# Human Connection in the Digital Age:
# Can Individuals Feel Seen, Heard and Valued via Messaging Apps?

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**Abstract**

Almost everyone uses instant messaging apps these days. But what are its effects on human connection in friendships? Previous research found that the role of self-disclosure is important in this process. The first objective of this thesis was to test the internet enhanced self-disclosure theory. This theory states that the stimulating effect of instant messaging on friendship quality is mediated by online self-disclosure. The second objective of this thesis was to re-test the multiple mediator model that states that online self-disclosure stimulates offline self-disclosure and thereby improves the quality of friendships. I found evidence for both these theories. Furthermore, I explored the influence of age and extraversion on online and offline self-disclosure behavior. I found evidence in line with past research: younger participants disclose more easily online in comparison to older participants. A suggestion for further research is to test the internet enhanced self-disclosure theory and the multiple mediator model in different age groups.

# Human Connection in the Digital Area: Can Individuals Feel Seen, Heard and Valued via Messaging Apps?

I grew up in a generation in which puppy love could be experienced by yourself in your room, holding your smartphone and using a messenger app, such as Facebook, Imessage or Whasapp, to have a conversation with your crush. Instead of experiencing butterflies when you saw a special someone walking up to you in a park, square or shopping mall, you got butterflies in your stomach when you saw a little red dot popping up on your phone. This anecdote suggests that people feel real human connection via these apps, because when you are in love, you feel very connected to the other person. But, is this real human connection? Can human connection be felt via messaging apps?

**The Mechanism behind Human Connection.** Attachment is the biological mechanism behind human connection; attachment theory originates in research on infant-mother bonding. An important finding is that infants are preadapted to form a bond with their human caregiver from the day they are born. Seeking proximity to others is not a conditioned response or learned behavior (Bowlby, 1958, Bretherton, 1992). Attachment is a basic need, something people cannot live without, just like people cannot live without food. The desire for interpersonal attachment is described in the literature as the need to belong. A meta-analysis about the need to belong has found overwhelming evidence for the need to belong as a 'powerful, fundamental and extremely persuasive motivation' (Baumeister & Leary, 1995, p.1). When people need food, they feel hungry, when people feel the need to belong, they get lonely. Loneliness is the motivational state for attachment. Long periods of loneliness have many negative consequences: they influence psychological functioning, diminish sleep quality, and increase morbidity and mortality rates (Hawkley & Cacioppo, 2010). Loneliness is twice as deadly as alcohol according to Psychiatrist Manfred Spitzer; in a Dutch news article he states that loneliness is one of the most urgent problems in Western society, especially in young girls and boys (Poll, 2018). In Germany, 10,5% of people report some degree of loneliness, the consequence of this is an increased risk on the aforementioned

negative consequences of loneliness (Beutel et al., 2017). This is a very counterintuitive development since we are more connected than ever; over half of the Dutch population uses Whatsapp on a daily basis (Oosterveer, 2018). An explanation for the increasing number of lonely people in Western society is offered by Kraut and colleagues (1998), who found that time spent online has replaced time spent with friends and family. His findings, although never replicated, started a global conversation about the negative consequences of internet use. Another negative consequence of the internet for social relationships is that relationships are becoming more superficial (Turkle, 2011). More recent concerns about the negative effects of communication via the internet are more about the quality of the relationships rather than the time spent on- or offline (Vriens & Van Ingen, 2018).

**The Definition of Human Connection.** Brown (2010), who is a researcher specialized in shame and vulnerability, defines human connection as follows: 'Connection is the energy that exists between people when they feel seen, heard and valued; when they can give and receive without judgement; and when they derive sustenance and strength from the relationship.' (p. 37). There are more ways to describe human connection; in social networking literature, one measure of human connection is tie strength. The definition of tie strength is: 'The strength of a tie is a (probably linear) combination of the amount of time, the emotional intensity, the intimacy (mutual confiding), and the reciprocal services which characterize the tie.'(Granovetter, 1973). Tie strength is similar to friendship quality. Strong ties are identified by asking participants questions about with whom they discuss matters that are important to them (Vriens & Van Ingen, 2018). Discussing important and personal matters with others is called 'disclosure' in friendship literature.

**Self-Disclosure.** Self-disclosure is crucial in the process towards human connection. Nguyen, Bin and Campbell (2011) define self-disclosure as follows: 'Self-disclosure is the voluntary and verbal communication of personal information to a targeted recipient.'. In everyday English their conclusion is that the amount of personal information you share with

someone is a predictor of the quality of that relationship. The relationship between use of instant messaging apps and friendship strength is fully mediated by self-disclosure of intimate information online. This finding is referred to as the internet enhanced self-disclosure theory (Valkenburg & Peter, 2009). The relationship between online self-disclosure and friendship quality is described in more detail by Desjarlais and Joseph (2017). They have found that the relationship between online self-disclosure and friendship quality is mediated by face-to-face self-disclosure. Sharing personal information online predicts sharing personal information face-to-face, and the sharing of the personal information face-to-face predicts friendship quality. Adolescents disclose information more easily online than offline (Davis, 2012). For adults the evidence regarding whether people self-disclose more easily on- or offline is mixed. There are many factors that influence the amount of self-disclosure: the mode of communication, the context and the relationship between the two actors (Nguyen et al., 2011). Personality traits also have an influence. Self-disclosure is related to social introversion; the less a person discloses, the more socially introverted this person is (Pedersen, Darhl, Kenneth & Higbee, 1969).

**Media Richness Theory.** One theory that describes the difference between communication channels is media richness theory (MRT). It theorizes that different types of media have different amounts of media richness (Daft & Lengel, 1986). The medium considered richest is face-to-face interaction since it has the most options for nonverbal interaction and a very short response time. Email is one of the poorest; no profile pictures, long response times and formal greetings. According to this theory, the more complex the message, the richer the medium should be for it to be communicated effectively. Conversations via the internet were seen as of slightly lower quality than face-to-face interactions and phone calls (Baym, Zhang, & Lin, 2004). In other words: the richness of an offline conversation is higher, this explains why the relationship between offline self-

disclosure and friendship quality is stronger than the relationship between online self-disclosure and friendship quality.

The practical implications of this study are immense, in this digital world where almost everyone uses messenger apps, many people can benefit if they have more knowledge about the relation between messaging apps and human connection. The information is also important because social connection is a basic need and knowledge about this topic could be used to help people fulfil this basic need. Therefore, my research question is: Can individuals feel real human connection via messaging apps? Based on the theory and research discussed above, I have formulated the following hypotheses: **Hypothesis 1:** The frequencies of both real-life interaction (H1a) and digital interaction (H1b) predict human connection.

**Hypothesis 2:** The association between real-life interaction and human connection is stronger than the association between digital interaction and human connection.

**Hypothesis 3** Perceived self-disclosure mediates the relationship between real-life interaction (H3a) as well as digital interaction (H3b) and human connection.

**Hypothesis 4:** The association between perceived self-disclosure in real-life interaction and human connection is larger than the association between perceived self-disclosure digital interaction and human connection.

**Hypothesis 5**: The relationship between perceived self-disclosure digital interaction and human connection is mediated by perceived self-disclosure real-life interaction.

The first five hypotheses are visualized in Figure 1.

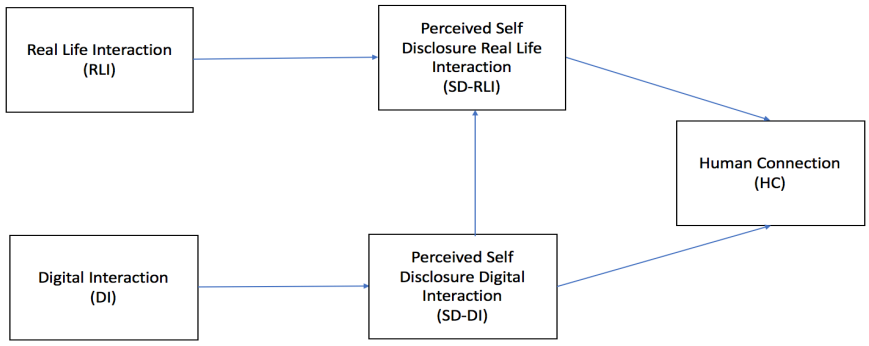


*Figure 1.* Model hypotheses 1-5.

Hypothesis six and seven explore the association of age and extraversion on self-disclosure behavior. **Hypothesis 6**: Introverts have relatively more online than offline interaction (H6a) and self-disclose relatively more information online than offline (H6b).

**Hypothesis 7** When someone is younger, they have relatively more online than offline interaction (H7a) and self-disclose relatively more information online than offline (H7b).

I will test all hypotheses in a survey study in which participants answer questions about one of their friendships

## Method

### Participants

Before I carried out this survey, I conducted a power analysis using G-power (http://www.gpower.hhu.de/). An a priori t-test with, linear bivariate regression, one group, size of slope, one tailed test was performed. For an alpha of .001 and a power of .95 the sample size required was 90 people. (There were) 188 people (that) have filled in the survey, of which 34 have not completed the survey. They were excluded of the analysis, since they did not provide enough information to test the hypothesis. The analyses were done on 154 participants. The average age in the sample is 30 years (SD=11.9), there were 71 males (46.1%) and 83 females (53.9%) who have filled in the survey of which 142 people (92.0%) have a Dutch nationality and 12 people (8.0%) have a non-Dutch nationality. Their highest

completed level of education was: university master (33.1%), university bachelor (29.2%), high school (20.8%), HBO (13.6% ),MBO (2.6%), primary school (0.6%).

**Procedure**

The design of this study was cross sectional, the measuring instrument was a survey. Qualtrics was used as an online survey facilitator. The sample was a convenience sample, I have spread the survey in my own and my parents social circle. The media used to spread the survey were Whatsapp and Facebook Messenger. Participants first filled in an informed consent. After the consent but before filling in the survey, participants were asked the following question: 'Think of a specific person who you consider to be a friend when you answer the questions.' Second, they answered questions about their personal characteristics and their personality. After that, questions about the duration and quality of their friendship and about their perceived connection with their friend were answered. Following, they answered questions about the frequency of interaction, perceived self-disclosure and perceived connectedness on three different media: face-to-face, via phone and via instant messaging apps. For all the different media there was an exclusion criterion, the participants were asked if they ever saw their friend face-to face, spoke to them via phone and if they had contact with them via instant messaging. If this was not the case, they did not have to fill in the questions about the frequency of interaction, perceived self-disclosure and perceived connectedness for that domain. The phone variables were inserted for exploration purposes, they will thus come back in the descriptive part of the results section but will not be used to formulate answers to the hypotheses.

**Measuring instruments**

**Real-life interaction (RI)/ Digital Interaction (DI).** The amount of real-life and digital interaction were both measured with a single item (How often have you seen this person face-to-face/spoken to over the phone/have used a messenger app with the past six months?) on a 9-point scale (Not at all, Less than once a month, About once a month, A

couple of times a month, About once a week, A couple of times a week, Nearly every day, Every day, More than once a day).

**Perceived Self-Disclosure (PSD).** Perceived self-disclosure was measured three times, in three different domains: real-life, digital and via phone. To measure perceived self-disclosure I have adapted the self-disclosure scale of Valkenburg and Peter (2009) that contains five items. The question they ask their participants is: 'how much do you usually tell about....'. I have added one item to this scale: 'Your fears/things you are afraid of', since fear is an important negative emotion and it was missing from the scale. The reliability of the measure improved with this change, the Cronbach alpha would be lower for all conditions when the question would be deleted (real-life .84, digital interaction .92, and phone interaction .91). Furthermore, I have made a few changes in the wording to make it suitable for adults as well as adolescents. The six items where measured on a five-point Likert scale ranging from 1 (I tell nothing about this) to 5 (I tell everything about this). Examples of statements are: 'Your personal feelings and 'Your secrets'. The six items were averaged into a self-disclosure score. The Cronbach alphas of self-disclosure are: real-life interaction .86, digital interaction .94, phone interaction .93.

**Friendship quality (FQ).** Friendship quality was measured in the same way as in the article of Desjarlais and Joseph (2017); with the communication subscale of the Peer Attachment Scale (Armsden & Greenberg, 1987). In that article, the scale is used to measure 'quality of close friendships'. I have used the same scale to measure connection. Participants were asked to rate eight statements on a scale of 1-5 (Almost Never or Never True- Not Very Often True- Sometimes True- Often True- Almost Always or Always True). Examples of statements are: (I like to get my friend's point of view on things I'm concerned about. - My friend can tell when I'm upset about something…). The total score for friendship quality was the average score of the eight statements. The Cronbach alpha of friendship quality is: .83.

**Connection (CG, CRLI CPI, CDI).** Connection was measured four times: in general, for phone conversations, for face-to-face Interactions and for instant messaging. It was measured with single items on a 1-5 Likert scale 'When you read the following definition, on a scale of 1-5, how connected do you feel with your friend?' Definition: ('Human connection is the energy that exists between people when they feel seen, heard and valued; when they can give and receive without judgement; and when they derive sustenance and strength from the relationship.').

**Human connection (HC).** To describe human connectedness and to increase the reliability of the single item measure of connection, a human connectedness variable was calculated. It summarized friendship quality and general connection. It was calculated by taking a weighted average of 1/3 * General Connection and 2/3 * Friendship Quality. These weights where chosen taking into consideration the importance of the scales and the amount of questions that the scale exists out of. The (unweighted) Cronbach alpha of human connection is: .84,

**Introversion/extraversion (I/E).** For extraversion/introversion (zijn de woorden expres omgedraaid tov de titel?) I have used the extraversion scale of the EPQ RS, the shortened Eysenck Personality Questionnaire (Francis, Brown, & Philipchalk, 1992). This scale consists of twelve yes/no questions, of which ten are positive (yes = +1), and two are negative (No = +1). They were added into a sum score. Positive questions were: (Are you a talkative person? Are you a lively person? ...) The negative questions were: (Are you someone who tends to stay at the background during social events? (eg. At Parties) Are you mostly quiet when you are in groups?). The Cronbach alpha of the extraversion score is .79.

**Interaction Ratio (IR) /Self-Disclosure Ratio (SDR).** An interaction ratio was calculated by dividing real-life interaction by digital interaction. A self-disclosure ratio was calculated by dividing real-life self-disclosure by digital self-disclosure.

## Results

### Descriptive Statistics

As we can see in Table 1, almost all the respondents saw their friend face-to-face (n=152) and also had digital Interaction with them (n=145). Whereas only 2/3 of the respondents called their friends (n=104). The averages of the interaction frequencies in the three domains are significantly different *(p=.000)*: Real-life interaction (M=4.66) (about once a week), phone interaction (M=2.88) (about once a month), digital interaction (M=5.94) (a couple of times a week). This shows that digital interaction was most frequent, followed by real-life interaction and phone interaction. Another interesting thing to notice is that real-life connection (M=4.28) and general connection (M=4.20) have similar averages, these averages don't differ significantly *(p=.190).* Connection phone (M= 3.38) and connection digital (M=3.19) seem to be in a different category, they both differ significantly from real-life and general connection *(p=.000),* but there was no significant difference between the two variables *(p=.027).* Furthermore, people disclose most information face-to-face (M=3.53), a little less online (M=2.79) and the least via phone (M=2.57). Face-to-face interaction differs significantly from online and phone interaction *(p=.000),* phone and online interaction didn't differ significantly *(p=.187).* It was interesting to see that the self-disclosure over the phone was lower than in digital interaction, since the respondents do feel more connection over the phone than via digital interaction, this is in contradiction with media richness theory. Table 2 shows the correlations between interaction, self-disclosure and human connection in the three different domains. There are quite a few significant associations, I have reported only those that are both statistically significant at $p < .01$ and larger than .35. Real-life interaction is correlated to digital interaction *(r=.50, p=.000).* This suggests that respondents who see each other face to face more often, also have more digital contact. Furthermore, digital interaction is associated with phone interaction *(r=.41, p=.000),* this suggests that people that call each other, also have digital interaction. I found a positive association between self-disclosure real-life and self-disclosure digital, *(r=.55, p=.000),* as well as an association between self-

disclosure real-life and self-disclosure phone *(r=.68, p=.000)* and self-disclosure digital and self-disclosure phone *(r=.53, p=.000)*. This suggests that people that disclose more online, also disclose more face to face and vice versa. Furthermore, people that disclose via phone also disclose more online and face-to-face. There was also a correlation found between self-disclosure real-life and human connection *(r=.56, p=.000)*, people that feel connected self-disclose more face to face, and people that self-disclose more, feel more connected. Also, a correlation between self-disclosure digital interaction and human connection was found *(r=.39, p=.000)*. So, people that feel connected self-disclose more digitally, and people that self-disclose more, feel more connected. An association between self-disclosure phone and human connection was also found *(r=.43, p=.000),* people that disclose more via phone feel more connected and people that feel more connected disclose more via phone. Table 3 shows the correlations between the variables relevant for the hypotheses. Real-life interaction is negatively correlated with age *(r=-.37, p=.000),* suggesting that older people see their friends less often.

**First Hypothesis**

For the first hypothesis, 1A, the results can be found in table 2 when we look at the correlation between real-life interaction and human connection. The correlation is very weak and non-significant *(r= .08, p=.331)*. Hypothesis 1A was thus rejected. For hypothesis 1B, the result is also found in table 2, there is a small association between digital interaction and human connection *(r=.284, p=.001)*, hypothesis 1B was thus accepted.

**Second Hypothesis**

When a regression analysis of digital and real-life interaction on human connection was performed, I found that the association between digital interaction and human connection is significant *(β= .09, p=.001)* and the association of real-life interaction and human connection is not significant *(β= -.01, p=.554)*. Therefore, the second hypothesis was

rejected, since it states that the association between digital interaction and human connection is smaller than the association between real-life interaction and human connection.

**Third hypothesis**

Since there is no relationship found between real-life interaction and human connection *(β = .80, p=.331)*, this relationship also cannot be mediated thus hypothesis 3A was rejected. To test for hypothesis 3B I have used the HAYES PROCESS MACRO. In Step 1 of the mediation model, the regression of digital interaction on human connection, ignoring the mediator, is significant, *(β = .08, p = .001).* Step 2 showed that the regression of the digital interaction on the mediator, self-disclosure digital interaction, is also significant, *(β = .20, p = .000*). Step 3 of the mediation process showed that the mediator (self-disclosure digital interaction), controlling for digital interaction, is significant, *(β = .16, p = .000).* Step 4 of the analyses revealed that, controlling for the mediator (self-disclosure digital interaction), digital interaction scores were not a significant predictor of human connection, *(β = .05, p =.038).* It was found that self-disclosure digital interaction fully mediated the relationship between digital interaction and human connection. Hypothesis 3B was accepted.

**Fourth Hypothesis**

For this analysis I have performed a regression analysis. The independent variables were self-disclosure real-life interaction and self-disclosure digital interaction, the dependent variable was human connection. The association between self-disclosure real-life and human connection is *(β = .29, p =.000).* The association between self-disclosure digital and human connection is smaller and non-significant *(β = .06, p =.100)*. Therefore, the fourth hypothesis that states that the association between self-disclosure real-life and human connection is stronger than the association between self-disclosure digital and human connection was accepted.

**Fifth Hypothesis**

When testing for this hypothesis the HAYES PROCESS MACRO was used. In Step 1 of the mediation model, the regression of self-disclosure digital interaction on human connection, ignoring the mediator, is significant, *(β = .18, p = .000).* Step 2 showed that the regression of the self-disclosure digital interaction on the mediator, self-disclosure real-life interaction, is also significant, *(β = .41, p = .000*). Step 3 of the mediation process showed that the mediator (self-disclosure real-life interaction), controlling for self-disclosure digital interaction, is significant, *(β = .29, p = .000).* Step 4 of the analyses revealed that, controlling for the mediator (self-disclosure real-life interaction), self-disclosure digital interaction scores are not a significant predictor of human connection, *(β = .06, p =.100).* It was found that self-disclosure real-life interaction fully mediated the relationship between self-disclosure digital interaction and human connection. The fifth hypothesis was accepted.

**Sixth Hypothesis**

For hypothesis 6A and B the answer is found in Table 3. The association between extraversion and the interaction ratio is small and non-significant *(r=-.03, p=.735*). The association between extraversion and the self-disclosure ratio is also small and non-significant *(r =.00, p=.873)*. Both hypotheses were thus rejected.

**Seventh Hypothesis**

For hypothesis 7A and B the answer is found in Table 3. The association between age and the interaction ratio is small and non-significant *(r =.11, p=.193*). There was an association between age and the self-disclosure ratio that was significant *(r =.27, p=.001)*. The first association is non-significant so hypothesis 7A was rejected. However, hypothesis 7B was accepted, the younger the person, the more they self-disclose via instant messaging apps compared to face-to-face self-disclosure.

## Discussion

This first hypothesis partially answers the main research question posed in the title of this thesis: Can human connection be felt via instant messaging apps? The findings from

testing the first hypothesis were that there is a small association of digital interaction with human connection, but there was no association of real-life interaction with human connection. This suggests that the frequency of face to face contact, is not important in feeling connected. The frequency of digital contact is a little more important, but the association is too small to make any definitive conclusions. This finding is in line with the literature, where is stated that instant messaging has a positive effect on friendship quality (Valkenburg & Peter, 2009). So, it seems that it is possible that human connection is felt via messaging apps.

The second finding was that the frequency of real-life interaction had a smaller association with human connection than the frequency of digital interaction, this result was different than hypothesed. It does fit the literature, since I found no evidence of the frequency of real-life interaction on human connection, however I did find a very small effect of digital interaction on friendship quality (Desjarlais & Joseph, 2017).

The third finding was that online self-disclosure mediated the relationship between digital interaction and human connection. This finding is consistent with the internet enhanced self-disclosure theory (Valkenburg & Peter, 2009). The strong association between online self-disclosure and human connection is strong evidence for the main research question and suggest quite firmly that human connection is possible via instant messenger apps. However, since we did not have any participants that communicated only via instant messaging apps, without any contact via phone or face-to-face, we cannot empirically prove that it is possible to experience Human Connection via messaging apps.

The fourth finding was that the association between offline self-disclosure and friendship quality is larger than the effect of online self-disclosure on friendship quality. These findings are in line with media richness theory (Daft & Lengel, 1986). These results suggest that even though feeling connected via instant messaging apps might be possible, it is more efficient to self-disclose face-to-face. That is why, when we conclude that human

connection is possible via instant messaging apps, it is important to emphasize the importance of face-to-face contact since it can contribute more to human connection.

The fifth finding is that the relationship between self-disclosure digital interaction and human connection is mediated by self-disclosure real-life interaction. This finding is in line with the results found in earlier research where this mechanism is proposed to explain the effect of digital interaction on friendship quality (Desjarlais & Joseph, 2017). These findings also emphasize the importance of face to face contact.

The findings after testing the sixth hypothesis were that there was no relationship between the level of extraversion and the interaction ratio as well as on the self-disclosure ratio. There was no evidence yet on this hypothesis. There was also no correlation found between extraversion and digital as well as face-to-face self-disclosure. This contradicts the evidence that introverted individuals self-disclose less than extraverted individuals (Pedersen et al., 1969). The effects of this hypothesis were so close to zero, it shows us that extraversion and disclosure behavior are probably not related at all.

The findings of the seventh hypothesis were that younger people disclose more personal information online compared to face-to-face. This is in line with the findings of Davis, (2012) who found that adolescents disclose information easier online than offline. This is one of the most interesting findings, the question that immediately comes to mind is whether or not the association between online self-disclosure and human connection is stronger for adolescents. It also shows the relevance of this thesis, since the influence of instant messenger apps will only be bigger for future teenage generations.

**Limitations & Recommendations for future research**

There were some limitations to this research, firstly, almost all the participants in the study were higher educated individuals with a Dutch nationality. These results could be very different for people with a non-Western background. Furthermore, technological developments go very fast, it is only ten years ago that WhatsApp was invented, therefore these results should always be considered in the context of their time. Another shortcoming is

that a survey is used as a measuring instrument, a survey is a measuring instrument with relatively low 'media richness', human connection is a concept which is measured best when the media has high 'richness' for example in an interview. Furthermore, the data is cross sectional therefore it is difficult to make grounded claims about causality. A limitation concerning the second hypothesis is that we compare two different questions. For real-life interaction, the question: 'How often have you seen this person face-to-face in the last half year' is asked. However, for digital interaction, the question 'How often have you used an Instant Messaging app together with this person?' is asked. There is a clear difference between these questions, since the real-life question only asks if the participant has seen their friend and does not specify whether or not they have talked together, but the digital question does specify that they use the app together. This difference in formulation could have led to misinterpretation of this question and might explain the counterintuitive findings from hypothesis two.

I would recommend researching the effects in different age groups, especially adolescents since they are the generation that has grown up with digital media in their entire lives. It will be interesting to see if the associations concerning the first five hypotheses are stronger for adolescents compared to adults or even elderly. Furthermore, they are the generation that will have to deal with the consequences of the technologies.

**Conclusion**

The main finding of this thesis was that the effect of digital self-disclosure on human connection is mediated by face-to-face self-disclosure. This finding suggests that disclosing information online can enhance human connection felt between two individuals. This is a very interesting finding in a time where loneliness is a large societal problem and every future generation is more used to communication via Instant Messaging than the last.

## References

Armsden, G. C., & Greenberg, M. T. (1987). The inventory of parent and peer attachment: Individual differences and their relationship to psychological well-being in adolescence.

*Journal of Youth and Adolescence*, *16*(5), 427–454. https://doi.org/10.1007/BF02202939

Baumeister, R. F., & Leary, M. R. (1995). The Need to Belong: Desire for Interpersonal Attachments as a Fundamental Human Motivation. *Psychological Bulletin*, *117*(3), 497–529. https://doi.org/10.1037/0033-2909.117.3.497

Baym, N. K., Zhang, Y. B., & Lin, M.-C. (2004). Interpersonal communication on the Internet, telephone and face-to-face. *New Media Society*, *6*(3), 299–318. https://doi.org/10.1177/1461444804041438

Beutel, M. E., Klein, E. M., Brähler, E., Reiner, I., Jünger, C., Michal, M., … Tibubos, A. N. (2017). Loneliness in the general population: Prevalence, determinants and relations to mental health. *BMC Psychiatry*, *17*(1), 1–7. https://doi.org/10.1186/s12888-017-1262-x

Bowlby, J. (1958). Bowlby_Nature, 350–373.

Bretherton, I. (1992). *Attachment and bonding. In Handbook of social development*. Boston MA: Springer.

Brown, B. (2010). *The gifts of imperfection: Let go of who you think you're supposed to be and embrace who you are.* (Hazelden Publishing, Ed.).

Daft, R., & Lengel, R. (1986). Organizational information requirements, media richness and structural design. *Management Science*, *32*(5), 554–571.

Davis, K. (2012). Friendship 2.0: Adolescents' experiences of belonging and self-disclosure online. *Journal of Adolescence*, *35*(6), 1527–1536. https://doi.org/10.1016/j.adolescence.2012.02.013

Desjarlais, M., & Joseph, J. J. (2017). Socially Interactive and Passive Technologies Enhance Friendship Quality: An Investigation of the Mediating Roles of Online and Offline Self-Disclosure. *Cyberpsychology, Behavior, and Social Networking*, *20*(5), 286–291. https://doi.org/10.1089/cyber.2016.0363

Francis, L. J., Brown, L. B., & Philipchalk, R. (1992). The development of an abbreviated form of the revised Eysenck personality questionnaire (EPQR-A): Its use among students in England, Canada, the U.S.A. and Australia. *Personality and Individual Differences*, *13*(4), 443–449. https://doi.org/10.1016/0191-8869(92)90073-X

Granovetter, S. (1973). The strength of weak ties. *The Strength of Weak Ties, American Journal of Sociology*, *78*(6), 1360–1380.

Hawkley, L. C., & Cacioppo, J. T. (2010). Loneliness matters: A theoretical and empirical review of consequences and mechanisms. *Annals of Behavioral Medicine*, *40*(2), 218–227. https://doi.org/10.1007/s12160-010-9210-8

Kraut, R., Patterson, M., Lundmark, V., Kiesler, S., Mukopadhyay, T., & Scherlis, W. (1998). Internet Paradox, A Social Technology That Reduces Social Involvement and

Psychological Well-Being ? *American Psychologist*, *53*(9), 1071. https://doi.org/10.1016/j.porgcoat.2016.05.014

Nguyen, M., Bin, Y. S., & Campbell, A. (2011). Comparing Online and Offline Self-Disclosure: A Systematic Review. *Cyberpsychology, Behavior, and Social Networking*, *15*(2), 103–111. https://doi.org/10.1089/cyber.2011.0277

Oosterveer, D. (2018). Social media Social media in Nederland 2018 : uittocht van jongeren op Facebook. Retrieved September 22, 2019, from https://www.marketingfacts.nl/berichten/jongeren-keren-facebook-massaal-de-rug-toe

Pedersen, Darhl, M., Kenneth, L., & Higbee. (1969). Personality correlates of self-disclosure. *The Journal of Social Psychology*, *78*(1), 81–89.

Poll, W. van de. (2018, November 20). Eenzaamheid is twee keer zo dodelijk als alcohol, pp. 1–10.

Turkle, S. (2011). *Alone Together: Why We Expect More from Technology and Less from Each Other.* New York: Basic Books.

Valkenburg, P. M., & Peter, J. (2009). The effects of instant messaging on the quality of adolescents' existing friendships: A longitudinal study. *Journal of Communication*, *59*(1), 79–97. https://doi.org/10.1111/j.1460-2466.2008.01405.x

Vriens, E., & van Ingen, E. (2018). Does the rise of the Internet bring erosion of strong ties? Analyses of social media use and changes in core discussion networks. *New Media and Society*, *20*(7), 2432–2449. https://doi.org/10.1177/1461444817724169

Table 1

*Descriptive statistics*

| Variable | n | M | SD | Min | Max |
|---|---|---|---|---|---|
| Friendship duration (FD) (in half years) | 154 | 23.27 | 20.97 | 2.00 | 101 |
| Friendship quality (FQ) | 154 | 4.18 | .56 | 2.88 | 5.00 |
| Real-life interaction (RLI) | 152 | 4.66 | 1.93 | 1.00 | 9.00 |
| Phone interaction (PI) | 104 | 2.88 | 1.38 | 1.00 | 7.00 |
| Digital interaction (DI) | 145 | 5.94 | 1.80 | 1.00 | 9.00 |
| Connection real-life (CRLI) | 152 | 4.28 | .59 | 3.00 | 5.00 |
| Connection phone (CPI) | 103 | 3.38 | 1.02 | 1.00 | 5.00 |
| Connection digital (CDI) | 145 | 3.19 | 1.00 | 1.00 | 5.00 |
| Connection general (CG) | 153 | 4.20 | .65 | 2.00 | 5.00 |
| Self-disclosure real-life (SDRLI) | 152 | 3.53 | .83 | 1.83 | 5.00 |
| Self-disclosure phone (SDPI) | 145 | 2.57 | 1.08 | 1.00 | 5.00 |
| Self-disclosure digital (SDDI) | 102 | 2.79 | 1.14 | 1.00 | 5.00 |
| Human connection (HC) | 153 | 4.19 | .52 | 2.92 | 5.00 |
| Age (AGE) | 148 | 30.09 | 11.85 | 2.00 | 60.00 |
| Extraversion (EXTRA) | 152 | 8.40 | 2.82 | 1.00 | 12.00 |
| Interaction ratio (IR) | 144 | .84 | .48 | .14 | 5.00 |
| Self-disclosure ratio (SDR) | 144 | 1.62 | .78 | .69 | 4.67 |

Table 2

*Correlation Table*

| | Real-life interaction | Phone interaction | Digital I interaction | Self-disclosure real-life | Self-disclosure digital | Self-disclosure phone |
|---|---|---|---|---|---|---|
| Real-life interaction | - | | | | | |
| Phone interaction | ,228* | - | | | | |
| Digital interaction | ,495** | ,406** | - | | | |
| Self-disclosure real-life | -,046 | -,050 | ,183* | - | | |
| Self-disclosure digital | ,043 | ,055 | ,348** | ,549** | - | |
| Self-disclosure phone | -,237* | ,181 | ,139 | ,680** | ,530** | - |
| Human connection | ,080 | ,125 | ,284** | ,557** | ,393** | ,425** |

* $p < .05$. ** $p < .01$. (2-tailed)

Table 3

*Correlation Table*

| | Real-life interaction | Digital interaction | Self-disclosure real-life | Self-disclosure digital | Human connection | Age | Extraversion | Interaction ratio |
|---|---|---|---|---|---|---|---|---|
| Real-life interaction | - | | | | | | | |
| Digital interaction | .495** | - | | | | | | |
| Self-Disclosure real-life | -.046 | .183* | - | | | | | |
| Self-Disclosure digital | .043 | .348** | .549** | - | | | | |
| Human connection | .080 | .284** | .557** | .393** | - | | | |
| Age | -.371** | -.327** | -.106 | -.253** | -.075 | - | | |
| Extraversion | .012 | -.009 | .074 | .000 | .094 | -.092 | - | |
| Interaction ratio | - | - | -.162 | -.236** | -.067 | -.111 | -.029 | - |
| Self-disclosure ratio | -.043 | -.238** | - | - | .016 | .273** | .013 | .174* |

* $p < .05$. ** $p < .01$. (2-tailed)