Please cite as follows:


Developing a model of adolescent friendship formation on the Internet

Jochen Peter, Ph. D., Patti M. Valkenburg, Ph. D., & Alexander P. Schouten, M. A.

The Amsterdam School of Communications Research ASCoR

University of Amsterdam

Kloveniersburgwal 48

1012 CX Amsterdam, The Netherlands

Tel: +31 20 525 3752/ 2348/ 6174

Fax: +31 20 525 3681

Email: j.peter@uva.nl; p.m.valkenburg@uva.nl; a.p.schouten@uva.nl
Abstract

Previous research has been largely silent about what precisely influences online friendship formation and has ignored motives for online communication as potential explanations. Drawing on a sample of 493 adolescents, this study tested a path model of adolescent friendship formation including as predictors introversion/extraversion, online self-disclosure, motive for social compensation, and frequency of online communication. Our path analysis showed that extraverted adolescents self-disclosed and communicated online more frequently, which, in turn, facilitated the formation of online friendships. Introverted adolescents, by contrast, were more strongly motivated to communicate online to compensate for lacking social skills. This increased their chances of making friends online. Among introverted adolescents, a stronger motive for social compensation also led to more frequent online communication and online self-disclosure, resulting in more online friendships. The model suggests that the antecedents of online friendship formation are more complex than previously assumed and that motives for online communication should be studied more closely.
Developing a model of adolescent friendship formation on the Internet

Research on the social consequences of the Internet has recently begun to focus on the influence of introversion/extraversion on online friendship formation.¹⁻⁴ Introversion can be defined as a person's tendency to prefer his/her own company to large social events and quiet reflection to social interaction. Conversely, extraversion captures a person's inclination to seek company and social interaction.¹ Scholars have put forward two opposing hypotheses on the relationship between introversion/ extraversion and online friendship formation. The so-called rich-get-richer hypothesis states that the Internet will primarily benefit extraverted individuals.³ Because contact can be made more easily online, the greater social skills of extraverted individuals can develop fully and will facilitate the formation of online friendships. The social compensation hypothesis, by contrast, proposes that the Internet will be particularly beneficial to introverts.⁵ Due to reduced auditory and visual cues and anonymity, the Internet may enable introverted people to compensate for their weaker social skills. As a result, introverted individuals may more easily self-disclose online, which may facilitate the formation of online friendships.⁵⁻⁷

To date, scholars have adhered to a rather deterministic conceptualization regarding the Internet’s role in the formation of online friendships. Although greater anonymity and reduced cues are important features of online communication⁸⁻¹¹, studies have treated the consequences of these features as undisputed assumptions rather than researchable variables. For example, it is unclear whether the anonymity of the Internet indeed leads individuals to consider online communication a means to compensate for face-to-face inhibitions as is assumed in some theories of online friendships.⁵,⁶ Generalizing from the features of a medium to its uses and effects also ignores what uses-and-gratifications research has demonstrated for decades: people's use of media and their effects may differ from what the media's objective
features would suggest. Communication researchers have repeatedly emphasized the relevance of people's motives to explaining the consequences of the Internet, but studies on online friendship formation have not yet adopted this perspective.

This study combines concepts from psychological and uses-and-gratifications research to develop an initial model of online friendship formation in adolescence. We focus on adolescents because they are the defining users of the Internet. They not only spend more time online than adults, but they also use Internet-based communication technologies more often, such as instant messaging and Internet Relay Chat, thus integrating the Internet and online communication into their social lives. We focus upon adolescent online friendships because adolescence is the period in life when concerns with interpersonal relationships are most acute. In a recent US survey, 25% of youth reported online friendships with people they did not know in person. However, with the exception of Wolak, Mitchell, and Finkelhor's study, we know little about which personality traits may determine the formation of online friendships. Our model tries to provide initial insights into how and why different types of adolescents form online friendships.

Predictors of online friendship formation

*Introversion and frequency of online communication*

To date, empirical research has only tentatively dealt with either the rich-get-richer or the social compensation hypothesis. In support of the rich-get-richer hypothesis, Kraut et al. reported that, with increasing Internet use, introverts were less involved in local communities and felt lonelier than extroverts. However, Kraut et al. dealt with the consequences of Internet use on people's integration into real-life social networks, but did not study the consequences of the Internet on online friendships. The studies that focused on online relationships tended to support the social compensation hypothesis. Gross, Juvonen, and Gable found that socially anxious adolescents communicate online more often with strangers. In principle,
then, introverts are more likely to form online friendships. A recent study by McKenna et al.\textsuperscript{4} provided evidence for this conclusion. Therefore, we can tentatively conclude that introverted adolescents seem more likely to form online relationships than extraverted adolescents.

However, we do not expect the effect of introversion on online friendship formation to be direct, but mediated by the frequency of online communication. Existing studies have not specified the relationship between the frequency of online communication and online friendship formation.\textsuperscript{4,20} There is, however, initial evidence that introverts generally spend more hours on the Internet than extraverts do.\textsuperscript{2} We therefore expect that introverts will communicate online more frequently than extraverts (Hypothesis 1a; for a visualization of all hypothesized influences, see Figure 1). The frequency of online communication, in turn, will positively affect online friendship formation (Hypothesis 1b, see Figure 1). After all, only those who invest some time in online communication may have a chance to make online friends at all. Altogether, we expect an indirect effect of introversion on the formation of online friendships. Introverts will communicate more frequently online than extroverts and will consequently make more online friends than extraverts do.

***** FIGURE 1 ABOUT HERE ****

Self-disclosure

Generally, self-disclosure is important for the formation of friendships.\textsuperscript{21-23} Self-disclosure is the "act of revealing personal information to others" (p. 183).\textsuperscript{24} Recent research suggests that the extent to which individuals are able to self-disclose on the Internet may also affect online friendship formation.\textsuperscript{4-5,25-26} The Internet's anonymity and reduced cues may stimulate online self-disclosure. Dangers of face-to-face self-disclosure such as being ridiculed or rejected\textsuperscript{22,27} and fears of disapproval are much less prevalent in online interaction.\textsuperscript{6,28} Internet communication thus resembles the "stranger on the train" phenomenon\textsuperscript{29}: people disclose themselves to a stranger sitting next to them and tell him or
her intimate details which they would never tell colleagues or even friends. Such early self-disclosure can stimulate online friendship formation, in particular when a person can self-disclose continuously with the same person, as is the case with Internet communication.\(^4,25\)

The Internet's anonymity and reduced visual and auditory cues along with the resulting ease of self-disclosure may be particularly appealing to introverts when trying to open up. Because introverts feel awkward about self-disclosure in face-to-face situations,\(^{30-32}\) they may have an intense need for self-disclosure in a "protected" environment like the Internet. In line with this reasoning, McKenna et al.\(^4\) have found that introverts were more likely to present their true selves on the Internet than were extraverts. Consequently, we expect that introverts will more frequently self-disclose online than extraverts. Along with the just mentioned importance of self-disclosure for friendship formation, we further expect that self-disclosure will mediate the influence of introversion on online friendship formation. The more introverted adolescents are, the more they will self-disclose online (Hypothesis 2a, see Figure 1). The more they self-disclose online, the more online friendships they will form (Hypothesis 2b, see Figure 1).

*Motive for online communication: Social compensation*

We have argued above that a mechanistic relationship between the features and people's use of online communication may be somewhat simplistic. Not everybody may respond equally to the Internet's anonymity and reduced auditory and visual cues. For example, adolescents may be well aware of the anonymity and the reduced cues of online communication, but they may still vary in their motivation to use these features to compensate for inhibitions or lacking social skills. Initial support for the existence of this motive comes from Papacharissi and Rubin\(^{33}\) who demonstrated that people may be motivated to use the Internet as a functional alternative to face-to-face communication.
The motive to use online communication for social compensation may be more prominent among introverted adolescents because they are likely to feel awkward in face-to-face conversations. Papacharissi and Rubin\textsuperscript{33} have shown that people who were less satisfied and felt less valued in face-to-face communication were more strongly motivated to replace face-to-face communication with online communication. Moreover, lonely people were found to perceive the anonymity of the Internet as liberating\textsuperscript{34}. We, therefore, expect introverts to be more strongly motivated than extroverts to use online communication for social compensation (Hypothesis 3a, see Figure 1). If, in turn, online communication is used to overcome inhibitions of face-to-face situations, then this may be just another way of getting in contact with other people. Eventually, this may lead to online friendships. Consequently, we expect that those who are motivated to use online communication to compensate for lacking social skills will form more online friendships (Hypothesis 3b, see Figure 1). Taken together, Hypotheses 3a and 3b suggest an indirect influence of introversion on online friendship formation mediated by the motive for social compensation.

Previous research has rarely studied the role of the frequency of online communication on friendship formation. Above, we have conceptualized the frequency of online communication as a mediator of the impact of introversion on friendship formation. However, it also seems plausible to expect the frequency of online communication to mediate the influence of the social compensation motive on self-disclosure, particularly when taking into account that social motives for Internet use have generally been found to increase the frequency of online communication.\textsuperscript{35} In line with Papacharissi and Rubin’s\textsuperscript{33} findings, a stronger motive for social compensation may thus result in more frequent online communication (Hypothesis 4a, see Figure 1). More frequent online communication may subsequently increase adolescents' willingness and ability to self-disclose. A recent study has demonstrated relationships between loneliness and problems of self-disclosure on the one
hand and increased Internet use, perceptions of the liberating character of the Internet, and less inhibited online interactions on the other.\textsuperscript{34} Consequently, we hypothesize that more frequent online communication will result in greater self-disclosure (Hypothesis 4b, see Figure 1).

Method

Sample and Procedure

We conducted a survey among 600 adolescents, who were between 9 and 18 years of age ($M = 13.37, SD = 1.98$). The adolescents were recruited from six elementary, middle, and high schools in the Netherlands. The schools were chosen in such a way that they represented adolescents in all levels of socioeconomic status.

The questionnaire consisted of three parts. In the first part, adolescents identified their age, grade, and gender, and completed a 10-item introversion scale. The adolescents were then asked if they had ever used chat rooms or instant messaging on the Internet. Only adolescents who had ever used chat rooms or instant messaging ($n = 493, 82\%$) completed the second part of the questionnaire, which included questions about online self-disclosure, the social compensation motive, the frequency of online communication, and online friendships.

Measures

Introversion. We used the introversion subscale of the Adolescent Temperament List.\textsuperscript{36-37} This scale consists of 10 items, such as “I don’t talk easily about my problems,” and “I am shy around strangers”. The response categories for each of the items ranged from 1 (completely agree) to 5 (completely disagree). The 10 items formed a one-dimensional scale, with a Cronbach’s alpha of .77.

Online Self-disclosure. We operationalized online self-disclosure with four items tapping topics which adolescents talked about when communicating on the Internet. The
items, which were concerned with romantic love, secrets, falling in love, and dating, formed a one-dimensional scale with a Cronbach’s alpha of .87.

**Social compensation motive.** We used three items related to how often adolescents chatted online (1) because they can talk more comfortably; (2) because they dare to say more; and (3) to feel less shy. The items have been adjusted to the topic of the study, but are comparable with items used in uses-gratifications research to assess motives for Internet use. The response categories ranged from 1 (*never*) to 3 (*often*). We created an index, with a Cronbach’s alpha of .72.

*Frequency of online communication* was measured on a scale ranging from 1 (*less than* once a week) to 5 (*several times a day*). We collapsed response category 5 and response category 4 (*every day*) to form a four-point metric scale.

*Online friendships.* Respondents were asked whether they had made close friends by chatting on the Internet. The response categories were 0 (*no*), 1 (*yes, one*), and 2 (*yes, several*).

**Results**

As the zero-order correlations in Table 1 show, there was initial support for the relationships hypothesized in our model, the negative relationship between introversion and online self-disclosure and the non-significant relationship between introversion and frequency of online communication notwithstanding. To more rigorously test our model from Figure 1, we conducted a path analysis using AMOS 5.0. We proceeded in two steps: First, we tested whether the hypothesized model fit the data. Second, we checked whether we could improve the model’s fit by adding or removing causal paths from the hypothesized model.

Our hypothesized model did not fit the data well and had to be rejected, $\chi^2 (2, N = 493) = 56.2, p < .001$, comparative fit index (CFI) = .76, root mean square error of approximation (RMSEA) = .24. The modification indices and the values of the expected
parameter change\textsuperscript{39-40} revealed that the model could be improved significantly by adding a path from the social compensation motive to online self-disclosure. This is in line with a recent study that implied that online self-disclosure may be more motive-driven than previously modeled in research\textsuperscript{26}. The modified model fit the data very well, $\chi^2 (1, N = 493) = 1.59$, $p = .21$, CFI = .99, RMSEA = .04, and explained 14\% of the variance of the dependent variable, formation of online friendships. We, therefore, accepted the model as an adequate description of the data. Figure 2 visualizes the observed final path model. The coefficients in Figure 2 are standardized beta's.

\textbf{***** FIGURE 2 ABOUT HERE ****}

Hypothesis 1a predicted that introversion would positively influence the frequency of online communication. Hypothesis 1b specified that more frequent online communication, in turn, would lead to more online friendships. Hypothesis 1a was not confirmed. Introversion resulted in less rather than more frequent online communication ($\beta = -.10$, $p < .05$). Hypotheses 1b, however, was supported: More frequent online communication led to more online friendships ($\beta = .28$, $p < .001$). Introversion, then, had no direct influence on friendship formation, but this impact was mediated by the frequency of online communication.

Whereas Hypothesis 2a predicted that introverted adolescents would display more online self-disclosure, we found an opposite relationship. Introverted adolescents self-disclosed less often in online communication than extraverted adolescents did ($\beta = -.33$, $p < .001$). Therefore, Hypothesis 2a had to be rejected. However, in line with Hypothesis 2b, greater self-disclosure led to more online friendships ($\beta = .12$, $p < .05$). The two paths from introversion, via both frequency of online communication and self-disclosure, to friendship formation indicate that introverts were less likely to make friends online because they both communicated and self-disclosed less frequently than extroverts.
Hypothesis 3a predicted that introverted adolescents would more frequently use online communication to compensate for lacking social skills. This hypothesis was confirmed ($\beta = .22$, $p < .001$). The social compensation motive positively influenced whether adolescents formed online friendships ($\beta = .12$, $p < .05$), supporting Hypothesis 3b. The path introversion – social compensation motive – friendship formation, then, indicates that introverts may indeed have a chance to make friends online.

Hypothesis 4a specified that adolescents with a stronger social compensation motive would communicate online more often. As Figure 2 shows, this hypothesis was supported ($\beta = .19$, $p < .001$). Adolescents who communicated online more often also tended to self-disclose online more frequently ($\beta = .20$, $p < .001$). This confirmed Hypothesis 4b.

The final model also suggested a strong effect of the social compensation motive on online self-disclosure ($\beta = .28$, $p < .001$). The more strongly adolescents used the Internet for social compensation, the more they self-disclosed online. It is worth noting that there were three more indirect influence paths of introversion on online friendship formation. Introverts displayed a stronger social compensation motive. This motivation resulted, first, in higher self-disclosure, which eventually facilitated online friendships. Second, this motivation led to more frequent online communication, which increased online self-disclosure and eventually resulted in more online friendships. Third, the social compensation motive led to more frequent online communication, which finally increased the number of online friendships.

Given the major changes that take place during adolescence and the distinct differences between boys and girls at this developmental stage, we tested our final basic model with age and gender as control variables (not shown in Figure 2). Gender affected self-disclosure: Girls revealed more about themselves than boys ($\beta = .35$, $p < .001$). Age influenced both the frequency of online communication ($\beta = .20$, $p < .001$) and the formation of online friendships ($\beta = -.10$, $p < .05$). Older adolescents communicated more frequently online, but younger
adolescents were more likely to make friends online. More importantly, the model with age and gender as control variables still fit the data well, $\chi^2 (9, N = 493) = 15.9, p = .07$, CFI = .98, RMSEA = .04, and none of the influences of our final model from Figure 2 changed significantly.

Discussion

This study has combined concepts from psychological and uses-and-gratifications research to develop an initial model of adolescent online friendship formation. Generally, the structure of our model confirmed McKenna and Bargh's\(^5\) dictum that "the Internet by itself is not a main effect cause of anything" (p. 57). Rather, our results showed that the psychological characteristics of people interacted with motives and Internet use patterns in their effect on online friendship formation. Our model extends and challenges current research because it shows that the explanation of online friendship formation is more complex than previously assumed.

The rich-get-richer and the social compensation hypothesis are valuable descriptions regarding the potential outcomes of online communication. However, both hypotheses fall short of adequately specifying how and why particular adolescents form online friendships. In contrast to what both the rich-get-richer and social compensation hypothesis propose, adolescents' degree of introversion (or extraversion) did not directly influence whether they formed online friendships. Given a similar finding by McKenna et al.,\(^4\) it therefore seems no longer plausible to say that adolescents fail or succeed in forming online relationships just because they are introverted or extraverted. Rather, introversion (or extraversion) affected online self-disclosure, frequency of online communication, and the social compensation motive. These three mediators, in turn, influenced online friendship formation. Our model, then, is able to specify how and why both extraverted and introverted adolescents form online friendships.
Compared with introverted adolescents, extraverted adolescents self-disclosed and communicated online more often. These are the reasons why extraverted adolescents form online friendships. If one only looks at this result, our study seems to support a modified rich-get-richer hypothesis. Because of their greater social skills, extraverted adolescents also self-disclose and interact more easily with others in online situations. Thus, the antecedents of the extraverts' online friendship formation do not differ from offline settings given their ease of self-disclosure and interaction in face-to-face situations. Online communication, then, only increases the opportunities for extraverted adolescents to make friends.

Strikingly, however, we found that introverted adolescents may also form online friendships. The key factor in how introverted adolescents formed online relationships was their motivation to use online communication for social compensation. The social compensation motive, which was more evident among introverts than extraverts, facilitated online friendship formation. Moreover, this motive also increased online self-disclosure, frequency of online communication and, through these two variables, online friendship formation. The social compensation motive neutralizes the negative consequences of introversion.

The importance of the social compensation motive shows that deterministic accounts regarding the role of the Internet in online friendship formation are problematic. Features of online communication such as anonymity and reduced auditory and visual cues do not automatically lead introverts to self-disclose or communicate more frequently online. One of the key findings of uses-and-gratifications research has also proven influential for Internet research: People use the Internet for different goals and the consequences of this use vary depending on these goals. To better understand the social consequences of the Internet, it therefore seems crucial not to generalize from the features of the medium to uses and effects, but to systematically take into account people's motives for using the Internet.
The mediating influence of the social compensation motive also specifies McKenna et al.'s\textsuperscript{4} finding that introverts were more likely than extroverts to present their true self online and, as a result, to make friends online. Our model shows that the possibility to self-disclose in a more anonymous setting did not automatically lead to greater online self-disclosure among introverted adolescents. However, when adolescents were motivated to use online communication to compensate for lacking social skills, they then self-disclosed to a greater extent. In line with McKenna et al., then, we find that introversion has no direct influence on online friendship formation. Extending McKenna et al.'s result, we suggest that what they call the "location of the true self" may more precisely be captured with the motive for social compensation and online self-disclosure.

Using the social compensation motive as an additional explanatory variable of online friendship formation may also help us understand why the direction of two influences was different from what could be expected on the basis of existing research: Introversion had a negative effect on both online self-disclosure and the frequency of online communication. However, when taking into account the social compensation motive, introversion had a positive indirect effect on both self-disclosure and frequency of online communication. We cannot rule out that our specific sample, adolescents, or our particular variable, frequency of online communication, caused our deviating results. Nevertheless, we urge researchers to revisit the traditionally positive direct effects of introversion, social anxiety, or loneliness on the social uses of the Internet and include motives for Internet use as additional explanatory variables. Based on our model, we predict that established effects may either reverse their direction or may be mediated by motives of Internet use.

Our model of online friendship formation is able to integrate divergent findings from previous research. By including concepts from both psychological and uses-and-gratification research, the model may also contribute to interdisciplinary theory formation. There are,
however, several challenges for future research. Although we specified the direction of our influences on the basis of previous research, the unidirectionality of some effects may turn out to be reciprocal when studied over time. We were mainly concerned with whether people formed online friendships, but once these friendships are established, they may affect the degree of online self-disclosure and the frequency of online communication. Methodologically and conceptually, this was beyond the scope of this study, but our understanding of online friendships may greatly benefit from longitudinal approaches.
References


Table 1

*Zero-order correlations between the components of the model*

<table>
<thead>
<tr>
<th></th>
<th>Introversion</th>
<th>Online self-disclosure</th>
<th>Social compensation motive</th>
<th>Frequency of online communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online self-disclosure</td>
<td>- .28***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social compensation</td>
<td>.22***</td>
<td>.24***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>motive</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency of online</td>
<td>-.06</td>
<td>.27***</td>
<td>.16***</td>
<td></td>
</tr>
<tr>
<td>communication</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Online friendship</td>
<td>-.09*</td>
<td>.23***</td>
<td>.20***</td>
<td>.34***</td>
</tr>
<tr>
<td>formation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. * p < .05; *** p < .001 (two-tailed)*
Figure 1. Hypothesized model of adolescent online friendship formation

Note. (+) indicates a hypothesized positive influence.
Figure 2. Observed path model of adolescent online friendship formation

Note. Solid arrows indicate initially hypothesized influences. Broken arrows indicate influences that were added to the final model. Unless indicated with an asterisk ($p < .05$), all influences were significant at $p < .001$. Coefficients are standardized beta's.