

Do Socially Anxious Adolescents Develop Social Support Online?

A Longitudinal Study of Friendship Support

Abstract

In this longitudinal study, we examined to what extent socially anxious adolescents developed supportive, intimate relationships online. A total of 584 adolescents (ages 10-24) in Swedish town Kumla answered questionnaires about their online friendship support, social anxiety, motives to compensate for lack of offline relationships with online relationships, and time spent chatting. In an eight-month follow-up, the same group answered questions about their friendship support. The results showed that social anxiety predicted an increase in online friendship support over time, while compensation motive predicted a decrease. These effects held regardless of how much they chatted. Social anxiety did not predict changes in offline friendship support. Findings indicate that socially anxious adolescents are the ones who find important relationships online.

Key words: Social anxiety, compensation motive, chatting, friendship support

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Introduction

Most adolescents in contemporary societies had daily access to the Internet during recent years, and social forums were widely used, according to major reviews (e.g. Willoughby, 2008; Findahl, 2011). Online forums, such as Facebook and Microsoft Network (MSN) became a popular arena for communicating with others. Among Swedish children and adolescents, 90% or more visited social forums and 70% or more used them frequently (Findahl, 2011). The most common reason adolescents communicated online was to stay in touch with friends from their existing offline social network (Valkenburg, Schouten, & Peter, 2005; Subrahmanyama, Reich, Waechter, & Espinoza, 2008; Gross, 2004; Barker, 2009), but adolescents could also have online exclusive friends with whom they only spent time with online (Van Zalk, Branje, Denissen, Van Aken, & Meeus, 2011). In sum, in most contemporary societies, online communication has a central role in the social lives of adolescents.

Although most youths in general use online communication for social purposes, some demographic differences have been found in the content of usage. Age seem to play a part in online communication use and its social consequences (e.g. Valkenburg, 2005). Young adolescents communicated more with strangers, while older adolescents kept in touch with their existing network to a higher degree (Valkenburg, 2005; Ojanen et al., 2010). The proportion of adolescents who had close relationships online increased from age 10, peaked at age 15 and decreased in ages 16-17 (Wolak, Mitchell, & Finkelhor, 2002). Apart from age differences in online use, there were differences between genders. The specific activities differs between genders in both US and Chinese samples, with early adolescent boys playing more games, and girls communicating more via email and chat (Jackson, et. al. 2008). Thus, age and gender should be controlled for when analyzing online communication and its consequences.

The social use of the Internet is perhaps somewhat unsurprising, given the interest in friends expressed by young adolescents and the importance of these relationships. During early adolescence, same age-friends became increasingly important (Steinberg & Silverberg, 1986). Early adolescents spent most of their leisure time with friends compared with other relationships (Furman and Buhrmeister, 1985). Friendships differed in a number of ways, including levels of support (e.g. Bukowski, Hoza, & Boivin, 1994; Hartup & Stevens, 1997). Several studies have shown important benefits of friendship support on both short-term and long-term emotional development. Supportive friendships seem to protect against bullying and victimization during adolescence (Kendrick, Jutengren, & Stattin, 2012), depressive symptoms in middle adolescence (Nilsen, Karevolda, Röysamba, Gustavsona, & Mathiesena, 2012), and depressive symptoms in late adolescence among girls with low social skills (Nilsen, et. al. 2012). Having friends during preadolescence also predicted lower depressive symptoms in early adulthood (Bagwell, Newcomb, & Bukowski, 1998). Thus, several studies indicated that supportive relationships with offline friends can be an important protective factor in adolescence. Still, a lot of key issues remain unexplored, especially regarding online relationships. This study aims to further contribute to understand the importance and functions of online relationships in adolescence.

Theoretical perspectives on online communication

Adolescents use the Internet mainly for social purposes, and the Internet is a new and exciting arena for adolescents to form new types of friendships. Nevertheless, adolescents who use the Internet excessively could be at risk for certain problems. According to the displacement perspective, there may be negative social effects of time spent online (Kraut, Patterson, Lundmark, Kiesler, Mukopadyay, & Scherlis, 1998). Kraut et al. (1998) argued that more frequent use of the Internet led to increased loneliness, because time spent online would reduce time spent on offline social activities. The core assumption here was that most online relationships were superficial, and

less supportive than offline relationships. Thus, excessive Internet use could displace strong offline relationships with weaker online relationships. In sum, the displacement perspective predicts that time spent online leads to superficial relationships, at a cost in terms of offline relationships, which in turn leads to lower support.

In contrast, the Internet could act as an arena for training social skills, and for gaining social relations offline. A general idea is that the specific features of online communication, for example relative anonymity and accessibility, would facilitate social relationships for those who need it the most (McKenna, Green, & Gleason, 2002). This idea was called the stimulation perspective (e.g. Valkenburg & Peter, 2007a). If satisfying relationships were formed online, people are expected to be highly motivated to bring these relationships offline. Online communication could stimulate offline social relationships directly through the formation of new relationships online and indirectly through social skills learned online (Valkenburg & Peter, 2009a). Thus, according to the stimulation perspective, frequent online communication leads to increased friendship support.

Empirical studies showed mixed support for the displacement and stimulation perspectives. At least two studies supported the displacement perspective. Kraut et al. (1998) followed American families during their first two years of Internet-use. Greater frequency of Internet-use was related to lower social involvement and higher levels of depression symptoms. Sanders, Field, Diego and Kaplan (2000) found that Internet use was cross-sectionally negatively related to offline intimacy. Thus, these studies showed that time spent online was associated with lower social involvement and offline relationship quality. In contrast, other studies supported the stimulation perspective. In a Dutch sample, online communication was positively related to more perceived closeness to friends (Valkenburg & Peter, 2007b). In another cross-sectional analysis, adolescents who communicated online and felt close to their friends were more satisfied with life (Valkenburg & Peter, 2007a). Time spent online was associated with life satisfaction and offline relationship quality. There were

also studies that did not support either perspective. In their 3-year follow-up of the American families, Kraut, Kiesler, Boneva, Cummings, Helgeson and Crawford (2002) found that Internet use was no longer related to lower social involvement or higher depression. Wästlund, Norlander and Archer (2002) found that general time spent on the Internet did not predict depression. There are important differences in focus on the type of Internet use between these prior empirical studies. Whereas studies supporting the displacement perspective focused on general Internet use (Kraut et al. 1998; Sanders et al., 2000), studies supporting the stimulation perspective have focused on online communication, like chatting (Valkenburg & Peter, 2007a; Valkenburg & Peter, 2007b). Surfing and chatting are different activities; studies comparing them have found that these activities have different associations with depressive symptoms (Morgan & Cotten, 2003; Selfhout, Branje, Delsing, ter Bogt, & Meeus, 2009). The outcome measures were also different, ranging from social involvement and depression (Kraut et al., 1998) to perceived closeness to friends and life satisfaction (Valkenburg & Peter, 2007a). Thus, the displacement and stimulation perspectives were supported by studies using different operationalizations.

Besides differences in support for the displacement and stimulation perspectives according to type of Internet use and outcomes, several specific hypotheses have been proposed about the effects of online communication for different types of users. According to the social compensation hypothesis (e.g. Valkenburg & Peter, 2007b), there may be greater benefits of online communication for those who find it harder in social settings or have less support in their existing offline lives. An example of such a difficulty has been social anxiety, which involves fear of different social situations, and often avoidance of activities involving a lot of contact with other people (Holt, Heimberg, & Hope, 1992). If socially anxious adolescents were to benefit from online communication by forming friendships they would not otherwise form, that would mean that online communication was different from offline communication. Several such differences have been

proposed that highlight how online communication can be appealing for socially anxious adolescents. For example, online communication was relatively more anonymous, accessible, and facilitated finding friends with similar narrow interests (Valkenburg & Peter, 2009a). Scholars have described ideas about that online communication feels safer for those who seek to train social skills (Campbell, Cumming, & Hughes, 2006), that it presents a more attractive arena for those who perceive greater offline social risks (Yan, Charmian, & Yee Lo, 2012), and that people can disclose personal information online without the feeling of being limited by social expectations (Valkenburg & Peter, 2009a). In sum, the social compensation hypothesis suggests that online communication should make friendship development easier for socially anxious adolescents and thus predicts more supportive online relationships for them.

In contrast to the social compensation hypothesis, the poor-get-poorer hypothesis propose that adolescents who have poor social networks and escape into the Internet could get worse outcomes (Selfhout et al., 2009). The reason may be that these adolescents spend time surfing instead of communicating. They are thought to lack people to chat with, since they cannot as easily bring friends from their offline network into online forums. According to this hypothesis, researchers should differentiate between adolescents with supportive and unsupportive offline friendships, since Internet use may have different consequences for them. Theoretically, socially isolated individuals may prefer online communication to offline communication, which can help explain why Internet use sometimes was associated with more loneliness (Caplan, 2003). The poor-get-poorer hypothesis predicts that online communication can further decrease social support for adolescents with low levels of social support from friends.

A complementary hypothesis to the poor-get-poorer hypothesis is the rich-get-richer hypothesis. It states that people with already well-functioning offline social lives would be able to interact with offline friends even more, and get more benefits from online social networks (Kraut et

al., 2002). This view complemented the poor-get-poorer hypothesis, since it concerned adolescents at the other end of the normal distribution. For example, adolescents with large social networks could bring these online, so that socially “rich” adolescents would have more friends online (Lee, 2009). In addition, adolescents who were more skilled in social situations should be able to achieve higher levels of friendship quality online (Desjarlais & Willoughby, 2010). In this view, the Internet is “just another venue” for those who were able to make friends (Valkenburg & Peter, 2007b). In sum, the rich-get-richer hypothesis predicts good outcomes of online use for those who succeed socially offline.

Several different definitions of being “rich” or “poor” appeared in the literature, including extraversion (Kraut et al., 2002), social anxiety (e.g. Desjarlais & Willoughby, 2010; Valkenburg & Peter, 2007b), and quality of offline social networks (Lee, 2009). These definitions resulted in different subgroups when testing the hypotheses, because not all extraverted people developed rich networks. Different interpretations of social richness led to mixed results when investigating these hypotheses. Consequently, studies supported either hypothesis partly depending on what they asked adolescents.

Several studies supported the social compensation hypothesis, indicating beneficial outcomes of Internet use for socially poor adolescents. Offline troubles and conflicts with parents correlated in a positive direction with closeness of online relationships (Wolak, Mitchell, & Finkelhor, 2003). This could mean that adolescents tried to compensate for offline troubles online. A longitudinal study found that among introverted adolescents, online chatting with friends was associated with higher self-esteem, and indirectly with less depression through friendship support (Van Zalk et al., 2011). This study supported the social compensation hypothesis for introverted adolescents. Researchers also found support for socially anxious adolescents, as adolescents with high social anxiety valued the controllability of online communication higher than those with low

social anxiety and reported using online communication to compensate for their difficulties (Peter & Valkenburg, 2006). In a cross-sectional analysis, social anxiety seemed to moderate the effects of online use on friendship quality among boys (Desjarlais & Willoughby, 2010). One study supported the idea that increased self-disclosure is involved in the mechanism. Using instant messaging frequently, adolescents increased their self-disclosure, and subsequently their friendship support and satisfaction one year later (Valkenburg & Peter, 2009b). In sum, these studies indicated that socially anxious, and introverted adolescents, can compensate online.

There were also studies in support of the poor-get-poorer hypothesis. Socially anxious adolescents communicated online less frequently (Valkenburg & Peter, 2007b), indicating that they used more of their time online in non-communicative activities. This supported a part of the theoretical idea concerning behavior online. Selfhout et al. (2009) found that adolescents with poor quality offline relationships who surfed frequently, were more depressed later. Thus, adolescents escaping into Internet activities in lack of offline support may have suffered negative consequences. Two studies found that lonely adolescents spent more time online, and that time spent online for these adolescents could lead to social withdrawal or depression. (Van den Eijnden, Meerkerk, Vermulst, Spijkerman, & Engeln, 2008; Kim, LaRose, & Peng, 2009). In sum, the poor-get-poorer hypothesis received support from studies measuring relationships, or loneliness.

The rich-get-richer hypothesis was also supported by empirical studies. Kraut et al. (2002) found that Internet use was positively associated with community involvement, and lower levels of loneliness, among extraverted people. Adolescents with high quality offline friendships used online communication more often, which in turn led to more cohesive friendships (Lee, 2009). These results indicated that those who have extraverted personalities, or good relationships offline, could benefit even further from online communication.

We have briefly reviewed the stimulation perspective, the displacement perspective, the social compensation hypothesis, the poor-get-poorer hypothesis and the rich-get-richer hypothesis. These perspectives based their predictions on the assumption that adolescents want to develop good quality relationships. This was a good enough assumption, given the strong relational motives for people in general (e.g. Baumeister & Leary, 1995), and for adolescents in particular (e.g. Steinberg & Silverberg, 1986). Nevertheless, if there is individual variation to how much adolescents lived up to this assumption, it could confound the results. Especially if some adolescents use online communication to compensate for social difficulties offline, and some had other motives. Therefore, we turned to studies asking why adolescents use online communication.

Adolescents' motives to compensate for social difficulties

One important factor in online communication has been what adolescents want and expect to achieve with it. Studies have found a “compensation motive”, a context-specific motive to compensate online for offline difficulties (Peter, Valkenburg, & Schouten, 2005; Peter, Valkenburg, & Schouten, 2006; Bonetti, Campbell, & Gilmore, 2010). Some adolescents reported for example that they chatted online because they felt less shy and talked more comfortably (Peter et al., 2006). This motive to use the Internet to compensate was correlated with social anxiety (Weidman et al., 2012), social phobia (Shepherd & Edelman, 2005), and introversion (Peter et al., 2005), and could thus confound results regarding these constructs. For example, while introverted adolescents generally disclosed less personal information on the Internet, those with motives to compensate for social difficulties disclosed more (Peter et al., 2005). These results pointed to the importance of distinguishing between motives and other constructs.

Compensation motives could explain differences between some studies. For example why socially anxious adolescents reported that the Internet was an important arena for talking intimately with others (Valkenburg & Peter, 2007a), but still used online communication less (Valkenburg &

Peter, 2007b). It could be because measurements of the perception of the Internet as an important arena did not capture the compensation motive. Compensation motive could also help explain gender differences in online communication. Barker (2009) found that males with both low and high collective self-esteem reported compensation motives for online communication, but only females with low levels of collective self-esteem reported compensation motives. Thus, compensation motives could be important to measure simultaneously with gender and social anxiety.

Past studies have revealed little about the effects of compensation motives on online friendship support. Pornsakulvanich, Haridakis and Rubin (2008) found that both personal dispositions and motives contributed to people's satisfaction with online relationships, and closeness with online friends. Thus, motives seemed to matter for the evaluations of online relationships when controlling for personality. Compensation motives could explain why some adolescents with social difficulties achieve good outcomes of online communication (Valkenburg & Peter, 2007a; Valkenburg & Peter, 2009a; Weidman et al., 2012), possibly driven to online communication with a social motive. And why others achieved poor outcomes, possibly driven by a dependency and a compulsive Internet use (Kim et al., 2009; Van der Aa, Overbeek, Engels, Scholte, Meerkerk, & Van den Eijnden, 2009; Van den Eijnden et al., 2008). There may also have been an interaction effect since people with both social anxiety, and a motive to compensate, could be the ones with greatest benefits of time spent communicating online. Thus, the effect of compensation motives on online support is an open question.

When most previous studies measured for example social anxiety (Peter & Valkenburg, 2006; Desjarlais & Willoughby, 2010; Valkenburg & Peter, 2009b), they have often assumed that any differences found were because of that difficulty. As we have argued, it could have been because of these adolescents motive to compensate for their difficulties, rather than their difficulties

alone. Despite studies indicating that compensation motives could be important (Peter et al., 2005; Peter et al., 2006; Bonetti et al., 2010), there are, to our knowledge, no studies examining longitudinal changes in online friendship support. Despite studies indicating that high or low social anxiety is an important distinction when determining the effects of online communication (Peter & Valkenburg, 2006; Desjarlais & Willoughby, 2010; Valkenburg & Peter, 2009b), none of them have measured longitudinal change in online friendship support while controlling for compensation motives. Thus, previous results could have been explained by either social anxiety or by its correlated compensation motive. That has led to the aim of this study.

Aim of this study

In this study, we aim to investigate to what extent adolescents with social anxiety and/or compensation motives could develop supportive friendships online. We also aim to explore the role of chatting for these adolescents. These aims go beyond earlier studies, none of which measured longitudinal changes in online friendship support. Our questions are: 1) How much increase or decrease in online friendship support can be explained by social anxiety, while controlling for compensation motives, age and gender? 2) Is chatting important in predicting online friendship support for the socially anxious, or for those with a compensation motive? 3) Is chatting especially important in predicting online friendship support for adolescents who both are socially anxious and had a motive to compensate? 4) If we find that social anxiety explains changes in online friendship support, are these effects specific for online friendship support, or does social anxiety predict similar changes in offline support?

Method

Participants

The sample included 584 children and adolescents attending school in the Swedish city Kumla. In our sample, 302 (51,7%) were female, and 282 (48,3%) were male. Ages ranged from 10

to 24 ($M = 14.29$, $SD = 1.57$). A total of 466 reported that they were born in Sweden (79,8%), 70 reported that they were not born in Sweden (12,0%), 48 did not answer (8,2%) the question. The participants were asked if their family have more or less money compared to other families in their neighborhood. 9 (1,5%) reported that they have “a lot less money”, 85 (14,6%) that they have “a little less”, 340 (58,2%) “as much as other families”, 80 (13,7%) “a little more”, 14 (2,4%) “a lot more money”. 56 (9,6%) did not answer the question.

Procedure

This survey was administered in two waves, with eight months in between. Test leaders from Örebro University administered Wave 1 with an offline questionnaire in the classrooms, during school hours. The test leaders informed the students that the purpose of the study was to learn more about their Internet habits, feelings about Internet use, and problems they may have on the Internet. They also informed the pupils that participation was voluntary. Wave 2 was administered via the Internet, using email addresses from the offline questionnaire. As a reward for spending time on the study, the pupils received two movie tickets if they filled out both questionnaires.

Informed consent was gathered from both parents and students. Less than 5% decided not to participate and were therefore excluded from the study. The schools received information both prior to and after the study. Data is reported on group level only, so that no individuals can be identified. The procedures and measures used were all approved by the Regional Ethics Committee.

Measurements

Social anxiety. Social anxiety was measured with a modified version of the Social Phobia Screening Questionnaire (SPSQ; Furmark, Tillfors, Everz, Marteinsdottir, Gefvert, & Fredrikson, 1999). The modified version has been validated as a screening instrument for social anxiety disorder in adolescence (Gren-Landell, Björklind, Tillfors, Furmark, Svedin, & Andersson, 2009)

and has longitudinally been linked with depressive symptoms (Tillfors, El-Khoury, Murray, & Trost, 2009). This modified version has a total of 9 items, with the question “How scared are you usually when:”, followed by situations that can elicit anxiety (e.g. “Looking in someones eyes while speaking”). The response alternatives were: “No fear”, “some fear”, “a lot of fear”. One online situation was added (“To get in touch with someone you don’t know on the Internet”) to the original eight situations. The Cronbach’s alpha was .74 at Wave 1 and .81 at Wave 2.

Time spent chatting, frequency and length. Chatting was defined in the instructions: “By chatting we mean being online and sending messages directly to other people who can answer you straight away (like MSN, for example). Chatting is NOT leaving messages on forums, blogs, e-mailing, sms-ing, or any other way of communication that does not involve direct contact”. Time spent chatting was measured with two questions: “How often do you chat per week”, followed by response items: “None of the days”, “1 day/week”, “2 days/week”, “3 days/week”, “4 days/week”, “5 days/week”, “6 days/week”, “All days of the week”; and “If you chat, how long do you chat each time?”, followed by response items: “I never do that”, “Up to 1 hour”, “Between 1-2 hours”, “Between 2-3 hours”, “Between 3-4 hours”, “Between 4-5 hours”, “Between 5-6 hours”, “More than 6 hours”. The Cronbach’s alpha was .62 at Wave 1 and .68 at Wave 2.

Online friendship support. The online friendship support scale is a modification of the original Friendship Quality Questionnaire (FQQ), developed by Parker and Asher (1993). The original scale consisted of 40 items on a five degree scale. The original scale measures different features of friendship quality in relation to a single high valued friend. The scale was modified for online friendships, and shortened from 40 items about relationship quality to 7 items measuring friendship support. The participants were asked to think about a person whom they only spend time with online. The 7 items regarded support with the VIOP (very important online peer) for example “My VIOP keeps his or her promises”. The participants rated these statements on a 5 degree scale,

from “Don’t agree at all” to “Agree completely”. The Cronbach’s alpha was .95 at Wave 1 and .96 at Wave 2.

Offline friendship support. This is a subscale from the original Friendship Quality Questionnaire (FQQ) by Parker and Asher (1993). It has corresponded moderately well with friend ratings of the same relationships, across time and genders (Simpkins, Parke, Flyr, & Wild, 2006). It has good factorial validity and target specificity (Kiesner, Nicotra, & Notari, 2005). The scale is similar to the online friendship support scale described above, but the participants were asked to think about a person they spend time with offline and the term “VIOP” was replaced with “friend”. The Cronbach’s alpha was .90 at Wave 1 and .91 at Wave 2.

Compensation motive. Motive to compensate online was measured using a 4 item 7 degree scale. The scale starts with a statement, “I chat online because:” followed by four possible motives for chatting online; “I feel less shy online”, “I feel more comfortable expressing myself online”, “I’m less ashamed of myself online” and “It’s easier for me to talk to others online”. The participants rated the motives from 1 (Completely true) to 7 (Not true at all). Low scores indicated a higher compensation motive, we used reversed scores for our analyses. The Cronbach’s alpha was .92 at wave 1 and .92 at Wave 2.

Strategy of analysis

The frequency of missing data ranged from 28 % to 79 % across the measurements (See Table 1). We used Expectation maximization (EM) to handle all of the missing data. This method is a better way of handling missing data than listwise deletion (Schlomer, Bauman, & Card, 2010), which is been the standard procedure in SPSS. Listwise deletion would have excluded all participants who does not have data on all variables, which decreases the number of participants and decreases power of all analyses. EM is a maximum likelihood approach where available data is used to estimate missing data. The estimation generates new parameters for the missing variables, which are

compared to the original parameters. These steps are repeated until the changes of the new estimations were small for the missing data (Schlomer et al., 2010). This type of method was recommended for exploratory statistical analyses which require large sample sizes (Schlomer et al., 2010). Little's test for MCAR (Missing Completely At Random) showed that the missing data did not have a completely random pattern (Chi-Square = 816.08, DF = 632, Sig. = .00). We conducted a logistic regression to see if any of the variables predicted missing data on our dependant variable (Online friendship support at Wave 2). Social anxiety Wave 1 did significantly ($p > .05$) predict if a person did fill out answers on support at Wave two, and so did chatting Wave 1 ($p > .01$). Thus the missing data had a pattern of missing not at random (MNAR). To replace the missing data, we performed Expectation maximization using chatting, social anxiety, compensation motive and online friendship support.

To answer our first research question, we tested a linear regression predicting online friendship support at Wave 2, with online friendship support at Wave 1, compensation motives, social anxiety, and chatting. To test our second and third research questions regarding interactions, we computed interaction terms by multiplying independent variables with each other, and then entering them in the regression. We multiplied social anxiety with compensation motive, chatting with compensation motive, social anxiety with chatting and chatting with compensation motive and social anxiety. As a further control, we replicated that main model regression using offline support as a dependent measure.

TABLE 1

Missing data

	Valid	Missing	Missing %
Motive W1	420	164	28.08%
Chatting W1	420	164	28.08%
Social Anxiety W1	406	178	30.48%
Online friendship support W1	192	392	67.12%
Online friendship support W2	123	461	78.94%

W1 = Wave 1, W2 = Wave 2.

Results

To describe our data, we report the means and standard deviations of all variables used in the analyses (see Table 2). Table 3 shows Pearson's correlations between the variables used as independent variables in this study. Significant linear correlations exist between compensation motive and support at Wave 1 (negative), compensation motive and social anxiety, social anxiety and chatting (negative). Female gender correlates with social anxiety, social support at both Wave 1 and Wave 2.

TABLE 2

Means and standard deviations

	Mean	Standard Deviation
Motive W1	3.46	1.67
Chatting W1	4.50	1.61
Social Anxiety W1	1.40	.27
Online friendship support W1	3.46	.79
Online friendship support W2	3.72	.75

W1 = Wave 1, W2 = Wave 2.

TABLE 3

Pearson Correlations

Scale	1	2	3	4	5	6	7
1. Age	-						
2. Gender	.06	-					
3. Online friendship support W1	-.02	.21***	-				
4. Social Anxiety W1	.02	.33***	.03	-			
5. Motive W1	-.05	.05	-.13**	.21***	-		
6. Chatting W1	-.01	.04	.08	-.17***	.25***	-	
7. Online friendship support W2	-.04	-.28***	.38***	.27***	-.08*	.02	-

N = 584. * $p < .05$; ** $p < .01$; *** $p < .001$. W1 = Wave 1, W2 = Wave 2.

To answer our first research question, we examined online friendship support at Wave 2 as a function of online friendship support at Wave 1, age, gender, compensation motive at Wave 1, social anxiety at Wave 1, and chatting at Wave 1 (Table 4). For this analysis, we used a linear regression.

Social anxiety predicted an increase in online friendship support. Being male and compensation motive both predicted decreases in online friendship support. This model explained 23.4% of the variance in online friendship support at Wave 2 ($R=.49$, Adj. $R^2=.23$, Std Error=.65).

To answer our second and third research questions, we examined interactions between social anxiety and compensation motive between chatting and compensation motive, and between social anxiety and chatting, while controlling for the main effects of these variables. After we enter these interactions, standardized effects cannot be meaningfully interpreted (Preacher & Hayes, 2008). Social anxiety did not interact with chatting to predict online friendship support. Compensation

motive did not interact with chatting to predict online friendship support. Compensation motive, social anxiety, and chatting did not interact together to predict online friendship support. In sum, none of the interactions were significant.

TABLE 4

Regression Model, Dependent variable Online friendship support W2

	b	SE	β
Model 1			
Online friendship support W1	.31	.04	.33***
Social Anxiety W1	.74	.12	.26***
Motive W1	-.05	.02	-.11**
Gender	-.18	.06	-.12**
Chatting W1	.03	.02	.07
Age	-.02	.02	-.04
R ²	.24		
Model 2			
Chatting W1*Social Anxiety W1	.05	.06	.16
Model 3			
Motive W1*Chatting W1	.00	.01	.01
Model 4			
Motive W1*Social Anxiety W1	.05	.06	.17
Model 5			
Chatting W1*Social Anxiety W1*Motive W1	-.00	.01	-.08

*N=584. ** $p < .01$; *** $p < .001$. W1 = Wave 1, W2 = Wave 2.*

Analyses of offline friendship support

To answer research question number four, we conducted further analyses to examine offline friendship support at Wave 2 as a function of offline social support at Wave 1, age, gender, compensation motive at Wave 1, social anxiety at Wave 1 and chatting at Wave 1. For this analysis, we replicated the Expectation maximization procedure using offline friendship support instead of

online friendship support. The reason for this was to get a model that could be compared with the main model predicting online friendship support. For Wave 1, a total of 111 participants had missing data on offline friendship support; for Wave 2, a total of 261 participants had missing data on offline friendship support.

Offline friendship support at Wave 1 correlated $-.20, p < .01$ ($N=584$) with compensation motive, $.04, ns.$ ($N=584$) with social anxiety, $.07, ns.$ ($N=584$) with chatting and $-.37, p < .01$ ($N=584$) with gender. Offline friendship support at Wave 2 correlated $-.20, p < .01$ ($N=584$) with compensation motive, $.11, p < .01$ ($N=584$) with social anxiety, $-.01, ns.$ ($N=584$) with chatting and $-.37, p < .01$ with gender. The stability correlation for offline friendship support between Wave 1 and Wave 2 was $.55, p < .01$ ($N=584$).

For the next analysis we used a linear regression. Being male predicted a decrease in offline support at Wave 2. Compensation motive predicted a decrease in offline support at Wave 2. Social anxiety did not significantly predict any change in offline friendship support at Wave 2. Neither did chatting. This model explained 34.8% of the variance in offline friendship support at Wave 2 ($R=.59, Adj. R^2=.35, Std Error=.56$).

TABLE 5

Regression Model, Dependent variable Offline friendship support W2

	b	SE	β
Offline friendship support W1	.40	.03	.47***
Age	.00	.02	.00
Gender	-.24	.05	-.17***
Motive W1	-.05	.02	-.11**
Social Anxiety W1	-.16	.10	.06
Chatting W1	-.00	.02	-.01
R^2	.35		

$N=584$. * $p < .05$; ** $p < .01$; *** $p < .001$. W1 = Wave 1, W2 = Wave 2.

Discussion

This study indicated that adolescents with higher levels of social anxiety developed more supportive friendships online than adolescents with lower levels of social anxiety. First, we asked if social anxiety in itself would predict changes in online friendship support, or if the motivation to compensate for difficulties online would explain these changes. The results were clear. In support of the social compensation hypothesis, socially anxious adolescents increased their online friendship support during the period of our study. This was surprising, since previous studies have found social anxiety to be related to lower offline friendship quality in general (Desjarlais & Willoughby, 2010), and lower social support for girls (La Greca & Lopez, 1998), and boys (Tillfors, Persson, Willén, & Burk, 2012). To further enhance the interpretation of our findings, we showed that social anxiety was not predictive of the future development of offline friendship support. This could mean that the online arena is different, and that its specific features described by Valkenburg & Peter (2009a) gave access to support for adolescents who were too anxious to be comfortable getting it offline. The control for compensation motives further strengthened our conclusion. Compensation motives predicted decreases in online friendship support. A previous study showed positive associations between compensation motives and friendship formations (Peter et al., 2005). This indicated that the supportive qualities we measured were different from friendship formation. Possibly, compensation motives would drive adolescents into seeking new friendships, rather than develop the quality of the ones they have online. To our knowledge, this is the first study predicting online friendship support longitudinally while controlling for compensation motives. The results indicate that social anxiety has an important role in the development of online friendship support.

Socially anxious adolescents' development of online supportive friendships could have important implications for interventions. Online friendship support had beneficial effects in previous studies. For example, communicating online with close friends was related to higher well-

being (Gross, Juvonen, & Gable, 2002). This indicated a positive role of online friendship support. Researchers and clinicians should also consider the possibilities of online friendship support as a protective factor for socially anxious adolescents. A central question could be if online friendship support also can play the same protective role as has been demonstrated for offline support (e.g. Kendrick et al., 2012; Nilsen et al., 2012; Bagwell, et al., 1998), especially for socially anxious adolescents who develop these relationships more than adolescents with lower social anxiety. Considering that depressive symptoms have been found to be particularly common among socially anxious adolescents (Buckner, Bernert, Cromer, Joiner, & Schmidt, 2008; José, Wilkins, & Spendelov, 2012; Tillfors et al., 2009), developing online supportive friendship could prove to be very important to a group of adolescents who often have lower levels of offline friendship support. Socially anxious adolescents with high friendship quality were more likely to be helped by cognitive behavioral therapy, according to a treatment study of anxiety disorders (Baker & Hudson, 2013). If this is also true for online friendships, they could play an important role in future treatments of for example depression among socially anxious adolescent. Thus, there can be important implications in both preventions as well as in interventions.

Social anxiety alone does not explain why or how online friendship support developed, even though this study indicates it is an important factor in explaining this. Scholars have proposed different mechanisms. Campbell et al. (2006) theorized that socially anxious chat users log on to cope with their difficulties, and to rehearse social behaviors. In that view, social anxiety would motivate the training of social skills online, which could enhance friendship qualities. The more socially anxious adolescents could have changed their social skills more than others from using online communication during the period of our study. Another possible mechanism was that socially anxious adolescents disclosed more personal information on the Internet, since several scholars have suggested that self-disclosure is more frequent in online communication, than in

offline communication. (e.g. Pornsakulvanich et al., 2008; Peter et al., 2005; Tidwell & Walther, 2002). Valkenburg & Peter (2007a) theorized that online communication would lead to more online self-disclosure for socially anxious adolescents, and that online self-disclosure would lead to higher online friendship quality. Consequently, online self-disclosure was associated with higher perceived friendship qualities (Valkenburg & Peter, 2007b). Our study did not test the relevance of such a mechanism, but a future longitudinal study measuring self-disclosure could test it. That would be interesting since it would suggest that those adolescents who wish to enhance their relationship qualities should train self-disclosure online. Future studies should examine processes such as self-disclosure and social skills training, which can explain why socially anxious adolescents find more online friendship support longitudinally.

As a second question, we asked if chatting would predict online friendship support especially for adolescents who are socially anxious, or who have a motive to compensate. The answer seemed to be no, since chatting was unrelated to online friendship support and did not interact with social anxiety or compensation motives when predicting online friendship support. According to the stimulation perspective, time spent communicating online would lead to stimulation of relationships, regardless of social anxiety levels (McKenna et al., 2002; Valkenburg & Peter 2007a). That is not what we found, time spent chatting did not predict online support. One reason could be that we captured a quality in existing relationships, while the stimulation perspective originally focused on friendship formation (McKenna et al., 2002). Our study also differed from some results regarding existing relationships. As an example, in a previous study, social anxiety was negatively associated with online communication and online communication was positively associated with closeness to existing friends (Valkenburg & Peter, 2007b). One difference between their study and our current study is that our current study explained how much the perceived support from online friends increased among adolescents, rather than the level of

perceived closeness to friends. In sum, the stimulation perspective would predict positive associations between online communication and online friendship quality, but we found no support for this.

Another reason for why we found no effect of chatting could be a conceptual limitation in our measure of chatting. Online communication is a broad term, and possibly chatting did not capture the full construct. Adolescents have reported other ways of communicating on the Internet besides chatting, for example 52% of Swedish boys ages 12-15 play multiplayer online games every day (Findahl, 2011). The nature of social network technology has been in constant change since this area of research started. For example, the Kraut et al. (1998) study found detrimental effects of Internet use, which disappeared later (Kraut et al., 2002), possibly due to the introduction of new software such as chatting. Similarly, chatting may have been a good indicator of communication online until now, but may lose its role. Thus, this area of research needs to keep up with changes in the online environment, and make sure measurements also capture the quality of online communication rather than just frequency.

This study also controlled for a number of external variables, including gender and age. The controls for age and gender strengthened the conclusion that social anxiety predicted online friendship. Only gender affected the result. Girls reported higher online friendship support over time. Girls and boys activities online differed in previous studies, which could be a part of the explanation. For example, girls communicated more online using chat, while boys played more multiplayer online games (Jackson et al., 2008). Thus, this was important to control for. Age did not significantly affect online friendship support, although age has been reported as a possible explanation for outcomes of online use in earlier research, albeit for depression measures (Wästlund et al., 2001). Our sample was more homogeneous, although it included early to late adolescents.

Thus, this study could show a longitudinal association between social anxiety and online friendship support while controlling for age and the effect of gender.

The main limitation in this study was that the dependent measure, online friendship support at Wave 2, had the largest amount of missing data. Social anxiety at Wave 1 predicted if the person had a missing value on the dependent variable. We handled the missing data with the EM-method, which is a method superior to simple methods like for example listwise deletion (Schlomer et al., 2010). The EM method handled the risk of biased estimates for data missing not at random (Graham, 2003). Thus, despite problems with missing data, we adopted a method to handle this data that reduces the risk of selecting a small, non-representative group among all adolescents who use online communication. Nevertheless, future studies should aim to reduce the amount of missing data on online friendship support, perhaps by targeting and following online forums and other online social meeting places over time.

Another limitation was that online friendship support was measured with self-reports only. This captures perceptions regarding friendships online, or could capture thoughts about the online relationships that reflect dissonance with offline relationships, rather than a more objective measure of online relationship. Previous research on this measurement scale in offline settings has demonstrated moderate correlations between friends ratings of the same relationship (Simpkins et al., 2006), indicating that it is not just one person's perceptions. Further, perceptions of support have been shown to predict emotional development over time, and could thus be important in themselves (Selfhout et al., 2009). Thus, we found indications in the literature that this was a measure of relationship quality, valid to predict emotional development. Still, to make certain this reflected differences in online relationships, as opposed to need-based perceptions, future studies could include online support with assessments by online friends to compare to self-reported measures.

This study overcame some of the limitations in earlier research within this area. We specifically used a measure of social anxiety, together with the motive to compensate for these difficulties. Measuring motive, we went beyond the assumption that adolescents want to develop good relationships, and controlled for the possibility that there could be a difference in motives for online communication. Furthermore, we used longitudinal data, in contrast to previous studies of compensation motives which used cross-sectional data (Peter et al., 2005; Peter et al., 2006; Bonnetti, Campbell & Gilmore, 2010). Longitudinal data added the possibility of measuring change, which made it possible to discuss the development of online friendship quality over time. The longitudinal analysis also ruled out a possible hypothesis about reversed causality, since online friendship quality at Wave 2 could not possibly have caused social anxiety at Wave 1. Taken together, the measures and the longitudinal design in this study are a unique contribution to this field.

The possibilities with socially anxious adolescents developing online supportive friendships, needs to be taken into consideration in interventions or preventive programs for them. If they can train social skills online, such an applied area can be interesting to explore further. If they have an important arena for friendship support, it can be important. Interventions aimed at decreasing their online use may be detrimental. In sum, socially anxious adolescents may have had a reason for developing social support online.

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