 (1.9)	.58

Note. SD = standard deviation. CISC = corrected item-scale correlation. N = 135 (Sample 2). Items translated by the author. The CMC Scale (CMC = coping-related media choice) was originally developed, pretested and evaluated for this thesis. It consists of six items that represent day-to-day stressors from student life and three dimensions on which participants can rate how likely they would use a specific medium (facebook, internet, phone) in order to get supportive information. For the evaluation of the scale, a principal component analysis was done. It showed that all three dimensions of the scale are empirically one dimensional, i.e. only one component showed an Eigenvalue above 1 (Kaiser`s criterion; Kaiser 1960). This one dimension explained 58.3% (facebook), 44.4% (internet), and 51.1% (phone) of variance. Furthermore, the three dimensions had good internal consistency with Cronbach`s α of .86 (facebook), .74 (internet), and .80 (phone). Only facebook and internet showed a weak correlation, r = .26, $p < .01$

Appendix C: Correlations between User-/Facebook-Related Variables and Facebook Use in Samples 1, 2, 3

	Sample 1	Sample 2	Sample 3
Age	.06	-.07	-.03
Distance[a]	.27*	-	-
Neuroticism	-.09	-.02	-
Extraversion	.18	-	-
Openness	-.05	-	-
Agreeableness	-.13	-	-
Conscientiousness	-.07	-	-
Shyness	-	-.13	-
Offline relationships[b]	.28**	-	-
Facebook Likes[c]	-	-	.39***
Satisfaction with Facebook	-	-	.14
Identification [d]	.08	-	-

Note. All correlations are Spearman`s correlations. Sample 1: N = 90. Sample 2: N = 143. Sample 3: N = 116 (N = 79 for likes).
[a] Distance refers to the distance to students` last place of residence. [b] Number of friends and acquaintances offline. [c] Amount of content that a user "liked" since the introduction of the like-button; refers to content that had been posted on the facebook wall of the user. [d] Refers to participant`s identification with their fellow students.
*$p < .05$. **$p < .01$. $p < 0.001$

Appendix D: Correlations (a) and *t*-Tests (b) Related to Network Structure and User Variables

a) Correlations between Network Structure and Four Personality Traits

	Components	Isolates	Actor BC
Extraversion	-.10	-.05	.02
Openness	-.17	-.17	-.07
Agreeableness	-.08	-.11	-.11
Conscientiousness	-.06	-.07	-.04

Note. All correlations are Spearman`s correlations. N = 82. BC = Betweenness centrality

b) *t*-Tests for Gender and Residential Status

	Gender			Residential Status		
	F	M	*t*-value	< 150 km	> 150 km	*t*-value
Components	3.25	3.19	$t(80) = 0.1, p = .90$	2.69	3.48	$t(80) = -1.7, p = .09$
Isolates	7.46	7.54	$t(80) = -0.1, p = .96$	5.69	8.32	$t(67) = 0.5, p < .05$[a]
Actor BC	.31	.30	$t(80) = 0.5, p = .65$	.30	.31	$t(80) = -0.4, p = .67$

Note. N = 82 (female = 56/ male = 26; < 150km = 26/ > 150km = 56). BC = Betweenness Centrality.

[a] While in the *t*-test there is a significant difference between participants according to the distance from their last place of residence, this effect was no longer existing in the subsequent regression analysis, where other predictors were added. Therefore, residential status was not included in the final regressions that are displayed in Chapter 8 (Table 15).

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Summary (German)

Deutsche Zusammenfassung der Dissertation: Social Capital Sites - Understanding Digital Networks from a Resource Perspective.

Zwei konkrete Fragen standen im Zentrum dieser Dissertation. Erstens, weshalb sollten soziale Netzwerkseiten (SNS), wie z.B. facebook, den Alltag ihrer Nutzer beeinflussen? Zweitens, mittels welcher Prozesse sollte diese Beeinflussung stattfinden? Die Dissertation beantwortet diese Fragen aus einer Sozialkapitalperspektive. Dabei wurde theoretisch herausgearbeitet und empirisch analysiert, wie SNSn über das mit ihnen verbundene Sozialkapital und nutzungsspezifische Risiken in den Alltag von Nutzern/innen hineinwirken. Digitale Netzwerke, ihrer Größe und Struktur, spielen hierbei eine zentrale Rolle.

Diese Arbeit trägt zur existierenden Literatur durch einen umfassenden theoretischen Ansatz, durch die Einbindung von Netzwerkdaten, durch die längsschnittliche Beobachtung von Facebooknetzwerken, durch die Entwicklung und Anwendung eigener SNS-spezifischer Skalen und durch die Nutzung deutscher Probanden bei. Im Folgenden werde ich die theoretischen, empirischen und methodischen Kernpunkte meiner interdisziplinären Arbeit kurz darstellen.

1.Größe, Wachstum und Struktur digitaler Netzwerke und Sozialkapital

Durch ihre spezielle Technologie unterstützen SNSn ihre Nutzer beim Aufbau und bei der Aufrechterhaltung eines großen und heterogenen Netzwerkes

sozialer Kontakte. Diese Netzwerke stellen eine wichtige Ressource dar und wurden bisher im Bereich der Sozialwissenschaften kaum untersucht.

Im empirischen Teil der Arbeit analysierte ich die Größe, Struktur, und das Wachstum individueller, egozentrierter Facebook Netzwerke von Erstsemesterstudenten/innen über die ersten acht Monate ihres Studiums. Im Durchschnitt wuchsen diese Netzwerke linear und stabil um ca. 2 Kontakte pro Woche, von 157 (Oktober 2010) auf 223 Kontakte (Juli 2011). Erstsemesterstudenten/innen mit vielen Freunden und Bekannten und solche, die nicht aus der näheren Umgebung der Hochschule gekommen waren, wiesen größere Netzwerke zu Beginn des Semesters auf. Außerdem hatten Extraversion und die Identifikation mit den Kommilitonen/innen einen positiven Einfluss auf die Netzwerkgröße zu Semesterbeginn. Die tägliche Facebooknutzung war der wichtigste Prädiktor von Netzwerkgröße und zeigte zudem einen positiven Einfluss auf das Wachstum der Netzwerke. Zudem zeigte sich ein positiver Zusammenhang zwischen der Netzwerkgröße am Anfang und der Stärke, so wie auch der Stabilität, des Wachstums.

Neben der Netzwerkgröße, wurden drei unterschiedliche Maße für Netzwerkstruktur untersucht. *Components* sind Gruppen von Kontakten innerhalb des Netzwerkes die keine Verbindung zu anderen Kontakten in diesem Netzwerk besitzen. Analog dazu, sind *Isolates* einzelne Kontakte die keine Verbindung zu anderen Kontakten im Netzwerk besitzen. *Actor Betweenness Centrality* wurde als aggregierter Indikator für die Vernetzung der Kontakte innerhalb des Netzwerks genutzt. Ein durchschnittliches Netzwerk enthielt drei Components, sieben Isolates und Nutzer/innen hatten eine durchschnittliche Betweenness Centrality von .31. Die weitere Untersuchung ergab, dass Persönlichkeit, Geschlecht, Alter und die Entfernung zwischen dem letzten Wohnort und dem Studienort kaum Einfluss auf die drei Maße

der Netzwerkstruktur hatten. Nur Neurotizismus (Isolates) und Alter (Actor Betweenness Centrality) zeigten einen signifikanten, positiven Effekt.

Digitale Netzwerke unterscheiden sich von nicht-digitalen Netzwerken, durch die höhere Anzahl und Unterschiedlichkeit der in ihnen beinhalteten Kontakte. Basierend auf dem weitverbreiteten Sozialkapital-Ansatz (z.B. Bourdieu 1986; Burt 2000; Coleman 1988; Lin 2001; Putnam 2000), definierte ich SNS-basierte Informationsressourcen, als Online Social Capital (OSC).

Die empirischen Ergebnisse zeigten, dass Nutzer/innen ihre digitalen Netzwerke generell als Informationsressource wahrnahmen (Zustimmung: 4.1 auf einer Skala von 1 bis 7). Zudem war diese Wahrnehmung mit einer höheren Nutzung von facebook, allgemein und zur Kommunikation („likes"), und mit einer höheren Zufriedenheit mit Facebook verbunden.

Desweiteren zeigten die Ergebnisse den angenommenen positiven Zusammenhang zwischen Netzwerkgröße und wahrgenommenem OSC. Ich hatte außerdem angenommen, dass Netzwerke mit vielen Isolates/ Components und solche, in denen der Nutzer/ die Nutzerin eine hohe Betweenness Centrality besitzt, über viele unterschiedliche Informationsquellen verfügten. Sie sollten deshalb mehr OSC aufweisen. Die empirische Auswertung bestätigte den Einfluss von Isolates. Die Dissertation enthält eine ausführliche Diskussion der Vor- und Nachteile von Netzwerkmassen im Kontext sozialwissenschaftlicher Fragestellungen.

2. Auswirkungen von SNSn auf den Alltag ihrer Nutzer – Informationssuche und Risiken

SNSn erhöhen einerseits die Kapazität des individuell verfügbaren Sozialkapitals, andererseits verbessern sie die Möglichkeiten von

Nutzern/innen dieses zu mobilisieren. Diese Mobilisierung wird insbesondere durch website-basierte Möglichkeiten der Kontaktsuche und der Kommunikation unterstützt, welche zu einer erhöhten Effizienz und einer weiteren Anwendbarkeit von OSC, im Vergleich zu nicht-digitalen Formen von Sozialkapital, beitragen.

Um empirisch zu testen, wie weit digitale Netzwerke zur Informationssuche genutzt werden, wurde eine eigene Skala entwickelt und angewendet. Die CMC Scale misst, inwiefern Testpersonen facebook oder andere Medien nutzen, um sich bei Alltagsproblemen Hilfe zu holen. Die Ergebnisse zeigten, dass die Probanden/innen, im Allgemeinen, die Nutzung von Internet und Telefon bevorzugten und nur wenig Facebook nutzten. Schüchternheit, Alter und Geschlecht hatten hierbei keinen Einfluss auf die Nutzung von Facebook.

Die Nutzung von SNSn ist mit bestimmten Risiken verbunden, die sich je nach Nutzer/in stark unterscheiden können. Diese Risiken beziehen sich auf abhängige/ schädliche Mediennutzung, Datenmissbrauch, unterschiedliche Formen von Cyberharassment sowie auf den sozialen Druck, den problematischen sozialen Vergleich und das Konfliktpotential welche mit der Mediennutzung verbunden sind.

Empirisch wurde in dieser Arbeit Network Demand mit einer eigens entwickelter Skala untersucht. Network Demand bezieht sich auf die Häufung von Anfragen aus dem digitalen Netzwerk, welche in ihrer Summe zur Belastung für Nutzer/innen werden könnten, z.B. im Sinne von chronischem Stress. Insgesamt empfanden Nutzer wenig Network Demand. Während die Netzwerkgröße einen positiven Zusammenhang mit Network Demand zeigte, hatte Neurotizismus keinen Einfluss.

Die geringe Belastung der Nutzer und auch die niedrige Nutzung von Facebook zur Informationssuche, sind wahrscheinlich darin begründet, dass die Facebooknutzung zur Zeit der Erhebung (Anfang 2011) in Deutschland noch im Anfangsstadium war. Die Ergebnisse deuten darauf hin, dass die seitdem stattgefundene gesteigerte Nutzung von Facebook sich positiv auf die Nutzung der Website zur Informationssuche und auf den wahrgenommenen Network Demand ausgewirkt haben könnte.

Ehrenwörtliche Erklärung (zu „Social Capital Sites - Understanding Digital Networks from a Resource Perspective“)

Sehr geehrte Damen und Herren,

hiermit erkläre ich,

- dass mir die geltende Promotionsordnung bekannt ist.
- dass ich die Dissertation selbst angefertigt habe, keine Textabschnitte eines Dritten oder eigener Prüfungsarbeiten ohne Kennzeichnung übernommen und alle von mir benutzten Hilfsmittel, persönlichen Mitteilungen und Quellen in meiner Arbeit angegeben habe.
- dass die Hilfe eines Promotionsberaters nicht in Anspruch genommen wurde und dass Dritte weder unmittelbar noch mittelbar geldwerte Leistungen von mir für Arbeiten erhalten haben, die im Zusammenhang mit dem Inhalt der vorgelegten Dissertation stehen. Die englischen Rechtschreibung und Grammatik in dieser Dissertation wurde gegen Bezahlung von Fr. McMillan Korrektur gelesen.
- dass ich die Dissertation noch nicht als Prüfungsarbeit für eine staatliche oder andere wissenschaftliche Prüfung eingereicht habe.
- dass ich die gleiche, eine in wesentlichen Teilen ähnliche oder eine andere Abhandlung nicht bei einer anderen Hochschule als Dissertation eingereicht habe.

Unterschrift

Ort, Datum